

SUPPLEMENTAL CARBON SYSTEM UPGRADE

PROJECT MANUAL



July 2026

ISSUED FOR BID

*LOTT PROJECT NO. B12205
CONTRACT NO. 568-03-08*

*LOTT CLEAN WATER ALLIANCE
500 ADAMS STREET NE
OLYMPIA, WA 98501*

I hereby certify that the Specifications contained herein were developed under my direct supervision.



7/17/26

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Division 0

Bidding and Contracting Requirements General Conditions

SECTION 00 11 13

ADVERTISEMENT FOR BIDS

SUPPLEMENTAL CARBON SYSTEM UPGRADE BI2205

LOTT CLEAN WATER ALLIANCE

The LOTT Clean Water Alliance (LOTT) is a public wastewater utility that owns and operates wastewater conveyance and treatment facilities in Thurston County, WA. Bids for the construction of the SUPPLEMENTAL CARBON SYSTEM UPGRADE must be submitted electronically as a PDF document to the project portal by 2 p.m., Pacific Time on August 27, 2026. Bid guarantees must be submitted in person and addressed to Angelea Miller, Contract Manager, LOTT Clean Water Alliance, 500 Adams Street NE, Olympia, WA 98501. They shall be labeled "For the SUPPLEMENTAL CARBON SYSTEM UPGRADE – BID GUARANTY." Postmarked and/or late packages or faxes will not be considered for bid.

Drawings, specifications, addenda, and the Document Takers list for this project are posted on the project portal at <https://mrscrosters.bonfirehub.com/projects/234312/details>. Bidders must register for free-of-charge access to download documents, to be notified of addenda, and to submit a bid.

Bids will be opened publicly immediately after the time that bids are due. The bid opening may be attended in person at 500 Adams Street NE, Olympia, WA 98501, or viewed at <https://us02web.zoom.us/j/89463729742?pwd=1F9NIR3aJkIH96vUT5zPWX5Sf0tllW.1>. The webinar ID is 894 6372 9742. The passcode is 5729.

The project consists of furnishing and installing a chemical storage and feed system including sitework, tanks, metering pumps, enclosure, piping, valves, electrical, instrumentation, and controls.

The work is located at LOTT Clean Water Alliance, Budd Inlet Treatment Plant (BITP), 500 Adams Street NE, Olympia, WA 98501.

The engineer's construction estimate for this project is \$590,000 - \$750,000 including sales tax.

The Contractor will have 150 working days to substantially complete the work in compliance with all applicable laws and regulations. Physical construction work at the Site shall be limited by Notice to Commence Construction.

Submit questions regarding the bidding requirements, contract general conditions, or technical requirements to bids@lottcleanwater.org. As necessary, responses to questions will be made available to all bidders via addenda. Questions for which responses affect the bid conditions will be accepted until 4:00 p.m. on August 12, 2026.

Minority and women owned businesses shall be afforded full opportunity to submit bids in response to this invitation, and shall not be discriminated against on the grounds of gender, race, religion, color, age, national origin, or disability in consideration of an award of any contract or subcontract. Further, all bidders are directed to solicit and consider minority and women owned businesses as potential subcontractors and material suppliers for this project.

Each bid shall be accompanied by a bid guaranty bond or a certified or cashier's check payable to the order of the LOTT Clean Water Alliance in an amount not less than five percent (5%) of the amount of the bid including tax as a guaranty that the bidder will execute the contract, if it is awarded, in conformity with the bid form. The successful bidder will be required to furnish performance and payment bonds, each in an amount not less than one hundred percent (100%) of the contract price.

A **Pre-Bid Meeting** will be held at Budd Inlet Treatment Plant on August 5, 2026 at 10:00 a.m. A site visit will follow the meeting. Details regarding the meeting and site visits are included in Section 00 21 13 (Instructions to Bidders).

***** END OF SECTION *****

SECTION 00 21 13

INSTRUCTIONS TO BIDDERS

1.01 INSPECTION OF SITE

A. PRE-BID MEETING

A Pre-Bid Meeting will be held at Budd Inlet Treatment Plant, 500 Adams Street NE, Olympia, WA 98501 on Wednesday, August 5, 2026 at 10:00 a.m. Representatives of LOTT and its consultants will be available during this meeting to answer questions about the Project Manual and bidding procedures. Prospective bidders are encouraged to attend.

B. PRE-BID SITE VISIT

A Pre-Bid Site Visit will be held at the Budd Inlet Treatment Plant on August 5, 2026 at 10:00 a.m. This site visit is not mandatory. However, prospective bidders that are not familiar with the project area are strongly encouraged to attend.

Bidders will be climbing multiple stairs and entering facilities that can have trip and slip hazards. Bidders must bring personal protective equipment including hard hats, high visibility vests, eye protection, masks, and safety footwear.

C. EXAMINATION OF SITE CONDITIONS

Contractors are required to inspect the Site to satisfy themselves by personal examination or by such other means as they may prefer, of the location of the proposed work, and of the actual conditions of and at the Site.

If, during the course of this examination, a contractor finds facts or conditions which appear to them to be in conflict with the letter or spirit of the Project Manual, they may apply to the Owner, in writing, for additional information and explanation before submitting their Bid.

Submission of a Bid by the Contractor shall constitute acknowledgment that, if awarded the contract, they have relied and are relying on their own examination of (1) the site of the work, (2) access to the site, and (3) all other data and matters requisite to the fulfillment of the work and on their own knowledge of existing facilities on and in the vicinity of the site of the work to be constructed under the contract.

The information provided by the Owner is not intended to be a substitute for, or a supplement to the independent verification by the Contractor to the extent such independent investigation of site conditions is deemed necessary or desirable by the Contractor. The Contractor acknowledges that they have not relied solely upon Owner furnished information regarding site conditions in preparing and submitting a Bid hereunder.

1.02 EXAMINATION OF PROJECT MANUAL

Each contractor shall thoroughly examine and be familiar with those Contract Documents contained in the Project Manual. Submission of a Bid shall constitute acknowledgment upon which the Owner may rely that the Contractor has thoroughly examined and is familiar with the Project Manual. Failure or neglect of a contractor to examine any of the Contract Documents contained in the Project Manual shall in no way relieve them from any obligation with respect to their Bid or to the Contract. No claim will be allowed for additional compensation based upon a lack of knowledge of the Work.

1.03 INTERPRETATION OF PROJECT MANUAL

Contractors, prospective subcontractors, manufacturers, and suppliers may request interpretation of the Project Manual prior to bid opening. Submit questions regarding the bid, technical requirements, or contract general conditions to bids@lottcleanwater.org. Requests to clarify the source of materials, equipment, suppliers, or any other such matter which does not modify, change, increase, or decrease the scope of work requires no action by the Owner other than a response to the Contractor requesting the clarification. Contract exceptions or requests to clarify possible ambiguous, conflicting, or incomplete statements or designs, or any other such clarification which modifies, changes, increases, or decreases the Scope of Work, requires issuance of an addendum by the Owner for the interpretation to become effective and shall be submitted in writing no later than the date listed in the Advertisement for Bids.

1.04 BID DOCUMENTS

A. BID PROPOSAL FORM

1. GENERAL: Bids shall be made on the blank bid forms prepared and provided by the Owner. Bids shall give the prices proposed in figures as required on the Bid Proposal form, shall give all other information requested, and shall be signed by the Contractor or his authorized representative. The Bid Proposal form shall be uploaded as a PDF document to the project portal at <https://mrscrosters.bonfirehub.com/projects/234312/details>.

2. BID PRICES: Bid prices shall include everything necessary for the completion of the Work including but not limited to providing the materials, equipment, tools, and the management, superintendence, labor and services. Bid prices shall include allowance for federal, state and local taxes.

In the event that the product of a unit price and an estimated quantity does not equal the extended amount bid, the unit price shall govern, and the correct product of the unit price and the estimated quantity shall be deemed to be the amount bid. If the sum of two or more items in a quoting schedule does not equal the total amounts bid, the individual item amounts shall govern and the correct total shall be deemed to be the amount bid.

3. CONTRACTOR'S SIGNATURE AND AUTHORITY: If the Bid is made by an individual, their name, signature, and mailing address must be shown. If made by a firm or partnership, the name and mailing address of the firm or partnership and the signature of at least one of the general partners must be shown. Additionally, a list of the partners shall be furnished upon request. If

made by a corporation, the Bid shall show the name of the state under the laws of which the corporation is chartered, the name and mailing address of the corporation, and the title of the person who signs on behalf of the corporation. Additionally, a copy of the bylaws or resolution of the Board of Directors of the corporation showing the authority of the officer signing the Bid to execute contracts on behalf of the corporation shall be furnished upon request. If the Bid is made by a joint venture, the Bid shall be signed by a representative of one of the joint venture firms. Additionally, a copy of the resolution or agreement empowering the representative to execute the Bid and bind the joint venture shall be furnished upon request.

4. BID IRREGULARITIES: Contractors are warned against making erasures or alterations of any kind, and bids which contain omissions, erasures, or irregularities of any kind may be rejected. Any correction to a bid made by interlineations, alteration, or erasure, shall be initialed by an authorized representative of the Bidder or the Bid may be considered nonresponsive. No oral, telegraphic, or telephonic Bids or modifications will be considered.

5. MODIFICATION OF BID: Modification of a Bid already received may be made by submitting a new Bid Proposal to the project portal prior to the time established for receiving Bids.

B. ALTERNATIVE MATERIALS AND EQUIPMENT

Manufacturers or suppliers of materials and equipment may offer an alternative product to the Contractor and request that alternatives to specified products be considered equal if submission of alternatives is not otherwise prohibited in the Contract Documents. Inclusion of such alternatives in the Bid is the responsibility of the Contractor. Award of the contract does not guarantee the Owner's acceptance of alternative materials and equipment. After award of the Contract, such offers of alternative products will be reviewed and processed as an equal or a substitution provided under Section 00 72 05 (General Conditions).

C. BID GUARANTY

The original bid guaranty must be enclosed in a sealed envelope, labeled as specified in the Advertisement for Bids, and received at 500 Adams Street NE, Olympia, WA 98501, no later than the date and time that Bid Proposals are due. A bid guaranty bond shall be provided by a guaranty company authorized to carry on business in the State of Washington for payment to the Owner in the sum of at least 5% of the total amount of the Bid price, including tax, or, alternatively, by a certified or cashier's check, payable to the Owner in the sum of at least 5% of the total amount of the Bid price, including tax. Cash will not be accepted for a Bid deposit. Certified or cashier's checks shall be deposited by Owner. Bonds must be executed by a duly licensed surety company, which is listed in the latest Circular 570 of the United States Treasury Department, as being acceptable as surety on federal bonds. The Bid guaranty bond shall be provided on the form included in this Project Manual and shall be signed by the Bidder and Surety. The power of attorney for the surety officer empowered to sign the bond shall be attached. The failure to furnish a Bid deposit of a minimum of 5% with the Bid shall make the Bid nonresponsive.

The amount payable to the Owner under the Bid guaranty bond, or the certified or cashier's check and the amount thereof, as the case may be, shall be forfeited to the Owner as liquidated damages in case of a failure or neglect of the contractor to furnish, execute, and deliver to the Owner the required performance and payment bonds and evidences of insurance; and to enter into, execute,

and deliver to the Owner the agreement on the form provided, within ten working days after receiving written notice from the Owner that the award has been made and the agreement is ready for execution.

D. LIST OF SUBCONTRACTORS

A list of proposed subcontractors as described in RCW 39.30.060 is not required.

E. ADDENDA

Addenda will be posted on the project portal. Bidders must download the bid documents from the project portal to be added to the Document Takers list and to be informed of Addenda. It is the bidder's responsibility to confirm whether any addenda have been issued. Each Bid form shall include specific acknowledgment, in the space provided, of receipt of all addenda issued by the Owner during the bidding period. Failure to so acknowledge may result in the Bid being rejected as nonresponsive.

1.05 CONTRACTOR'S QUALIFICATIONS

The Contractor shall have, at the time of bidding and throughout the period of the Contract, all required licenses to perform the work required in the Contract. The Contractor also shall be knowledgeable of the unusual and peculiar hazards associated with the general class and type of work required to construct the specified project within the terms given in the Project Manual. The Contractor shall be competent and skilled in the protective measures necessary for the safe performance of the construction work with respect to such unusual and peculiar hazards.

A. MANDATORY RESPONSIBILITY CRITERIA

It is the intent of the Owner to award a contract to the low responsible Contractor. Before award, the Contractor must meet the mandatory bidder responsibility criteria in RCW 39.04.350(1), as amended, to be considered a responsible Contractor. The Contractor may be required by the Owner to submit documentation demonstrating compliance with the criteria. The Contractor must:

1. Have a current certificate of registration as a Contractor 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 which must have been in effect at the time of Bid submittal;
2. Have a current Washington Unified Business Identifier (UBI) number;
3. If applicable, have Industrial Insurance (workers' compensation) coverage for the Contractor's employees working in Washington, as required in Title 51 RCW;
4. If applicable, have a Washington Employment Security Department number, as required in Title 50 RCW;
5. If applicable, have a Washington Department of Revenue state excise tax registration number, as required in Title 82 RCW;
6. Not be disqualified from bidding on any public works contract under RCW 39.06.010 or 39.12.065(3);

7. If bidding on a 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 ratio, without appropriate supervision, or outside their approved work processes as outlined in their standards of apprenticeship under chapter 49.04 RCW for the one-year period immediately preceding the date of the bid solicitation;
8. Have received training on the requirements related to public works and prevailing wage under chapters 39.04 and 39.12 RCW unless exempt;
9. 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 Washington Department of Labor and Industries or through a civil judgment 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.

B. SUPPLEMENTAL RESPONSIBILITY CRITERIA

In addition to the mandatory bidder responsibility criteria referenced above, the Contractor must also meet the following Supplemental Bidder Responsibility Criteria applicable to the Project. As evidence that the Contractor meets the Supplemental Bidder Responsibility Criteria, the Bidder(s) shall submit the Supplemental Bidder Responsibility Criteria documentation to the Owner within 24 hours of such request.

1. Claims Against Retainage and Bonds

- a. Criterion: The Bidder shall not have a record of excessive claims filed against the retainage or payment bonds for public works projects during the previous five years that demonstrate a lack of effective management by the Bidder of making timely and appropriate payments to its subcontractors, suppliers, and workers, unless there are extenuating circumstances acceptable to the Owner. For the purpose of this criterion, "Bidder" shall include the registered construction company submitting the bid, as well as the owner(s) of the company and any other construction companies the owner(s) may currently or previously have owned.
- b. Documentation: If there have been claims filed against the retainage or payment bond for public works projects during the five year period immediately preceding the bid submittal deadline for this Project, the Bidder shall submit a list of claims filed against the retainage and/or payment bond and the following information:
 - The project name;
 - The owner and contact information for the owner;
 - A written explanation of the circumstances surrounding each claim and the ultimate resolution of the claim.

The Owner may contact previous owners to validate the information provided by the Bidder.

2. Termination for Cause / Termination for Default

- a. Criterion: The Bidder shall not have had any public works contract terminated for cause or terminated for default during the five year period immediately preceding

the bid submittal deadline for this project, unless there are extenuating circumstances acceptable to the Owner.

- b. Documentation: The Bidder shall execute the Termination for Cause Certification provided in the Supplemental Bidder Responsibility Criteria section of this Project Manual. This form certifies compliance with the criterion. The Owner may also use independent sources of information that may be available to demonstrate whether the Bidder is in compliance with this criterion.

For any such projects in which the Bidder was terminated for cause or terminated for default, provide a written explanation identifying the Project contract that was terminated, the government agency which terminated the contract, the date of the termination, and a description of the circumstances surrounding the termination.

3. Liquidated Damages

- a. Criterion: The Bidder shall not have been assessed liquidated damages related to the performance of a public works contract during the five year period immediately preceding the bid submittal deadline for this Project, unless there are extenuating circumstances acceptable to the Owner.
- b. Documentation: For any such projects in which the Bidder was assessed liquidated damages, provide a written explanation for all liquidated damages paid by identifying the Project, the government agency which assessed the liquidated damages, the amount of the liquidated damages, the date the liquidated damages were paid, and a description of the circumstances surrounding the assessment.

4. Litigation

- a. Criterion: The Bidder shall not have been a party as a plaintiff or defendant in any lawsuits involving performance or payment issues relating to a public works contract unless there are extenuating circumstances acceptable to the Owner. For the purpose of this criterion, "Bidder" shall include the registered construction company submitting the bid, as well as the owner(s) of the company and any other construction companies the owner(s) may currently or previously have owned.
- b. Documentation: The Bidder shall execute the Litigation Certification provided in the Supplemental Bidder Responsibility Criteria section of this Project Manual. This form certifies compliance with the criterion. The Owner may also use independent sources of information that may be available to demonstrate whether the Bidder is in compliance with this criterion.

For any such projects in which the Bidder has been a party as a plaintiff or defendant in any lawsuit involving performance or payment issues relating to a public works contract, provide a written explanation for all lawsuits, including identifying the parties, court, case number, status of case, and judgment and penalties.

5. Compliance with Laws Relating to Public Works Contracts

- a. The Bidder shall not have violated any public laws relating to public works contracts during the five year period immediately preceding the bid submittal deadline for this Project, unless there are extenuating circumstances acceptable to the Owner.
- b. Documentation: The Bidder shall execute the Public Law Certification provided in the Supplemental Bidder Responsibility Criteria section of this Project Manual. This form certifies compliance with the criterion. The Owner may also use independent sources of information that may be available to demonstrate whether the Bidder is in compliance with this criterion.

For any such projects in which the Bidder violated public laws relating to the contract, provide a written explanation identifying the Project, the law violated, the judgment and/or penalty, and a description of the circumstances surrounding the violation.

6. Safety Record

- a. Criterion: The Bidder shall not have a record of excess compensable claims due to injury or uncorrected safety and health violations, unless there are extenuating circumstances acceptable to the Owner.
- b. Documentation: The Bidder shall provide completed and signed Occupational Safety and Health (OSHA) 300-A forms for the three years preceding the year of the bid submittal for this Project. If the Bidder is not required to file OSHA 300-A forms, the Bidder shall provide workers' compensation frequency and severity records for the last three years.

7. Other Qualifications

- a. Criterion: The Bidder shall be qualified to do the work called for in the Contract Documents by:
 - Ability, capacity, and skill to perform the work
 - Character, integrity, reputation, judgment, experience, and efficiency
 - Ability to perform the work within the specified time
 - Quality of performance on previous contracts
- b. Documentation: Upon request, the Bidder shall provide any such other information the Owner deems necessary to ascertain the ability of the Bidder to perform the Work satisfactorily.

If a bidder fails to submit any documentation required by the bidding documents to demonstrate compliance with the Bidder Responsibility Criteria, the Owner may:

- Find the Bidder not responsible, or
- Determine responsibility based upon availability of information.

C. RESPONSIBILITY DETERMINATION AND APPEAL

The Owner may conduct reference checks on any bidder whose bid is under consideration for award. In the event that information obtained from the reference checks reveals that the bidder does not meet the Bidder Responsibility Criteria (mandatory or supplemental as described herein) the Owner shall have the right to determine (in its discretion) that the bidder is not a responsible bidder. Prior to making a determination that a bidder is not responsible, the Owner may discuss with the bidder the information obtained from the references, and provide the bidder with the opportunity to offer explanations, and additional information that may help inform whether the Owner declares the bidder not responsible.

If Owner determines the Bidder does not meet the bidder responsibility criteria above and is therefore not a responsible Bidder, the Owner shall notify the Bidder in writing with the reasons for the determination. If the Bidder disagrees with this determination, it may appeal the determination within two business days of the Owner's determination by presenting its appeal and any additional information to the Owner in writing. The Owner will consider the appeal and any additional information before issuing its final determination in writing. If the final determination affirms that the Bidder is not responsible, the Owner will not execute a contract with any other Bidder until at least two business days after the Bidder determined to be not responsible has received the Owner's final determination. For the purposes of this subsection, the date of the Owner's transmission of the Owner's determination(s) by facsimile or electronic mail to the Bidder at the facsimile number or e-mail address provided by the Bidder in its Bid shall constitute the date of receipt by the Bidder of the written notices provided for herein.

If the Owner determines the bidder is not responsible, subject to following the requirements of the appeal process described above, the Owner may award the contract to the next lowest bidder who meets the Bidder Responsibility Criteria.

D. SUBCONTRACTOR RESPONSIBILITY

The Successful Bidder shall include the mandatory responsibility criteria in each of its first 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. Upon request of the Owner, the Successful Bidder shall promptly provide documentation to the Owner demonstrating that the subcontractor meets the mandatory subcontractor responsibility criteria. The requirements of the mandatory responsibility criteria section apply to all subcontractors regardless of tier.

E. REQUESTS FOR MODIFICATION OF SUPPLEMENTAL RESPONSIBILITY CRITERIA

During the bidding period, but not later than August 12, 2026, a potential bidder may request that the Owner modify the Supplemental Bidder Responsibility Criteria. Any such request must be in writing and submitted to the email address in Section 1.03.

The Owner shall evaluate any such requests, and if a decision is made by the Owner in its sole discretion to modify the criteria, such modification shall be communicated to all bidders and plan holders via the issuance of an addendum to the bidding documents. If the Owner determines not to modify the supplemental criteria, the Owner shall notify the requesting bidder of its decision in writing.

1.06 POSTPONEMENT OF OPENING

The Owner reserves the right to postpone the date and time for receiving and/or opening of bids at any time prior to the date and time established in the Advertisement for Bids. Postponement notices shall be issued to contractors in the form of addenda.

1.07 CONSIDERATION OF BIDS

A. BIDDING PREFERENCE

In accordance with RCW 39.04.380, a reciprocal bid preference is enforced for resident contractors. If a bid is received from a contractor who is:

1. A nonresident contractor (that is, at the time of bidding on a public works project, does not have a physical office located in the State of Washington); and
2. From a state that provides a percentage bid preference to its resident contractors bidding on public works contracts in that state

Then, a comparable percentage disadvantage will be applied to the Total Bid of that nonresident contractor. The state of residence for a Nonresident contractor is the state in which the contractor is 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 determining the lowest responsive, responsible bidder.

If a nonresident contractor is still the lowest responsive, responsible bidder after the nonresident disadvantage total is applied, then they will be awarded a contract in the amount of their original bid (not including the disadvantage percentage amount).

B. REJECTION OF BIDS

1. Irregular Bids

The Owner reserves the right to reject Bids which are incomplete, obscure, or irregular as determined by Owner. The Owner also reserves the right to waive any immaterial irregularities in any bid. If an uploaded document cannot be opened or is unreadable, Owner will make a reasonable effort to contact the bidder to access the submitted information. The bid may be considered nonresponsive at Owner's discretion.

2. Collusion

If the Owner has reason to believe that collusion exists among Contractors and subcontractors, the Owner will reject the Bids of the known participants in such collusion and may, at its option, require that all contractors certify under penalty of perjury that no collusion has occurred or exists. The Owner also, at its option, may reject all Bids received.

C. IDENTICAL BID TOTALS: If two or more lowest responsive Bid totals are exactly equal, then the tie-breaker will be determined by a drawing at the Bid opening as described in the current

WSDOT Standard Specification 1-03.1(1). If an authorized representative from a Bidder is not present, a representative of the Owner shall draw for the bidder.

- D. **WITHDRAWAL OF BIDS:** Prior to award of the contract, a contractor may withdraw its Bid providing it can establish to the Owner's satisfaction that a mistake was made in preparing the Bid. A contractor desiring to withdraw shall give written notice to the Owner no later than 5:00 p.m. on the first business day after bid opening or the request will not be considered. The notice shall specify in detail how the mistake occurred, and how the mistake made the Bid materially different than it was intended to be. Withdrawal will not be permitted for mistakes resulting from errors in judgment or carelessness in inspecting the site of the work or in reading the Project Manual. Owner will review the information and issue a determination on whether to allow withdrawal of the Bid.

1.08 RETURN / RELEASE OF BID GUARANTIES

Within ten working days after the Bids are opened, the Owner will issue checks for deposited certified or cashier's checks or provide a statement releasing the bidder from the obligations and liabilities of the Bid Guaranty Bonds for those bids which are not to be considered further in making the award. All other Bid guaranties will be held until the contract has been fully executed; after which, they will be returned or released, as applicable, to the respective contractors whose Bids they accompanied.

1.09 AWARD OF CONTRACT

The LOTT Clean Water Alliance Board of Directors is expected to take action on the contract on September 9, 2026. Award of the contract will be to the responsible Bidder with the lowest responsive bid as approved by the Board unless the Board rejects all bids. The Owner reserves the right to refuse a Bid if the Contractor does not meet the qualifications described.

Following Board action, acceptance of a Bid will be evidenced by a notice of award of contract in writing, delivered in person, by certified mail, or by e-mail with Delivery Receipt requested to the Contractor whose Bid is accepted and to the address specified on the Bid Proposal. No other act of the Owner shall constitute acceptance of a Bid. The award of contract shall obligate the Contractor, whose Bid is accepted, to furnish performance and payment bonds and evidences of insurance, and to execute the agreement set forth in the Project Manual.

1.10 EXECUTION OF CONTRACT

The contract Agreement as provided shall be executed by the successful Contractor and returned with the performance and payment bonds and evidences of insurance, within ten working days after receiving written notice of the award of the contract. After execution by the Owner, one copy of the agreement shall be returned to the Contractor.

1.11 LABOR REQUIREMENTS

A. WAGE DETERMINATION

The successful Contractor shall pay not less than the prevailing rate of wages as determined by the Washington Department of Labor and Industries. The successful Contractor shall post a copy of such determination at each job site. Applicable wage rate information is provided in the Contract.

B. SAFETY AND HEALTH REGULATIONS FOR CONSTRUCTION

The Contractor shall comply with all state and federal laws and county and local ordinances and regulations which in any manner affect those engaged or employed in the work. Contractor shall also comply with the requirements set out in Section 01 35 20 (Safety and Health Requirements).

C. APPRENTICE UTILIZATION

This project has no apprentice utilization requirements.

1.12 INFORMATION REQUESTS

From time to time, it may be necessary for those individuals or agencies routinely involved in this bid process, such as bidders, plan centers, contractors, or subcontractors, to request information from Owner in electronic, paper, or other format, throughout the bid process. Owner will assume any such request is **not** made under the Washington Public Records Act (Act) unless the requester makes reasonably clear it is a request under the Act, WAC 44-14-04002. Owner may treat any information request as a public records request at its discretion. If Owner determines a request is made under the Act, the request will be referred to Owner's Public Records Officer and may be reviewed by Owner's legal counsel. Individuals or agencies understand and agree with this provision as it relates to all information requests that may be made in connection with the bid process for this project. The *bid process* is defined as being from bid advertisement date until a contract is entered into for the project.

***** END OF SECTION *****

SECTION 00 41 13

BID PROPOSAL

The price shall be shown in figures. LOTT Clean Water Alliance (Owner) reserves the right to correct obvious mathematical errors. Selection of a particular Bidder by Owner shall not be construed as a waiver of any requirements set forth in the Project Manual.

The Bidder hereby certifies that the cost of all labor, equipment, materials and taxes necessary for proper completion of the work shall be included in the prices for the various bid items shown herein.

The Bid Schedule identifies work to be conducted under this contract. All work identified in the Bid Schedule is subject to collection of Washington State Sales tax on the bid price. Bidders should contact the Washington State Department of Revenue for further clarification of sales tax rules. The Owner will not adjust payment if the Bidder bases a bid on a misunderstood tax liability.

BID SCHEDULE

I, the Bidder, propose to provide following items in accordance with the terms, conditions, and specifications contained herein for the price set forth below:

ITEM	DESCRIPTION	UNITS	ESTIMATED QUANTITY	UNIT BID PRICE	TOTAL BID PRICE
1.	Mobilization and Demobilization	Lump Sum	1	\$	\$
2.	Minor Changes	Estimated	1	\$25,000	\$25,000
3.	Trench Excavation Safety Systems	Lump Sum	1	\$	\$
4.	O&M Manuals	Lump Sum	1	\$2,000	\$2,000
5.	As-Built Redlines	Lump Sum	1	\$2,000	\$2,000
6.	Supplemental Carbon System Upgrade	Lump Sum	1	\$	\$
SUBTOTAL BID SCHEDULE PRICE					\$
10% WA STATE SALES TAX					\$
TOTAL BID PRICE					\$

I, the undersigned, as bidder, declare that I have received and examined the Project Manual for the Supplemental Carbon System Upgrade Project. If my bid is accepted, I agree, by signing this Bid Proposal, to enter into a contract with the Owner for the fulfillment of this project at the prices listed and on the terms herein contained.

I have submitted a bid guaranty bond duly completed by a guaranty company authorized to carry on business in the State of Washington or a certified or cashier's check payable to the Owner in the amount of at least 5% of the total amount of our bid including tax.

If my bid is accepted, I agree to sign the agreement without qualifications and to furnish the performance and payment bonds and the required evidences of insurance within 10 working days

after receiving written notice of the award of the contract.

I further agree, if my bid is accepted and a contract for performance of the work is entered into with the Owner, to so plan work and to prosecute it with such diligence that the work shall be completed within the time stipulated.

I acknowledge that addenda numbers _____ through _____ have been received and have been examined as part of the project manual.

I, the undersigned, as bidder, declare that I, my firm, association 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.

Name of Company

Bidder's Name and Title

Bidder's Signature

BIDDER INFORMATION

Address: _____

City: _____ State: _____ Zip Code: _____

Contact Name: _____

Phone Number: _____ Fax Number: _____

Email _____

State of Incorporation: _____

Contractor's License Number for State of Washington: _____

***** END OF SECTION *****

SECTION 00 43 13

BID GUARANTY BOND

KNOW BY ALL PRESENT

THAT _____, hereinafter called the Principal, and _____, hereinafter called the Surety, are jointly and severally held and firmly bound unto the LOTT Clean Water Alliance, hereinafter called the Obligee, in the penal sum of five percent (5%) of the total amount of the bid by the Principal in lawful money of the United States for the payment thereof unto the Obligee; the Principal and Surety jointly and severally bind themselves forever firmly by these presents.

WHEREAS, the Principal is herewith submitting its offer for the fulfillment of Obligee's contract for the provision of the (project name) _____.

NOW, THEREFORE, the condition of this obligation is such that if the Principal is awarded the contract, and if the Principal, within the time specified in the bid for such contract, enters into, executes, and delivers to the Obligee an agreement in the form provided herein complete with evidences of insurance, and if the Principal within the time specified in the bid gives to the Obligee the performance and payment bonds on the form provided herein, then this obligation shall be void; otherwise, the Principal and Surety will pay unto the Obligee the penal sum hereof.

AND IT IS HEREBY DECLARED AND AGREED that the Surety shall be liable under this obligation as Principal, and that nothing of any kind or nature whatsoever that will not discharge the Principal shall operate as a discharge or a release of liability of the Surety.

IT IS HEREBY FURTHER DECLARED AND AGREED that this obligation shall be binding upon and inure to the benefit of the Principal, the Surety, and the Obligee and their respective heirs, executors, administrators, successors and assigns.

SIGNED AND SEALED this _____ day of _____.

Name and Title of Principal

(SEAL)

Signature for Principal

Name and Title of Surety

(SEAL)

Signature for Surety

***** END OF SECTION *****

SECTION 00 43 93

BIDDER'S CHECKLIST

- ☐ Bid Proposal – submit electronically
- ☐ Bid Deposit or Bid Guaranty Bond – submit in person

SECTION 00 45 15

SUPPLEMENTAL BIDDER RESPONSIBILITY FORM

Upon request, these forms shall be completed in their entirety and submitted by the Bidder(s) to the Owner within 24 hours of such request.

Failure to submit and meet the requirements as stated in Paragraph 1.05.B. of Section 00 21 13 (Instructions to Bidders) may be grounds for rejection of the bid. The Owner will be the sole judge in determining if the Bidder meets the minimum experience requirements.

Contractor

Name _____
Contact Person _____
Email Address _____
Phone Number _____

1. Claims Against Retainage and Bonds

Check the appropriate box.

- ☐ The Bidder **has not** had claims against retainage and bonds in the five year period immediately preceding the bid submittal deadline.
- ☐ The Bidder **has** had claims against retainage and bonds in the five year period immediately preceding the bid submittal deadline. Bidder must submit Documentation listed in Paragraph 1.05.B.1.b. of Section 00 21 13 (Instructions to Bidders).

2. Termination for Cause / Termination for Default

Check the appropriate box.

- ☐ The undersigned certifies that the Bidder **has not** had any public works contracts terminated for cause or terminated for default in the five year period immediately preceding the bid submittal deadline.
- ☐ The undersigned confirms that the Bidder **has** had public works contracts terminated for cause or terminated for default in the five year period immediately preceding the bid submittal deadline. Bidder must submit Documentation listed in Paragraph 1.05.B.2.b. of Section 00 21 13 (Instructions to Bidders).

3. Liquidated Damages

Check the appropriate box.

- ☐ The Bidder **has not** been assessed liquidated damages related to the performance of a public works contract during the five year period immediately preceding the bid submittal deadline.

- ☐ The Bidder **has** been assessed liquidated damages related to the performance of a public works contract during the five year period immediately preceding the bid submittal deadline. Bidder must submit Documentation listed in Paragraph 1.05.B.3.b. of Section 00 21 13 (Instructions to Bidders).

4. Litigation

Check the appropriate box.

- ☐ The undersigned certifies that the Bidder **has not** been a party in any lawsuits involving performance or payment issues relating to a public works contract.
- ☐ The undersigned confirms that the Bidder **has** been a party in lawsuits involving performance or payment issues relating to a public works contract. Bidder must submit Documentation listed in Paragraph 1.05.B.4.b. of Section 00 21 13 (Instructions to Bidders).

5. Compliance with Laws Relating to Public Works Contracts

Check the appropriate box.

- ☐ The undersigned certifies that the Bidder **has not** violated any public laws relating to public works contracts in the five year period immediately preceding the bid submittal deadline.
- ☐ The undersigned confirms that the Bidder **has** violated public laws relating to public works contracts in the five year period immediately preceding the bid submittal deadline. Bidder must submit Documentation listed in Paragraph 1.05.B.5.b. of Section 00 21 13 (Instructions to Bidders).

6. Safety Record

Bidder must submit Documentation listed in Paragraph 1.05.B.6.b. of Section 00 21 13 (Instructions to Bidders).

Date

Signature

Print Name

Title

***** END OF SECTION *****

SECTION 00 50 10

CONTRACT FORMS

The following documents shall be completed and submitted by the Contractor upon Notice of Award:

Section 00 52 20 Public Works Contract

Section 00 61 13.13 Performance Bond

Section 00 61 13.16 Payment Bond

SECTION 00 52 20

PUBLIC WORKS CONTRACT

PROJECT BI2205 CONTRACT 568-03-08 SUPPLEMENTAL CARBON SYSTEM UPGRADE

This Agreement (Agreement) by and between the LOTT Clean Water Alliance (LOTT), a 501(c)(3) corporation, acting as a public agency to provide wastewater resource management services, and _____ (Contractor), a provider of construction services in the State of Washington (together referred to as "Parties"), in consideration of the terms and conditions contained herein, and any attachments incorporated by reference, is as follows:

SECTION 1 – WORK TO BE COMPLETED

Contractor shall perform all work and furnish all tools, materials, and equipment, for the SUPPLEMENTAL CARBON SYSTEM UPGRADE. The work site is the Budd Inlet Treatment Plant located at 500 Adams Street NE, Olympia, WA 98501. The work shall be in accordance with, and as described in the Bid Proposal and Project Manual which are by this reference incorporated herein, and made a part hereof.

SECTION 2 – TIME FOR COMPLETION

The Contract time will commence to run, and Contractor shall start to perform its obligation under the Contract Documents, on the date indicated in the Notice to Proceed. A Notice to Proceed may be given at any time within 30 calendar days after the Agreement is signed and the performance bond, payment bond, and evidence of insurance have been approved and filed by LOTT. Contract work shall be substantially completed within 150 working days.

Physical construction work at the Site shall be limited by Notice to Commence Construction as described in Section 01 11 00 (Summary of Work).

Time is of the essence, and any breach thereof shall be considered material in nature.

SECTION 3 – LIQUIDATED DAMAGES

If said work is not substantially completed within the time specified, Contractor agrees to pay LOTT the sum of \$1,000 for each and every working day said work remains uncompleted after expiration of the specified time, as liquidated damages. These liquidated damages are intended to estimate administration, engineering, inspection, and supervision costs related to the late completion of the Contract. Payment of liquidated damages shall not prevent LOTT from recovering under any other remedy, legal or equitable, that it may be entitled to under the law.

SECTION 4 – PAYMENT

Contractor shall provide and bear all expenses reasonably necessary for completion of the work provided for in this Contract, including but not limited to, the expense of all materials, equipment, work and labor of any type whatsoever that may be required, for an amount of \$_____ including applicable sales tax.

SECTION 5 – LOTT OBLIGATIONS

LOTT hereby promises to retain Contractor to provide the materials and to perform the above-described work, and to complete and finish the same, at the time and in the manner and upon the conditions provided for in this Agreement. LOTT shall not be required to complete this Agreement with Contractor if Contractor is in breach of any of its obligations under this Agreement. Payment by LOTT of any amount under this Agreement, or any other conduct that is not an express written waiver on the part of LOTT, shall not constitute a waiver of any of LOTT's rights under this Agreement, or a waiver of any remedies in law or equity.

SECTION 6 – INDEMNIFICATION/HOLD HARMLESS

Contractor shall defend, indemnify, and hold LOTT, its officers, officials, employees, and volunteers harmless from any and all claims, injuries, damages, losses, or suits including attorney fees, arising out of or in connection with the performance of the Agreement, except for injuries and damages caused by the sole negligence of LOTT.

However, should a court of competent jurisdiction determine that this Agreement is subject to RCW 4.24.115, then, in the event of liability for damages arising out of bodily injury to persons or damages to property caused by or resulting from the concurrent negligence of Contractor and LOTT, its officers, officials, employees, and volunteers, Contractor's liability hereunder shall be only to the extent of Contractor's negligence. It is further specifically and expressly understood that the indemnification provided herein constitutes Contractor's waiver of immunity under Industrial Insurance, Title 51 RCW, solely for the purposes of this indemnification. This waiver has been mutually negotiated by the parties. The provisions of this section shall survive the expiration or termination of this Agreement.

SECTION 7 – CORRECTION PERIOD

Contractor shall guarantee said materials and work during a correction period of one year after Substantial Completion is issued by LOTT, except as may be modified by the Contract Drawings, Specifications, or other Contract Documents, and except to the extent as may be covered by applicable manufacturer's warranties available to LOTT directly or through the Contractor. Contractor's guarantee means the project is free from defect and operates as designed, as determined exclusively by LOTT after consultation with its design engineer. During the one-year correction period, Contractor is required to replace defective or non-conforming equipment to the extent not covered by an applicable manufacturer's warranty or correct defective workmanship at its own cost and expense.

SECTION 8 – PREVAILING WAGES

This Contract is subject to the payment of prevailing wages for work performed in the State of Washington. Contractor and all subcontractors must pay wages at rates not less than those prevailing for the same type of work on similar construction in the immediate locality, in compliance with state prevailing wage rate requirements, RCW 39.12. State of Washington prevailing wage rates for Thurston County or the County in which work is performed with an effective date of the bid due date are applicable and may be found at the following website address of the Washington State Department of Labor and Industries: <https://secure.lni.wa.gov/wagelookup/rates/journey-level-rates>. A copy of the applicable wage

rates is available for viewing at LOTT's offices. LOTT will mail a hard copy of the applicable wage rates upon request. Contractor and all subcontractors must file the Statement of Intent to Pay Prevailing Wage and the Affidavit of Wages Paid forms with the Department of Labor and Industries.

SECTION 9 – RETAINAGE

Pursuant to RCW 60.28, there will be reserved and retained from monies earned by Contractor a sum equal to 5% of the amount shown in Section 4, excluding sales tax. Payment of the retained percentage shall be withheld for a period of 45 days following the final completion of the work as determined by LOTT, and shall be paid to Contractor at the expiration of said 45 days in the event no claims, as provided by law, have been filed against such funds; and provided further, that releases have been obtained from all departments and agencies having jurisdiction over the activities of Contractor when applicable. In the event such claims are filed, Contractor shall be paid such retained percentages less an amount sufficient to pay any such claims together with a sum sufficient to pay the cost of such action and to cover attorney fees as determined by LOTT.

SECTION 10 – PAYMENT AND PERFORMANCE BONDS

Payment and performance bonds for 100% of the Contract amount in Section 4, including all change orders and sales tax, shall be furnished for the work, and shall be in a form acceptable to LOTT. No payment or performance bond is required if the Contract amount is \$150,000 or less and Contractor agrees that LOTT may, in lieu of the bond, increase the retained amount to 10% of the Contract sum for the period allowed by RCW 39.08.010.

SECTION 11 – ASSIGNMENT

Contractor, and its heirs, executors, administrators, successors, and assigns, do hereby agree to the full performance of all the provisions contained herein. Contractor shall not assign or convey its interests or obligations under the Contract without the express written consent of LOTT.

SECTION 12 – TREATMENT OF ASSETS AND WORK PRODUCTS

Title to all property furnished by LOTT shall remain in the name of LOTT. Title to all property furnished by Contractor for which Contractor is entitled to reimbursement by LOTT, shall pass to and vest in LOTT upon incorporation in the Project and payment in full.

LOTT is a public agency and subject to the Public Records Act (RCW 42.56) (PRA). At any time, to the extent that public records, as determined by LOTT, then in the custody of the Contractor, are needed for LOTT to respond to a request under the PRA, as determined by LOTT, the Contractor agrees to make them promptly available to LOTT.

LOTT has, and by this section assumes, no obligation on behalf of the Contractor to claim any exemption from disclosure under the PRA. If the Contractor considers any portion of any record provided to LOTT under this Agreement, whether in electronic or hard copy form, to be protected from disclosure under the law, the Contractor shall clearly identify any specific information that it claims to be confidential or proprietary.

LOTT shall not be liable to the Contractor for any records that LOTT releases in compliance with this section or in compliance with an order of a court of competent jurisdiction.

SECTION 13 – INFORMATION REQUESTS

It may be necessary for Contractor to request information from LOTT in electronic, paper, or other format, while this Agreement is in effect. LOTT will assume any such request is not made under the Washington Public Records Act unless the requester makes reasonably clear it is a request under the Act. If LOTT determines a request is made under the Act, the request will be referred to LOTT's Public Records Officer and may be reviewed by LOTT's legal counsel. Contractor understands and agrees with this provision as it relates to all information requests that may be made under this Agreement.

SECTION 14 – DISPUTES UNDER THIS AGREEMENT

In the event of any dispute, claim, question, or disagreement arising from or relating to this Contract, or the breach thereof, the parties hereto shall use their best efforts to settle the dispute, claim, question, or disagreement. To this effect, they shall consult and negotiate with each other in good faith and, recognizing their mutual interests, attempt to reach a just and equitable resolution satisfactory to both Parties. If the Parties do not reach such resolution then, upon written notice by one Party to the other, all disputes, claims, questions, or differences shall be referred to non-binding arbitration administered by the Washington Arbitration and Mediation Service (WAMS) in accordance with the provisions of its Arbitration Rules. Both Contractor and LOTT shall make good faith efforts to agree upon a single arbitrator approved by WAMS to preside over any arbitration. In the event the Parties cannot agree to the selection of an arbitrator, they will defer to WAMS for the selection of an appropriate arbitrator. The Parties may by written stipulation agree to a panel of three arbitrators in lieu of a single arbitrator and, if they so agree, each Party shall select one arbitrator approved by WAMS and the two arbitrators selected shall select a third arbitrator, who shall also be approved by WAMS. Should an arbitration panel be selected and hear a dispute arising under this Contract, a vote of at least two out of the three shall be required for an award or decision to be rendered. Both Parties may elect to make an arbitration award binding by written mutual agreement prior to the commencement of any arbitration.

LOTT, at its sole discretion, shall choose the venue for any arbitration, mediation or other alternative dispute resolution that arises out of this Contract. This Contract shall be construed and enforced in accordance with the laws of the State of Washington, and the Parties agree that in any litigation, jurisdiction and venue shall be in the Superior Court in and for the County of Thurston. In cases that require federal jurisdiction, the parties agree that the appropriate venue is the U.S. District Court for the Western District of Washington.

SECTION 15 – DIRECT OBLIGATION TO LOTT

By entering into this Agreement, the Parties expressly intend to create a third party beneficiary contract for the benefit of LOTT. This direct contractual obligation to LOTT is not merely incidental, indirect, or inconsequential. The Parties hereby incorporate by reference the Agreement between LOTT and the General Contractor for this project, and all the terms expressed therein. By creating this obligation, the Parties understand that LOTT does not impliedly waive any other legal remedies, either in law or equity.

SECTION 16 – STANDARDS OF CONDUCT

Contractor's employees are expected to act in a professional manner while onsite at LOTT facilities and construction sites. Compliance with all LOTT administrative policies pertaining to employee conduct, whether such policies are in existence at the time of the execution of this Agreement or subsequent thereto, is required. LOTT shall provide administrative policies upon request. Such policies include, but may not be limited to:

TOBACCO FREE CAMPUS: LOTT maintains a tobacco-free campus. Contractor shall not smoke, use tobacco products, or use e-cigarettes at any time in all LOTT buildings, facilities, properties, construction sites, and vehicles.

PREVENTION OF WORKPLACE VIOLENCE: The use of threatening or violent behavior, including possession of weapons, is prohibited at any LOTT worksite.

SECTION 17 – SAFETY AND HEALTH AGREEMENT

Contractor shall comply with Section 01 35 20 (Safety and Health Requirements), a copy of which Contractor acknowledges having received and reviewed.

SECTION 18 – ENTIRE AGREEMENT; MODIFICATIONS

This Agreement, including its attachments and exhibits, constitutes the full and entire understanding and agreement between the Parties. This Agreement may not be modified in any manner whatsoever without the express written consent of LOTT, approved as to form by its legal counsel.

SECTION 19 – EQUAL OPPORTUNITY TO DRAFT

The Parties have both had an equal opportunity to participate in the drafting of this Agreement, and the Exhibits, if any, attached. No ambiguity shall be construed against any Party upon a claim that that Party drafted the ambiguous language. The Parties agree that both had an opportunity for review of this Agreement by competent legal counsel prior to its execution.

SECTION 20 – PAYMENT OF INVOICES

Once LOTT declares work under this Agreement complete, Contractor shall ensure LOTT receives all remaining invoices within 30 calendar days of the completion date. Invoices submitted, but not received, by LOTT within this time period will be considered late and invalid. Contractor agrees that it is not entitled to payment for any invoice received by LOTT beyond 30 calendar days from the date LOTT declares the work complete. Nothing in this Section is intended to imply LOTT is authorizing payment of any invoice that is not otherwise meritorious.

SECTION 21 – INSURANCE

Contractor shall procure and maintain for the duration of the Agreement, insurance against claims which may arise from, or in connection with, the work hereunder by Contractor, its agents, representatives, or employees irrespective of when the claim is brought against LOTT, its employees, agents, and assigns as described herein. The policies of insurance shall remain in effect at least until Final Acceptance and at all times thereafter when Contractor may be

correcting, removing, or replacing defective Work. Completed operations coverage shall remain in effect for three years following substantial completion of the Work.

No Limitation

Contractor's maintenance of insurance, its scope of coverage, and limits as required herein shall not be construed to limit the liability of Contractor to the coverage provided by such insurance, or otherwise limit LOTT's recourse to any remedy available at law or in equity.

Minimum Scope of Insurance

Contractor shall obtain insurance of the types described below:

1. Automobile Liability insurance covering all owned, non-owned, hired, and leased vehicles. Coverage shall be at least as broad as Insurance Services Office (ISO) form CA 00 01.
2. Commercial General Liability insurance shall be at least as broad as ISO occurrence form CG 00 01 and shall cover liability arising from premises, operations, independent contractors, products-completed operations, stop gap liability, personal injury and advertising injury, and liability assumed under an insured contract. 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 endorsement providing at least as broad coverage. There shall be no exclusion for liability arising from explosion, collapse, or underground property damage. LOTT shall be named as an additional insured under Contractor's Commercial General Liability insurance policy with respect to the work performed for LOTT using ISO Additional Insured endorsement CG 20 10 10 01 and Additional Insured-Completed Operations endorsement CG 20 37 10 01 or substitute endorsements providing at least as broad coverage.
3. Workers' Compensation coverage as required by the Industrial Insurance laws of the State of Washington.
4. Aviation Liability or Aircraft Liability insurance is required if Contractor will use unmanned aerial systems. This coverage may also be provided by endorsement to the Contractor's Commercial General Liability insurance policy.

Minimum Amounts of Insurance

Contractor shall maintain the following insurance limits:

1. Automobile Liability insurance with a minimum combined single limit for bodily injury and property damage of \$1,000,000 per accident.
2. Commercial General Liability insurance shall be written with limits no less than \$2,000,000 each occurrence, \$2,000,000 general aggregate, and \$2,000,000 products-completed operations aggregate limit.

3. Aviation Liability or Aircraft Liability insurance with limits not less than \$1,000,000 each occurrence and \$2,000,000 in the aggregate.

LOTT Full Availability of Contractor Limits

If Contractor maintains higher insurance limits than the minimums shown above, LOTT shall be insured for the full available limits of Commercial General and Excess or Umbrella liability maintained by the Contractor, irrespective of whether such limits maintained by the Contractor are greater than those required by this Agreement or whether any certificate of insurance furnished to LOTT evidences limits of liability lower than those maintained by the Contractor.

Other Insurance Provision

Contractor's Automobile Liability and Commercial General Liability insurance policies are to contain, or be endorsed to contain, that they shall be primary insurance as respect LOTT. Any insurance, self-insurance, or self-insured pool coverage maintained by LOTT shall be excess of Contractor's insurance and shall not contribute with it.

Contractor's Insurance for Other Losses

The Contractor shall assume full responsibility for all loss or damage from any cause whatsoever to any tools, Contractor's employee owned tools, machinery, equipment, or motor vehicles owned or rented by the Contractor or the Contractor's agents, suppliers, contractors, or subcontractors as well as to any temporary structures, scaffolding, and protective fences.

Waiver of Subrogation

The Contractor hereby agrees to waive rights of subrogation which any insurer of Contractor may acquire from Contractor by virtue of the payment of any loss. Contractor agrees to obtain any endorsement that may be necessary to affect this waiver of subrogation. The General Liability and Workers' Compensation policies shall be endorsed with a waiver of subrogation in favor of LOTT for all work performed by Contractor, its employees, agents, and subcontractors.

Acceptability of Insurers

Insurance is to be placed with insurers with a current A.M. Best rating of not less than A:VII.

Verification of Coverage

Contractor shall furnish LOTT with original certificates and a copy of the amendatory endorsements including, but not necessarily limited to, the additional insured endorsements, evidencing the Automobile Liability and Commercial General Liability insurance of the Contractor before commencement of the work. Upon request by LOTT, Contractor shall furnish certified copies of all required insurance policies, including endorsements, required in this Agreement and evidence of all subcontractors' coverage.

Subcontractors' Insurance

Contractor shall cause each and every subcontractor to provide insurance coverage that complies with all applicable requirements of the Contractor-provided insurance as set forth herein, except Contractor shall have sole responsibility for determining the limits of coverage required to be obtained by subcontractors. Contractor shall ensure that LOTT is an additional insured on each subcontractor's Commercial General Liability insurance policy using an endorsement at least as broad as ISO CG 20 10 10 01 for ongoing operations and CG 20 37 10 01 for completed operations.

Notice of Cancellation

Contractor shall provide LOTT and all Additional Insureds with written notice of any policy cancellation within two business days of their receipt of such notice.

Failure to Maintain Insurance

Failure on the part of Contractor to maintain the insurance as required shall constitute a material breach of contract, upon which LOTT may, after giving five business days' notice to Contractor to correct the breach, immediately terminate the Agreement without recourse or, at its discretion, procure or renew such insurance and pay any and all premiums in connection therewith, with any sums so expended to be repaid to LOTT on demand, or at the sole discretion of LOTT, offset against funds due Contractor from LOTT.

SECTION 22 – GRANT OF LICENSE

LOTT grants Contractor, and Contractor hereby accepts, a non-exclusive right and privilege to the areas owned by LOTT (Premises) as provided in the Project Manual for parking and for the staging of construction materials and equipment. The term of this license shall end when Physical Completion is issued.

Costs and Expenses

Contractor shall be responsible for payment of all costs and expenses incurred in connection with its operations on Premises; shall obtain all permits required for its operations; shall supply all

fixtures and equipment necessary or desirable for its activities; and shall hire and be responsible for any employees.

Property Restoration

Contractor shall restore the property to the same condition in which it was at the beginning of this license at no expense to LOTT.

No Authority

Parties acknowledge and agree that this license does not create a partnership or joint venture between the Parties, nor is this to be deemed to create any agency relationship.

Indemnification / Hold Harmless

Contractor shall defend, indemnify, and hold harmless LOTT, its officers, officials, employees, and volunteers from and against any and all claims, suits, actions, or liabilities for injury or death of any person, or for loss or damage to property, which arises out of Contractor's use of Premises or from the Contractor's business, or from any activity, work or thing done, permitted, or suffered by Contractor in or about the Premises, except only such injury or damage as shall have been occasioned by the sole negligence of LOTT.

Termination for Cause

LOTT may terminate this license upon written notice if Contractor breaches any material term, condition, or covenant of this Section 22 and fails to cure any such breach within five days of notice of occurrence of such breach.

Access to Premises

This license does not convey to Contractor any right, title, or interest in or to the Premises, except that Contractor shall have, and is hereby granted, a non-exclusive license to enter upon and occupy the Premises for the purposes of the activities permitted hereunder. Contractor has examined the Premises and accepts the Premises "AS IS" and in its present condition. LOTT does not make, and hereby expressly disclaims, any and all warranties, expressed or implied, regarding the Premises or any condition thereon, past present or future, known or unknown, and regarding the results Contractor will obtain from the activities permitted pursuant to this license.

Attorney's Fees

If any litigation or arbitration is commenced between the Parties concerning any provision of Section 22 or the rights or duties of any person in relation thereto, the party prevailing in such

litigation or arbitration will be entitled, in addition to such other relief as may be granted, to reasonable attorney's fees and expenses incurred in connection with such litigation or arbitration.

Subcontracts and Assignment

This license may be freely assigned by LOTT at any time. Contractor may not assign this license or delegate, assign, or subcontract all or any part of its duties under this license without the express written consent of LOTT, in its sole discretion.

Integration

Section 22 constitutes the entire agreement between the parties pertaining to the grant of license for use of Premises; supersedes all prior agreements and understandings, whether oral or written, which the parties may have in connection herewith; and may not be modified except by written agreement signed by the parties.

Waiver

Failure of either party at any time or from time to time to enforce any of the terms of Section 22 shall not be construed to be a waiver of such term or of such party's right to thereafter enforce each and every provision hereof. No waiver of any term of Section 22 shall be effective unless made in writing signed by the party against whom any such waiver is sought to be enforced.

SECTION 23 – PERFORMANCE OF CONTRACT

See Article 13 of Section 00 72 05 (General Conditions).

SECTION 24 – TERMINATION

See Article 15 of Section 00 72 05 (General Conditions).

SECTION 25 – SEVERABILITY

If any portion of the Agreement is held unenforceable, the remainder of the Agreement shall remain in full force and effect.

SECTION 26 – NOTICES

Notices required in this Agreement shall be in writing and either hand delivered during normal business hours, or mailed with postage prepaid, to the following addresses:

Contractor

LOTT Clean Water Alliance
500 Adams Street NE
Olympia, WA 98501-6911

SECTION 27 – SIGNATURES

Contractor

LOTT Clean Water Alliance

By: _____

By: Matthew J. Kennelly, P.E.

Its: _____

Its: Executive Director

Date: _____

Date: _____

***** END OF SECTION *****

SECTION 00 61 13.13

FAITHFUL PERFORMANCE BOND

KNOW BY ALL PRESENT,

THAT the LOTT Clean Water Alliance, hereinafter designated the "Owner," has, on _____, awarded to _____, hereinafter designated as the "Principal," a contract for the provision of the _____; and

WHEREAS, said Principal is required under the terms of said contract to furnish a bond for the faithful performance of said contracts:

NOW, THEREFORE, WE, the Principal, and _____ as Surety, are held and firmly bound unto the Owner the penal sum of (write out dollar & cents) _____ dollars ((numbers) \$ _____) lawful money of the United States, for the payment of which sum well and truly to be made, we bind ourselves, our heirs, executors, administrators and successors, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION IS SUCH, that if the above bounden Principal, his or its heirs, executors, administrators, successors, or assigns, shall in all things stand to and abide by, and well and truly keep and faithfully perform the covenants, conditions, and agreements in the said contract and any alterations made as therein provided, on his or their part, to be kept and performed at the time and in the manner therein specified, and in all respects according to their true intent and meaning, and shall indemnify and save harmless, the Owner, its officers and agents as therein stipulated, then this obligation shall become null and void; otherwise it shall be and remain in full force and virtue and Principal and Surety, in the event suit is brought on this bond, will pay to the Owner such reasonable attorney's fees as shall be fixed by the court.

As a condition precedent to the satisfactory completion of the said contract, the above obligation in the said amount shall hold good through the guarantee period(s) and the completion of any post-construction activities required by the contract. During the guarantee period(s), if the above bounden Principal, his or its heirs, executors, administrators, successors or assigns shall fail to make full, complete, and satisfactory repair and replacements or totally protect the said Owner from loss or damage made evident during said period(s), and resulting from or caused by defective materials and/or faulty workmanship in the prosecution of the work done, the above obligation in the said amount shall remain in full force and effect. However, anything in this paragraph to the contrary notwithstanding, the obligation of the Surety hereunder shall continue so long as any obligation of the Principal remains.

And the said Surety, for value received, hereby stipulates and agrees that no change, extension of time, alteration, or addition to the terms of the contract or to the work to be performed there under or the specifications accompanying the same shall, in any way, affect its obligations on this bond, and it 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. The Surety agrees that modifications and changes to the terms and conditions of the Contract that increase the total amount to be paid to the Principal shall automatically increase the obligation of the Surety on this bond over and above the

initial penal sum previously stated by an amount equal to the total amount to be paid to the Principal due to said modifications and changes to the terms and conditions, that notice to Surety is not required for such increased obligation, and that any commensurate increase in the cost of this bond will be the sole responsibility of the Principal.

IN WITNESS WHEREOF, the above bounden parties have executed this instrument under their seals this _____ day of _____, the name and corporate seal of each corporate party being hereto affixed and these presents duly signed by its undersigned representative, pursuant to authority of its governing body.

Name and Title of Principal

(SEAL)

Signature for Principal

Name and Title of Surety

(SEAL)

Signature for Surety

***** END OF SECTION *****

SECTION 00 61 13.16

PAYMENT BOND

KNOW BY ALL PRESENT,

THAT the LOTT Clean Water Alliance, hereinafter designated the "Owner," has, on _____, awarded to _____, hereinafter designated as the "Principal," a contract for the provision of the _____; and

WHEREAS, said Principal is required to furnish a bond in connection and with said contract, providing that if said Principal, or any of his or its subcontractors, shall fail to pay for any materials, provisions, or other supplies used in, upon, for, or about the performance of the work contracted to be done, or for any work or labor done thereon of any kind, the Surety of this bond will pay the same to the extent hereinafter set forth:

NOW, THEREFORE, WE, the Principal, and _____, as Surety, are held and firmly bound unto the Owner for the penal sum of (write out dollar & cents) _____ dollars ((numbers) \$ _____) lawful money of the United States, for the payment of which sum well and truly to be made, we bind ourselves, our heirs, executors, administrators and successors, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION IS SUCH, that if said Principal, his or its heirs, executors, administrators, successors, or assigns, shall fail to pay for any materials, provisions, or other supplies used in, upon, for, or about the performance of the work contracted to be done, or for any work or labor thereon of any kind or for amount due under the Unemployment Insurance Act with respect to such work or labor, and provided that the persons, companies, or corporations so furnishing said materials, provisions, or other supplies, appliances, or power use, in, upon, for, or about the performance of the work contracted to be executed or performed, or any person who performs work or labor upon same, or any person who supplies both work and materials, thereto, shall have complied with the provisions of State and Federal codes, then said surety will pay the same in or to an amount not exceeding the amount hereinabove set forth, and also will pay in case suit is brought upon this bond, such reasonable attorney's fees to the Owner as shall be fixed by the court.

This bond shall inure to the benefit of any and all persons, companies, and corporations entitled to file claims under State and Federal codes, so as to give a right of action to them or their assigns in any suit brought upon this bond.

And the said Surety, for value received, hereby stipulates and agrees that no change, extension of time, alteration, or addition of the terms of the contract or to the work to be performed there under or the specifications accompanying the same shall, in any way, affect its obligations of this bond, and it does hereby waive notice of any change, extension of time, alteration, or addition to the terms of the contract or to the work or to the specifications. The Surety agrees that modifications and changes to the terms and conditions of the Contract that increase the total amount to be paid to the Principal shall automatically increase the obligation of the Surety on this bond over and above the initial penal sum previously stated by an amount equal to the total amount to be paid to the Principal due to said modifications and changes to the terms and conditions, that notice to Surety is not required for such

increased obligation, and that any commensurate increase in the cost of this bond will be the sole responsibility of the Principal.

IN WITNESS WHEREOF, the above bounden parties have executed this instrument under their seals this _____ day of _____, the name and corporate seal of each corporate party being hereto affixed and these presents duly signed by its undersigned representative, pursuant to authority of its governing body.

Name and Title of Principal

(SEAL)

Signature for Principal

Name and Title of Surety

(SEAL)

Signature for Surety

***** END OF SECTION *****

SECTION 00 72 05

GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

These General Conditions are specific to this Contract and are largely based on the EJCDC C-700 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 and printed with initial capital letters, the terms listed below will have the meanings indicated which are applicable to both the singular and plural thereof. 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 which is evidence of the agreement between Owner and Contractor covering the Work.
 3. *Application for Payment*—The Owner's form 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. *Not Used*
 5. *As-Built Redlines*—A neatly and legibly marked set of all contract drawings showing the final location of structures, piping, equipment, conduits, outlet boxes and cables; as well as additional documents such as schedules, lists, drawings, and electrical and instrumentation diagrams.
 6. *Asbestos*—Any material that contains more than one percent asbestos and is friable or is releasing asbestos fibers into the air above current action levels established by the United States Occupational Safety and Health Administration.
 7. *Bid*—The offer or proposal of a Bidder submitted on the prescribed form setting forth the prices for the Work to be performed. When Quotes or Bid Quotations are requested, the term Bid shall also mean Quotes or Bid Quotations.
 8. *Bidder*—The entity that submits a Bid directly to Owner.
 9. *Bidding Documents*—The Bidding Requirements and the proposed Contract Documents (including all Addenda).
 10. *Bidding Requirements*—The advertisement or invitation to bid, Instructions to Bidders, Bid security of acceptable form, if any, and the Bid Form with any supplements.
 11. *Calendar Day*—All days including holidays and non-work days.
 12. *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, issued on or after the Effective Date of the Agreement.
 13. *Change Order Proposal*—A document that includes costs, credits, and additional working days associated with changes to the Work. A Change Order Proposal approved by the Owner will not change the Contract Price or the Contract Times but is evidence that the parties expect that the change ordered or documented by the Change Order Proposal will be incorporated in a subsequently issued Change Order.

14. *Claim*—A demand or assertion by Owner or Contractor seeking an adjustment of Contract Price or Contract Times, or both, or other relief with respect to the terms of the Contract. A demand for money or services by a third party is not a Claim.
15. *Construction Manager*—The construction site representative of the Owner employed to act as advisor and consultant to the Owner in construction matters related to the Contract.
16. *Contract*—The entire and integrated written agreement between the Owner and Contractor concerning the Work. The Contract supersedes prior negotiations, representations, or agreements, whether written or oral.
17. *Contract Documents*—The writings and drawings embodying the legally binding obligations between the Owner and the Contractor for completion of the Work. The Contract Documents comprise the following documents:
 - a. Project Manual
 1. Advertisement for Bids
 2. Instructions to Bidders
 3. Bid Proposal
 4. General Conditions
 5. Specifications
 6. Contract Drawings
 7. Addenda
 - b. Bonds
 - c. Agreement
 - d. Notice of Award
 - e. Notice to Proceed
 - f. Change Orders
 - g. Directives
18. *Contract Drawings*—The drawings included in the Project Manual plus those prepared by the Owner and the Contractor pursuant to the terms of the Contract. They include:
 - a. Drawings in the Project Manual. Drawings included as “Reference Documents” are for reference only and are not part of the Contract documents.
 - b. Modified Drawings issued by Addenda.
 - c. Drawings submitted by the Contractor during the progress of the Work and accepted by the Owner either as attachments to Change Orders or as non-modifying supplements to drawings and drawings issued by Addenda.
 - d. Drawings submitted by the Owner to the Contractor during the progress of the Work either as attachments to the Change Orders or as explanatory supplements to drawings and drawings issued by Addenda.
 - e. Drawings submitted as Shop Drawings or manufacturer’s drawings that contain key elements of equipment or processes incorporated into the Contract.
19. *Contract Price*—The moneys payable by Owner to Contractor for completion of the Work in accordance with the Contract Documents as stated in the Agreement (subject to the provisions of Paragraph 11.03 in the case of Unit Price Work).

20. *Contract Times*—The number of days or the dates stated in the Agreement to: (i) achieve Milestones, if any; (ii) achieve Substantial Completion; and (iii) complete the Work so that it is ready for final payment as evidenced by Engineer's written recommendation of final payment.
21. *Contractor*—The entity with whom Owner has entered into the Agreement.
22. *Contractor Drawings*—All drawings generated by or for the contractor for use in completing the Work. Including but not limited to shop drawings, routing, installation, calculation, diagrams, schedules, and permit application drawings
23. *Cost of the Work*—See Paragraph 11.01 for definition.
24. *Drawings*—That part of the Contract Documents prepared or approved by Engineer which graphically shows the scope, extent, and character of the Work to be performed by Contractor. Shop Drawings and other Contractor submittals are not Drawings as so defined.
25. *Effective Date of the Agreement*—The date indicated in the Agreement on which it becomes effective, but if no such date is indicated, it means the date on which the Agreement is signed and delivered by the last of the two parties to sign and deliver.
26. *Engineer*—When the Project has been designed by the engineer of record, such person shall assume all duties and responsibilities, and have the rights and authority assigned to Engineer in the Contract Documents in connection with the completion of the Work in accordance with the Contract Documents. When there is no engineer of record, the Owner shall act as Engineer.
27. *Field Order*—A written order issued by the Owner's Representative which requires minor adjustments in the Work but which is not anticipated to involve a change in the Contract Price or the Contract Times.
28. *Final Completion and Acceptance*—The time at which all the Work is completed and all the obligations of the Contractor under the Contract are fulfilled. All documentation required by the Contract and required by law must be furnished by the Contractor before establishment of the Final Completion and Acceptance date.
29. *General Requirements*—Sections of Division 1 of the Specifications.
30. *Governing Body*—Reference to the LOTT Clean Water Alliance Board of Directors. An elected representative from each of the member jurisdictions (Lacey, Olympia, Tumwater, and Thurston County) make up the Board of Directors.
31. *Hazardous Environmental Condition*—The presence at the Site of Asbestos, PCBs, Petroleum, Hazardous Waste, or Radioactive Material in such quantities or circumstances that may present a substantial danger to persons or property exposed thereto.
32. *Hazardous Waste*—The term Hazardous Waste shall have the meaning provided in Section 1004 of the Solid Waste Disposal Act (42 USC Section 6903) as amended from time to time.
33. *Not Used*
34. *Laws and Regulations; Laws or Regulations*—Any and all applicable laws, rules, regulations, ordinances, codes, and orders of any and all governmental bodies, agencies, authorities, and courts having jurisdiction.
35. *Liens*—Charges, security interests, or encumbrances upon Project funds, real property, or personal property.

36. *List of Submittals*—A list of required submittals, initially included in the Specifications, and updated and maintained by Contractor.
37. *LOTT Holidays*: January 1, the third Monday of January, the third Monday of February, Memorial Day, June 19, July 4, Labor Day, November 11, Thanksgiving Day, the day after Thanksgiving, and Christmas Day. When any of these holidays fall on a Sunday, the following Monday shall be the holiday. When the holiday falls on a Saturday, the preceding Friday shall be the holiday.
38. *Milestone*—A principal event specified in the Contract Documents relating to an intermediate completion date or time prior to Substantial Completion of all the Work.
39. *Minor Change*—An instruction or interpretation given by Owner that does not involve an adjustment of the Contract Time or Contract Price. The cost of the Minor Change must be below the amount included in the Contract Price under the Minor Change bid item.
40. *Notice of Award*—The written notice by Owner to the Successful Bidder stating that upon timely compliance by the Successful Bidder with the conditions precedent listed therein, Owner will sign and deliver the Agreement.
41. *Notice to Commence Construction*—A written notice given by Owner to Contractor fixing the date on which physical construction Work may begin at the Site.
42. *Notice to Proceed*—A written notice given 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 under the Contract Documents.
43. *Owner*—The entity with whom Contractor has entered into the Agreement and for whom the Work is to be performed. The terms LOTT, LOTT Alliance, or Owner refer to LOTT Clean Water Alliance.
44. *Owner's Representative*—See "Construction Manager" for definition. Owner's Construction Manager or written designee is the Owner's Representative for this project.
45. *PCBs*—Polychlorinated biphenyls.
46. *Petroleum*—Petroleum, including crude oil or any fraction thereof which is liquid at standard conditions of temperature and pressure (60 degrees Fahrenheit and 14.7 pounds per square inch absolute), such as oil, petroleum, fuel oil, oil sludge, oil refuse, gasoline, kerosene, and oil mixed with other non-Hazardous Waste and crude oils.
47. *Physical Completion*—The time at which 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. However, all Punch List items must be completed.
48. *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.
49. *Project*—The total construction of which the Work to be performed under the Contract Documents may be the whole, or a part.
50. *Project Manual*—The bound documentary information prepared for bidding and constructing the Work. A listing of the contents of the Project Manual, which may be bound in one or more volumes, is contained in the table(s) of contents.

51. *Promptly*—Promptly shall be no more than 24 hours unless specified or agreed to in writing.
52. *Punch List*—List of incomplete items of work and of items of work which are not in conformance with the contract that will be issued with Substantial Completion. The list will be prepared by the Construction Manager when the Contractor (1) notifies the Construction Manager in writing that the work has been completed in accordance with the contract and (2) requests in writing that the Owner accept the work.
53. *Radioactive Material*—Source, special nuclear, or byproduct material as defined by the Atomic Energy Act of 1954 (42 USC Section 2011 et seq.) as amended from time to time.
54. *Record Drawings*—Drawings prepared by the Engineer or Owner utilizing As-Built Redlines, Contractor Drawings, Subcontractor Drawings, Vendor Drawings, Construction Manager's field notes, etc.
55. *Reasonable Time*—Reasonable time shall be no longer than 1 day unless specified herein.
56. *Samples*—Physical examples of materials, equipment, or workmanship that are representative of some portion of the Work and which establish the standards by which such portion of the Work will be judged.
57. *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.
58. *Shop Drawings*—All drawings, diagrams, illustrations, schedules, and other data or information which are specifically prepared or assembled by or for Contractor and submitted by Contractor to illustrate some portion of the Work.
59. *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 for access thereto, and such other lands furnished by Owner which are designated for the use of Contractor.
60. *Specialist*—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.
61. *Specifications*—That part of the Contract Documents consisting of written requirements for materials, equipment, systems, standards and workmanship as applied to the Work, and certain administrative requirements and procedural matters applicable thereto.
62. *Standard Specifications*—Wherever in these Contract Documents reference is made to the Standard Specifications, said reference shall be understood as referring to the current WSDOT Standard Specifications for Road, Bridge, and Municipal Construction from 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. Where used in the Standard Specifications, "Contracting Agency" and "Engineer" shall mean "Owner".

- 63. *Subcontractor*—An entity having a direct contract with Contractor or with any other Subcontractor for the performance of a part of the Work at the Site.
- 64. *Substantial Completion*—The time at which the Work (or a specified part thereof) has progressed to the point where, as determined by Owner, 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.
- 65. *Subcontractor Drawings*—Shop drawings, equipment drawings, details, wiring diagrams, loop diagrams, interconnect diagrams, elementary diagrams and other drawings that depict the 'as-built' and 'as-installed' condition.
- 66. *Successful Bidder*—The responsible Bidder submitting a responsive Bid to whom Owner makes an award.
- 67. *Supplier*—A manufacturer, fabricator, supplier, distributor, material, 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 Subcontractor.
- 68. *Underground Facilities*—All underground pipelines, conduits, ducts, cables, wires, maintenance holes, vaults, tanks, tunnels, or other such facilities or attachments, and any encasements containing such facilities, including those that convey electricity, gases, steam, liquid petroleum products, telephone or other communications, cable television, water, wastewater, storm water, other liquids or chemicals, or traffic or other control systems.
- 69. *Unit Price Work*—Work to be paid for on the basis of unit prices.
- 70. *Vendor Drawings*—All equipment drawings, details, wiring diagrams, loop diagrams, interconnect diagrams, elementary diagrams and other drawings as necessary to depict the 'as-built' and 'as-installed' condition.
- 71. *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, and furnishing, installing, and incorporating all materials and equipment into such construction, all as required by the Contract Documents.
- 72. *Work Change Directive*—A written statement to Contractor issued on or after the Effective Date of the Agreement and signed by Owner's Representative and recommended by Engineer ordering an addition, deletion, or revision in the Work, or responding to differing or unforeseen subsurface or physical conditions under which the Work is to be performed or to emergencies. The Work Change Directive form will not change the Contract Price or the Contract Times but is evidence that the parties expect that the change ordered or documented by a Work Change Directive will

be incorporated as a Minor Change or in a subsequently issued Change Order following negotiations by the parties as to its effect, if any, on the Contract Price or Contract Times.

73. *Working Day*—A working day is any day that is not a nonworking day. A nonworking day is defined as a Saturday, a Sunday, or a LOTT Holiday. The days between December 25 and January 1 will be classified as nonworking days. If the Contractor requests to work a Saturday, Sunday, or LOTT Holiday, and Owner grants the request, the day shall be counted as a working day. A whole or half day on which the Contract specifically prohibits Work or where inclement weather prohibits work as determined by the Construction Manager shall not be considered a working day. For purposes of assessing liquidated damages, every day past the scheduled Substantial Completion date will be counted as a “working day” unless it is a nonworking day or determined by the Construction Manager to be an unworkable day.

1.02 TERMINOLOGY

- A. The words and terms discussed in Paragraph 1.02.B through F 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 Paragraph 9.03 or any other provision of the Contract Documents.
- C. Day:
1. Unless otherwise specified, all references to “days” shall mean “working days.”
- 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 14.04).
- 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. When "furnish," "install," "perform," or "provide" is not used in connection with services, materials, or equipment in a context clearly requiring an obligation of Contractor, "provide" is implied.
- 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. 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, except those bonds Contractor has agreed to deliver earlier.
- B. *Evidence of Insurance:* When Contractor delivers the executed counterparts of the Agreement to Owner, Contractor shall also deliver to Owner, with copies to each additional insured identified in the Agreement, certificates of insurance which Contractor is required to purchase and maintain in accordance with Article 5.

2.02 COPIES OF DOCUMENTS

- A. Owner shall furnish to Contractor up to five printed or hard copies of the Drawings and Project Manual. Additional copies will be furnished upon request at the cost of reproduction.

2.03 COMMENCEMENT OF CONTRACT TIMES

- A. The Contract Times will commence to run as indicated in the Agreement.

2.04 STARTING THE WORK

- A. Contractor shall start to perform the Work on the date when the Contract Times commence to run as provided in the Notice to Proceed. The count of working days begins at this time. No Work shall be done at the Site prior to the date on which the Contract Times commence to run. If applicable, Contractor shall comply with requirements of the Notice to Commence Construction as outlined in Division 1.

2.05 BEFORE STARTING CONSTRUCTION

- A. *Preliminary Progress Schedule:* Within 10 days after the Effective Date of the Agreement or at the pre-construction meeting (whichever is sooner), Contractor shall submit a preliminary Progress Schedule, if applicable, to Owner for review. The preliminary Progress Schedule shall show a date for mobilization, a date for the start of on-site construction, the anticipated schedule for at least the first 60 working days of the project, and the list of predecessors and successors for each activity.

2.06 PRECONSTRUCTION MEETING; DESIGNATION OF AUTHORIZED REPRESENTATIVES

- A. Before any Work at the Site is started, a meeting 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 2.05.A, procedures for handling Shop Drawings and other submittals, processing Applications for Payment, and maintaining required records.
- B. At this meeting, 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 instructions, receive information, render decisions relative to the Contract, and otherwise act on behalf of each respective party.

2.07 INITIAL SUBMITTAL AND ACCEPTANCE OF PROGRESS SCHEDULE AND SCHEDULE OF VALUES

- A. The Contractor shall submit a Progress Schedule in accordance with the requirements of Section 01 32 16 (Progress Schedules) and a Schedule of Values in accordance with Section 01 20 00 (Measurement and Payment). No progress payment shall be made to Contractor until acceptable schedules are submitted to Owner.
 - 1. The Progress Schedule will be acceptable to Owner under the following conditions:
 - a. It provides an orderly progression of the Work to completion within the Contract Times.
 - b. The Progress Schedule includes all bid items and shall show all critical path elements, start and finish dates for each activity,

- dependencies between activities, float time, deadlines, milestones, goals, and completion dates.
 - c. Progress Schedule shall include permit conditions.
 - d. Progress Schedule shall include shutdowns.
 - e. Progress Schedule shall include the submittal review period.
2. Contractor's submittal review period will be acceptable to Owner if it provides a workable arrangement for reviewing and processing the required submittals and it appropriately accounts for a reasonable timeframe for review, revision, and approval.
 3. Contractor's Schedule of Values will be acceptable to Owner as to form and substance if it provides a reasonable allocation of the Contract Price to component parts of the Work.
 4. Acceptance will not impose on Owner responsibility for the Progress Schedule, for sequencing, scheduling, or progress of the Work, nor interfere with or relieve Contractor from Contractor's full responsibility therefore.

ARTICLE 3 – CONTRACT DOCUMENTS: INTENT, AMENDING, 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. Any labor, documentation, services, materials, or equipment that reasonably may be inferred from the Contract Documents or from prevailing custom or trade usage as being required to produce the indicated result will be provided whether or not specifically called for, at no additional cost to Owner.
- C. Clarifications and interpretations of the Contract Documents shall be issued by Owner or Engineer as provided in Articles 8 and 9.
- D. Sections of Division 1, General Requirements, govern the execution of the Work of all sections of the Specifications.
- E. Owner's actions that do not strictly adhere to the Contract Documents shall not be construed as a waiver of any requirements set forth in the Contract Documents.
- F. Order of Precedence: Any inconsistency in the parts of the contract shall be resolved by following this order of precedence (e.g., 1 presiding over 2, 2 presiding over 3, 3 over 4, and so forth):
 1. Change Orders,

2. Directives
3. Signed Agreement,
4. Addenda (if any),
5. Technical Specifications (Divisions 2 – 48),
6. Drawings (in case of conflict within the Drawings, large scale drawings shall take precedence over small scale drawings),
7. Instructions to Bidders
8. General Requirements (Division 1),
9. General Conditions,
10. Bid Proposal (completed and signed),
11. Permitting Jurisdiction's Permit requirements, Standard Plans and Development Guidelines,
12. Current WSDOT Standard Specifications for Road, Bridge and Municipal Construction (if applicable),
13. WSDOT Standard Plans for Road, Bridge, and Municipal Construction (if applicable),
14. Advertisement for Bids

3.02 REFERENCE STANDARDS

A. Standards, Specifications, Codes, Laws, and Regulations

1. Reference to standards, specifications, manuals, 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, code, or Laws or Regulations in effect at the time that Bids are due, except as may be otherwise specifically stated in the Contract Documents.
2. No provision of any such standard, specification, manual, 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 Contract Documents. 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 Contract Documents.

3.03 REPORTING AND RESOLVING DISCREPANCIES

A. Reporting Discrepancies:

1. *Contractor's Review of Contract Documents Before Starting Work:* Before undertaking each part of the Work, Contractor shall carefully study and compare the Contract Documents and check and verify pertinent figures therein and all applicable field measurements. Contractor shall be solely responsible for measuring and confirming the layout, configuration, and sizes of all existing structures, slabs, mechanical equipment, tanks, piping systems, equipment pads, electrical items, instrumentation and control

items, and all other pertinent items prior to performing the Work. Contractor shall promptly report in writing to the Owner any conflict, error, ambiguity, or discrepancy which Contractor discovers, or has actual knowledge of, and shall obtain a written interpretation or clarification from Engineer before proceeding with any Work affected thereby.

2. ***Contractor's Review of Contract Documents During Performance of Work:*** If, 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) any standard, specification, manual, or code, or (c) any instruction of any Supplier, then Contractor shall promptly report it to the Owner in writing. Contractor shall not proceed with the Work affected thereby (except in an emergency as required by Paragraph 6.16.A) until an amendment or supplement to the Contract Documents has been issued by one of the methods indicated in Paragraph 3.04.

B. Resolving Discrepancies:

1. Except as may be otherwise specifically stated in the Contract Documents, the provisions of the Contract Documents shall take precedence in resolving any conflict, error, ambiguity, or discrepancy between the provisions of the Contract Documents and:
 - a. The provisions of any standard, specification, manual, or code, or the instruction of any Supplier (whether or not specifically incorporated by reference in the Contract Documents); 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 AMENDING AND SUPPLEMENTING CONTRACT DOCUMENTS

- A. The Contract Documents may be amended to provide for additions, deletions, and revisions in the Work or to modify the terms and conditions thereof by either a Change Order or a Work Change Directive.
- B. The requirements of the Contract Documents may be supplemented, and minor variations and deviations in the Work may be authorized, by one or more of the following ways:
 1. A written Directive;
 2. Engineer's or Owner's written approval of a Shop Drawing or Sample (subject to the provisions of Paragraph 6.17.D.3); or
 3. Engineer's or Owner's written interpretation or clarification.

3.05 REUSE OF DOCUMENTS

- A. Contractor and any Subcontractor or Supplier 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
 - 2. 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.
- 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.

3.06 ELECTRONIC DATA

- A. Unless otherwise stated, the data furnished by Owner or Engineer to Contractor, or by Contractor to Owner or Engineer, that may be relied upon are limited to the printed copies (also known as hard copies). Files in electronic media format of text, data, graphics, or other types are furnished only for the convenience of the receiving party. Any conclusion or information obtained or derived from such electronic files will be at the user's sole risk. If there is a discrepancy between the electronic files and the hard copies, the hard copies govern.
- B. Because data stored in electronic media format can deteriorate or be modified inadvertently or otherwise without authorization of the data's creator, the party receiving electronic files agrees that it will perform acceptance tests or procedures within 60 calendar days, after which the receiving party shall be deemed to have accepted the data thus transferred. Any errors detected within the 60-day acceptance period will be corrected by the transferring party.
- C. When transferring documents in electronic media format, the transferring party makes no representations as to long term compatibility, usability, or readability of documents resulting from the use of software application packages, operating systems, or computer hardware differing from those used by the data's creator.
- D. Copies of all data, including but not limited to Progress Schedule, Schedule of Values, submittals, RFIs, Drawings, shop drawings, and all other required documentation, shall be furnished to the Construction Manager for the Owner in electronic format and hard copy format. The Owner may elect for either format. Both formats are required if neither is specified.

ARTICLE 4 – AVAILABILITY OF LANDS; SUBSURFACE AND PHYSICAL CONDITIONS; HAZARDOUS ENVIRONMENTAL CONDITIONS; REFERENCE POINTS

4.01 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. Owner will obtain in a timely manner and pay for easements for permanent structures or permanent changes in existing facilities. If Contractor and Owner are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times, or both, as a result of any delay in Owner's furnishing the Site or a part thereof, Contractor may make a Claim therefor as provided in Paragraph 10.06.
- 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 the Work is to be performed 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.
- D. Contractor may be required to sign a License Agreement or other document setting forth conditions with which the Contractor must comply for use of lands and/or access obtained by Owner.
- E. When private properties are affected by the Work, Contractor shall restore such properties to the original condition unless otherwise provided for in the Drawings and Specifications. At the discretion of Owner, Property Restoration Release Statements, which are included at the end of this specification section, may be required in order to issue Physical Completion.

4.02 SUBSURFACE AND PHYSICAL CONDITIONS

- A. *Reports and Drawings:* No soil exploration has been conducted as part of this project
- B. *Limited Reliance by Contractor on Technical Data Authorized:* Contractor may rely upon the accuracy of the "technical data" contained in such reports and drawings, if applicable, but such reports and drawings are not Contract Documents. Except for such reliance on such "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.

4.03 DIFFERING SUBSURFACE OR PHYSICAL CONDITIONS

- A. *Notice:* If Contractor believes that any subsurface or physical condition that is uncovered or revealed 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 4.02 is materially inaccurate; or
 2. Is of such a nature as to require a change in the Contract Documents; 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 6.16.A), notify Owner and Engineer in writing about such condition. Contractor shall not further disturb such condition or perform any Work in connection therewith (except as aforesaid) until receipt of written order to do so.
- B. *Engineer’s Review:* After receipt of written notice as required by Paragraph 4.03.A, Engineer will promptly review the pertinent condition, determine the necessity of Owner’s obtaining additional exploration or tests with respect thereto, and advise Owner in writing (with a copy to Contractor) of Engineer’s findings and conclusions.
- C. Possible Price and Times Adjustments:
1. The Contract Price or the Contract Times, or both, may be equitably adjusted to the extent that the existence of such differing subsurface or physical condition 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 meet any one or more of the categories described in Paragraph 4.03.A; and
 - 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 11.03.
 2. Contractor shall not be entitled to any adjustment in the Contract Price or Contract Times if:
 - a. Contractor knew of the existence of such conditions at the time Contractor made a final 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
 - b. The existence of such condition could reasonably have been discovered or revealed as a result of any examination, investigation, exploration, test, or study of the Site and contiguous areas required by the Bidding Requirements or Contract Documents to be conducted by or for Contractor prior to Contractor's making such final commitment; or
 - c. Contractor failed to give the written notice as required by Paragraph 4.03.A.
3. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times, or both, a Claim may be made therefor as provided in Paragraph 10.06. However, neither Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors shall be liable to Contractor for any claims, costs, losses, or 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) sustained by Contractor on or in connection with any other project or anticipated project even if arising out of this agreement.

4.04 UNDERGROUND FACILITIES

- A. *Shown or Indicated:* Information and data shown or indicated in the Contract Documents with respect to existing Underground Facilities at or contiguous 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 Project Manual:
- 1. Owner and Engineer shall not be responsible for 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 such information and data;
 - b. Locating all Underground Facilities shown or indicated in the Contract Documents;
 - c. Coordination of the Work with the owners of such Underground Facilities, including Owner, during construction; and
 - d. The safety and protection of all such Underground Facilities and repairing any damage thereto resulting from the Work.
- B. *Not Shown or Indicated:*
- 1. If an Underground Facility is uncovered or revealed at or contiguous to the Site which was not shown or indicated, or not shown or indicated with reasonable accuracy in the Contract Documents, 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 6.16.A), identify the

owner of such Underground Facility and give written notice to that owner and to Owner and Engineer. Engineer will promptly review the Underground Facility and determine the extent, if any, to which a change is required in the Contract Documents to reflect and document the consequences of the existence or location of the Underground Facility. During such time, Contractor shall be responsible for the safety and protection of such Underground Facility.

2. If the Owner's Representative concludes that a change in the Contract Documents is required, a Work Change Directive or a Change Order will be issued to reflect and document such consequences. An equitable adjustment shall be made in the Contract Price or Contract Times, or both, to the extent that they are attributable to the existence or location of any Underground Facility that was not shown or indicated or not shown or indicated with reasonable accuracy in the Contract Documents and that Contractor did not know of and could not reasonably have been expected to be aware of or to have anticipated. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any such adjustment in Contract Price or Contract Times, Contractor may make a Claim therefor as provided in Paragraph 10.06.

4.05 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 Owner and 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.
- 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.
- C. In accordance with Washington Administration Code WAC 332 120 050, no survey monument shall be removed or destroyed before a permit is obtained from Washington's Department of Natural Resources.
- D. After completion of activity that causes the removal or destruction of the monument, if applicable, Contractor shall conduct re-monumentation activities and file survey monumentation records in accordance with Washington Administrative Code 332 120 060.

4.06 HAZARDOUS ENVIRONMENTAL CONDITION AT SITE

- A. *Reports and Drawings:* There are no reports and drawings known to Owner relating to Hazardous environmental conditions that have been identified at the site. Owner is reasonably certain that asbestos will not be disturbed by the project.
- B. *Limited Reliance by Contractor on Technical Data Authorized:* Contractor may rely upon the accuracy of the “technical data” contained in such reports and drawings, if applicable, but such reports and drawings are not Contract Documents. Except for such reliance on such “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 any Hazardous Environmental Condition uncovered or revealed at the Site which was not shown or indicated in Drawings or Specifications or identified in the Contract Documents to be within the scope of the Work. Contractor shall be responsible for a Hazardous Environmental Condition created with any materials brought to the Site by Contractor, Subcontractors, Suppliers, or anyone else for whom Contractor is responsible.
- D. If Contractor encounters a Hazardous Environmental Condition or if Contractor or anyone for whom Contractor is responsible creates a Hazardous Environmental Condition, Contractor shall immediately: (i) secure or otherwise isolate such condition; (ii) stop all Work in connection with such condition and in any area affected thereby (except in an emergency as required by Paragraph 6.16.A); and (iii) 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 4.06.E.
- E. Contractor shall not be required to resume Work in connection with such condition or in any affected area until after Owner has obtained any required permits related thereto and delivered written notice to Contractor: (i) specifying that such condition and any affected area is or has been rendered safe for the resumption of Work; or (ii) specifying any special conditions under which such Work may be resumed safely. 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, the Contractor may make a Claim therefor as provided in Paragraph 10.06.

- F. 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. If Owner and Contractor cannot agree as to entitlement to or on the amount or extent, if any, of an adjustment in Contract Price or Contract Times as a result of deleting such portion of the Work, then the Contractor may make a Claim therefor as provided in Paragraph 10.06. Owner may have such deleted portion of the Work performed by Owner's own forces or others in accordance with Article 7.

ARTICLE 5 – BONDS AND INSURANCE

5.01 PERFORMANCE, PAYMENT, AND OTHER BONDS

- A. When required in the Agreement, Contractor shall furnish performance and payment bonds, 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 Documents. These bonds shall remain in effect until completion of the correction period specified in Paragraph 13.07, or until the completion of any post-construction activities required by the Contract, whichever is later, except as provided otherwise by Laws or Regulations or by the Contract Documents. Contractor shall also furnish such other bonds as are required by the Contract Documents.
- B. All bonds shall be in the form prescribed by the Contract Documents except as provided otherwise by Laws or Regulations, and shall be executed by such sureties as are named in the list of "Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies" as published in Circular 570 (amended) by the Financial Management Service, Surety Bond Branch, U.S. Department of the Treasury. All bonds 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 each bond.
- C. If the surety on any bond furnished by Contractor is declared bankrupt or becomes insolvent or its right to do business is terminated in any state where any part of the Project is located or it ceases to meet the requirements of Paragraph 5.01.B, 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 requirements of Paragraphs 5.01.B and 5.02.
- D. Owner may require Sureties or Surety companies on the bonds to appear and qualify themselves. Whenever the Owner deems the Surety or Sureties to be inadequate, it may, upon written demand, require the Contractor to furnish additional Surety to cover any remaining Work. Until the added Surety is furnished, payments on the Contract will stop.

5.02 LICENSED SURETIES AND INSURERS

- A. All bonds and insurance required by the Contract Documents to be purchased and maintained by Contractor shall be obtained from surety or insurance companies that are duly licensed or authorized in the jurisdiction in which the Project is located to issue bonds or insurance policies for the limits and coverages so required.

5.03 CERTIFICATES OF INSURANCE

- A. Contractor shall deliver to Owner, with copies to each additional insured and loss payee identified in the Agreement, certificates of insurance (and other evidence of insurance requested by Owner or any other additional insured) which Contractor is required to purchase and maintain.
- B. Failure of Owner to demand such certificates or other evidence of Contractor's full compliance with these insurance requirements or failure of Owner to identify a deficiency in compliance from the evidence provided shall not be construed as a waiver of Contractor's obligation to maintain such insurance.
- C. By requiring such insurance and insurance limits herein, Owner does not represent that insurance coverage and limits established in this Contract necessarily will be adequate to protect Contractor.
- D. The insurance and insurance limits required herein shall not be deemed as a limitation on Contractor's liability under the indemnities granted to Owner in the Contract Documents.

5.04 CONTRACTOR'S INSURANCE

- A. Contractor shall purchase and maintain such insurance as is appropriate for the Work being performed and as will provide protection from claims set forth below which 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:
 - 1. Claims under workers' compensation, disability benefits, and other similar employee benefit acts;
 - 2. Claims for damages because of bodily injury, occupational sickness or disease, or death of Contractor's employees;
 - 3. Claims for damages because of bodily injury, sickness or disease, or death of any person other than Contractor's employees;
 - 4. Claims for damages insured by reasonably available personal injury liability coverage which are sustained:
 - a. By any person as a result of an offense directly or indirectly related to the employment of such person by Contractor, or
 - b. By any other person for any other reason;

5. 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; and
 6. 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.
- B. The policies of insurance required by this Paragraph 5.04 shall:
1. With respect to insurance required by Paragraphs 5.04.A.3 through 5.04.A.6 inclusive, be written on an occurrence basis, include as additional insureds (subject to any customary exclusion regarding professional liability) Owner and any other individuals or entities identified in the Agreement, all of whom shall be listed as additional insureds, and 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;
 2. Include at least the specific coverages and be written for not less than the limits of liability provided in the Agreement or required by Laws or Regulations, whichever is greater;
 3. Include contractual liability insurance covering Contractor's indemnity obligations under Paragraphs 6.11 and 6.20; and
 4. Remain in effect for the duration stated in the Agreement including all times thereafter when Contractor may be correcting, removing, or replacing defective Work in accordance with Paragraph 13.07; and
 5. Include completed operations coverage.
- C. The minimum scope of insurance and limits of liability for the insurance required by Paragraph 5.04 shall be as stated in the Agreement.

5.05 PROPERTY INSURANCE

- A. Contractor is responsible for any physical loss or damage, except that caused by the Owner, to the Work, temporary buildings, falsework, and materials and equipment in transit or storage, for all perils or causes of loss, including fire, lightning, theft, vandalism, malicious mischief, water damage, and earthquake, until Physical Completion of the Work.
- B. If stated in the Agreement, Contractor is required to purchase and maintain property insurance, also known as Builder's Risk policy coverage, upon the Work at the Site.

5.06 WAIVER OF RIGHTS

- A. 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 utilization or after Substantial Completion pursuant to Paragraph 14.04 or after final payment pursuant to Paragraph 14.07.

5.07 RECEIPT AND APPLICATION OF INSURANCE PROCEEDS

- A. Contractor as fiduciary shall have power to adjust and settle any loss with the insurers unless one of the parties in interest shall object in writing within 15 days after the occurrence of loss to Contractor's exercise of this power. If such objection be made, Contractor as fiduciary shall make settlement with the insurers in accordance with such agreement as the parties in interest may reach. If no such agreement among the parties in interest is reached, Contractor as fiduciary shall adjust and settle the loss with the insurers and, if required in writing by any party in interest, Contractor as fiduciary shall give bond for the proper performance of such duties.

5.08 ACCEPTANCE OF BONDS AND INSURANCE; OPTION TO REPLACE

- A. If Owner has any objection to the coverage afforded by or other provisions of the bonds or insurance required to be purchased and maintained by the Contractor in accordance with Article 5 on the basis of non-conformance with the Contract Documents, the Owner shall act in accordance with the Agreement.

ARTICLE 6 – CONTRACTOR'S RESPONSIBILITIES

6.01 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. Contractor shall not be responsible for the negligence of Owner or Engineer in the design or specification of a specific means, method, technique, sequence, or procedure of construction which is shown or indicated in and expressly required by the Contract Documents. Plan or method of work suggested by the Owner or the Construction Manager to the Contractor, but not specified or required, if adopted or followed by the Contractor in whole or in part, shall be at the risk and responsibility of the Contractor. The Owner and the Construction Manager assume no responsibility therefore and in no way will be held liable for any defects in the Work which may result from or be caused by use of such plan or method of work.

- B. At all times during the progress of the Work, Contractor shall assign a competent resident superintendent approved by Owner who shall not be replaced without Owner's approval except under extraordinary circumstances.
- C. Contractor shall have an authorized representative on site at all times whenever the Work is underway. If the representative is not the Superintendent, then that person shall be identified in writing to the Owner.

6.02 LABOR; WORKING HOURS; WAGE RATES

- 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. Working days, non-working days, and LOTT Holidays shall be as defined in Paragraph 1.01.A.
- C. Normal working hours shall be any consecutive 8-hour period between 7 a.m. and 4 p.m., Monday through Friday, exclusive of a lunch break, unless otherwise approved by Owner. If the Contractor desires different than the normal working hours stated above, the request must be submitted in writing. The working hours shall be established at or prior to the preconstruction meeting.
- D. Contractor hours of labor for the Work, including work that is required by the Contract to be performed outside of normal working hours, shall comply with Chapter 49.28 RCW.
- E. Permits and local ordinances may be more restrictive of work hour operations. Permits and local jurisdictions shall take precedence over outlined work hours, and may require additional written approval.
- F. Work outside of normal working hours or work on a LOTT Holiday, Saturday, Sunday, or other non-work time shall be approved by the Owner prior to the work occurring.
- G. When work is performed outside of normal working hours, except when required by the Contract or in the case of extraordinary emergency, Contractor agrees to pay the costs of overtime incurred by Owner's staff, Engineer's staff, or other's inspection or other work, unless otherwise agreed to by Owner in writing as set forth in Section H below. Overtime inspection or other overtime work shall include inspection or other work required during LOTT Holidays, Saturdays, Sundays, and weekdays between the hours of 6:00 p.m. and 7:00 a.m. Costs of overtime inspection or other work will cover engineering, inspection, general supervision, and overhead expenses which are directly chargeable to the overtime work. Contractor agrees that Owner shall deduct such charges from payments due the Contractor.
- H. The Owner may waive overtime charges if it is in the best interest of the project that work be completed outside the above parameters. A written request will be made to the Construction Manager and will be responded to in a written approval

or denial. Unless otherwise agreed, the Owner shall not be responsible for any wages incurred (overtime or regular) by the Contractor or subcontractors for granting approval for work outside of pre-established working hours.

- I. Wages: Contractor shall follow wage requirements described in Section 00 73 43 (Wage Rate Requirements). Further, the Contractor shall be responsible for wage rate compliance by all firms engaged in any part of the Work necessary to complete this Contract.

6.03 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.
- B. All materials and equipment incorporated into the Work shall be as specified or, if not specified, shall be of good quality and new, except as otherwise provided in the Contract Documents. Manufacturer's warranties shall be issued in Owner's name. All special warranties and guarantees required by the Specifications shall expressly run to the benefit of Owner. If applicable, a summary of items with extended warranty periods is included at the end of this specification. The Contractor shall furnish to the Owner any guarantee or warranty furnished as a customary trade practice in connection with the purchase of any equipment, materials, or items incorporated into the Work. 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.
- D. The Owner may reject equipment used in the performance of the Work that repeatedly breaks down or fails to produce results within the required tolerances. The Contractor shall have no claim for additional payment or for extension of time due to rejection and replacement of equipment.

6.04 PROGRESS SCHEDULE

- A. Contractor shall adhere to the Progress Schedule established in accordance with Paragraph 2.07 as it may be adjusted from time to time as provided below.
 1. Working days shall be counted as defined in Article 1.01.A unless the Contractor submits a written request to Owner for an unworkable day and Owner approves the request.

2. The Progress Schedule and all elements within the schedule shall be updated when requested by the Owner. The Owner may request a Progress Schedule update when any of the following events occur:
 - a. The project has experienced a change that affects the critical path.
 - b. The sequence of Work is changed from that in the approved Progress Schedule.
 - c. The project is significantly delayed. A “significant” delay in time is defined as 10 working days or 10 percent of the original contract time, whichever is greater.
 - d. Upon receiving an extension of Contract time.

The Contractor shall submit a Progress Schedule update within 15 calendar days of receiving a written request, or when an update is required by any other provision of the Contract. The Progress Schedule is not officially changed until updates are accepted by the Owner.

In addition to the other requirements of this section, Progress Schedule updates shall reflect the following information:

- a. The actual duration and sequence of as-constructed Work activities, including changed Work.
- b. Approved time extensions.
- c. Any construction delays or other conditions that affect the progress of the Work.
- d. Any modifications to the as-planned sequence or duration of remaining activities.
- e. The Physical Completion of all remaining Work in the remaining Contract time.

Unresolved requests for time extensions shall be reflected in the Progress Schedule update by assuming no time extension will be granted, and by showing the effects to follow-on activities necessary to physically complete the project within the currently authorized time for completion.

3. Proposed adjustments in the Progress Schedule that will change the Contract Times shall be submitted in accordance with the requirements of Article 12. Adjustments in Contract Times may only be made by a Change Order.
4. Contractor shall make all reasonable efforts to mitigate any damages resulting from delays in labor, materials, supplies, or permitting. In the event the Contractor believes such a delay is about to occur, or has occurred, it must notify Owner and Engineer immediately upon learning of such condition. Under no circumstances will Owner be liable to Contractor should this paragraph be violated.
5. When requested by Owner, the Contractor shall make all reasonable efforts to accelerate the schedule. Such efforts shall be at Owner’s cost.

- B. The Contractor shall furnish such labor, materials, facilities, and equipment as may be necessary to ensure the prosecution and completion of the work in accordance with the accepted Progress Schedule. If work experiences a significant delay as defined in Part 6.04.A.2.c., the Contractor agrees that he will take some or all of the following actions to return the project to the accepted Progress Schedule. These actions may include the following:
1. Increase labor resources in quantities and crafts
 2. Increase the number of working hours per shift, shifts per working day, working days per week, or the amount of equipment, or any combination of the foregoing.
 3. Reschedule activities.
- C. All actions to return the project to the Progress Schedule are at the Contractor's expense.
- D. The Contractor shall pay all costs incurred by the Owner which result from the Contractor's action to return the project to its accepted Progress Schedule. Contractor agrees that Owner shall deduct such charges from payments due the Contractor. It is further understood and agreed that none of the services performed by the Construction Manager in monitoring, reviewing and reporting project status and progress shall relieve the Contractor of responsibility for planning and managing construction work in conformance with the Progress Schedule.

6.05 SUBSTITUTES AND “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 specification or description 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 or no substitution is permitted, other items of material or equipment or material or equipment of other Suppliers may be submitted to the Owner for review under the circumstances described below.
1. *“Or-Equal” Items:* If in Owner’s sole discretion, with input from Engineer, 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, it may be considered by Owner, with input from Engineer, as an “or-equal” item, in which case review and approval of the proposed item may, in Owner’s sole discretion, with input from Engineer, be accomplished without compliance with some or all of the requirements for approval of proposed substitute items. 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; and
3. It has a proven record of performance and availability of responsive service.
- 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.
2. Substitute Items:
 - a. If in Owner's sole discretion, with input from Engineer, an item of material or equipment proposed by Contractor does not qualify as an "or-equal" item under Paragraph 6.05.A.1, it will be considered a proposed substitute item.
 - b. Contractor shall submit sufficient information as provided below to allow Engineer to determine if the item of material or equipment proposed is essentially equivalent to that named and an acceptable substitute therefor. Requests for review of proposed substitute items of material or equipment will not be accepted by Engineer from anyone other than Contractor.
 - c. The requirements for review by Engineer will be as set forth in Paragraph 6.05.A.2.d and as Engineer may decide is appropriate under the circumstances.
 - d. Contractor shall make written application to Owner for review of a proposed substitute item of material or equipment that Contractor seeks to furnish or use. The application:
 1. 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;
 2. Will state:
 - 1) The extent, if any, to which the use of the proposed substitute item will prejudice Contractor's achievement of Substantial Completion on time,
 - 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;
 3. Will identify:
 - 1) All variations of the proposed substitute item from that specified, and
 - 2) Available engineering, sales, maintenance, repair, and replacement services; and

4. Shall contain an itemized estimate of all costs or credits that will result directly or indirectly from use of such substitute item, including costs of redesign and claims of other contractors affected by any resulting change.
- B. *Substitute Construction Methods or Procedures:* If a specific means, method, technique, sequence, or procedure of construction is expressly required by the Contract Documents, Contractor may furnish or utilize a substitute means, method, technique, sequence, or procedure of construction approved by Owner, with input from Engineer. Contractor shall submit sufficient information to allow Owner, in Owner's sole discretion with input from Engineer, to determine that the substitute proposed is equivalent to that expressly called for by the Contract Documents. The requirements for review by Owner, with input from Engineer, will be similar to those provided in Paragraph 6.05.A.2.
 - C. *Engineer's Evaluation:* Engineer will be allowed a reasonable time within which to evaluate each proposal or submittal made pursuant to Paragraphs 6.05.A and 6.05.B. Engineer may require Contractor to furnish additional data about the proposed substitute item. No "or equal" or substitute will be ordered, installed or utilized until Engineer's review is complete, which will be evidenced by a Change Order in the case of a substitute and an approved Shop Drawing for an "or equal." Engineer will advise Owner in writing of any negative determination. Owner, with input from the Engineer, will be the sole judge of acceptability.
 - D. *Special Guarantee:* Owner may require Contractor to furnish at Contractor's expense a special performance guarantee or other surety with respect to any substitute.
 - E. *Engineer's Cost Reimbursement:* Engineer will record Engineer's costs in evaluating a substitute proposed or submitted by Contractor pursuant to Paragraphs 6.05.A.2 and 6.05.B. 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. Reimbursement rates for Engineer or Related Entities for evaluation of proposed substitutes shall be available upon written request. Reimbursement for service shall be compensated as established in Article 14.
 - F. *Contractor's Expense:* Contractor shall provide all data in support of any proposed substitute or "or-equal" at Contractor's expense.

6.06 CONCERNING SUBCONTRACTORS, SUPPLIERS, AND OTHERS

- A. Contractor shall not employ any Subcontractor, Supplier, or other individual or entity (including those acceptable to Owner as indicated in Paragraph 6.06.B), whether initially or as a replacement, against whom Owner may have reasonable objection. Contractor shall not be required to employ any Subcontractor, Supplier, or other individual or entity to furnish or perform any of the Work against whom

Contractor has reasonable objection. Owner requires that Contractor self-perform at least 10% of the contract price. Upon request, Contractor shall provide documents to Owner to demonstrate compliance. Noncompliance may be considered in the determination of bidder responsibility on future projects.

- B. If the identity of certain Subcontractors, Suppliers, or other individuals or entities is required to be submitted to Owner in advance for acceptance by Owner by a specified date prior to the Effective Date of the Agreement, and if Contractor has submitted a list thereof in accordance with the Contract Documents, Owner's acceptance (either in writing or by failing to make written objection thereto by the date indicated for acceptance or objection in the Contract Documents) of any such Subcontractor, Supplier, or other individual or entity so identified may be revoked on the basis of reasonable objection after due investigation. Contractor shall submit an acceptable replacement for the rejected Subcontractor, Supplier, or other individual or entity, and the Contract Price will be adjusted by the difference in the cost occasioned by such replacement, and an appropriate Change Order will be issued. 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 any right of Owner or Engineer to reject defective Work.
- C. 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. 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 moneys due any such Subcontractor, Supplier, or other individual or entity except as may otherwise be required by Laws and Regulations.
- D. Contractor shall be solely responsible for scheduling and coordinating the Work of Subcontractors, Suppliers, and other individuals or entities performing or furnishing any of the Work under a direct or indirect contract with Contractor. While Subcontractors, Suppliers, or other individuals or entities are performing Work, the Contractor shall continuously supervise that Work and be present at the site of Work.
- E. Contractor shall require all Subcontractors, Suppliers, and such other individuals or entities performing or furnishing any of the Work to communicate with Owner or Engineer through Contractor.
- F. 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.
- G. All Work performed for Contractor by a Subcontractor or Supplier will be pursuant to an appropriate agreement between Contractor and the Subcontractor or

Supplier which specifically binds the Subcontractor or Supplier to the applicable terms and conditions of the Contract Documents for the benefit of Owner and Engineer.

- H. Prior to subcontracting any work, the Contractor shall verify that every first tier subcontractor meets the responsibility criteria in RCW 39.04.350(1) as amended. The Contractor shall require first tier subcontractors to verify that their subcontractors meet the responsibility criteria.

6.07 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 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 not specified in the Contract Documents.
- D. Contractor shall, at its sole expense, defend and pay all damages, fees, royalties, and costs awarded in any proceeding brought against Owner, its employees and Related Entities, in which it is claimed that the use of any treatment process, material, equipment, or parts thereof furnished constitutes an infringement of any patent or other proprietary information right, provided Contractor is promptly notified of the commencement of any such proceedings. Contractor's indemnity applies only when infringement occurs from the normal use for which such

treatment process, material, or equipment were designed. Owner may, at its option, be represented at any such proceeding. If use is held in any such proceeding to constitute an infringement and is enjoined, Contractor, at its expense, shall either procure for Owner the right to use such treatment process, material and equipment or manufacture and sell product generated from the use of the treatment process; or pay the costs for damages, fees, or royalties.

- E. To the fullest extent permitted by Laws and Regulations, Owner shall defend and indemnify Contractor and its officers, directors, members, partners, employees, agents, consultants, and subcontractors against any and 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 others' use of any such patented or copyrighted material if such claim arises from the complaining party's use of such material as provided by Owner.
- F. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold Owner and its officers, directors, members, partners, employees, agents, consultants, and subcontractors harmless against any and 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 from Contractor's exclusive use of any such patented or copyrighted materials obtained or utilized by Contractor in the completion of the Work.

6.08 PERMITS

- A. Contractor shall obtain and pay for all construction permits and licenses unless otherwise provided in Section 01 41 00 (Regulatory Requirements). 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 on the Effective Date of the Agreement. Owner shall pay all charges of utility owners for connections for providing permanent service to the Work.
- B. Contractor must keep a complete set of permits and approved permit drawings on site at all times. All permits shall be posted in accordance with regulatory requirements in an area visible to Owner staff and construction personnel.

6.09 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 knowing or having reason to know that it is contrary to Laws or Regulations, Contractor shall bear 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. However, it shall not be Contractor's responsibility to make certain that the Specifications and Drawings are in accordance with Laws and Regulations, but this shall not relieve Contractor of Contractor's obligations under Paragraph 3.03.

- C. Changes in Laws or Regulations not known at the time that Bids were due having an effect on the cost or time of performance of the Work shall be the subject of an adjustment in Contract Price or Contract Times. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any such adjustment, a Claim may be made therefor as provided in Paragraph 10.06.

6.10 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. The Washington State Department of Revenue has issued special rules on the State sales tax. Paragraphs B and C are meant to clarify those rules.
- B. WAC 458-20-170 and its related rules apply to the constructing and repairing of new or existing buildings, or other structures, upon real property. This includes, but is not limited to, the construction of streets, roads, highways, etc., owned by the state of Washington; water mains and their appurtenances; sanitary sewers and sewage disposal systems unless such sewers and disposal systems are within, and a part of, a street or road drainage system; telephone, telegraph, electrical power distribution lines, or other conduits or lines in or above streets or roads, unless such power lines become a part of a street or road lighting system; and installing or attaching of any article of tangible personal property in or to real property, whether or not such personal property becomes a part of the realty by virtue of installation.

For work performed in such cases the Contractor shall collect retail sales tax from the Owner. The Owner will automatically add this sales tax to each payment to the Contractor. For this reason, the Contractor shall not include the retail sales tax in the unit bid item prices, or in any other contract amount subject to Rule 170, with the following exception.

Exception: The Contractor will include sales tax for a payment the Contractor or subcontractor makes on the purchase or rental of tools, machinery, equipment, or consumable supplies not integrated into the project.

- C. WAC 458-20-171, and its related rules, apply to building, repairing, or improving streets, roads, etc., which are owned by a municipal corporation, or political subdivision of the state, or by the United States, and which are used primarily for foot or vehicular traffic. This includes storm or combined sewer systems within and included as a part of the street or road drainage system and power lines when such are part of the roadway lighting system.

For work performed in such cases, the Contractor shall include Washington State Retail Sales Taxes in the various unit bid item prices, or other contract amounts, including those that the Contractor pays on the purchase of the materials, equipment, or supplies used or consumed in doing the work.

6.11 USE OF SITE AND OTHER AREAS

A. Limitation on Use of Site and Other Areas:

1. Contractor shall confine construction equipment, the storage of materials and equipment, and the operations of workers to the areas designated by the Owner on the Site and other areas permitted by Laws and Regulations, and shall not unreasonably encumber the Site and other areas with construction equipment or other materials or equipment. Contractor shall assume full responsibility for any damage to any such land or area, or to the owner or occupant thereof, or of any adjacent land or areas resulting from the performance of the Work.
2. Should any claim be made by any such owner or occupant because of the performance of the Work, Contractor shall promptly settle with such other party by negotiation or otherwise resolve the claim by arbitration or other dispute resolution proceeding or at law.
3. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner 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 claim or action, legal or equitable, brought by any such owner or occupant against Owner or any other party indemnified hereunder to the extent caused by or based upon Contractor's performance of the Work.

B. Contractor shall enforce any instructions of the Owner regarding signs, advertising, fires, danger signals, barricades, and smoking; and shall require all persons employed on the Work to comply with all Owner regulations while on premises.

C. *Removal of Debris During Performance of the Work:* During the progress of the Work Contractor shall keep the Site and other 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.

D. *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 Physical Completion of the Work Contractor shall remove from the Site 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. Contractor shall be solely responsible for the lawful disposal of items removed from the site.

- E. *Loading Structures:* Contractor shall not load nor permit any part of any existing building, structure, piping, or equipment to be loaded in any manner that will endanger the structure, nor shall Contractor subject any part of the Work or adjacent property to stresses or pressures that will endanger it.
- F. *Overhead Hoist System:* Contractor may request permission to utilize Owner's equipment. Contractor's written request shall identify the equipment to be used and for what purpose. Contractor shall also identify personnel who are trained and qualified to operate the overhead hoist system. No other personnel will be authorized to operate the equipment.

During Contractor's use, Contractor shall be responsible for protecting, safely operating, and maintaining the overhead hoist system. Contractor shall be entirely responsible for verifying the weights of the items to be moved by the overhead hoist system and that all loads are within the overhead hoist system's design load capacity. Load ratings shall never be exceeded.

Contractor shall assume all liability for the safety of its staff and any subcontractor's staff while operating the overhead hoist system. Contractor shall hold the Owner harmless if any injuries occur while the Contractor is operating the overhead hoist system. The overhead hoist system shall be inspected to ensure that no damage has occurred during the Contractor's use. Any damage will be the responsibility of the Contractor and repaired immediately to the Owner's satisfaction. The Owner may elect to make any necessary repairs and deduct the costs from future payments owed to the Contractor.

6.12 RECORD DOCUMENTS

- A. Contractor shall maintain in a safe place at the Site one record copy of all Drawings, Specifications, Addenda, Change Orders, Work Change Directives, Field Orders, and written interpretations and clarifications in good order and annotated to show changes made during construction. These record documents together with all approved Samples and a counterpart of all approved Shop Drawings will be available to Construction Manager, Owner, and Engineer for reference.

6.13 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, 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 owners of adjacent property and of Underground Facilities and other utility owners when prosecution of the Work may affect them, and shall cooperate with them in the protection, removal, relocation, and replacement of their property.
 - C. Owner shall inform Contractor of the applicable requirements of Owner's safety programs, if any, with which Contractor must comply. .
 - 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 6.13.A.2 or 6.13.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 (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 for protection of the Work shall continue until such time as Owner accepts the Work as physically complete (except as otherwise expressly provided in connection with Substantial Completion).
 - G. Public Safety and Convenience: The Contractor shall conduct Work so as to ensure the least possible obstruction to traffic and inconvenience to the general public and the residents in the vicinity of the work and to ensure the protection of persons and property. No road or street shall be closed to the public except with the permission of the Construction Manager and the proper governmental authority. Fire hydrants on or adjacent to the work shall be accessible to firefighting equipment. Temporary provisions shall be made by the Contractor to ensure the use of sidewalks, private and public driveways and proper functioning of gutters, sewer inlets, drainage ditches and culverts, irrigation ditches, and natural watercourses.
 - H. The Contractor shall comply with Section 01 35 20 (Safety and Health Requirements). If, at any time, the Contractor is not in compliance with this section, work may be terminated or suspended until compliance is met. Compensation for

losses of any nature shall not be allowed for termination or suspension of work due to non-compliance. In addition, no additional extension of contract time shall be allowed for non-compliance with the Safety and Health Agreement.

6.14 SAFETY REPRESENTATIVE

- A. Contractor shall designate a qualified and experienced safety representative at the Site in accordance with Section 01 35 20 (Safety and Health Requirements).

6.15 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.

6.16 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 and must promptly notify Construction Manager, Owner, and Engineer of any such actions taken. Contractor shall give Owner 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 Owner 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.
- B. Contractor shall provide Owner with an "Emergency Contact List" listing phone numbers for at least three individuals that may be contacted in an emergency related to the Contract Work that can respond as required. If the Contractor cannot be reached or does not correct the emergency situation, the Owner will take actions and charge the contractor for work performed to correct the emergency.

6.17 SUBMITTALS, SHOP DRAWINGS, AND SAMPLES

- A. Contractor shall provide Submittals, Shop Drawings and Samples to the Owner for review by Engineer and approval in accordance with the accepted List of Submittals (as required by Paragraph 2.07). Each submittal will be identified as the Owner may require.
 - 1. Submittals:
 - a. Submit number of copies specified in Section 01 33 00 (Submittals).
 - b. Clearly identify materials that are being submitted for this project. Cross out items that do not apply.
 - 2. Shop Drawings:
 - a. Submit number of copies specified in Section 01 33 00 (Submittals).
 - 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 6.17.D.

3. Samples:

- a. Submit number of Samples specified in the Specifications.
- b. 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 6.17.D.

B. Where a Shop Drawing or Sample is required by the Contract Documents or the List 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. Submittal Procedures:

1. Contractor shall follow submittal requirements in Section 01 33 00 (Submittals)
2. Before submitting each Shop Drawing or Sample, Contractor shall have:
 - a. Reviewed and coordinated each 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 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.
3. 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 and approval of that submittal.
4. With each submittal, Contractor shall give specific written notice of any variations that the item may have from the requirements of the Contract Documents. This notice shall be both a written communication separate from the submittal; and, in addition, by a specific notation made on each item submitted to Owner for review and approval of each such variation.

D. Engineer's Review:

1. Engineer will provide review 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 (except where a particular means, method, technique, sequence, or procedure of construction is specifically and expressly called for by the Contract Documents) or to safety precautions or programs incident thereto. The review and approval of a separate item as such will not indicate approval of the assembly in which the item functions.
3. Engineer's review and approval 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 6.17.C.4 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's review and approval shall not relieve Contractor from responsibility for complying with the requirements of Paragraph 6.17.C.2.

6.18 CONTINUING THE WORK

- A. 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, except as permitted by Paragraph 15.04 or as Owner and Contractor may otherwise agree in writing.

6.19 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 representation of 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 or Owner;
 2. Recommendation by Engineer or payment by Owner of any progress or final payment;

3. The issuance of a certificate of Substantial Completion by Owner 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 or the issuance of a notice of acceptability by Engineer;
6. Any inspection, test, or approval by others; or
7. Any correction of defective Work by Owner.

6.20 INDEMNIFICATION

- A. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner 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 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 any of its 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 6.20.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 6.20.A shall not extend to the liability of Owner and its 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.
- 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 or Owner'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.

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

6.21 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 law.
- 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, Shop Drawings 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 6.21, 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 6.17.D.1.
- E. Contractor shall not be responsible for the adequacy of the performance or design criteria required by the Contract Documents.
- F. Upon completion of the Work, Contractor grants to Owner an irrevocable, non-exclusive, royalty-free license to use any designs, plans, drawings, or specifications, or any part thereof, of any patented or copyrighted materials obtained or utilized by Contractor in the completion of the Work.

ARTICLE 7 – OTHER WORK AT THE SITE

7.01 RELATED WORK AT SITE

- A. Owner may perform other work related to the Project at the Site with Owner's employees, or through other direct contracts therefor, or have other work performed by utility owners. If such other work is not noted in the Contract Documents, then:
 - 1. Written or verbal notice thereof will be given to Contractor prior to starting any such other work; and
 - 2. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times that should be allowed as a result of such other work, a Claim may be made therefor as provided in Paragraph 10.06.
- B. Contractor shall afford each other contractor who is a party to such a direct contract, each utility owner, and Owner, if Owner is performing other work with Owner's employees, proper and safe access to the Site; provide a reasonable opportunity for the introduction and storage of materials and equipment and the execution of such other work; and properly coordinate the Work with theirs. 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 Owner and the others whose work will be affected. The duties and responsibilities of Contractor under this Paragraph are for the benefit of such utility owners and other contractors to the extent that there are comparable provisions for the benefit of Contractor in said direct contracts between Owner and such utility owners and other contractors.
- C. If the proper execution or results of any part of Contractor's Work depends upon work performed by others under this Article 7, Contractor shall inspect such other work and promptly report to Owner 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.
- D. The Contractor shall promptly compensate for any injury or damage that may be sustained by other contractors or employees of the Owner as a result of Contractor's actions. The Contractor shall join his work to that of others and perform his work in proper sequence in relation to that of others.
- E. Owner may perform miscellaneous maintenance projects throughout the Site. Owner will notify the Contractor prior to starting such projects. Contractor shall be responsible for reviewing the scope of the Owner's work, notifying Owner of impacts to the Contractor's work, and continuously coordinating its work with the Owner for the duration of Owner maintenance projects.

7.02 COORDINATION

- A. If Owner intends to contract with others for the performance of other work on the Project at the Site, Owner shall have sole authority and responsibility for such coordination unless otherwise provided in the Contract Documents.
- B. If requested by the Contractor, the Owner shall arrange meetings with other contractors performing work on behalf of the Owner to plan coordination of construction activities. The Owner shall keep the Contractor informed of the planned activities of other contractors.
- C. Contractor shall be responsible for coordinating its construction activities with Owner at all times during start-up, testing, and commissioning such that normal operation of Owner's facility is unaffected by the Contractor's work.

7.03 LEGAL RELATIONSHIPS

- A. Paragraphs 7.01.A and 7.02 are not applicable for utilities not under the control of Owner.
- B. Each other direct contract of Owner under Paragraph 7.01.A shall provide that the other contractor is liable to Owner and Contractor for the reasonable direct delay and disruption costs incurred by Contractor as a result of the other contractor's wrongful actions or inactions.
- C. Contractor shall be liable to Owner and any other contractor under direct contract to Owner for the reasonable direct delay and disruption costs incurred by such other contractor as a result of Contractor's wrongful action or inactions.
- D. Differences or conflicts arising between the Contractor and other contractors employed by the Owner or between the Contractor and the workers of the Owner with regard to their work, shall be submitted to the Construction Manager for his decision in the matter. If the work of the Contractor is affected or delayed because of any act or omission of other contractors or of the Owner, the Contractor may submit for the Owner's consideration, a documented request for a change order.

ARTICLE 8 – OWNER'S RESPONSIBILITIES

8.01 COMMUNICATIONS TO CONTRACTOR

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

8.02 REPLACEMENT OF ENGINEER

- A. In case of termination of the employment of Engineer, Owner shall appoint an engineer whose status under the Contract Documents shall be that of the former Engineer.

8.03 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.

8.04 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.

ARTICLE 9 – RESPONSIBILITIES OF ENGINEER AND CONSTRUCTION MANAGER

9.01 CONSTRUCTION MANAGER

- A. The Contractor shall look initially to the Construction Manager in matters relating to the contract.
- B. Limitations of Authority: The limitations upon Engineer's authority and responsibility set forth in Paragraph 9.03 shall also apply to the Construction Manager. Further, the Construction Manager will not:
 - 1. Undertake any of the responsibilities of Contractor, Subcontractors, or Contractor's superintendent; or
 - 2. Accept Submittals from anyone other than Contractor.

9.02 DECISIONS ON REQUIREMENTS OF CONTRACT DOCUMENTS AND ACCEPTABILITY OF WORK

- A. Owner's Representative will be the initial interpreter of the requirements of the Contract Documents and judge of the acceptability of the Work thereunder. All matters in question and other matters between Owner and Contractor arising prior to the date final payment is due relating to the acceptability of the Work, and the interpretation of the requirements of the Contract Documents pertaining to the performance of the Work, will be referred initially to Owner's Representative in writing within 30 days of the event giving rise to the question.
- B. Owner's Representative will, with reasonable promptness, render a written decision on the issue referred. If Owner or Contractor believes that any such decision entitles them to an adjustment in the Contract Price or Contract Times or both, a Claim may be made under Paragraph 10.06. The date of Owner's Representative's decision shall be the date of the event giving rise to the issues referenced for the purposes of Paragraph 10.06.B.

9.03 LIMITATIONS ON ENGINEER'S AUTHORITY AND RESPONSIBILITIES

- A. Direction from the Engineer will come through the Owner or Owner's Representative.
- B. Neither Engineer's authority or responsibility under this Article 9 or under any other provision of the Contract Documents 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.
- C. 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.
- D. 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.
- E. The limitations upon authority and responsibility set forth in this Paragraph 9.03 shall also apply to the Owner's Representative and assistants, if any.

ARTICLE 10 – CHANGES IN THE WORK; CLAIMS

10.01 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 by a Change Order, or a Work Change Directive. Upon receipt of any such document, Contractor shall promptly proceed with the Work involved which will be performed under the applicable conditions of the Contract Documents (except as otherwise specifically provided).
- B. If Owner and Contractor are unable to agree on entitlement to, or on the amount or extent, if any, of an adjustment in the Contract Price or Contract Times, or both, that should be allowed as a result of a Work Change Directive,
 - 1. The Owner can direct the Contractor to execute the work and provide detailed force account records to the Owner describing the work, craft hours, materials, and equipment required to perform the work on a daily basis to be signed by the Owner's Representative; or
 - 2. The Contractor can submit a Claim as provided in Paragraph 10.06.
- C. Change Order Proposals shall be in accordance with Section 01 26 00 (Modification Procedures).

10.02 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 as provided in Paragraph 3.04, except in the case of an emergency as provided in Paragraph 6.16 or in the case of uncovering Work as provided in Paragraph 13.04.D.

10.03 AUTHORIZED VARIATIONS IN WORK

- A. Owner may authorize minor variations in the Work from the requirements of the Contract Documents which 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. These may be accomplished by a Field Order and will be binding on Owner and also on Contractor, who shall perform the Work involved promptly. If Owner or Contractor believes that a Field Order justifies an adjustment in the Contract Price or Contract Times, or both, and the parties are unable to agree on entitlement to or on the amount or extent, if any, of any such adjustment, a Claim may be made therefor as provided in Paragraph 10.06.

10.04 EXECUTION OF CHANGE ORDERS

- A. Owner and Contractor shall execute appropriate Change Orders recommended by Engineer and Owner's Representative, subject to the approval of the Owner's governing body where required, covering:
 - 1. Changes in the Work which are: (i) ordered by Owner pursuant to Paragraph 10.01.A, (ii) required because of acceptance of defective Work under Paragraph 13.08.A or Owner's correction of defective Work under Paragraph 13.09, or (iii) agreed to by the parties;
 - 2. 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; and
 - 3. Changes in the Contract Price or Contract Times which embody the substance of any written decision by the Owner pursuant to Paragraph 10.06; provided that the Contractor may appeal any decision by the Owner in accordance with the provisions of the Contract Documents and applicable Laws and Regulations, but during any such appeal, Contractor shall carry on the Work and adhere to the Progress Schedule as provided in Paragraph 6.18.A.

10.05 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.

10.06 CLAIMS

- A. Owner's Decision Required: All Claims shall be referred to the Owner for decision. A decision shall be required as a condition precedent to any exercise by Contractor of any rights or remedies Contractor may otherwise have under the Contract Documents or by Laws and Regulations in respect of such Claims.
- B. Notice: Written notice stating the general nature of each Claim shall be delivered by the Contractor to the Owner promptly (but in no event later than 30 calendar days) after the start of the event giving rise thereto, which shall be the date that Change Order or Work Change Directive work is first performed. The responsibility to substantiate a Claim shall rest with the party making the Claim. Notice of the amount or extent of the Claim, with supporting data, shall be delivered to the Owner within 30 calendar days after the completion of such event (unless Owner allows additional time for Contractor to submit additional or more accurate data in support of such Claim). As minimum, supporting data shall include:
 - 1. A detailed factual statement of the claim for additional compensation and time, if any, providing all necessary dates, locations, and items of Work affected by the Claim;
 - 2. The date on which facts arose which gave rise to the Claim;
 - 3. The name of each of Owner individual, official, or employee involved in or knowledgeable about the Claim;
 - 4. The specific provisions of the Contract Documents which support the Claim and a statement of the reasons why such provisions support the Claim;
 - 5. If the Claim relates to a decision of the Owner which the Contract leaves to the Owner's discretion or as to which the Contract Documents provide that the Owner's decision is final, the Contractor shall set out in detail all facts supporting its position relating to the decision of the Owner;
 - 6. The identification of any documents and the substance of any oral communications that support the Claim;
 - 7. Copies of any identified documents that support the Claim (manuals which are standard to the industry, used by the Contractor, may be included by reference;
 - 8. If an adjustment in Contract Times is sought:
 - a. The specific days and dates for which it is sought;
 - b. The specific reasons the Contractor believes a time extension should be granted; and
 - c. The Contractor's analysis of its Progress Schedule in accordance with Section 01 26 00 (Modification Procedures).
 - 9. If additional compensation is sought, the exact amount sought and a breakdown of that amount into the following categories:
 - a. Labor;
 - b. Materials;
 - c. Direct Equipment. The actual cost for each piece of equipment shall be in accordance with Section 01 26 00 (Modification

Procedures). The following information shall be provided for each piece of equipment:

1. Detailed description
 2. The hours of use or standby; and
 3. The specific day and dates of use or standby
 - d. Job overhead;
 - e. Overhead (general and administrative);
 - f. Subcontractor's claims (in the same level of detail as specified herein is required for any Subcontractor's claims); and
 - g. Other categories as specified by Owner.
10. A notarized statement containing certification that the Claim for extra compensation and time, if any, is a true statement of the actual costs incurred and time sought, and that the adjustment claimed is the entire adjustment to which the claimant believes it is entitled as a result of said event.

C. Owner's Action: Owner will review each Claim and, within 30 calendar days after receipt of the last submittal of the claimant, take one of the following actions in writing:

1. Deny the Claim in whole or in part;
2. Approve the Claim in whole or in part; or
3. Notify the parties that the Owner is unable to resolve the Claim if, in the Owner's sole discretion, it would be inappropriate for the Owner to do so. For purposes of further resolution of the Claim, such notice shall be deemed a denial.

D. Owner's action under Paragraphs 10.06.C will be final and binding upon the Contractor, unless Owner or Contractor invoke the dispute resolution procedure set forth in Article 16 within 7 calendar days of such action or denial.

E. In the event that Owner does not take action on a Claim within said 30 calendar days, the Claim shall be deemed denied. The denial of the Claim shall be final and binding upon the Contractor, unless Contractor invokes the dispute resolution procedure set forth in Article 16 within 7 calendar days after the latest date that the Owner was to issue a determination.

F. No claim for an adjustment in Contract Price or Contract Times will be valid if not submitted in accordance with this Paragraph 10.06.

G. Owner and Engineer do not waive any of the claims requirements by discussing or attempting to resolve any claims made by the Contractor.

ARTICLE 11 – COST OF THE WORK; ALLOWANCES; UNIT PRICE WORK

11.01 COST OF THE WORK

A. The Cost of the Work will be as defined in the Bid Proposal and Section 01 20 00 (Measurement and Payment). The cost of any changes to the Work will be determined as defined in Section 01 26 00 (Modification Procedures).

11.02 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. Minor Change Allowance:
 - 1. Contractor agrees that a Minor Change allowance, if any, is for the sole use of Owner to cover unanticipated costs.
- C. 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.

11.03 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. Determinations of the actual quantities and classifications of Unit Price Work performed by Contractor will be made by the Owner subject to the provisions of Paragraph 14.02.
- 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. The unit price of an item of Unit Price Work may be subject to re-evaluation and adjustment as described in Section 01 26 00 (Modification Procedures).

ARTICLE 12 – CHANGE OF CONTRACT PRICE; CHANGE OF CONTRACT TIMES

12.01 CHANGE OF CONTRACT PRICE

- A. The Contract Price may only be changed by a Change Order. Any Claim for an adjustment in the Contract Price shall be based on written notice submitted by the Contractor to the Owner in accordance with the provisions of Paragraph 10.06. Change Orders shall be subject to the approval of the Owner's governing body when required.

- B. The value of any Work covered by a Change Order or of any Claim for an adjustment in the Contract Price will be determined as described in Section 01 26 00 (Modification Procedures).

12.02 CHANGE OF CONTRACT TIMES

- A. The Contract Times may only be changed by a Change Order. Any Claim for an adjustment in the Contract Times shall be based on written notice submitted by the Contractor to the Owner in accordance with the provisions of Paragraph 10.06.
- B. Any adjustment of the Contract Times covered by a Change Order or any Claim for an adjustment in the Contract Times will be determined in accordance with the provisions of this Article 12 and Section 01 26 00 (Modification Procedures).
- C. Unless otherwise stated in the change order, all change orders include any claim for delay by the Contractor concerning the work described in the change order. The terms of the signed change order supersede any terms of the Contractor's proposal.
- D. Submittal of the Progress Schedule described in Part 2.07.A.1 and subsequent updates described in Section 6.04 is required as a predicate condition of any Contractor claims. Contractor agrees to waive any claim if it fails to submit such Progress Schedule submittals.

12.03 DELAYS

- A. Where Contractor is prevented from completing any part of the Work within the Contract Times due to delay beyond the control of Contractor, the Contract Times will be extended in an amount equal to the time lost due to such delay if a Claim is made therefor as provided in Paragraph 12.02.A. Delays beyond the control of Contractor shall include, but not be limited to, acts or neglect by Owner, acts or neglect of utility owners or other contractors performing other work as contemplated by Article 7, fires, floods, epidemics, abnormal weather conditions, or acts of God.
- B. If Owner, Engineer, or other contractors or utility owners performing other work for Owner as contemplated by Article 7, 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 Price or the Contract Times, or both. 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.
- C. If Contractor is delayed in the performance or progress of the Work by fire, flood, epidemic, abnormal weather conditions, acts of God, acts or failures to act of utility owners not under the control of Owner, or other causes not the fault of and beyond control of Owner and Contractor, then Contractor shall be entitled to an equitable adjustment in Contract Times, if such adjustment is 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 described in this Paragraph 12.03.C.

- D. Owner, Engineer, and their officers, directors, members, partners, employees, agents, consultants, or subcontractors shall not be liable to Contractor for any claims, costs, losses, or 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) sustained by Contractor on or in connection with any other project or anticipated project.
- E. Unless authorized by the Owner, Contractor shall not be entitled to an adjustment in Contract Price or Contract Times for delays within the control of Contractor. Delays attributable to and within the control of a Subcontractor or Supplier shall be deemed to be delays within the control of Contractor.
- F. The Owner may grant an extension of time for avoidable delay. In exchange, the Owner shall be compensated by the Contractor for the actual costs to the Owner of engineering, inspection, general supervision and overhead expenses which are directly chargeable to the work and which accrue during the period of such extension. The actual costs do not include charges for final inspection and preparation of the final estimate by the Owner.

ARTICLE 13 – TESTS AND INSPECTIONS; CORRECTION, REMOVAL OR ACCEPTANCE OF DEFECTIVE WORK

13.01 NOTICE OF DEFECTS

- A. Prompt notice of all defective Work of which Owner or Engineer has actual knowledge will be given to Contractor. Defective Work may be rejected, corrected, or accepted as provided in this Article 13.

13.02 ACCESS TO WORK

- A. Owner, Engineer, their consultants and other representatives and personnel of Owner, independent testing laboratories, and governmental agencies with jurisdictional interests will have access to the Site and the Work at reasonable times for their observation, inspection, and testing.
- B. Contractor shall provide proper and safe conditions for such access, including but not limited to traffic control and confined space entry requirements, and shall advise of Contractor's safety procedures and programs to be complied therewith as applicable.

13.03 TESTS AND INSPECTIONS

- A. Contractor shall facilitate required inspections, tests, and approvals and shall provide the Owner with any information requested in connection with the inspection of the work.

- B. Owner shall employ and pay for the services of an independent testing laboratory to perform all inspections, tests, or approvals required by the Contract Documents except:
1. For inspections, tests, or approvals covered by Paragraphs 13.03.D and 13.03.E below;
 2. That costs incurred in connection with tests or inspections conducted pursuant to Paragraph 13.04.B shall be paid as provided in Paragraph 13.04.C;
 3. As otherwise specifically provided in the Contract Documents;
 4. For inspections, tests, or approvals required due to failed tests on the Work; and
 5. For costs incurred by the Owner for standby or show up time when the Contractor failed to complete the Work for which tests are scheduled.
- C. Contractor shall schedule all inspections, tests, and approvals with the testing laboratory, inspector, or authority having jurisdiction and shall provide the Owner with 48 hours' notice of the scheduled inspection or testing date. The Contractor shall provide the testing laboratory, inspector, or authority having jurisdiction with any information requested in connection with the inspection of the work, which may include approved submittals and approved Drawings.
- D. 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 unless otherwise provided for in the Contract Documents, and furnish the Owner the required certificates of inspection or approval.
- E. Contractor shall be responsible for arranging and obtaining and shall pay all costs in connection with any inspections, tests, or approvals required for Owner's and Engineer's acceptance of materials or equipment to be incorporated in the Work; or acceptance of materials, mix designs, or equipment submitted for approval prior to Contractor's purchase thereof for incorporation in the Work. Such inspections, tests, or approvals shall be performed by organizations acceptable to Owner and Engineer.
- F. Contractor shall provide a copy to Owner of all reports, correction notices, and written directions received in connection with tests and inspections.
- G. If any Work (or the work of others) that is to be inspected, tested, or approved is covered by Contractor without written concurrence of Owner or Engineer, Contractor shall, if requested by Owner, uncover such Work for observation.
- H. Uncovering Work as provided in Paragraph 13.03.G shall be at Contractor's expense unless Contractor has given Owner or Engineer timely notice of Contractor's intention to cover the same and Owner or Engineer has not acted with reasonable promptness in response to such notice.

13.04 UNCOVERING WORK

- A. If any Work is covered contrary to the written request of Owner, it must, if requested by Owner, be uncovered for Owner's observation and replaced at Contractor's expense.
- B. If Owner or Engineer considers it necessary or advisable that covered Work be observed by Engineer or inspected or tested by others, Contractor, at Owner's request, shall uncover, expose, or otherwise make available for observation, inspection, or testing as Owner may require, that portion of the Work in question, furnishing all necessary labor, material, and equipment.
- C. If it is found that the uncovered Work is defective, 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 and defense costs) 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 Owner shall be entitled to an appropriate decrease in the Contract Price.
- D. 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, Contractor may make a Claim therefor as provided in Paragraph 10.06.

13.05 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, 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.

13.06 CORRECTION OR REMOVAL OF DEFECTIVE WORK

- A. Promptly after receipt of written notice, Contractor shall correct all defective Work, whether or not fabricated, installed, or completed, or, if the Work has been rejected by Owner, with input from Engineer, remove it from the Project and replace it with Work that is not defective. 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 and defense costs) arising out of or relating to such correction or removal (including but not limited to all costs of repair or replacement of work of others).

- B. When correcting defective Work under the terms of this Paragraph 13.06 or Paragraph 13.07, Contractor shall take no action that would void or otherwise impair Owner's special warranty and guarantee, if any, on said Work.

13.07 CORRECTION PERIOD

- A. There shall be a one-year correction period from 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. During the correction period, if any Work is found to be defective, or if the repair of any damages to the land or areas made available for Contractor's use by Owner or permitted by Laws and Regulations as contemplated in Paragraph 6.11.A is found to be defective, Contractor shall promptly, without cost to Owner and in accordance with Owner's written instructions:
 - 1. Repair such defective land or areas; or
 - 2. Correct such defective Work; or
 - 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 other land or areas resulting therefrom.
- B. The Contractor shall appoint a representative to be the point-of-contact for response to defective work during the one-year correction period. Upon notification by the Owner, the Contractor shall evaluate the problem and correct it or initiate the response by the appropriate vendor or subcontractor as applicable.
- C. The Contractor shall provide written notification to the Owner indicating scheduled time of response so that Owner maintenance personnel may be scheduled to be on hand to provide assistance and witness the repair. Such work may only be undertaken on Mondays through Fridays, from 8 a.m. to 5 p.m., unless the Owner gives express written consent for the performance of the work at other times.
- D. If Contractor does not promptly comply with the terms of Owner's written instructions, or in an emergency where, in the opinion of the Owner, 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. In the case of an emergency, Owner may make corrections without prior notice to the Contractor. 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 and defense 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) will be paid by Contractor.

- E. In special circumstances where Substantial Completion is issued for a particular item(s) of equipment before Substantial Completion of all the Work, the correction period for that item(s) shall start to run from its Substantial Completion date.
- F. Where defective Work (and damage to other Work resulting therefrom) has been corrected or removed and replaced under this Paragraph 13.07, 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.
- G. Contractor's obligations under this Paragraph 13.07 are in addition to any other obligation or warranty. The provisions of this Paragraph 13.07 shall not be construed as a substitute for, or a waiver of, the provisions of any applicable statute of limitation or repose.
- H. A summary of items with correction periods or manufacturer's warranty periods longer than one year is included at the end of this specification section.

13.08 ACCEPTANCE OF DEFECTIVE WORK

- A. If, instead of requiring correction or removal and replacement of defective Work, Owner (and, prior to Engineer's recommendation of final payment, Engineer) prefers to accept it, Owner may do so. 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 and defense costs) 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 pursuant to this sentence. If any such acceptance occurs prior to Engineer's recommendation of final payment, a Change Order will be issued incorporating the necessary revisions in the Contract Documents with respect to the Work, and Owner shall be entitled to an appropriate decrease in the Contract Price, reflecting the diminished value of Work so accepted.

13.09 OWNER MAY CORRECT DEFECTIVE WORK

- A. If Contractor fails within a reasonable time after written notice from Owner to correct defective Work, or to remove and replace rejected Work as required by Owner in accordance with Paragraph 13.06.A, 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, 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 13.09, Owner shall proceed within a reasonable period of time. 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, take possession of Contractor's tools, appliances, construction equipment and machinery at the Site, 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 (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 and defense costs) incurred or sustained by Owner in exercising the rights and remedies under this Paragraph 13.09 will be charged against Contractor, and a Change Order will be issued incorporating the necessary revisions in the Contract Documents with respect to the Work; and Owner shall be entitled to an appropriate decrease in the Contract Price. 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. The rights exercised under the provisions of this section shall not diminish the Owner's right to pursue any other avenue for additional remedy or damages with respect to the Contractor's failure to perform the work as required.
- D. Contractor shall not be allowed an extension of the Contract Times or compensation therefore 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 13.09.

ARTICLE 14 – PAYMENTS TO CONTRACTOR AND COMPLETION

14.01 SCHEDULE OF VALUES

- A. The Schedule of Values established as provided in Paragraph 2.07.A will serve as the basis for progress payments and will be incorporated into a form of Application for Payment acceptable to the Owner. Progress payments on account of Unit Price Work will be based on the number of units completed.

14.02 PROGRESS PAYMENTS

- A. Applications for Payments:
 - 1. Not more often than once a month, Contractor shall submit to Owner and 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.
 - 2. 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 showing the price paid and warranting that the materials and equipment are free and clear of all Liens and by evidence that the materials and equipment are covered by appropriate property insurance or other arrangements to

protect Owner's interest therein. Contractor shall complete and submit the Owner's Certificate for Material Stored On or Off Job Site with required documentation, all of which must be satisfactory to Owner. The Certificate is included at the end of this specification section. Payment for stored materials shall be at the sole discretion of the Owner and shall not exceed 75% of the installed cost in the Schedule of Values unless otherwise approved by Owner or otherwise specified for selected equipment in Section 01 20 00 (Measurement and Payment). Contractor will be responsible for stored materials regardless of Owner's payment for such material.

3. Each Application shall include Contractor's Certificate on Owner's form 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. Owner's Invoice form is included at the end of this specification section.
4. The amount of retainage with respect to progress payments will be as stipulated in the Agreement.

B. Review of Applications:

1. Construction Manager will, within 10 working days after receipt of each Application for Payment, either indicate in writing a recommendation of payment and present the Application to Owner or return the Application to Contractor indicating in writing Construction Manager's reasons for refusing to recommend payment. In the latter case, Contractor may make the necessary corrections and resubmit the Application.
2. Construction Manager will determine the actual quantities and classifications of Unit Price Work performed by Contractor. Construction Manager will review with Contractor preliminary determinations on such matters before rendering a written decision thereon (by recommendation of an Application for Payment or otherwise). Written decision of the Construction Manager thereon will be final and binding (except as modified by Construction Manager to reflect changed factual conditions or more accurate data) upon Owner and Contractor, subject to the provisions of Paragraph 10.06.
3. Construction Manager's recommendation of any payment requested in an Application for Payment will constitute a representation by Construction Manager to Owner, based on review of the Application for Payment and the accompanying data and schedules, and on Engineer's observations of the executed Work as an experienced and qualified design professional, that to the best of Construction Manager'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 14.02.B.2, 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 Construction Manager's responsibility to observe the Work.
- 4. By recommending any such payment Construction Manager 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 Construction Manager and Engineer in the Contract Documents; 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.
- 5. Neither Construction Manager's and Engineer's review of Contractor's Work for the purposes of recommending payments nor Construction Manager's recommendation of any payment, including final payment, will impose responsibility on Construction Manager and 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 moneys 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.
- 6. Construction Manager may refuse to recommend the whole or any part of any payment if, in Construction Manager's opinion, it would be incorrect to make the representations to Owner stated in Paragraph 14.02.B.3. Construction Manager may also refuse to recommend any such payment or, because of subsequently discovered evidence or the results of subsequent inspections or tests, revise or revoke any such payment recommendation previously made, to such extent as may be necessary in Construction Manager's opinion to protect Owner from loss because:
 - a. The Work is defective, or completed Work has been damaged, requiring correction or replacement;
 - b. The Contract Price has been reduced by Change Orders;
 - c. Owner has been required to correct defective Work or complete Work in accordance with Paragraph 13.09; or
 - d. Construction Manager has actual knowledge of the occurrence of any of the events enumerated in Paragraph 15.02.A.

C. Payment Becomes Due:

- 1. In accordance with RCW 39.76.011, within 30 days after presentation of the Application for Payment to Owner with Construction Manager's recommendation, the amount recommended will (subject to the provisions

of Paragraph 14.02.D) become due, and when due will be paid by Owner to Contractor.

2. In accordance with RCW 39.12.040, the first payment shall not be made until the Contractor has submitted the "Statement of Intent to Pay Prevailing Wages (Intent)", approved by the Department of Labor and Industries (L&I), for itself and all Subcontractors that performed work to be paid on the Pay Application. Each subsequent payment shall not be made until the Contractor submits the Intent, approved by L&I, for each new subcontractor performing work since the last invoice.

D. Reduction in Payment:

1. Owner may refuse to make payment of the full amount recommended by Engineer because:
 - a. Claims have been made against Owner on account of Contractor's performance or furnishing of the Work;
 - b. 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;
 - c. There are other items entitling Owner to a set-off against the amount recommended; or
 - d. Owner has actual knowledge of the occurrence of any of the events enumerated in Paragraphs 14.02.B.6.a through 14.02.B.6.c or Paragraph 15.02.A.
2. If Owner refuses to make payment of the full amount recommended by Engineer, Owner will give Contractor written notice (with a copy to Engineer) stating the reasons for such action and pay Contractor any amount remaining after deduction of the amount so withheld. Owner shall pay Contractor the amount so withheld, or any adjustment thereto agreed to by Owner and Contractor, if Contractor remedies the reasons for such action.
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 14.02.C.1 and subject to interest as provided in RCW 39.76.011.
4. Items entitling Owner to retain set-offs from the amount recommended include, but are not limited to:
 - a. Witnessing retesting of corrected or replaced defective Work;
 - b. Return visits to manufacturing facilities to witness factory testing or retesting;
 - c. Submittal review in excess of three reviews (initial submittal and up to two re-submittals) by Engineer for substantially the same Submittal;
 - d. Evaluation of proposed substitutes and making changes to Contract Documents occasioned thereby;
 - e. Overtime worked by Contractor necessitating Engineer, Engineer's site staff, Construction Manager, or Owner's site staff, if any, to work extraordinary overtime. Such overtime would not have been contemplated by Owner at time of Bid opening; or

- f. Delays necessitating a time extension for the performance of Engineer's services.

14.03 CONTRACTOR'S WARRANTY OF TITLE

- A. Contractor warrants and guarantees that title to all Work, materials, and equipment covered by any Application for Payment will pass to Owner upon incorporation in the Project and payment in full free and clear of all Liens.

14.04 SUBSTANTIAL COMPLETION

- A. Contractor shall complete all the work within the time designated in the Agreement unless modified by Change Order or the Certificate of Substantial Completion.
- B. The Work is substantially complete when the Owner can be provided full time, uninterrupted, and continuous beneficial operation of the facilities. In addition, all required functional, performance, and acceptance or startup testing must have been demonstrated for all components, devices, equipment and instrumentation and control to the satisfaction of the Engineer in accordance with the requirements of the Specifications. If applicable, training of Owner personnel by an authorized representative of the manufacturer must also have been completed.
- C. Partial Utilization: Prior to Substantial Completion of all the Work, the Owner may use or occupy any substantially completed part of the Work which has specifically been identified in the Contract Documents, or which Owner, Construction Manager, 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. Owner at any time may request Contractor in writing to permit Owner to use or occupy any such part of the Work which Owner believes to be ready for its intended use and substantially complete. If and when the Contractor agrees that such part of the Work is substantially complete, Contractor, Owner, Construction Manager, and Engineer will follow the procedures of Parts 14.04.F-I of this Section.
 - 2. Contractor at any time may notify Owner and Engineer in writing that Contractor considers any such part of the Work ready for its intended use and substantially complete and requires Owner to issue a certificate of Substantial Completion for that part of the Work.
 - 3. Within a reasonable time after either such request, Owner, Construction Manager, Contractor, and Engineer shall make an inspection of that part of the Work to determine its status of completion. If Construction Manager does not consider that part of the Work to be substantially complete, Construction Manager will notify Owner and Contractor in writings giving the reasons therefor. If Construction Manager considers that part of the Work to be substantially complete, the provision of Parts 14.04.G and I of this Section 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.

- D. Operational Testing and Commissioning: It is the intent of the Owner to have a complete and operable system at the Substantial Completion date. Therefore, when the work involves the installation of machinery or other mechanical equipment, street lighting, electrical distribution or signal systems; irrigation systems; buildings; or other similar work, it may be desirable for the Contractor to operate and test the work for a period of time after inspection but prior to the Substantial Completion date. Whenever items of work are listed in the Project Manual for operational testing, they shall be fully tested under operating conditions for the time period specified to ensure their acceptability prior to the Substantial Completion date. During and following the test period, the Contractor shall correct any items of workmanship, materials, or equipment which prove faulty or do not meet operating conditions as defined in the Contract Documents. Equipment, electrical controls, meters, or other devices and equipment to be tested during this period shall be tested under the observation of the Engineer or Owner, so that the Engineer or Owner may determine their suitability for the purpose for which they were installed. Operational testing may be followed by a commissioning period. The Substantial Completion date cannot be established until operational testing, commissioning, and corrections have been completed to the satisfaction of the Engineer and Owner.
- E. Operational and test periods, when required, shall not affect a manufacturer's guaranties or warranties furnished under the terms of the Contract.
- F. When Contractor considers the entire Work ready for its intended use, Contractor shall notify Owner in writing that the entire Work is substantially complete (except for items specifically listed by Contractor as incomplete) and request that Owner issue a certificate of Substantial Completion. Contract time is automatically suspended upon the Owner's receipt and acceptance, in writing, of the notification.
- G. The Owner has sole discretion for determination of Substantial Completion. If the Owner considers the work substantially complete, the Owner will notify the Contractor in writing that the work is accepted as substantially complete. The acceptance notice will include a punch list of incomplete work items, set the date for their completions, describe the division of responsibility between the Owner and the Contractor, and describe any other terms of acceptance.
- H. Should the Owner determine that work is not Substantially Complete:
1. Owner shall notify the Contractor in writing stating reasons thereof.
 2. Contractor shall complete work and send subsequent written notice(s) to Owner certifying that work or designated portion of work is Substantially Complete.
- I. The one-year correction period begins on the date of Substantial Completion.

14.05 PHYSICAL COMPLETION

- A. The Work is physically complete when the Owner can be provided a complete and operable system. At a minimum, the following must occur:

1. All physical work must be completed;
 2. Punch list items must be completed to the satisfaction of the Owner;
 3. All spare parts must be delivered to Owner;
 4. All final permit inspections must be completed;
 5. Certificate of Occupancy must be issued;
 6. Access control items including keys and badges must be returned to Owner; and
 7. The following documents must be submitted to Owner:
 - a. Final O&M Manuals
 - b. Final As-built Redlines
 - c. As-built Finish Schedule
 - d. Motor data sheets to include calibration data and all testing certifications
 - e. Equipment Warranties and Warranty Certificates
 - f. Vendor CAD drawings
 - g. Material Acceptance Verifications, such as mill test reports, if applicable
 - h. Property Restoration Release Statements, if applicable
- B. When the Contractor considers the work physically complete and ready for final inspection, the Contractor shall, by written notice, request to schedule a final inspection. The Construction Manager will set a date for final inspection with the Construction Manager, Owner, Engineer, and the Contractor.
- C. Should the Owner determine that work is not Physically Complete:
1. Construction Manager shall notify the Contractor in writing of all particulars in which the final inspection reveals the work to be incomplete or unacceptable.
 2. Contractor shall immediately take such corrective measures as are necessary to remedy the listed deficiencies. Corrective work shall be pursued vigorously, diligently, and without interruption until physical completion of the listed deficiencies. This process will continue until the Construction Manager is satisfied that the listed deficiencies have been corrected.
- D. The Owner has sole discretion for determination of Physical Completion. If the Owner considers the work physically complete, the Construction Manager will notify the Contractor in writing that the work is accepted as physically complete. The acceptance notice will include a list of items required to issue Final Completion and Acceptance.
- E. Upon Physical Completion, Owner may pay the Mobilization/Demobilization bid item in full.
- F. Physical Completion shall not imply acceptance of the work or that all the obligations of the Contractor under the contract have been fulfilled.

14.06 FINAL COMPLETION AND ACCEPTANCE

- A. The Contractor must perform all obligations under the Contract before the Final Completion and Acceptance Date can be established. A Certificate of Completion and Acceptance of the work issued by the Owner will establish the Completion and Acceptance Date and certify the work as complete. The following must occur before the Final Contract Price can be calculated and the Completion and Acceptance Date can be established:
 - 1. All permits must be closed.
 - 2. The Contractor must furnish all documentation and parts required by the Contract and required by law, necessary to allow the Owner to certify the Contract as complete. This includes, but is not limited to:
 - a. Final Pay Application
 - b. Final Change Order, if applicable
 - c. Affidavits of Wages Paid
 - d. Certified Payrolls, if applicable
- B. The Owner will issue the Notice of Final Completion and Acceptance in writing. Progress estimates or payments shall not be construed as acceptance of any work under this Contract.
- C. Failure of the Contractor to perform all of the Contractor's obligations under the Contract shall not bar the Owner from unilaterally certifying the Contract complete so the Owner may calculate a Final Contract Price.
- D. The Contractor agrees that Final Completion and Acceptance shall not relieve the Contractor of the responsibility to indemnify, defend, and protect the Owner against any claim or loss resulting from the failure of the Contractor (or the Subcontractors or lower tier subcontractors) to pay all laborers, mechanics, subcontractors, material persons, or any other person who provides labor, supplies, or provisions for carrying out the Work or for any payments required for unemployment compensation under Title 50 RCW or for industrial insurance and medical aid required under Title 51 RCW.
- E. Final acceptance shall not constitute acceptance of any unauthorized or defective work or material. The Owner shall not be barred from requiring the Contractor to remove, replace, repair, or dispose of any unauthorized or defective work or material or from recovering damages for any such work or material.
- F. Final acceptance shall not extinguish any covenant or agreement on the part of the Contractor to be performed or fulfilled under this Contract which has not, in fact, been performed or fulfilled at the time of such acceptance.

14.07 FINAL PAYMENT

- A. Application for Payment:
 - 1. After Contractor has, in the opinion of Construction Manager and 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, marked-up record documents (as provided in Paragraph 6.12), and other documents, Contractor may make application for final payment following the procedure for progress payments. Final payment shall mean payment for completion of all Work, not to include retained funds, if any.

2. The final Application for Payment shall be accompanied (except as previously delivered) by:
 - a. All documentation called for in the Contract Documents; and
 - b. A list of all Claims against Owner that Contractor believes are unsettled.

B. Construction Manager's Review of Application and Acceptance

1. If, on the basis of Construction Manager's and Engineer's observation of the Work during construction and final inspection, and Construction Manager's review of the final Application for Payment and accompanying documentation as required by the Contract Documents, Construction Manager is satisfied that the Work has been completed and Contractor's other obligations under the Contract Documents have been fulfilled, Construction Manager will, within ten days after receipt of the final Application for Payment, indicate in writing recommendation of payment and present the Application for Payment to Owner for payment. Otherwise, Construction Manager 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. Payment Becomes Due

1. Thirty calendar days after the presentation to Owner of the Application for Payment and accompanying documentation, the amount recommended by Construction Manager, less any sum Owner is entitled to set off against Construction Manager's recommendation, including but not limited to liquidated damages, will become due and will be paid by Owner to Contractor.

D. Release of Retained Funds or Retainage Bond

1. Upon final payment and Final Completion and Acceptance, Owner will notify the Department of Revenue, the Department of Labor and Industries, and the Employment Security Department of the completion of the Work under these Contract Documents.
2. At the end of the period to file claims against the retained funds, the Contractor shall submit the following to Owner:
 - a. Release and Certificate of Payment, which is included at the end of this specification section

- b. Complete and legally effective releases or waivers (satisfactory to Owner) of all Lien rights arising out of or Liens filed in connection with the Work.
- 3. In lieu of the releases or waivers of Liens specified in Paragraph 14.07.D.2 and as approved by Owner, Contractor may furnish receipts or releases in full and an affidavit of Contractor that: (i) the releases and receipts include all labor, services, material, and equipment for which a Lien could be filed; and (ii) 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.
- 4. Provided the Departments certify that 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, authorize release of retained funds held in escrow, or authorize release of retainage bond subject to the provisions of RCW Title 60.28.011. 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 the remainder will be released from escrow, or released from the retained funds and paid to Contractor.

ARTICLE 15 – SUSPENSION OF WORK AND TERMINATION

15.01 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 calendar days and for any further period mandated by applicable law or to which the Owner and Contractor agree by notice in writing to Contractor and Engineer which will fix the date on which Work will be resumed. Contractor shall resume the Work on the date so fixed. Contractor shall be granted an adjustment in the Contract Price or an extension of the Contract Times, or both, directly attributable to any such suspension if Contractor makes a Claim therefor as provided in Paragraph 10.06.
- B. Before and during any suspension, the Contractor shall protect the Work from damage or deterioration. Suspension shall not relieve the Contractor from anything the Contract requires unless stated otherwise. All costs associated with protecting and maintaining such Work shall be the responsibility of the Contractor except those costs associated with implementing the Temporary Erosion and Sediment Control Plan, if applicable. After any suspension, the Contractor shall resume all responsibilities the Contract assigns for the Work.

15.02 OWNER MAY TERMINATE FOR CAUSE

- A. The occurrence of any one or more of the following events will justify termination for cause:

1. Contractor's 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 established under Paragraph 2.07 as adjusted from time to time pursuant to Paragraph 6.04);
 2. Contractor's disregard of Laws or Regulations of any public body having jurisdiction including Owner's Policies;
 3. Contractor's repeated disregard of the authority of Engineer or Owner; or
 4. Contractor's violation in any substantial way of any provisions of the Contract Documents.
- B. If one or more of the events identified in Paragraph 15.02.A occur, Owner may, with written notice, terminate the services of Contractor and:
1. Exclude Contractor from the Site, and take possession of the Work and of all Contractor's tools, appliances, construction equipment, and machinery at the Site, and use the same to the full extent they could be used by Contractor (without liability to Contractor for trespass or conversion);
 2. 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
 3. Complete the Work as Owner may deem expedient.
- C. If Owner proceeds as provided in Paragraph 15.02.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 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) sustained by Owner arising out of or relating to completing the Work, such excess will be paid to Contractor. If such claims, costs, losses, and damages exceed 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 Owner, 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.
- D. 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. Any retention or payment of moneys due Contractor by Owner will not release Contractor from liability.
- E. If and to the extent that Contractor has provided a performance bond under the provisions of Paragraph 5.01.A, the termination procedures of that bond shall supersede the provisions of Paragraphs 15.02.B and 15.02.C.

15.03 OWNER MAY TERMINATE FOR CONVENIENCE

- A. Upon fifteen 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 or any portion of 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;
 3. 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) incurred in settlement of terminated contracts with Subcontractors, Suppliers, and others; and
 4. Reasonable expenses directly attributable to termination.
- B. Contractor shall not be paid on account of loss of anticipated profits or revenue or other economic loss arising out of or resulting from such termination.

ARTICLE 16 – DISPUTE RESOLUTION

16.01 METHODS AND PROCEDURES

- A. All claims or counterclaims, disputes, or other matters in question between Owner and Contractor arising out of or relating to the Contract Documents or the breach thereof not resolved under the provisions of Paragraph 10.06 will be decided by arbitration in accordance with the Agreement.

ARTICLE 17 – MISCELLANEOUS

17.01 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 to the individual designated by a party to accept delivery or to a member of the firm or to an officer of the corporation, or to an agent acting on behalf of the foregoing; or
 2. Sent to the attention of a person described in the preceding paragraph by United States mail, postage prepaid, to the last business address provided by the Contractor; or
 3. Sent to the attention of a person described in the first paragraph by e-mail, to the last e-mail address provided by the Contractor.
- B. All correspondence from the Contractor shall be directed to the Owner's Representative. Notice to the Owner is not considered effective until receipt by the Owner.

17.02 COMPUTATION OF TIMES

- A. Unless specifically noted as calendar days, all references in the Contract Documents to days shall be interpreted to be working days as defined in Article 1.01. If the date of the first working day for a period of time is not specified, then the period will begin on the first following working day.
- B. When any period of time is referred to in the Contract Documents by calendar days, the period will begin on the first following working day. If the last day of any such period falls on a Saturday or Sunday or on a LOTT Holiday, then the last day of the period shall be the next working day.

17.03 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 Documents. 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.

17.04 SURVIVAL OF OBLIGATIONS

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

17.05 CONTROLLING LAW

- A. This Contract is to be governed by the law of the state of Washington.

17.06 HEADINGS

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

***** END OF SECTION *****



Property Restoration Release Statement

Reference Specification Section 00 72 05, Article 4.01

Date: _____

Property Owner Name and Address:

Project Name:

Project Property Address:

Dear Property Owner:

Thank you for permitting LOTT Clean Water Alliance the use of your property for the above named project. By signing this letter you are agreeing that any restoration required on your property has been completed to your satisfaction and that no further restoration work will be necessary.

I have examined the restoration to my property and find it to be complete and satisfactory

Property Owner Printed Name

Property Owner Signature

Date

LOTT Construction Manager Signature

Date

Correction Period or Manufacturer's Warranty Period Longer than 1 Year

Reference Specification Section 00 72 05, Articles 13.07

All work has a one-year correction period from the date of Substantial Completion. The items listed below have correction periods and/or manufacturer's warranty periods longer than one year. This list is a reference and may not include all items. Contractor is not excused from the requirements of technical specifications not referred to.

ITEM	SPECIFICATION SECTION	CORRECTION OR WARRANTY PERIOD
Pre-Engineered Fiberglass Building	06 70 00	10 years
Water Heater	22 45 16	Electrical – 2 years Heater Exchanger – 6 year
Metering Pump	43 32 69	3 years
Polyethylene Storage Tank	43 41 45	5 years

Invoice Form

Reference Specification Section 00 72 05, Article 14.02

 LOTT Clean Water Alliance AGENCY NAME LOTT CLEAN WATER ALLIANCE 500 Adams Street NE Olympia, WA 98501 Attn: _____ VENDOR OR CLAIMANT 	<table border="1" style="width: 100%; border-collapse: collapse;"><tr><td style="width: 33%;">CONTRACT NO.</td><td style="width: 33%;">SYSTEM SITE</td><td style="width: 33%;">INVOICE NO.</td></tr><tr><td style="height: 30px;"></td><td></td><td></td></tr></table> VENUE CERTIFICATE: I HEREBY CERTIFY UNDER PENALTY OF PERJURY THAT THE ITEMS AND TOTALS LISTED HEREIN ARE PROPER CHARGES FOR MATERIALS, MERCHANDISE, OR SERVICES FURNISHED TO THE LOTT CLEAN WATER ALLIANCE. THAT ALL GOODS FURNISHED OR SERVICES RENDERED HAVE BEEN PROVIDED WITHOUT DISCRIMINATION ON THE GROUNDS OF RACE, CREED, COLOR, NATIONAL ORIGIN, SEX, AGE, SEXUAL ORIENTATION, DISABILITY, OR ANY OTHER STATE OR LEGALLY APPLICABLE PROTECTED CLASS. THAT PREJUDICIAL WAGES HAVE BEEN PAID IN ACCORDANCE WITH THE STATEMENT(S) OF INTENT ON FILE WITH THE DEPARTMENT OF LABOR AND INDUSTRIES AS APPROVED BY THE INDUSTRIAL STATISTICAL THAT ALL PREVIOUS PROGRESS PAYMENTS RECEIVED HAVE BEEN APPLIED TO DISCHARGE CONTRACTORS' LEGITIMATE OBLIGATIONS TO LABORERS, SUBCONTRACTORS, SUPPLIERS, AND OTHERS LESS EARNED RETAINAGE FOR WORK ASSOCIATED WITH PRIOR APPLICATIONS FOR PAYMENT; AND THAT, AS OF THE TIME OF THIS APPLICATION FOR PAYMENT, THERE ARE NO OTHER OUTSTANDING AMOUNTS DUE TO CONTRACTOR BY LOTT. FEDERAL TAX ID NO.: _____ FAILURE TO PROVIDE THIS NUMBER WILL RESULT IN DELAY OF PAYMENT. BY: _____ SIGNATURE TITLE: _____	CONTRACT NO.	SYSTEM SITE	INVOICE NO.			
CONTRACT NO.	SYSTEM SITE	INVOICE NO.					

DESCRIPTION	AMOUNT	FOR AGENCY USE
Total Earned to Date		
Plus Washington State Sales Tax	\$0.00	
Gross Earned to Date	\$0.00	
Less Retained Retained Percentage on Total Amount Earned to Date Not Including Sales Tax	\$0.00	
Net Earned to Date	\$0.00	
Less Previously Invoiced	\$0.00	
AMOUNT DUE THIS INVOICE	\$0.00	
This Certifies that Services Invoiced hereon have been received LOTT Clean Water Alliance By _____Date _____		

The following subcontractors performed work on this project to date:

Subcontractor is any firm (such as suppliers, manufacturers, and fabricators of nonstandard items) that meets the definition of "Contractor" in WAC 296-127-010. List subcontractors of all tiers.

Release and Certificate of Payment

Reference Specification Section 00 72 05, Article 14.07

1. Date: _____
2. Contractor:
 - a. Name: _____
 - b. Address: _____
 - c. Telephone: _____
3. Project:
 - a. Name: _____
 - b. Contract #: _____
4. Final Payment Amount: \$ _____
5. Period Covered: _____

Contractor covenants and warrants to LOTT Clean Water Alliance (Owner), and certifies as follows:

1. All persons, firms, corporations and other entities furnishing labor, employee benefits, materials, equipment, and/or professional services in connection with the Project, at the request of and for or on behalf of the Contractor will be paid through the period stated in No. 5 above from funds to be received from this payment. Contractor has made reasonable inquiry and is not aware of any person, firm, corporation, or other entity who has furnished labor, employee benefits, materials, equipment and/or professional services to the Contractor for the Project that currently has, or is expected to have, a claim or lien against the Project or against the Contractor's bonds, or any retained percentage, except by claimant(s) in the amount(s) as follows (none, unless otherwise stated):

Owner reserves the right to withhold an amount equal to such unpaid claims together with a sum sufficient to defray the costs and attorney fees incurred in foreclosing the lien of such claims.

2. Contractor has made reasonable inquiry and is not aware of any federal, state or municipal taxes, warrants, levies, or other claims, charges, unpaid or delinquent, for which the Contractor or its subcontractors are responsible which constitute an encumbrance, claim, or lien against the Project, or the Contractor's bonds, or retained percentage, except by claimant(s) in the amount(s) as follows (none, unless otherwise stated):

Owner reserves the right to withhold an amount equal to such unpaid taxes and unpaid claims together with a sum sufficient to defray the costs and attorney fees incurred in foreclosing the lien of such claims.

3. The undersigned Contractor agrees to indemnify and hold the Owner harmless from any and all claims for payment which might be filed contrary to the representations made above and to defend any such claims without any cost, expense, or damages, to the Owner.
4. The undersigned Contractor, in consideration for the Payment Amount shown above, hereby forever releases the Owner from any and all claims for payment arising under or in connection with the Project during the period covered and accepts said payment as full compensation and consideration for all of the Work performed under this contract.
5. This certificate is made by the undersigned Contractor with a full understanding of the facts set forth herein, and for the purpose of inducing the Owner to make payment to the Contractor on the assurance that there are no liens, claims or other encumbrances, except as described above.
6. The person signing this document, regardless of whether they are signing in representative capacity, specifically represents that they have reviewed the relevant records of the Contractor, and have personal knowledge that all lienable claims except those listed above have been paid. The undersigned also represents that they have been duly authorized to sign this release and to make the representations set forth above on behalf of the Contractor.

I declare under penalty of perjury under the laws of the State of Washington that the foregoing statements are true and correct.

SIGNED this _____ day of _____, 20__.

Signature of Contractor

Name and Title of Contractor

Contractor's License No, State, and Expiration Date

SECTION 00 73 43

WAGE RATE REQUIREMENTS

PART 1 – GENERAL

1.01 SUMMARY

This section describes the wage rate requirements for the project.

1.02 STATE WAGE RATE REQUIREMENTS

- A. This Contract is subject to the prevailing wage requirements of RCW 39.12. The Contractor and each subcontractor engaged in the work shall pay each employee an amount not less than the wage rate established for each trade or occupation listed by the Washington Department of Labor and Industries (L&I). If employing labor in a class not listed, the Contractor shall request a determination of the correct wage and benefits rate for that class and locality from the Industrial Statistician at L&I.
- B. Wage rates and benefit code key that apply to this contract will have the Effective Date of the bid due date as published by L&I, available from:

<https://secure.lni.wa.gov/wagelookup/rates/journey-level-rates>

Prevailing Wage Office

P. O. Box 44540
Olympia, Washington 98504-4540
(360) 902-5335

- C. Per RCW 39.12.020, for Contracts over \$10,000, the Contractor shall post a copy of the Statement of Intent to Pay Prevailing Wage (Intent) and contact information for the Industrial Statistician where a wage complaint or inquiry may be made. Information shall be posted in an area accessible to all workers, including subcontractors.
- D. Before any payment is made by the Owner of any sums due under this Contract, the Owner must receive from the Contractor and any subcontractors a copy of the Intent approved by L&I. Also, in order to issue Final Completion and Final Acceptance, the Owner must receive from the Contractor and each subcontractor a copy of the "Affidavit of Wages Paid" (Affidavit) approved by L&I. Payment by the Contractor or subcontractor of any costs to meet these requirements shall be included in the Cost of the Work.
- E. The Contractor shall ensure that the information reported on the Intent and Affidavit is correct. Payment of any penalties or claims resulting from incorrect reporting shall be the responsibility of the Contractor.
- F. The Contractor shall ensure that any firm, such as suppliers, manufacturers, or fabricators, that falls under the provisions of RCW 39.12 because of the definition of "Contractor" in WAC 296-127-010 complies with all the requirements of RCW 39.12.

The Contractor shall be responsible for wage rate compliance by all firms engaged in any part of the Work necessary to complete this Contract. Therefore, should a violation of this Section occur by any firm that is providing Work or materials for completion of this Contract, whether directly or indirectly responsible to the Contractor, the Owner will take action against the Contractor, as provided by the provisions of the Contract, to achieve compliance, including but not limited to, withholding payment on the Contract until compliance is achieved.

- G. The fabrication of certain items is subject to prevailing wage requirements. The following flow chart for determining applicability of prevailing wages is based on L&I Determination 11272007 regarding the fabrication of control panels and is included for the Contractor's convenience.

1.03 FEDERAL (DAVIS-BACON ACT) WAGE RATE REQUIREMENTS

There are no federal wage rate requirements for this Contract.

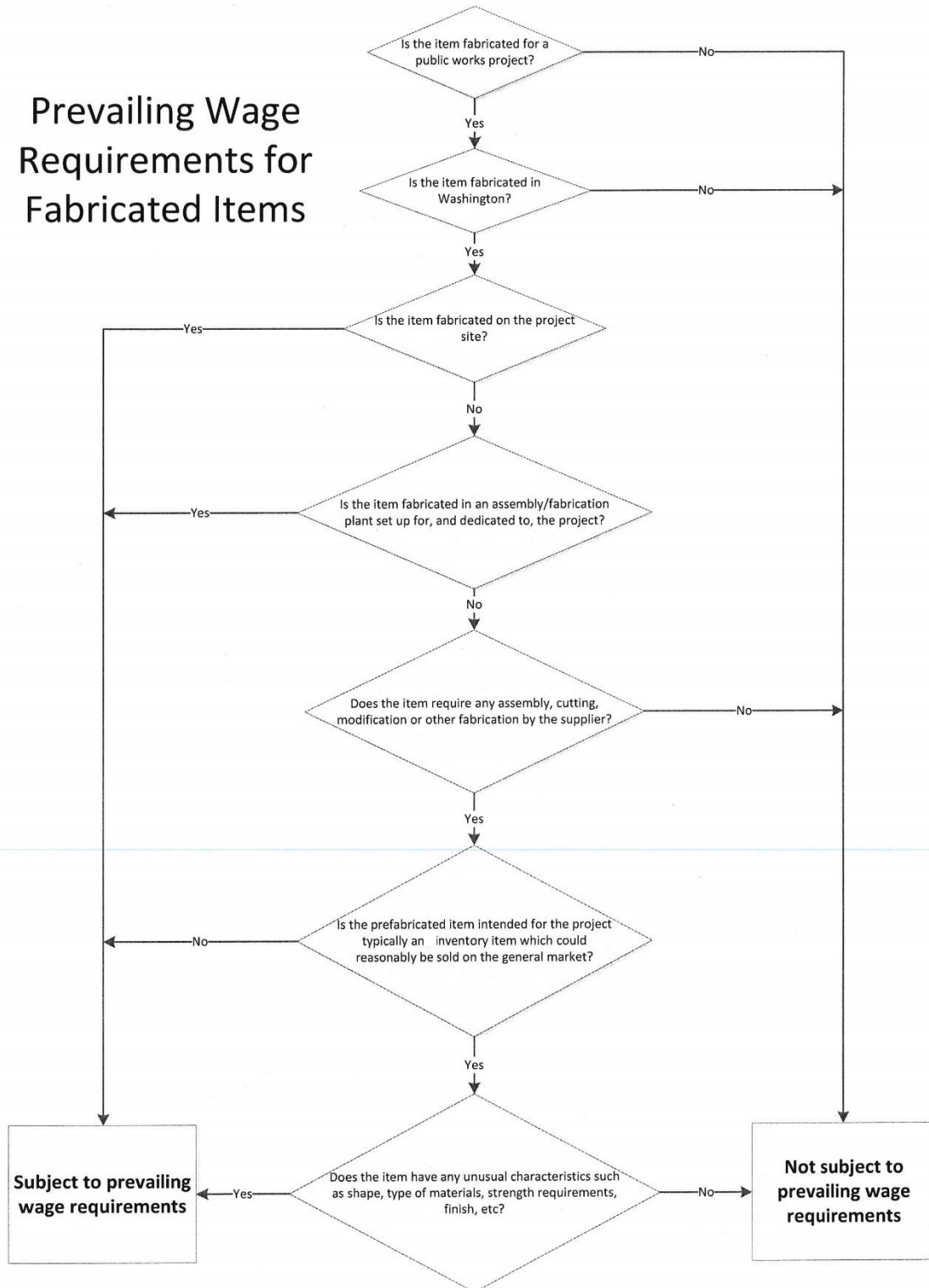
PART 2 – PRODUCTS

NOT USED

PART 3 – EXECUTION

NOT USED

Prevailing Wage Requirements for Fabricated Items



*** END OF SECTION ***

Division 1

General Requirements

SECTION 01 11 00

SUMMARY OF WORK

PART 1 – GENERAL

1.01 SUMMARY

- A. The chemical feed system is intended to provide a supplemental source of carbon to the biological process to allow the BITP to reduced the level of nitrogen discharge to Budd Inlet in warmer weather months.
- B. The Work consists of providing all labor, materials, supplies, equipment, services, transportation, permits, and submittals required to complete the project. Omissions from the Contract Documents of details of work that are necessary to carry out the intent of the Contract shall not relieve the Contractor from performing the omitted work.

1.02 PROJECT DESCRIPTION

- A. The Work to be provided by the Contractor under this Contract includes, but is not limited to, the following items:
 - 1. Obtain and comply with permits
 - 2. Complete demolition and site preparation work
 - 3. Furnish and install tanks and chemical feed system
 - 4. Furnish and install a new water heater and emergency shower and eyewash station
 - 5. Extend service air near the tanks.
 - 6. Furnish and install associated piping, valves, and appurtenances
 - 7. Furnish and install guardrail at the existing Splitter Box
 - 8. Prepare as-built redlines
 - 9. Furnish and install associated electrical, instrumentation, and controls
 - 10. Perform testing, startup, commissioning
 - 11. Provide training
 - 12. Prepare O&M manuals
- B. The project site is located at *the Budd Inlet Treatement Plant, 500 Adams Street NE, Olympia, WA 98501*

1.03 NOTICE TO COMMENCE CONSTRUCTION LIMITATIONS

- A. Notice to Commence Construction is to be issued by the Owner no earlier than Monday, October 26, 2026. After Notice to Commence Construction is issued, the Contractor shall commence physical construction Work at the project site. Under no circumstance shall the Contractor be allowed to perform physical construction Work at the project site prior to issuance of the Notice to Commence Construction.

- B. The Owner will not issue the Notice to Commence Construction until Owner's preparatory actions are complete and the following actions by Contractor are complete:
 - 1. Submittals as noted in Section 01 33 00 have been submitted, reviewed, and approved.
 - 2. Tanks, pump enclosure, and metering pumps have been delivered to the site.
- C. Delay by Owner in issuance of the Notice to Commence Construction related to the listed submittals above shall be considered a fault of the Contractor and no additional working days will be granted.
- D. If the Owner fails to issue the Notice to Commence Construction by the anticipated date listed above, through no fault of the Contractor, then the Owner will add one working day to the contract for each working day that lapses between the anticipated date and the date on which the Notice to Commence Construction is issued. The Contractor agrees that Owner's failure to issue the Notice to Commence Construction on the date specified herein does not constitute breach of contract, and that Contractor will be limited to an extension of the time to complete the contract Work as Contractor's sole remedy for any delay caused by Owner's failure. The Contractor is not entitled to any other measure of damages, including any delay damages, as a result of Owner's delay in issuing the Notice to Commence Construction.

1.04 ACCESS AND SITE CONSTRAINTS

- A. Contractor shall be aware that the Site includes the handling of municipal sewage. As such, the Work area may be in areas with sewage. The Work area may be located in what is considered a corrosive environment, hazardous location, or in confined space or wet or submerged locations. The Contractor shall be responsible for following all provisions necessary to complete the work items outlined in the Contract Documents.
- B. Site access to the Budd Inlet Treatment Plant is controlled and the work areas within the buildings are located within a secured campus. Coordination for site access will be made with the Owner. Contractor's use of the Owner's premises is limited to those activities in direct support of the Work.
- C. Portions of the Budd Inlet Treatment Plant will remain operational while the Work is being performed. The Contractor shall coordinate with the Owner for site specific safety requirements including any required lock-out / tag-out of equipment and or confined space entries.
- D. Other major construction projects will be under construction at the BITP at the same time. Contractor shall anticipate that deliveries and access to portions of the site must be coordinated with other projects. Maintaining scheduled dates for shutdowns and startups will be critical.

1.05 INTERFERENCES WITH WORK AND PLANT OPERATIONS

- A. Contractor shall coordinate with Owner to ensure that the Work described herein minimizes disruptions to the operation of the treatment facility and protects existing equipment from damage or disruption.
- B. Contractor shall provide temporary protection of the work in such a manner to facilitate continued operation of the treatment facility.
- C. The Contractor shall submit detailed Shutdown Work Plans to the Owner for review at least 20 working days in advance of any proposed shutdown unless a shorter schedule is approved by the Owner. The Owner will review each Shutdown Work Plan within 10 working days of submittal. Shutdown Work Plans must be approved at least 7 working days in advance of the shutdown.
- D. Owner will not normally approve a proposed shutdown or energized electrical work to occur on a Monday, Friday, or the day preceding or following a LOTT Holiday.
- E. Owner will not normally approve the start-up of new equipment/processes to occur on a Thursday, Friday, or the day preceding or following a LOTT Holiday.

1.06 TEMPORARY SHUTDOWN WORK PLANS

- A. Contractor shall submit Shutdown Work Plans for any proposed shutdown of plant systems. Plant systems include any treatment process, water systems, electrical/control panels, alarm, or any other system, equipment, pipe, drain, or ancillary appurtenance required for the plant to operate as intended.

Work in any energized electrical, control, or signal panel shall be avoided whenever possible and only performed when approved by the Owner. Shutdown Work Plans and Energized Electrical Work Permits are required for any work in energized panels. Energized Electrical Work Permits are reviewed by the Owner and issued and managed by the contractor performing the electrical work.

- B. The Shutdown Work Plan shall provide information in a format that can be used as a procedural checklist for each identified shutdown. Each Shutdown Work Plan submittal shall include the following:
 - 1. A unique name and identification number, date prepared or revised, and revision level depicted on the header of each page.
 - 2. Dates, start time, and duration of proposed shutdown.
 - 3. Work activities to be performed during the shutdown.
 - 4. List of equipment and/or systems to be shutdown (e.g., SWBDs, MCC, panels, equipment, pumps, low heat loop, water, etc.) including equipment asset number, description, and locations. Provide locations of isolation

valves (include asset numbers), plugs, or other mechanical isolation methods. Include all specific Lock-Out Tag-Out locations of equipment and or systems.

5. List of materials and equipment required during the shutdown.
 6. Identification of any temporary connections and/or equipment.
 7. Proposed deviations from the Work specified in the Contract Documents required for each shutdown.
 8. Assistance required of Owner's personnel before, during, and after shutdown.
 9. Contractor's personnel to be on-site during shutdown.
 10. Contingency plan if Work during shutdown is not completed during allotted time or critical equipment fails.
- C. Upon receipt of submittal, the Owner will decide what action needs to be taken and if the requested shutdown is acceptable considering the staffing, treatment process, plant flows and loads, forecasted weather, and other items as deemed necessary. If the Owner deems that the requested shutdown is unacceptable, the Owner will state such reasons, and the Contractor shall reschedule the shutdown.
- D. No shutdown shall be allowed until the Owner provides a written approval for the Shutdown Work Plan.
- E. Each shutdown shall be shown on the Contractor's Progress Schedule and updated by the Contractor as needed. The Owner may postpone a planned and approved shutdown at any time due to changed conditions such as weather or other plant operational needs.
- F. No shutdowns will be allowed until all equipment, piping, valves, and related appurtenances necessary to complete the Shutdown Work Plan have been delivered to the site and prepared for installation.
- G. Electrical Shutdown Work Plans shall include the following ADDITIONAL requirements:
1. Description of the purpose of the power shutdown or, when allowed, the Energized Electrical Work Permit and the live work to be performed. Contractor shall follow current NFPA 70E standards.
 2. Contractor personnel and role during shutdown.
 3. Description of the use of a portable diesel engine generator, on-site fuel storage, and connection of temporary electrical power cables to equipment when required to maintain operation of the plant during electrical work.

4. When critical equipment is energized using temporary power, the Shutdown Work Plan shall include visual inspection and verification that critical equipment is energized. This visual inspection and verification shall be performed when the critical equipment is placed on temporary power and when connected to the normal power source.
5. Certification that the Shutdown Work Plan meets or exceeds the requirements of NFPA 70E and identifies the required working boundaries, how the boundaries will be marked, and the PPE required. The Contractor shall have a copy of their Energized Electrical Work Permit covering the work to be performed onsite and available upon request.
6. Energized Electrical Work Permit or Electrical Shutdown Work Plans may include the following if applicable:
 - a. Contractor Superintendent's name and cell phone number, with signature.
 - b. Owner Construction Manager's name and cell phone number, with signature.
 - c. Owner Industrial Electrician's name and cell phone number, with signature.
 - d. Contractor Lead Electrician who shall be present during the power shutdown and cell phone number.
7. Temporary system shutdowns shall be preapproved and limited to those times and constraints listed below:
 - a. Shutdowns shall be preapproved by the Owner.
 - b. Flow Shutdowns shall be limited to one (1) per month and is flow/weather dependent. Electrical Shutdowns are limited to the times provided in this section. If Electrical Shutdown causes a 4-hour Flow Shutdown, only one (1) Flow Shutdown per month is allowed.
 - c. Flow shutdowns start at 4:00 a.m. and the Contractor will have from 4:30 a.m. to 8:30 a.m. to complete the work.
 - d. Contractor shall ensure the number of shutdowns are limited by maximizing the amount of work completed during the shutdown. Shutdowns shall coordinate with other projects shutdowns.
 - e. Potable Water System 4 hours maximum on a Tuesday/Wednesday/Thursday
 - f. MCC-6A Shutdowns not allowed during the months of March-October

- g. DP-6 2 hour maximum shutdown Tuesday/Wednesday/Thursday

1.07 WORK SEQUENCE

- A. The Contractor shall be solely responsible for the means, manpower, methods, techniques, schedule, sequences, and procedures of construction, and all safety programs required to perform the work specified in the Contract Documents. There are construction limitations and phasing requirements for the work that the Contractor must adhere to. These limitations and requirements are specified herein.
- B. The order of the work will be at the option of the Contractor.

1.08 SUBSTANTIAL COMPLETION

- A. When Owner will use or occupy portions of the project in phases, partial Substantial Completion for each phase shall not occur until the commissioning period for each phase, as specified in Section 01 91 00 (Installation, Start-Up, Testing, Commissioning, and Training), has been successfully completed as determined by the Owner. Training services must be performed prior to commissioning.
- B. Substantial Completion for the project shall not occur until the commissioning periods for all phases have been successfully completed for the entire project and the Substantial Completion requirements in Section 00 72 05 (General Conditions) have been met for all project elements as determined by the Owner.

1.09 EQUIPMENT AND MATERIAL DELIVERY AND INSPECTION

A. DELIVERY COORDINATION

- 1. Deliveries shall be coordinated and accepted by the Contractor.
- 2. Delivery of products or equipment as required to allow timely installation and avoid prolonged storage.
- 3. Owner shall be notified of delivery schedule of all deliveries.

B. DELIVERY INSPECTIONS

- 1. The Contractor shall perform delivery inspections prior to unloading on the site. The Contractor shall notify the Owner of all deliveries and delivery inspections.
- 2. Deliver products or equipment in manufacturer's original cartons or other containers designed and constructed to protect the contents from damage. All packaging shall clearly and fully identify the manufacturer, item, and product number.

3. The delivery inspection procedures shall consist of the following:
 - a. Perform inspection of all items delivered to the Site in order so that the Owner may be satisfied that such items are of the specified quality and workmanship and are in good order and condition at the time of delivery.
 - b. Should the Owner find, in his opinion, indication of damage or deficient quality of workmanship, the Contractor shall provide the necessary documentation, or conduct such tests deemed necessary by the Owner, to demonstrate compliance with the Contract Documents. Non-detected damage or deficiencies does not relieve the contractor of providing new equipment and material for the Project.

C. PROTECTION, STORAGE, AND HANDLING

1. Contractor shall follow all manufacturer's instructions for storage and handling the equipment/material, and provide information to the Owner on requirements and compliance documentation.
2. Contractor shall ensure no exposure to elements or harsh environments and install all equipment and materials in delivered new condition. Provide means for keeping deliveries thoroughly dry and protected during storage.
3. All electrical equipment, pumps, motors, sleeve bearings shall be kept at a minimum of 50 degrees unless otherwise noted.
4. All flammable liquids and hazardous material must be stored and contained from spills per manufactures and state and federal regulations.

1.10 HORIZONTAL AND VERTICAL CONTROL

- A. The Contractor will be responsible for all on-site construction layout and horizontal and vertical surveying required to perform the work shown on the Drawings. The Contractor shall establish other control and reference points from these furnished reference points as required to properly layout the work.
- B. The Contractor shall provide and be responsible for the layout of all Work in accordance with Article 4.05 of Section 00 72 05 (General Conditions). The Contractor shall provide all necessary surveys, field staking, and positioning for the construction of all components at the proper alignment, elevations, grades, and positions, as indicated on the Drawings and as required for the proper operation and function. The Contractor's layout shall be based on existing structures, survey control, and benchmarks established by the Owner and provided on the Drawings.

1.11 JOB CONDITIONS

- A. Prior to installation of material, equipment, and other work, verify with subcontractors, material or equipment manufacturers, and installers that the substrate or surface to which those materials attach is acceptable for installation of those materials or equipment. Substrate is defined as building surfaces to which materials or equipment is attached to such as floors, walls, ceilings, etc.
- B. Correct unacceptable substrate until acceptable for installation of equipment or materials.
- C. Control emissions of gases or particulates resulting from applications of adhesives, paints, or coatings or produced by welding, grinding, or other activities.
 - 1. Provide temporary partition walls, drapes, or other screening methods to isolate areas under construction from other areas of operation adjacent to construction areas.
 - 2. Provide temporary ventilation of construction area:
 - a. Exhaust air to outdoor discharge.
 - b. Locate exhaust air discharge at an elevation sufficient to prevent personal contact with exhaust air.
 - c. Locate exhaust air discharge to avoid short-circuiting with existing supply air intakes.

PART 2 – PRODUCTS

NOT USED

PART 3 – EXECUTION

NOT USED

***** END OF SECTION *****

SECTION 01 20 00

MEASUREMENT AND PAYMENT

PART 1 – GENERAL

1.01 SUMMARY

- A. This section further describes Measurement and Payment for this project.

1.02 SCHEDULE OF VALUES

- A. Submit in accordance with Section 01 33 00 (Submittals).
- B. The Contractor shall submit a preliminary Schedule of Values to the Owner. After receiving comments by the Owner, the Contractor shall submit a final Schedule of Values prior to submitting first Application for Payment.
- C. The Schedule of Values shall assign a fair, reasonable, and equitable dollar value for major activities on the Contractor's construction schedule submitted pursuant to the requirements of the Contract Documents. In addition, a detailed breakdown of lump sum prices shall be included in the Schedule of Values.
- D. The detailed breakdown for the work shall include the following items if not already identified on the bid proposal form:
 - 1. Mobilization
 - 2. Demolition work
 - 3. Painting or special coatings
 - 4. Equipment
 - 5. Piping systems
 - 6. Electrical and control systems
 - 7. Demobilization
 - 8. Training services
 - 9. Testing
 - 10. Start-up and commissioning
 - 11. As-built redlines
 - 12. O&M manuals
- E. The Schedule of Values shall specifically indicate installed cost for materials and equipment for each bid and sub-bid item.
- F. Each activity's assigned value shall consist of labor, equipment and materials cost, and a pro rata contribution to overhead and profit. Breakdown shall be so organized as to facilitate assessment of work and payment of subcontractors.
- G. The sum of the assigned values shall equal the lump sum price of the activity.
- H. Each approved Change Order Proposal, Work Change Directive, or other Change Order item shall be shown as a new line item in the Minor Change or Change Order

section of the Application for Payment and Schedule of Values and will be paid as work is completed.

1.03 MEASUREMENT

- A. Measurement for all items shall be as indicated in these Specifications for unit price and lump sum price bid items. Bid items are outlined in detail in this section and listed in the Proposal.
- B. Weighing equipment, scale verification checks, and load tickets for rock/fill materials, hot mix asphalt, bituminous construction materials, etc., shall conform to Section 1-09.2 of the WSDOT Standard Specifications.
- C. Load tickets shall be provided for all gravel materials, cast-in-place concrete, cement grout, CDF, hot mix asphalt, ATB, and reinforcing steel. The Owner will pay for no material received by weight unless they have been weighed as required in this Section or as required by another method the Owner has approved in writing. All costs incidental to weighing shall be merged into the various unit prices bid.

1.04 PAYMENT

- A. Payment for all work will be made at the contract unit price or lump sum price as indicated in the Bid Proposal, payment of which shall constitute full compensation, for a complete installation.
- B. Payment for stored materials shall be in accordance with Article 14 of Section 00 72 05 (General Conditions).

1.05 DESCRIPTION OF BID ITEMS

- A. The following is a list of bid items for the project. The contract price for each item constitutes full compensation for furnishing all equipment, labor, materials, appurtenances, and incidentals and performing all operations necessary to construct and complete the various bid items in accordance with the Contract Documents. Payment for each item shall be considered as full compensation, notwithstanding that minor features may not be mentioned herein. Work paid for under one item will not be paid for under any other item. If a particular item of work shown on the Drawings or described in Specifications is not described in a specific bid item, this item of work shall be considered as incidental to the work and the costs for this work shall be merged into the various respective unit price and lump sum bid items.
- B. MOBILIZATION AND DEMOBILIZATION
 - 1. Measurement: Will be measured by lump sum.
 - 2. Payment: The lump sum contract price for MOBILIZATION AND DEMOBILIZATION shall include all costs for the labor, materials, and equipment required for mobilization and demobilization on the project. The

lump sum price shall include the costs for administrative requirements for the project such as bonds and insurance, temporary facilities, photographs, removal of equipment and materials from the site, and final clean-up.

Payment for MOBILIZATION AND DEMOBILIZATION shall be as follows:

70% Payment: When Contractor has mobilized on-site and temporary facilities are in place. If mobilization is delayed, a partial payment of this amount may be made for bonds and insurance.

100% Payment: When Physical Completion has been issued.

C. MINOR CHANGES

1. Measurement: Will be negotiated prior to commencing any such work under this pay item and shall be for items such as work to remedy unforeseen conditions, utility conflicts, minor landscaping, minor drainage improvements, or special surface restoration.
2. Payment: Payment or credits for changes amounting to \$25,000 or less may be made under the Bid Item Minor Change. At the discretion of the Owner, this procedure for Minor Changes may be used in lieu of the more formal procedure for Change Orders as outlined in Section 01 26 00 (Modification Procedures).

Payments or credits will be determined in accordance with Section 01 26 00 (Modification Procedures). For the purpose of providing a common Proposal for all Bidders, the Owner has entered an amount for MINOR CHANGE in the Proposal to become part of the total Bid by the Contractor.

Changes that require additional working days shall not be processed as Minor Changes and shall follow the formal procedure for Change Orders as outlined in Section 01 26 00 (Modification Procedures).

D. TRENCH EXCAVATION SAFETY SYSTEMS

1. Measurement: Will be measured by lump sum.
2. Payment: The lump sum contract price for TRENCH EXCAVATION SAFETY SYSTEMS shall include all costs for labor, materials, and equipment required to provide sheeting, shoring, and bracing of trenches and open excavations as required to meet the Washington Industrial Safety and Health Act, Chapter 49.17 RCW. These costs shall not be considered incidental to any other bid item.

E. O&M MANUALS

1. Measurement: Will be measured by lump sum.

2. Payment: The lump sum contract price for O&M MANUALS shall include all costs for the labor, materials, and administrative requirements to submit and provide O&M materials as required by Section 01 78 23 (Operating and Maintenance Information).

Payment in full for O&M MANUALS shall be made when final O&M Manuals are approved by the Owner. Partial payments will not be made.

For the purpose of providing a common Proposal for all Bidders, the Owner has entered an amount for O&M MANUALS in the Proposal to become part of the total Bid by the Contractor.

F. AS-BUILT REDLINES

1. Measurement: Will be measured by lump sum.
2. Payment: The lump sum contract price for AS-BUILT REDLINES shall include all costs for the labor, materials, and administrative requirements to submit and provide As-Built Redlines as required by Section 01 78 39 (As-Built Redlines).

Payment in full for AS-BUILT REDLINES shall be made when final As-Built Redlines, including redlines and all required electronic files and vendor information, have been submitted to the Owner per Section 01 78 39 (As-Built Redlines). Partial payments will not be made.

For the purpose of providing a common Proposal for all Bidders, the Owner has entered an amount for AS-BUILT REDLINES in the Proposal to become part of the total Bid by the Contractor.

G. SUPPLEMENTAL CARBON SYSTEM UPGRADE

1. Measurement: Shall be measured by lump sum.
2. Payment: The lump sum contract price for SUPPLEMENTAL CARBON SYSTEM UPGRADE shall include all costs for the labor, materials, and equipment to furnish and install the chemical feed system, including sitework, excavation, backfill, grading, compaction, asphalt paving, reinforced concrete, polyethylene tanks, metering pumps, building, water heater, emergency shower and eyewash station, service air connection, permitting, paint striping, heat tracing, demolition, wastehauling, hose bibb, guardrail gate, guard rail bases, connection to existing potable water system, connection to existing non-potable water system, connection to existing service air system, pump skid, catch basin, guardrail, piping, valves, and appurtenances, electrical, instrumentation, and control, testing, commissioning and training as shown on the Drawings and as specified herein. All project costs not included in other bid items shall be included in this bid item.

PART 2 – PRODUCTS

NOT USED

PART 3 – EXECUTION

NOT USED

***** END OF SECTION *****

SECTION 01 26 00

MODIFICATION PROCEDURES

PART 1 – GENERAL

1.01 SUMMARY

- A. This section provides supplementary procedures for the administration of changes to the Contract as specified in the General Conditions. Whenever corrections, alterations, or modifications of the work under this Contract are ordered and approved by the Owner and increase the amount of work to be done, such added work shall be known as extra work; and when such corrections, alterations, or modifications decrease the amount of work to be done, such subtracted work shall be known as omitted work.
- B. The difference in cost of the work affected by such change will be added to or deducted from the Contract Price, as the case may be, by a fair and reasonable valuation, which shall be determined in one or more of the following ways, as directed by the Owner:
 - 1. Where applicable, by unit prices accepted by the Owner and stated in the Contract Documents;
 - 2. By unit prices subsequently fixed by agreement between the parties;
 - 3. By an acceptable lump sum proposal from the Contractor; or
 - 4. By Force Account, when directed in writing and administered by the Owner through its agents or representatives.
- C. The prices agreed upon and any agreed upon adjustment in Contract Time shall be incorporated in the written order issued by the Owner, which shall be written so as to indicate an acceptance on the part of the Contractor as evidenced by its signature. By signature of the Change Order, the Contractor acknowledges that the adjustments to cost and time contained in the Change Order are in full satisfaction and accord and constitute payment in full for the work described in the Change Order, and so waives any right to claim any further cost or time impacts at any time during and after completion of the Contract for the changes encompassed by the Change Order.

1.02 NEGOTIATED CHANGE ORDERS

- A. If the Owner requests lump sum pricing, the Contractor shall submit a Change Order Proposal. This shall consist of substantiating documentation for requested additional working days and an itemized breakdown of Contractor and subcontractor direct costs, including labor, material, equipment rentals, and approved services, pertaining to such ordered work in the form and detail acceptable to the Owner. The direct costs shall include only costs described in Paragraph 1.04, Direct Cost Categories.

- B. The Owner will review the Contractor's Change Order Proposal and negotiate an equitable adjustment with the Contractor. After there is an agreement, the Owner will prepare and process the Change Order. All Change Order Proposals must be approved by the Owner in writing before the work can be authorized and the Change Order executed.
- C. If the Owner decides not to issue a contract change order after requesting and reviewing a proposal from the Contractor, the Contractor will be notified of such decision in writing.

1.03 FORCE ACCOUNT PAYMENT (TIME AND MATERIALS CHANGES)

- A. If either the amount of work or payment for changed work cannot be determined or agreed upon beforehand, the Owner may direct by written Work Change Directive that the work be done on a force account basis. The term "force account" shall be understood to mean that payment for the work will be done on a time and materials basis, that is, on an accounting of the Contractor's forces, materials, equipment, and other items of cost as required and used to do the work. For the work performed, payment will be made for the documented actual cost of the work as described in Paragraph 1.04, Direct Cost Categories.
- B. Prior to the commencement of force account work, the Contractor shall notify the Owner of its intent to begin work. Labor, equipment and materials furnished on force account work shall be recorded daily by the Contractor upon report sheets acceptable to the Owner. The reports, if found to be correct, shall be signed by both the Contractor and Owner daily, and a copy shall be furnished to the Owner no later than the working day following the performance of said work. The daily report sheet shall thereafter be considered the true record of force account work provided. If the Owner, does not agree with the labor, equipment and/or materials listed on the Contractor's daily force account report, the Contractor and Owner, shall sign-off on the items on which they are in agreement. The Owner shall then review the items of disagreement and will advise the Contractor, in writing, of its determination. If the Contractor disagrees with this determination, it shall have the right to file a claim notice as provided in the General Conditions.
- C. The Contractor shall maintain its records in such a manner as to provide a clear distinction between the direct costs of work paid for on a force account basis and the costs of other operations.
- D. To receive payment for force account work, the Contractor shall submit, in a manner approved by the Owner, detailed and complete documented verification of the Contractor's and any of its subcontractor's actual costs involved in the force account pursuant to the pertinent Change Order or Field Order. Such costs shall be submitted within thirty (30) days after said work has been performed. No payments will be made for work billed and submitted to the Owner after the thirty (30) day period has expired.

- E. The force account invoice shall itemize the materials used and shall cover the direct costs of labor and the charges for equipment rental, whether furnished by the Contractor, subcontractor, or other forces. The invoice shall be in a form acceptable to the Owner and shall provide names or identifications and classifications of workers, the hourly rate of pay and hours worked, and also the size, type, and identification number of equipment and hours operated. Material charges shall be substantiated by valid copies of vendor's invoices.

1.04 DIRECT COST CATEGORIES

- A. The categories described below are defined to be direct costs. No other type of costs will be allowable as direct costs. Direct costs shall not include any labor costs pertaining to the Contractor's and subcontractor's managers, their office and engineering staffs, the cost of their offices, facilities, vehicles, or anyone not directly employed on such work, nor small tools and supplies. All such items are considered indirect costs which form a part of the Contractor's and subcontractors' overhead expenses.
- B. The Owner reserves the right to furnish such labor, materials and equipment as it deems expedient, and the Contractor shall have no claim for profit or added fees on the cost of such items.
- C. **DIRECT LABOR**
 - 1. The Contractor will be paid the cost of direct craft labor for the workers and foremen (when authorized by the Owner) used or proposed, if determined to be reasonable by the Owner, to be utilized in the actual and direct performance of the work.
 - 2. The direct labor cost will be the actual payroll cost, including wages, subsistence and travel payments, fringe benefits as established by negotiated labor agreements or applicable prevailing wages, workers' compensation and labor insurance, and labor taxes as established by law. No other fixed labor burdens will be considered, unless approved in writing by the Owner. Where subsistence and travel payments are required for performance of extra work, the charges shall consist of the actual amount paid to each worker for these items.
 - 3. For Force Account work, labor reimbursement calculations shall be based on a "Project Labor List" prepared and submitted by the Contractor and by any Subcontractor before that firm commences force account work. The Project Labor List shall include regular time and overtime rates for all work classifications expected to participate in Force Account work. The rates shall include the basic wage and fringe benefits, the current rates for Federal Insurance Compensation Act (FICA), Federal Unemployment Tax Act (FUTA), State Unemployment Tax Act (SUTA), the company's present rates for Medical Aid and Industrial Insurance premiums, and the planned payments for travel and per diem compensation. Once a list is approved by the Owner, it shall be used to calculate force account labor payment until a new list is submitted and approved.

4. In the event that an acceptable initial list or requested revised list is not received by the time that force account calculations are begun, the Owner will develop a list unilaterally, utilizing the best data available that will be used until a Contractor's list is received and approved. Prior payment calculations shall not be adjusted as a result of a new list.
5. Except as otherwise provided, the Contractor shall receive no additional compensation for wage premiums resulting from overtime performed on change order work without the prior written authorization of the Owner.

D. EQUIPMENT

1. General: The Rental Rate Blue Book published by Equipment Watch (Blue Book) as clarified or modified by this section will be used to establish rental rates for equipment approved for use on force account work unless the Owner accepts the use of another rate list. Rate modifications for Washington DOT shall be used for all equipment covered under this section. Equipment used will be at rates not higher than the rates in effect for each section of the Blue Book at the time of use.
2. Rental Rate: The hourly rental rate for equipment utilized on force account shall be a combination of the following items:
 - a. The Blue Book monthly rate multiplied by the Rate Adjustment factors for age and geographic location divided by 176.
 - b. Attachments will be included in the rental rate when the Owner deems them necessary to accomplish the force account work. An approved attachment that is continuously attached and used intermittently during the work will be paid for the same duration as the host equipment. When multiple attachments are approved for use, and the attachments are being used interchangeably on the force account operation, only the one attachment having the higher rate will be paid.
 - c. The hourly operating cost for each hour that the equipment is in use. "In use" shall mean that the presence of the equipment is necessary for the operation and that the equipment is present and is not being used for other activities while the force account work is underway. Under the circumstances, the equipment shall be paid at its hourly rate plus the hourly operating cost.
3. Standby Time
 - a. Standby time shall be defined as the time during which the force account work is temporarily halted and the equipment is idled and cannot be assigned to other work on the project. Only that equipment which has been utilized for work on the force account and is expected to be utilized again on the same force account will

be eligible for standby compensation. The Contractor is expected to utilize idled equipment on other work if reasonably possible. Standby time will only be paid if the Owner has had an opportunity to evaluate the cost of standby versus the cost of mobilizing and demobilizing and has ordered standby.

- b. When ordered by the Owner, standby time shall be paid at the rate in the Blue Book or, when a rate is not provided, at one-half of the rate established in accordance with this agreement. The operating cost shall not be included in the calculation for establishing the standby rate. Standby time will not be compensated beyond that amount which will bring the resulting total of operated time and standby time to eight (8) hours in any one (1) day or forty (40) hours in any one (1) week.

4. Rental Equipment

- a. If Contractor-owned equipment is not reasonably available, the Owner may approve the use of operated or non-operated rental equipment. Operated equipment shall be considered a "service" and shall be compensated according to Paragraph 1.03, Force Account Payment. Non-operated equipment shall be compensated according to the provisions for rented equipment in Paragraph 1.03, Force Account Payment. If the invoice costs of non-operated equipment do not specifically say the fuel is included, the Rental Rate Blue Book Hourly Operating Cost shall be added for each hour the equipment operates.
- b. When invoiced equipment is used on both force account and non-force account work, payment for the equipment will be a prorated share of the invoice cost.

5. Mobilization

- a. Force account mobilization of equipment is defined as the preparatory work performed by the Contractor including procurement, loading, and transportation of equipment that is intended for use in a force account. A pro-rata adjustment will be made when the equipment is eventually used for regular contract work in addition to the force account work. Mobilization also includes the costs incurred during demobilization. The costs will be included in the appropriate sections (Labor, Equipment, Services, etc.) depending on the nature of the cost. If the equipment being mobilized is hauled, payment will cover the hauling vehicle (operated cost). In the event that equipment is transferred under its own power, the payment will cover the operated cost of the equipment plus operator costs. Move-out, or demobilization costs will provide for the return of the equipment to the location from which it was obtained. In the event that the move-out is to a

different location, payment will not exceed the amount of the move-in.

- b. If approved by the Owner, payment will be allowed for moving equipment from work site to work site within the project after the equipment is on the job.
 - c. Charges for mechanic's time utilized in servicing equipment to ready it for use prior to moving to the project and similar charges will not be allowed.
- 6. Blue Book Omissions: In the event a rate has not been established for a particular piece of equipment in the Rental Rate Blue Book, a rate will be established, utilizing one or more of the following methods:
 - a. Use a rate for the most similar model found in the applicable Blue Book. Such characteristics as manufacturer, capacity, horsepower, and fuel type will be used as the basis for selecting a similar model.
 - b. Contact Equipment Watch for the rate not included in the book.
 - c. Utilize a rate agreed upon by the parties.
 - d. For equipment that is older than 20 years, the oldest adjustment rate available in the book shall be used.
- 7. Breakdown: The Contractor shall provide reasonable maintenance efforts for equipment utilized to force account. When a breakdown occurs for any piece of equipment being used on force account work, the Contractor shall divert idled equipment. Payment shall cease for the equipment that is broken down. Payment shall also cease for any other equipment that is idled as a result of the breakdown (there will be no standby payment). Payment for any labor that is idled as a result of the breakdown will be made in accordance with provisions of Paragraph 1.03, Force Account Payment, particularly as related to contractual obligations and normal practices of the Contractor.
- 8. SHUTDOWN
 - a. If the Owner orders a shutdown of any or all of the force account, the equipment idled as a result of the shutdown shall be diverted to other work. When diversion of equipment is not practical, standby time may be paid during non-operating hours as provided in Item 3, Standby Time, above.
 - b. The Owner reserves the right to cease standby payment for equipment that is idled as a result of a shutdown when the shutdown is anticipated to be for an extended period of time. No further payment shall be allowed after the date the Owner makes this determination except as provided in Item 5, Mobilization, above.

- c. Standby time shall not be paid when shutdown is the result of the fault or negligence of the Contractor.

E. MATERIALS

- 1. The Contractor will be paid the cost of the materials to the purchaser, including applicable taxes and freight/handling/delivery charges if paid. Materials shall include items provided by the Contractor or its subcontractor that are incorporated into the work or supplies used during the work. The Contractor shall furnish invoices or other satisfactory evidence of the cost of such materials for review by the Owner.

F. PROFESSIONAL SERVICES

- 1. Professional services shall be included in "actual necessary expense" provided both the Owner has determined that such services are necessary and the Owner has authorized in writing the provision of such services.

G. OTHER COSTS

- 1. Charges for items not included in paragraphs A through D may be included as "actual necessary expense" if such additional items are authorized in advance and in writing by the Owner.

1.05 MARKUP ALLOWANCES

- A. The Contractor and subcontractors shall be entitled to compensation for indirect and overhead costs, bonds and insurance costs, and profit for Change Order work. This compensation shall be in the form of markup percentages applied to the direct cost of the Change Order work, as further described below. The maximum markup allowed will be:

- 1. For work by its own organization, the Contractor may add up to the following percentages:
 - a. Direct Labor: 20%
 - b. Materials: 15%
 - c. Equipment (owned or rented): 15%
- 2. For all such work performed by subcontractors and for specialized services, such subcontractor may add the same percentages as the Contractor as listed in (1) above to its actual net increase in costs for combined overhead and profit. The Contractor may add up to 10% of the subcontractor's total for its combined overhead and profit. No further compensation will be allowed for the Contractor's administration of the work performed by the subcontractor.

3. When both additional and deleted work are involved in any one change, the markup allowances of this section shall be applied to the net extra cost of the work, if any, after subtraction of the costs for the omitted work from the extra work. No markup shall be added for Change Order work which results in a net decrease in cost. The Contractor shall not be entitled to nor claim for anticipated profits on work that may be omitted.
4. The added markups shall be considered to be full compensation, covering the cost of general supervision, overhead, profit, small tools, incidentals, bonds, insurance other than labor insurance, safety programs, and any other general expenses. The above markups represent the maximum limits which will be allowed, and they include the Contractor's and all subcontractors' indirect field and home office expenses and all other costs for cost proposal preparation, schedule analysis and preparation, operation and maintenance manual documentation, and record documents and change order administration.

1.06 CHANGES IN QUANTITIES

A. Eliminated Items

1. Should any Contract item of the Work be eliminated in its entirety, in the absence of an executed Contract Change Order covering such elimination, payment will be made to the Contractor for actual costs incurred in connection with such eliminated Contract item if incurred prior to the date of notification in writing by the Owner of such elimination.
2. If acceptable material is ordered by the Contractor for the eliminated item prior to the date of notification of such elimination by the Owner, and if orders for such material cannot be canceled, it will be paid for at the actual cost, plus a 5% mark-up. In such case, the material paid for shall become the property of the Owner and the actual cost of any further handling will be paid for by the Owner. If the material is returnable to the vendor and if the Owner so directs, the material shall be returned and payment will be made to the Contractor for the actual costs for returning the material.

1.07 COST PRICING DATA AND ACCESS TO RECORDS

- A. All cost and pricing data submitted by the Contractor with respect to any change, prospective or executed, or any claim for extra compensation shall be a true, complete, accurate and current representation of actual cost and pricing of the work. The Owner may require a formal certification as to cost and pricing data submitted by the Contractor.
- B. The Owner shall have access, upon reasonable notice during normal business hours, to any books, documents, accounting records, papers, project correspondence, project files, scheduling information and other relevant records of the Contractor and all subcontractors directly or indirectly pertinent to the work, original as well as changes and claimed extra work, and the Contract for the purpose of making audit, examination, excerpts and transcriptions and in order to

verify or evaluate any change, prospective or executed, or any claim for which compensation has been requested or notice of potential claim has been tendered.

- C. Such books, documents, and other records mentioned above shall include, but are not limited to all those reasonably necessary to determine the accurate amount of direct and indirect costs, job site, and delay and impact costs, however characterized, and shall include the original Bid and all documents related to the Bid and its preparation, as well as, the as-planned construction schedule and all related documents.
- D. Such access shall include the right to examine and audit such records and make excerpts, transcriptions, and photocopies at the Owner's cost.

1.08 TIME EXTENSIONS FOR CHANGE ORDERS

- A. If the Contractor requests a time extension for the extra work necessitated by a proposed Change Order, supporting data shall be providing in writing to the Owner's satisfaction in writing and will include Progress Schedule data.
- B. Progress Schedule data deemed satisfactory by the Owner in writing shall be provided to confirm the Contract completion date and/or Milestone completion dates have been affected by:
 - 1. Inserting new activities associated with delays which are beyond Contractor's control into the schedule;
 - 2. Revising activity logic or;
 - 3. Revising activity durations.
- C. Progress Schedule data deemed satisfactory by the Owner in writing shall indicate that Contractor has used, or will use, all the Contract Float available, including any float that may exist between the Contractor's planned completion date and the Contract completion date before additional time will be approved for any reason, including additional work by way of change order. Adjustment of the Contract Time will be granted only when the Contract Float has been, or will be, fully utilized and only when the revised date of completion of the Work will extend beyond the contract completion date. Adjustment of the Contract Time will be made only for the time that the planned completion of the work has been extended beyond the Contract float available at the time of the adjustment.
- D. Contract Float shall be for the mutual benefit of Owner and Contractor. Contractor acknowledges that it was aware of the Contract time available prior to its bid and calculated the amount of its bid accordingly. Contractor shall not be entitled to compensation of any kind from Owner for delay, or arising out of or related to delay, to the extent Contract float, including any additional float approved by Owner, was available, or to the extent Contractor failed to mitigate delay impacts. The foregoing limitations on Contractor's compensation shall be in addition to any other limitations, defenses, offsets, damages, actions, or remedies available to Owner under law.

- E. When the addition of working days is justified for change order work, Owner may require Contractor to mitigate delays at Owner's cost in lieu of adding more working days.

1.09 MINOR CHANGE

- A. If on the Bid Schedule an item for Minor Change has been included:
 - 1. Payments or credits for changes in the amount specified on the Bid Schedule or less may be made under the bid item "Minor Change." At the discretion of the Contracting Agency, this procedure for Minor Changes may be used in lieu of the more formal procedure outlined in this section. Documentation shall be required at the Owner's request. Payments or credits will be determined in accordance with this section.
 - 2. The Contractor will be provided a copy of the authorization to bill as Minor Change. The agreement for the Minor Change will be documented by signatures of the Owner and the Contractor or notation by Owner of the verbal agreement. If the Contractor is in disagreement with anything required by the order for Minor Change, the Contractor may protest the order as provided in Section 00 72 05 (General Conditions).
 - 3. If Contractor requests additional working days, then payment or credit for the change may not be made as a Minor Change. The formal change order procedure in this Section shall be followed.

PART 2 – PRODUCTS

NOT USED

PART 3 – EXECUTION

NOT USED

***** END OF SECTION *****

SECTION 01 26 13

REQUESTS FOR INFORMATION

PART 1 – GENERAL

1.01 SUMMARY

- A. After thorough review of the Contract Documents, if clarification is required for field conditions, conflicts, omitted information, or other deficiency, a written Request for Information (RFI) shall be submitted by the Contractor.
- B. It is the responsibility of the Contractor to read the Contract Documents fully and in detail. If the Owner determines that the Contractor is abusing the RFI process and not working in good faith, the Owner reserves the right to recover the cost of additional RFI response time through a deductive change order to the Contract.

1.02 RFI SUBMITTALS

- A. Identify the nature and location of each request using the RFI form that is included at the end of this specification section.
- B. Number each RFI sequentially beginning with RFI 001.
- C. Submit only one question per RFI form.
- D. Request information on single subject matter (architectural, civil, structural, mechanical, electrical) for each RFI form.
- E. A resubmitted RFI or a previously answered RFI requiring revising or further clarification shall be submitted using the original RFI number proceeded by “.1” to indicate revision 1 of the RFI (i.e.: RFI 025.1 for revision 1 to RFI 025).

1.03 COORDINATION

- A. RFIs shall be submitted far enough in advance to provide the Owner with adequate time to review and respond. No additional payment will be made for costs of delays due to tardiness in submitting RFIs.
- B. The Contractor shall not proceed with the Work affected until receipt of a response from the Owner. Any portion of the Work that is performed in advance of a response and is not completed in accordance with the Owner's interpretations, clarifications, instructions, or decisions may not be accepted. Furthermore, the Contractor shall be responsible for all costs associated with Work correction.
- C. If after the response from the Owner, the Contractor believes additional costs or schedule impacts will occur related to the RFI response that the Owner did not address, the Contractor must notify the Owner within 5 working days. Any related work must not start without agreement for cost and schedule impacts from the

Owner. Contractor shall provide information per Section 01 26 00 (Modification Procedures).

- D. In the event that the Contractor does not agree with a RFI response and related Contract requirements, the Contractor shall follow procedures set forth in Section 00 72 05 (General Conditions).

PART 2 – PRODUCTS

NOT USED

PART 3 – EXECUTION

NOT USED

***** END OF SECTION *****

Request for Information (RFI)

Reference Specification Section 01 26 13

Date:	RFI No:
RFI Subject:	
Project:	Project No:
Contractor:	Contract No:
Clarification Requested By:	

In Reference to:

Drawing No:	Spec Section:	Other:

Requested Information:

Proposed Solution:

Schedule Impact: ☐ Cost Impact: ☐

Response:

Response by /Firm: _____ Date: _____

SECTION 01 31 19

PROJECT MEETINGS

PART 1 – GENERAL

1.01 PRECONSTRUCTION MEETING

- A. Prior to beginning construction, a meeting of representatives of the Contractor, the Owner, the Engineer (if applicable) and other affected agencies or utilities will be held. The Contractor's Project Manager and on-site Superintendent should attend this meeting. Not more than 5 working days after "Notice to Proceed" but earlier if practical, the Owner will schedule a preconstruction meeting. The purpose of the meeting will be to establish lines of authority and communication and identify duties and responsibilities of the parties. If applicable, discussion will cover requirements stipulated by funding agencies, regulatory agencies, specific Contract Drawings, Specifications, unusual conditions, schedules of completion, equal employment regulations, minority and women business enterprise (M/WBE) requirements, apprenticeship programs, and other pertinent features of the Contract. The meeting will also be used to begin coordination of activities with on-going plant operations. Written notification of the preconstruction meeting will be made. See Section 00 72 05 (General Conditions) for additional information.
- B. At a minimum the following are to be provided by the Contractor at the preconstruction meeting or prior if contractually required:
 - 1. Preliminary Progress Schedule
 - 2. Name and contact information for project point-of-contact
 - 3. Name of safety representative
 - 4. Emergency contact list.

1.02 PROGRESS MEETINGS

- A. The Owner will conduct progress meetings weekly or as determined by Construction Manager. Attendees to these meetings shall be as designated by the Owner and may include: Contractor (Project Manager and on-site Superintendent), subcontractor's and/or supplier's representatives as may be needed, other contractors or vendors working at the site, the Engineer, and other interested parties, i.e., public utility, local governmental representatives, safety representative.
- B. Contractor shall bring a list of work completed the prior week and a two-week look-ahead schedule to each meeting per Section 01 32 16 (Progress Schedules).
- C. The specific purpose of the weekly meetings is to coordinate the efforts of all concerned so that the project progresses without delay to completion, with the least inconvenience. Detailed meeting minutes will be taken by the Owner.

1.03 OTHER MEETINGS

- A. The Contractor shall also schedule start-up coordination meetings as necessary to coordinate start-up and testing activities.

PART 2 – PRODUCTS

NOT USED

PART 3 – EXECUTION

NOT USED

***** END OF SECTION *****

SECTION 01 32 16

PROGRESS SCHEDULES

PART 1 – GENERAL

1.01 SUMMARY

- A. This section specifies the procedures for preparing and revising the Progress Schedule used for planning and managing construction activities. The Progress Schedule provides a basis for determining the progress status of the project relative to the completion time, specific dates, and for determining the acceptability of the Contractor's progress payment estimates.

1.02 SCHEDULE REQUIREMENTS

- A. The Contractor shall prepare a time scale network schedule using a critical path method. A general guide for preparing such a schedule is contained in "Construction Planning and Scheduling," published by the Associated General Contractors of America.
- B. Progress Schedule shall be prepared using project planning software.
- C. The Progress Schedule shall depict all significant construction activities and items of work. The dependencies between activities shall be indicated so that it may be established what effect the progress of any one activity has on the schedule. A list of predecessors and successors for each activity must be provided.
- D. If applicable, completion time and sequencing requirements described in Section 01 11 00 (Summary of Work) shall be shown on the Progress Schedule. Activities making up the critical path shall be identified. Float for each activity shall be identified.
- E. Activity durations shall be shown in working days as defined in Paragraph 1.01.A of Section 00 72 05 (General Conditions).
- F. No activity on the Progress Schedule shall have a duration longer than 15 working days except activities comprising only fabrication and delivery may extend for more than 15 working days. Activities which exceed these limits shall be divided into more detailed components. The scheduled duration of each activity shall be based on the work being performed during the normal 40-hour work week with allowances made for LOTT Holidays and normal weather conditions. Changes to a 40-hour week, work on holidays, and or weekends for special project conditions shall be shown and requested during Progress Schedule submittal. Approval for those special project conditions may be approved during submittal review or at a later date per Paragraph 6.02 of Section 00 72 05 (General Conditions).
- G. The Progress Schedule shall include activities for submittals, procurement and delivery of equipment items, traffic control, shut downs and service interruptions, permits, and any related permit requirements.

1.03 SUBMITTAL PROCEDURES

- A. Progress Schedules shall be submitted electronically in Portable Document Format (PDF).
- B. A preliminary Progress Schedule shall be submitted within 10 working days of the executed contract or at the pre-construction meeting whichever is sooner. The preliminary schedule shall have a date for construction start, mobilization, and shall show the anticipated schedule for at least the first 60 working days of the project.
- C. Prior to the first pay application submittal, the Contractor shall submit the complete Progress Schedule to the Owner. The Owner will review and provide comments on the submitted Progress Schedule within 10 working days. The Contractor shall have 10 working days from receipt of comments to make corrections and adjustments and to complete and resubmit the Progress Schedule. No progress payment shall be made to Contractor until the Progress Schedule has been submitted and accepted by the Owner. The Owner's review of the Progress Schedule does not constitute approval of the Contractor's proposed means and methods.
- D. The Progress Schedule and all elements within the schedule shall be updated and submitted to the Owner as required in Section 00 72 05 Part 6.04.A.2. The Progress Schedule shall be used to produce a two-week look-ahead schedule for each construction meeting.
- E. The submittal of the initial Progress Schedule and required updates to such schedule must be provided to the Owner within the time requirements of the Contract.

1.04 CHANGE OF CONTRACT TIME

- A. Requests for changes in contract time shall be made in accordance with Section 00 72 05 (General Conditions) and Section 01 26 00 (Modification Procedures).

PART 2 – PRODUCTS

NOT USED

PART 3 – EXECUTION

NOT USED

***** END OF SECTION *****

SECTION 01 32 33

PHOTOGRAPHS

PART 1 – GENERAL

1.01 SUMMARY

- A. The work specified in this section includes all photography requirements for the Project by the Contractor.

1.02 SUBMITTAL FORMAT

- A. Photographs shall be of commercial quality and shall indicate on digital print the date when each photograph was taken. A video shall not be considered an acceptable substitute, but may be also included to show more detail.
- B. Photos shall be digital JPEG format of 1 megapixel resolution or better. Photos shall be submitted to the Owner on USB flash drive or other electronic media acceptable to the Owner. The photographs shall not be randomly arranged, but shall be arranged and organized in a continuous fashion indicating topographical features from one end of the Project to the other. If the Project is in several locations each location shall have its own digital folder describing the location. On projects of over 1/2 mile in length, a legend map shall also be submitted with corresponding picture names to location.
- C. Each photo shall be named with the LOTT project number, area designation indicated in the Drawings, a description, and a sequence number if there is more than one photo of an item. For example, "HP1501_34_Discharge Valves-1".

PART 2 – PRODUCTS

NOT USED

PART 3 – EXECUTION

3.01 PRE-CONSTRUCTION PHOTOGRAPHS

- A. Prior to beginning construction, the Contractor shall provide comprehensive preconstruction photographs of the entire construction area and adjacent properties. The photographs shall provide complete coverage of all features in the project area. Special attention shall be given to depict existing piping, valves, electrical components, roadway and property conditions, fences, buildings, trees, ditches, culverts, meter boxes, etc. Any preexisting damage or condition of relevance is particularly important to document. The Contractor shall invite the Owner to the site during this work.
- B. Photographs shall be taken during a period of good visibility and shall be of sufficient quality to depict the pre-construction conditions.

***** END OF SECTION *****

SECTION 01 33 00

SUBMITTALS

PART 1 – GENERAL

1.01 SUMMARY

- A. The work specified in this section includes requirements that apply to all administrative work plans and equipment and materials supplied on the Project. Submittals may include, but are not limited to:
1. Administrative plans and schedules
 2. Manufacturer's information
 3. Shop drawings
 4. Test procedures
 5. Test results
 6. Design calculations
 7. Color and material samples
 8. Operation and maintenance manuals
 9. Post-construction drawings
 10. Warranties and guarantees
 11. Current Safety Data Sheets (SDS), required by the Hazardous Communication Standards for all hazardous chemicals or substances supplied on the project that will be permanently on-site.

1.02 CONTRACTOR RESPONSIBILITIES

- A. The Contractor shall be responsible for the accuracy and completeness of the information contained in each submittal and shall assure that the material, equipment or method of work shall be as described in the submittal.
- B. The Contractor shall verify that all features of all products conform to the requirements of the Contract Documents.
- C. Submittal documents shall be clearly edited to indicate only those items, models, or series of equipment that are being submitted for review. **All extraneous materials shall be crossed out or otherwise removed.** The Contractor shall ensure that there is no conflict with other submittals and notify the Owner in each case where the submittal may affect the work of another contractor or the Owner.
- D. The Contractor shall ensure coordination of submittals among the related crafts and subcontractors and shall verify such coordination on all submittals.
- E. The Contractor shall coordinate submittals with the work schedule so that work will not be delayed. He shall coordinate and schedule different categories of submittals, so that one will not be delayed for lack of coordination with another. No extension of time will be allowed because of failure to properly schedule submittals. The Contractor shall not proceed with work related to a submittal until the submittal process is complete. This requires that submittals for review and

comment shall be returned to the Contractor stamped "No Exceptions Taken" or "Make Corrections Noted."

- F. The Contractor may authorize in writing with the Owner's consent, a material or equipment supplier to deal directly with the Engineer or with the Owner with regard to a submittal. These dealings shall be limited to contract interpretations to clarify and expedite the work.

1.03 SUBSTITUTIONS OR "OR-EQUALS"

- A. Where noted in the Contract Documents, designs associated with the indicated equipment items are specific to the manufacturer and model number specified. Any modifications or redesign required to utilize an approved substitution or equal to the specified equipment shall be made by the Contractor at no additional cost to the Owner. Where approved substitutions or equals of specified equipment affect other materials or equipment, the Contractor shall note in the equipment submittal any necessary changes to accommodate the substituted or equal equipment.
- B. It is the responsibility of the Contractor to coordinate other equipment submittals to make sure that all changes necessary to accommodate the substitute or equal equipment are addressed in these submittals as well. All substitutions or equals must be clearly marked as such in the submittal.

1.04 GENERAL

- A. When the Contract Documents require a submittal, the Contractor shall include the Submittal Transmittal Form that is included at the end of this specification section and submit the specified information in electronic searchable PDF format to the Owner's designated representative. If electronic submittals are not possible or upon Owner request, the Contractor shall also submit a minimum of four (4) hard copies of the submittal to the Owner for review and comment. Each copy shall be labeled independently.

1.05 SUBMITTALS

A. SUBMITTAL INFORMATION

- 1. Shop, catalog, and other appropriate drawings and information shall be submitted to the Owner for review prior to fabrication or ordering of all equipment and materials specified. Any related work performed by the Contractor prior to the Owner's review and approval shall be at the sole expense and responsibility of the Contractor.
- 2. All submittals shall bear the Contractor's certification that he has reviewed, checked, and approved the submittal information prior to transmitting to the Owner. The submittal number and related specification section shall be marked on each submittal.
- 3. All equipment submittals shall be accompanied by a copy of the applicable sections of the related Contract Specification. Each paragraph should be

check marked to indicate compliance with the whole paragraph or the deviation requested for Owner approval.

4. Equipment submittals shall include installation instructions when required in the related Contract Specification.

B. REVIEW ACTION: When indicated in the Contract Documents, the Contractor shall submit product data for review by the Owner. Unless otherwise specified, within 10 working days after receipt of the submittal, the Owner shall review the submittal and provide comments to the Contractor. The review days begin on the day following the submittal receipt and ends on the day the submittal is in transit to the Contractor. If hard copies or samples were required, the Construction Manager will return two (2) copies of the marked-up submittal. Additional copies will be returned if the Contractor submitted more than four (4) originals. One (1) original will be retained by the Engineer and one (1) by the Owner. The returned submittal shall indicate one of the following actions:

1. If the review indicates that the material, equipment, or work method complies with the Contract Documents, submittal copies will be marked "NO EXCEPTIONS TAKEN." In this event, the Contractor may begin to implement the work method or incorporate the material or equipment covered by the submittal.
2. If the review indicates limited corrections are required, copies will be marked "MAKE CORRECTIONS NOTED." The Contractor may begin implementing the work method or incorporating the material and equipment covered by the submittal in accordance with the noted corrections.
3. If the review reveals that the submittal is insufficient or contains incorrect data, copies will be marked "AMEND AND RESUBMIT." Except at the Contractor's own risk, the Contractor shall not undertake work covered by this submittal until it has been revised, resubmitted, and returned marked either "NO EXCEPTIONS TAKEN" or "MAKE CORRECTIONS NOTED."
4. If the review indicates that the material, equipment, or work method does not comply with the Contract Documents, copies of the submittal will be marked "REJECTED - SEE REMARKS." Submittals with deviations that have not been identified clearly will be marked "REJECTED."
5. If the submittal is not subject to the Owner's review and approval, and it is being filed for information only, the submittal will be marked "RECEIPT ACKNOWLEDGED or REVIEWED FOR INFORMATION ONLY." No further submittal is then required by the Contractor.
6. If the review indicated that the materials, equipment, or method of work generally complies with the Contract Documents and is marked as such, but additional information is required, the SUBMIT SPECIFIED ITEM box will be checked. The Contractor shall submit additional information under a separate submittal number and transmittal cover.

C. IDENTIFICATION OF SUBMITTALS

1. General

- a. Each submittal shall be accompanied by the Owner's Submittal Transmittal Form showing the date of transmittal, specification section, or drawing number to which the submittal pertains, submittal number, and a brief description of the submitted item.
- b. Number submittals sequentially beginning with "001". Resubmittals shall be designated by successive letters. For example, Submittal 025A is the resubmittal of Submittal 025.
- c. File names shall include the LOTT Project Number, Submittal Number, Specification Section, and Short Description. For example, HP1501_Sub025_400500_Bolts.

2. Resubmittals: When material is resubmitted for any reason, it shall:

- a. Be submitted under a new submittal transmittal form.
- b. Include all of the approved portions of previous submittals.
- c. Have additional or amended areas noted in the Description section on the submittal form.

3. It is the Owner's intent to have a single complete record of each approved submittal for the Project.

4. The review and comment of resubmittals by the Owner shall apply to the amended areas only.

5. If the Owner must review more than two resubmittals for a particular submittal item, the Owner reserves the right to recover the cost of additional submittal review time through a deductive change order to the Contract.

D. MANUFACTURER'S LITERATURE: Where the contents of submitted literature include data not pertinent to the submittal, the portion(s) of the contents being submitted for the Owner's review shall be clearly indicated.

E. SHOP DRAWINGS

1. Shop drawings shall be submitted in the form of blue-line or black-line prints of each sheet. Blueprint submittals will not be acceptable.

2. All shop drawings shall be accurately depicted to a scale sufficiently large enough to show pertinent features and method of connection or joining. On all shop drawings, figure dimensions shall be used such that the reviewer does not rely solely on scaled dimensions.

F. COLOR AND MATERIAL SAMPLES

1. All material samples shall be of the exact article proposed to be furnished for the Work and shall be submitted in the quantity required. Samples shall be returned to the Contractor, with one (1) retained by the Construction Manager.
2. Unless the precise color is specifically described in the Contract Documents, or whenever a choice of color or pattern is available in a specified product, accurate color charts shall be submitted to the Owner for review and selection.

G. DESIGN CALCULATIONS: When required in the Contract Documents, design calculations shall be submitted to the Owner. Design calculations shall be complete, concise, and in legible format. All design calculations shall be signed and stamped by a Professional Engineer licensed in the State of Washington.

H. TEST REPORTS: Copies of all test reports shall be submitted to the Owner.

I. OPERATION AND MAINTENANCE MANUALS

1. Refer to Section 01 78 23 (Operating and Maintenance Information) for details of manual submission requirements.
2. The preliminary copies of the manufacturer's operation and maintenance manuals shall be delivered to the Construction Manager for review no later than the time of equipment delivery to the project site.

1.06 REVIEW OF SUBMITTALS

- A. The Owner will review all submittals for general conformance with the design and other requirements of the Contract Documents. Markings or comments shall not be construed as relieving the Contractor from compliance with the Contract Documents. A mark of "NO EXCEPTIONS TAKEN" or "MAKE CORRECTIONS NOTED" shall mean that the Owner has no objection to the Contractor, upon the Contractor's own responsibility, using the plan or method of work proposed, or providing the materials or equipment proposed.
- B. Submittals may be rejected based on inadequate information and/or not meeting the requirements of the Contract Documents. Rejection of submittals requires action on the part of the Contractor to correct the reason for the rejection. The Contractor remains responsible for details and accuracy, for confirming and correlating all quantities and dimensions, for selecting fabrication processes, and for techniques of assembly and installation.

1.07 COORDINATION OF SUBMITTALS

A. GENERAL

1. Prior to submittal for review by the Owner, all data shall be fully coordinated, including the following:
 - a. All field dimensions and conditions.
 - b. All trades and subcontractor work elements.
 - c. Public agencies and/Permit issuers related to the Work including time necessary for these parties' approvals.
 - d. All deviations from the Contract Documents.

- B. **GROUPING OF SUBMITTALS:** Individual submittals shall be limited to no more than one specification section unless grouping with associated items facilitates review by Owner.

1.08 TIMING OF SUBMITTALS

A. GENERAL

1. All submittals shall be made far enough in advance of installation to provide all required time for reviews and securing necessary approvals, including additional time for Permit issues review if necessary.
2. In scheduling, the Contractor shall allow for the time indicated in this Section for the Owner's review following receipt of the submittal.

- B. **DELAYS:** No additional or separate payment will be made for costs of delays occasioned by tardiness of submittals on the part of the Contractor, lack of coordination with subcontractors, or due to the resubmittal process.

PART 2 – PRODUCTS

NOT USED

PART 3 – EXECUTION

NOT USED

***** END OF SECTION *****

LIST OF SUBMITTALS

The following List of Submittals is included for the Contractor's convenience and may not include all required submittals.

Specification Section	Description	Notes for Early Submittals
00 72 05, 01 32 16	Preliminary Progress Schedule	
00 72 05, 14.05	Permits (after final inspections)	
01 11 00	Shutdown Work Plans	<i>Required to issue Notice to Commence Construction</i>
01 20 00	Schedule of Values	<i>Required to issue Notice to Commence Construction</i>
01 26 00	Project Labor List (prior to force account work)	
01 32 16	Progress Schedule	<i>Required to issue Notice to Commence Construction</i>
01 32 33	Preconstruction Photos	<i>Required to issue Notice to Commence Construction</i>
01 35 20	Emergency Contact List	<i>Required to issue Notice to Commence Construction</i>
01 35 20	Safety and Health Plan	<i>Required to issue Notice to Commence Construction</i>
01 50 00	Staging and Falsework Calculations (if required)	
01 50 00	Crane Plan (if required)	
01 78 23	Operations and Maintenance Manuals, including final extended warranties	
01 78 39	As-Built Redlines	
01 78 43, Technical Specs	Spare Parts Transfer Receipt	

01 91 00	Master Test Logbook (if required)	
01 91 00	Start-up, Testing, and Commissioning Procedures	
01 91 00	Installation Certification Forms	
02 41 00	Demolition Plan	<i>Required to issue Notice to Commence Construction</i>
03 20 00	Concrete Reinforcement	<i>Required to issue Notice to Commence Construction</i>
03 30 00	Cast-in-Place Concrete	<i>Required to issue Notice to Commence Construction</i>
05 52 00	Guard Rail Systems	<i>Required to issue Notice to Commence Construction</i>
06 70 00	Pre-Engineered Fiberglass Building	<i>Required to issue Notice to Commence Construction</i>
09 90 00	Painting	
Division 9	As-Built Finish Schedule (if applicable)	
22 45 16	Emergency Drench Shower System	<i>Required to issue Notice to Commence Construction</i>
26 05 19	Conductors and Cables	<i>Required to issue Notice to Commence Construction</i>
26 05 26	Grounding and Bonding	<i>Required to issue Notice to Commence Construction</i>
26 05 33	Raceway and Boxes	<i>Required to issue Notice to Commence Construction</i>
26 27 26	Wiring Devices	<i>Required to issue Notice to Commence Construction</i>

26 28 16	Enclosed Switches and Circuit Breakers	<i>Required to issue Notice to Commence Construction</i>
26 46 00	Low Voltage Transformers	<i>Required to issue Notice to Commence Construction</i>
31 23 23	Gravel Materials	<i>Required to issue Notice to Commence Construction</i>
31 25 00	Erosion Control	<i>Required to issue Notice to Commence Construction</i>
32 11 16	Base Courses	<i>Required to issue Notice to Commence Construction</i>
32 12 16	Asphalt Paving	<i>Required to issue Notice to Commence Construction</i>
33 41 13	Stormwater Gravity Piping	<i>Required to issue Notice to Commence Construction</i>
33 49 00	Stormwater Drainage Structure	<i>Required to issue Notice to Commence Construction</i>
40 05 07	Pipe and Conduit Support Systems	<i>Required to issue Notice to Commence Construction</i>
40 05 53	Valves	<i>Required to issue Notice to Commence Construction</i>
40 23 00	Process Piping Systems	<i>Required to issue Notice to Commence Construction</i>
40 72 13	Radar Level Sensors/Transmitters	<i>Required to issue Notice to Commence Construction</i>
40 72 76	Level Switches	<i>Required to issue Notice to Commence Construction</i>

40 73 13	Pressure Gauges	<i>Required to issue Notice to Commence Construction</i>
40 95 00	Control Panels	<i>Required to issue Notice to Commence Construction</i>
43 32 69	Chemical Feed Equipment	<i>Required to issue Notice to Commence Construction</i>
43 41 45	Polyethylene Storage Tank	<i>Required to issue Notice to Commence Construction</i>

Submittal Transmittal

Reference Specification Section 01 33 00

Date:	Spec Section:	Submittal No.
Submittal Description:		
Submittal Type: Shop Dwgs: ☐ Manufacturer Info: ☐ Testing Info: ☐ Material Sample: ☐ O&M: ☐ Other: ☐		
Project:		Project No:
Contractor:		Contract No:

Contractor Comments:

Submittal Contents:

Item	Spec Section	Description	Review Action	Review Comments Attached	Reviewer Initials	Date
1						
2						
3						
4						
5						

NET = No Exception Taken

MCN = Make Corrections Noted

A&R = Amend & Resubmit

R = Rejected

RA = Receipt Acknowledged

RI = Reviewed for Information Only

☐ **Submit Specified Item:** (a resubmittal is needed under a separate cover)

Owner Comments:

Contractor Certification:

- ☐ We have certified that the material or equipment contained in this submittal meets all the requirements, including coordination with all related work specified (no exceptions).
- ☐ We have certified that the material or equipment contained in this submittal meets all the requirements specified **except** for the deviations noted below.

Certified By: _____

Contractor Requested Deviation:

Item	Deviation

SECTION 01 35 20

SAFETY AND HEALTH REQUIREMENTS

PART 1 – GENERAL

1.01 SUMMARY

- A. This section specifies the safety and health requirements for this project.

1.02 SAFETY AND HEALTH REGULATIONS

- A. Contractor and subcontractors shall be familiar with and shall abide by the safety rules and regulations of any governmental body having authority to control the manner or method of carrying out the Work, including, but not limited to the Occupational Safety and Health Administration (OSHA), the Washington Industrial Safety and Health Act (WISHA), all rules and regulations established pursuant thereto, and all amendments and supplements thereto. Electrical work shall meet all NFPA 70E standards. Contractor further agrees to require all of its subcontractors and suppliers to comply with these requirements.
- B. The Contractor shall also comply with Paragraph 6.13 of Section 00 72 05 (General Conditions)

1.03 DESIGNATED SAFETY REPRESENTATIVE

- A. Each contractor is required to designate a responsible safety representative for each work site and provide that person's contact information. This individual may be a supervisor or a full-time safety representative. In either case, this employee will have the authority and responsibility to immediately correct any safety deficiencies. The designated person should be able to demonstrate, at a minimum, general knowledge in the safety requirements of the project and have completed an OSHA 30 course or equivalent as determined by the Owner.

1.04 CONTRACT TERMS AND CONDITIONS

- A. Contractor and subcontractors warrant and represent to the Owner that it has the supervision necessary to, and shall train, manage, supervise, monitor, and inspect the activities of its forces for the purpose of enforcing compliance by its forces with these safety requirements. Contractor acknowledges and agrees that the Owner and its consultants do not undertake any duty toward Contractor's employees to train, manage, supervise, monitor, and inspect Contractor's work activities for the purpose of enforcing compliance with these safety requirements.
- B. The Owner's review of the Contractor's submittals and performance does not include approval of the adequacy of the Contractor's Site Safety Officer, the project-specific Safety and Health Plan, safety program, or any safety measures taken in, on, or near the construction site.

- C. Failure on the part of the Contractor to follow its project-specific Safety and Health Plan or to conduct work in a safe manner may result in suspension of work by Owner. Contractor shall not be entitled to extra compensation for health- and safety-related suspensions, nor shall the Contract Time be extended.
- D. The Contractor and subcontractors shall be responsible without limitation for complying with all applicable provisions of the WISHA Chapter 296-800-170, and/or other local and state regulations relating to hazard communications or "right-to-know." The Contractor and all subcontractors shall maintain on site a 3-ring binder with a copy of all current Safety Data Sheets (SDS) required by the Hazardous Communication Standards for all hazardous chemicals or substances, which Contractor will introduce to any work location where employees may be present. To the extent that SDS must be posted in work locations where Contractor uses or stores hazardous chemicals or substances on any work location subject to this Contract, the Contractor shall see that such SDS are prepared and posted as required by law. The SDS shall be available for review by the Owner at any time.
- E. Without limiting the foregoing, Contractor specifically will require all employees, subcontractors, visitors, and suppliers under its direction to:
 - 1. Wear WISHA-required personal protective equipment when entering the jobsite.
 - 2. Provide and ensure the use of safety equipment in accordance with the Contractor's Safety Requirements. These include any requirements that are stricter than federal, state, or local standards, or generally recognized industry applicable standards.
- F. Without limiting the foregoing, Contractor and Contractor's subcontractors will:
 - 1. Conduct a weekly safety meeting with its employees and list the topics discussed with signatures of attendees. Such list shall be made available to the Owner upon request. Representatives of the Owner may attend these meetings at its discretion.
 - 2. Conduct Job Hazard Analyses when work tasks involve potential hazards that can cause injury, death, or near misses. These forms shall be made available to the Owner upon request.
 - 3. Perform self-audits (safety assessments) at least monthly and document findings. Such documentation shall be made available to the Owner upon request.
 - 4. Immediately, but no longer than 2 hours after the time of incident, advise the Owner of any incident resulting in death or injury to any person or damage to any property. In addition, Contractor shall promptly furnish the Owner a written report of any incident and liability arising out of, or in connection with, the performance of the Work. Upon request, Contractor

shall provide loss history of all workers' compensation and liability claims pertaining to the Project to the Owner.

5. Maintain clean work areas and secure and protect all work materials in accordance with safety requirements of generally recognized industry standards.
6. If it becomes necessary to have access to any openings or shafts or to remove handrails, Contractor and/or subcontractor shall ensure that the openings or shafts are protected in accordance with generally accepted practices and any applicable federal, state, or local safety standards while the work is in progress and that any covers or handrails previously removed by the Contractor and/or subcontractor are replaced before leaving the area.

- G. All persons entering Owner's facilities will be required to follow Owner's sign-in procedures.

1.05 EMERGENCY CONTACT LISTS

- A. Provide the Owner with an "Emergency Contact List". This list shall include phone numbers for at least three individuals that may be contacted in an emergency such as equipment failure or a weather event.

1.06 SAFETY AND HEALTH PLAN

- A. The Contractor shall develop and maintain for the duration of the Contract a Safety and Health Plan that will effectively incorporate and implement all required health and safety precautions. The Safety and Health Plan shall be submitted by the Contractor and reviewed by the Owner's Safety Manager before the start of Work. The Contractor understands and agrees that review of the Safety and Health Plan by Owner's Safety Manager does not relieve Contractor of its nondelegable and primary duty to ensure compliance with all OSHA and WISHA regulations for the protection of all employees at the jobsite, whether Contractor's own employees or those of an independent subcontractor, LOTT employees, consultants, third party inspectors or agencies, or the general public as required under RCW 49.17.060. Any ambiguities in the Contractor's responsibilities in this regard relative to Owner shall be construed as Contractor's responsibility.
- B. The Contractor shall designate an on-site, full-time employee who is qualified and authorized to supervise and enforce compliance with the Safety and Health Plan. The Contractor is responsible to ensure that all necessary monitoring equipment, protective clothing, and other supplies and equipment are available to implement the plan.
- C. The Contractor shall submit a copy of their Employee Safety Program. This program shall be submitted as an element of the Safety and Health Plan.
- D. The Safety and Health Plan shall, as a minimum, include the following elements:

1. Objective.
2. Employee Safety Program.
3. Personal protective equipment (PPE).
4. Hazard evaluation of different work activities.
5. “Hot Work”, including permit and firewatch procedures.
6. Lockout/Tagout procedures.
7. Confined space entry procedures.
8. Work practices.
9. Cleanup.
10. Spill cleanup.
11. Work limitations.
12. Authorized personnel.
13. Emergency procedures.
14. Person responsible for safety and health enforcement.
15. Telephone Numbers:
 - a. 24-hour number “Emergency Contact List” to contact Contractor.
 - b. Emergency services.
16. Items as specified in this section.
17. Other items as pertinent to specific work.

PART 2 – PRODUCTS

NOT USED

PART 3 – EXECUTION

NOT USED

***** END OF SECTION *****

SECTION 01 41 00

REGULATORY REQUIREMENTS

PART 1 – GENERAL

1.01 SUMMARY

- A. The work specified in this section contains information pertaining to permits and licenses, and use of private property.

1.02 PERMITS AND LICENSES

- A. Except as noted in Paragraph 1.02.B, the Contractor shall be responsible for obtaining and paying all fees associated with all the necessary permits, licenses, approvals, and construction permits necessary for the execution of this Contract, whether they be city, county, state, or federal permits. The Contractor is to provide a copy of permits to Owner. The Contractor shall comply with all conditions of each permit as if the conditions were detailed herein.
- B. The Owner will be responsible for obtaining the following approvals and permits, and will pay the fees associated with the application and procurement of such approvals and permits.

When noted below, the Contractor must pick up the permits from the issuing agency upon notification by Owner that the permits are available. The Contractor is to provide a copy of any permit requirements or comments to Owner.

The Contractor shall comply with all conditions of each approval/permit as if the conditions were detailed herein.

- 1. City of Olympia Commercial Miscellaneous Permit (applied and paid for by Owner, picked up by Contractor)
- 2. City of Olympia Mechanical/Plumbing Permit (applied and paid for by Owner, picked up by Contractor)
- 3. City of Olympia Electrical Permit (applied and paid for by Owner, picked up by Contractor)

1.03 OTHER PERMIT REQUIREMENTS

- A. The Washington State Department of Ecology has prohibited bypassing of sewage or reclaimed water to state waters. Unless specifically allowed in the specifications, all wastewater treatment and conveyance facilities shall remain operational during construction at all times. The Contractor shall maintain the conveyance and treatment facilities in continuous operation during the entire construction period and until the project has been accepted by the Owner. The Contractor shall pay all costs of any damages and/or Regulatory Agency penalties resulting from plant bypassing or overflows caused by his actions or inactions.

1.04 USE OF PRIVATE PROPERTY

- A. The Contractor shall be responsible for all conditions of any arrangements the Contractor makes for the use of any privately owned property.
- B. In the event any dispute occurs and claims for damages are filed by the property owners, the Owner will request that the Contractor provide evidence that Contractor's insurance company has been contacted to make personal contact with the claimants. Any settlement for insurance claims shall be strictly an act restricted to the claimant, the Contractor, and Contractor's insurance company.
- C. The Contractor is advised that in the event of any property damage, the Owner reserves the right to withhold monies to protect the property owner.

PART 2 – PRODUCTS

NOT USED

PART 3 – EXECUTION

NOT USED

***** END OF SECTION *****

SECTION 01 42 13

STANDARD REFERENCES

PART 1 – GENERAL

1.01 SUMMARY

- A. This Section includes standard references that are used throughout the Contract Documents.

1.02 REFERENCES

- A. Wherever used in the Project Manual, the following abbreviations will have the meanings listed:

AA	Aluminum Association Incorporated PO Box 753 Waldorf, MD 20604
AABC	Associated Air Balance Council 1518 K St. NW Washington, DC 20005
AAMA	American Architectural Manufacturers Association 1540 East Dundee Rd, Suite 310 Palatine, IL 60067
AASHTO	American Association of State Highway and Transportation Officials 444 North Capitol St. NW, Suite 249 Washington, DC 20001
ABMA	American Bearing Manufacturers Association 1200 19th St. NW, Suite 300 Washington, DC 20036
ACI	American Concrete Institute 22400 West Seven Mile Rd PO Box 19150, Redford Station Detroit, MI 48219
AEIC	Association of Edison Illuminating Companies 600 North 18th St. PO Box 2641 Birmingham, AL 35291

AGA	American Gas Association Records 1515 Wilson Boulevard Arlington, VA 22209
AGMA	American Gear Manufacturer's Association, Inc. 1500 King St, Suite 201 Alexandria, VA 22314
AHA	American Hardboard Association 1210 West Northwest Highway Palatine, IL 60067
AISC	American Institute of Steel Construction One East Wacker Dr, Suite 3100 Chicago, IL 60601
AISI	American Iron and Steel Institute 1101 Seventeenth St. NW, Suite 1300 Washington, DC 20036
AITC	American Institute of Timber Construction 7012 South Revere Parkway, Suite 140 Englewood, CO 80112
ALSC	American Lumber Standard Committee PO Box 210 Germantown, MD 20875
AMCA	Air Movement and Control Association, Inc. 30 West University Dr. Arlington Heights, IL 60004
ANSI	American National Standards Institute 11 West 42nd St. 13th Floor New York, NY 10036
APA	American Plywood Association 7011 South 19th St. Tacoma, WA 98466
API	American Petroleum Institute 1220 L St. NW Washington, DC 20005
ARI	Air-Conditioning and Refrigeration Institute 4301 North Fairfax Dr. Suite 425 Arlington, VA 22203

ASCE	American Society of Civil Engineers United Engineering Center 345 East 47th St. New York, NY 10017
ASCII	American Standard Code for Information Interchange United States of America Standards Institute 10 East 40th St. New York, NY 10016
ASHRAE	American Society of Heating, Refrigeration and Air Conditioning Engineers, Inc. 1791 Tullie Circle, NE Atlanta, GA 30329
ASME	American Society of Mechanical Engineers 345 East 47th St. New York, NY 10017
ASTM	American Society for Testing and Materials 100 Barr Harbor Dr. West Conshohocken, PA 19428
AWS	American Welding Society 550 NW LeJeune Rd. PO Box 351040 Miami, FL 33135
AWWA	American Water Works Association 6666 West Quincy Ave. Denver, CO 80235
BOCA	Building Officials and Code Administrators, International, Inc. 4051 West Flossmoor Rd. Country Club Hills, IL 60478
CBM	Certified Ballast Manufacturers 2120 Keith Building Cleveland, OH 44115
CFR	Code of Federal Regulations United States Government
CMAA	Crane Manufacturers Association of America, Inc. (AKA: Overhead Electrical Crane Institute (OECI)) 8720 Red Oak Blvd, Suite 201 Charlotte, NC 28217

CRSI	Concrete Reinforcing Steel Institute 933 N Plum Grove Rd. Schaumburg, IL 60173
CSA	Canadian Standards Association 178 Rexdale Blvd. Rexdale, Ontario, M9W 1R3, Canada
DHI	Door and Hardware Institute 14170 Newbrook Dr. Chantilly, VA 22021
ECY	Washington State Department of Ecology 300 Desmond Drive SE Lacey, WA 98503
EEI	Edison Electric Institute 90 Park Ave. New York, NY 10016
EIA	Electronic Industries Association Order from: Global Engineering Documents 18201 McDermott West Irvine, CA 92714
EJMA	Expansion Joint Manufacturers Association 25 North Broadway Tarrytown, NY 10591
ESO	Electrical Safety Orders California Administrative Code, Title 8, Chap. 4, Sub-article 5 Office of Procurement, Publications Section PO Box 20191 8141 Elder Creek Rd. Sacramento, CA 95820
FEDSPEC	Federal Specifications General Services Administration Specification and Consumer Information Distribution Branch Washington Navy Yard, Bldg. 197 Washington, DC 20407
FEDSTDS	Federal Standards (see FEDSPEC)
FM	Factory Mutual Engineering and Research Corporation 1151 Boston-Providence Turnpike PO Box 9102 Norwood, MA 02062

HEI	Heat Exchange Institute 1300 Sumner Ave. Cleveland, OH 44115
HI	Hydraulic Institute 9 Sylvan Way, Suite 180 Parsippany, NJ 07054
IAPMO	International Association of Plumbing and Mechanical Officials 20001 Walnut Dr. S Walnut, CA 91789
IBC	International Building Code International Code Council 3060 Saturn Street, Suite 100 Brea, CA 92821
ICBO	International Conference of Building Officials 5360 Workman Mill Rd. Whittier, CA 90601
ICEA	Insulated Cable Engineers Association PO Box 440 South Yarmouth, MA 02664
IEEE	Institute of Electrical and Electronics Engineers 445 Hoes Lane PO Box 1331 Piscataway, NJ 08855
IES	Illuminating Engineering Society of North America 120 Wall St. New York, NY 10017
ISA	Instrument Society of America 67 Alexander Dr. PO Box 12277 Research Triangle Park, NC 27709
JIC	Joint Industrial Council 7901 West Park Dr. McLean, VA 22101
MFMA	Metal Framing Manufacturers Association 401 N. Michigan Ave. Chicago, IL 60611

MSS	Manufacturers Standardization Society of the Valve and Fittings Industry, Inc. 127 Park St. NE Vienna, VA 22180
MUTCD	Manual on Uniform Traffic Control Devices United States Department of Transportation Federal Highway Administration
NAAMM	National Association of Architectural Metal Manufacturers 11 South La Salle St., Suite 1400 Chicago, IL 60603
NACE	National Association of Corrosion Engineers 1440 South Crk Dr. Houston, TX 77084
NBC	National Building Code Published by BOCA
NEC	National Electric Code National Fire Protection Association One Batterymarch Park PO Box 9101 Quincy, MA 02269
NELMA	Northeastern Lumber Manufacturers Association, Inc. P.O. Box 87A Cumberland Center, ME 04021
NEMA	National Electrical Manufacturer's Association 2101 L St. NW, Suite 300 Washington, DC 20037
NESC	National Electric Safety Code American National Standards Institute 1430 Broadway New York, NY 10018
NFPA	National Fire Protection Association One Batterymarch Park PO Box 9101 Quincy, MA 02269
NSF	National Sanitation Foundation 3475 Plymouth Rd. PO Box 130140 Ann Arbor, MI 48113

OSHA	Occupational Safety and Health Act U.S. Department of Labor Occupational and Health Administration San Francisco Regional Office 450 Golden Gate Ave., Box 36017 San Francisco, CA 94102
PCI	Precast/Prestressed Concrete Institute 175 West Jackson Blvd., Suite 1859 Chicago, IL 60604
PPIC	The Plumbing & Piping Industry Council, Inc. 510 Shatto Pl., Suite 402 Los Angeles, CA 90020
RMA	Rubber Manufacturers Association 1400 K St. NW, Suite 900 Washington, DC 20005
RCW	Revised Code of Washington Books Publishing 201 Westlake Ave N. Seattle, WA 98109-5293
SAMA	Scientific Apparatus Makers Association One Thomas Circle Washington, DC 20005
SBC	Standard Building Code Published by SBCCI
SBCCI	Southern Building Code Congress International Inc. 900 Montclair Rd Birmingham, AL 35213
SCMA	Southern Cypress Manufacturers Association 400 Penn Center Blvd, Suite 530 Pittsburg, PA 15235
SDI	Steel Door Institute 30200 Detroit Rd Cleveland, OH 44145
SMACNA	Sheet Metal and Air Conditioning Contractors National Association, Inc. PO Box 221230 Chantilly, VA 22021

SPI	Society of the Plastics Industry, Inc. 1275 K St NW, Suite 400 Washington, DC 20005
SPIB	Southern Pine Inspection Bureau 4709 Scenic Highway Pensacola, FL 32504
SSPC	Steel Structures Painting Council 4516 Henry St, Suite 301 Pittsburgh, PA 15213
SSPWC	Standard Specifications for Public Works Construction Building News, Inc. 3055 Overland Ave Los Angeles, CA 90034
TPI	Truss Plate Institute 583 D'Onofrio Dr, Suite 200 Madison, WI 53719
UBC	Uniform Building Code Published by ICBO
UL	Underwriters Laboratories Inc. 333 Pfingsten Rd Northbrook, IL 60062
UMC	Uniform Mechanical Code Published by ICBO
UPC	Uniform Plumbing Code Published by IAPMO
USBR	Bureau of Reclamation U.S. Department of Interior Engineering and Research Center Denver Federal Center, Building 67 Denver, CO 80225
WABO	Washington Association of Building Officials PO Box 7310 Olympia, WA 98507-7310
WAC	Washington Administrative Code State of Washington

WISHA Washington Industrial Safety and Health Act
Department of Labor and Industries
300 West Harrison, Room 301
Seattle, WA 98119

WSDOT/ Washington State Department of Transportation/
APWA American Public Works Association
Standard Specifications for Roads and Bridge Construction
Washington State Transportation
Olympia, WA 98504

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 SUMMARY

- A. Contractor Quality Control: The primary function of contractor quality control is to assure that the completed project meets all quality requirements of the contract with a quality of workmanship that ensures a long life of the work provided on the project. The general contractor will manage and control his own, all subcontractor's and supplier's activities so that the completed project complies with contract requirements.

1.02 DEFINITIONS

- A. Quality Assurance: Activities, actions, and procedures performed before and during execution of the work to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements. The primary function of quality assurance is to obtain completed construction that meets all contract requirements. Assurance is defined as a degree of certainty.
- B. Quality Control: Tests, inspections, procedures, and related actions during and after execution of the work to evaluate that actual products incorporated into the work and completed construction comply with requirements.
- C. Minimum Quality Levels: The quality level shown or specified shall be the minimum provided or performed.

1.03 GENERAL REQUIREMENTS

- A. The Contractor is responsible for quality control and shall establish and maintain an effective quality control system. The quality control system shall consist of plans, procedures, and organization necessary to produce an end product which complies with the contract requirements. The system shall cover all construction operations, both onsite and offsite, and shall be keyed to the proposed construction sequence and schedule.
- B. The Contractor shall inspect, test, and verify that the completed Work meets or exceeds the requirements of the Contract Documents prior to requesting inspection by the Owner. For work that is to be covered, the Owner shall be allowed adequate time to inspect all Work prior to cover. Only completed systems will receive final inspection or approval.

1.04 PERSONNEL

- A. The site project superintendent shall maintain a physical presence at the site at all times, and shall be responsible for all construction and construction related

activities at the site. The Contractor shall identify an individual within the onsite work organization who shall be responsible for overall management of quality control and have the authority to act in all quality control matters for the Contractor.

- B. The Contractor shall ensure qualified personnel are performing the Work on the Project:
 - 1. Installer Qualifications: A firm or individual experienced in installing, erecting, or assembling work similar in material, design, and extent to that indicated for this Project.
 - 2. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project.
 - 3. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project.
 - 4. Factory-Authorized Service Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to inspect installation of manufacturer's products.

1.05 QUALITY CONTROL

- A. The Contractor is responsible for all testing and inspections, including scheduling and coordination of special inspections as specified Paragraph 13.03 of Section 00 72 05 (General Conditions). Inspect and test work as needed to ensure that the quality of materials, workmanship, construction, finish, and functional performance are in compliance with applicable specifications, drawings, and those required by the Building Code.
- B. Testing includes operation and/or acceptance tests when specified.
- C. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements. The quality of all work shall be the responsibility of the Contractor.
- D. Specified tests, inspections, and related actions do not limit Contractor's other quality assurance and control procedures that facilitate compliance with the Contract Document requirements.
- E. The Contractor shall perform the following activities and record and provide the following data:
 - 1. Verify that testing procedures comply with contract requirements.
 - 2. Verify that facilities and testing equipment are available and comply with testing standards.
 - 3. Check test instrument calibration data against certified standards.

4. Verify that recording forms and test identification control number system, including all of the test documentation requirements, have been prepared on approved forms and completely filled out.
 5. When required, pressure tests shall be recorded on the Pipe Test Report that is included at the end of this specification section.
 6. For Contract-required testing by permit or technical specifications, see Paragraph 13.03 of Section 00 72 05 (General Conditions).
 7. As needed the Contractor can engage a qualified testing agency to perform quality-control services for their own quality assurance.
 8. Testing and inspecting requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
 9. Submit the appropriate report, for each quality-control service or manufactures startup requirements.
 10. The Owner will have the opportunity to witness all tests and inspections.
- F. Manufacturer's Field Services: Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing on Owner approved forms.
 - G. Re-testing/Re-inspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and re-inspecting, for construction that replaced work that failed to comply with the Contract Documents.
 - H. Coordination: Coordinate sequence of activities to accommodate required quality assurance and control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.
 - I. Off-site Fabrication: Items that are fabricated or assembled off-site shall be inspected for quality control at the place of fabrication. Owner will be provided access to witness all off-site fabrications at Owner's request and expense.
 - J. Factory Testing: Owner will be given advance notification of all factory testing in accordance with Section 01 91 00 (Installation, Start-up, Testing, Commissioning, and Training). Owner will be provided access to witness all factory testing at Owner's request and expense.

1.06 COMPLETION

- A. The Contractor shall ensure Work meets minimum quality requirements when requesting completion per Article 14 of Section 00 72 05 (General Conditions).

PART 2 – PRODUCTS

NOT USED

PART 3 – EXECUTION

NOT USED

***** END OF SECTION *****



PIPE TEST REPORT (Pressure Test)

DATE OF TEST: _____	
PROJECT: _____	PROJECT NO: _____
CONTRACTOR: _____	SYSTEM TEST NO.: _____
PIPE SYSTEM: _____	RETEST: YES ☐ NO ☐ PREVIOUS TEST NO. ☐
Test Specification: _____ Drawing Reference: _____	
Pipe Material: _____	Nominal Diameter Of Pipe: _____ inches
Location of Test: _____	
Length of Pipe Tested: _____	Test Media: _____
Test From: _____ (Sta)	To: _____ (Sta) Test Pressure: _____ PSI
Test Start Time: _____ ^{AM} _{PM}	Test End Time: _____ ^{AM} _{PM} Test Duration: _____ Hours
Test Result: Pass ☐ Fail ☐	Reason for Failure: _____

Remarks:

Valves / Appurtenances Tested

Description: _____	Asset No. _____	Location/Sta. _____
Material: _____	Size: _____	Connection Type: _____

Contractor Certification:

LOTT Representative/Witness:

System Testing Complete? Yes ☐ No ☐

Signature

Signature

Title

Title

SECTION 01 50 00

TEMPORARY FACILITIES

PART 1 – GENERAL

1.01 SUMMARY

- A. The work specified in this section consists of temporary facilities, temporary utilities, and field offices and storage sheds.

1.02 TEMPORARY FACILITIES

- A. Construction hoists, elevators, scaffolds, stages, shoring, and similar temporary facilities shall be of ample size and capacity to adequately support and move the loads to which they will be subjected. Railings, enclosures, safety devices, and controls required by law or for adequate protection of life and property shall be provided.
- B. STAGING AND FALSEWORK
 - 1. Temporary supports shall be designed by a professional engineer registered in the State of Washington with an adequate safety factor to ensure adequate seismic and load bearing capability. If requested by the Owner, the Contractor shall submit design calculations for staging and shoring prior to application of loads.
- C. TEMPORARY ENCLOSURES
 - 1. When sandblasting, spray painting, spraying of insulation, or other activities inconveniencing or dangerous to property or the health of employees or the public are in progress, the area of activity shall be enclosed adequately to contain the dust, over-spray, or other hazard. In the event there are no permanent enclosures of the area, or such enclosures are incomplete or inadequate, the Contractor shall provide suitable temporary enclosures.
- D. WARNING DEVICES AND BARRICADES
 - 1. The Contractor shall delineate the work area to alert the Owner's staff of potential hazards and shall adequately identify and guard all hazardous areas and conditions by visual warning devices and, where necessary, physical barriers. Such devices shall, as a minimum, conform to the requirements of WISHA.
- E. TEMPORARY PIPING
 - 1. The Contractor shall provide and maintain all required and necessary temporary piping and pumping and, upon completion of the work, remove all such temporary piping as required, except as designated on the

Drawings to remain as a part of the Project. Prior to installation, the Contractor shall submit drawings to the Owner showing the proposed installation of temporary piping and pumps, including location, type of pipe, fittings, and valves. The Contractor shall obtain the Owner's approval for temporary piping and pumping plan prior to installation.

2. Temporary piping and pumping shall be provided as necessary to maintain the existing facilities in operation until the new facilities are constructed, and operational.

F. OFF-SITE STAGING AND PARKING

1. The Contractor shall note that space is limited throughout the Site. Employees of the Contractor, all subcontractors, vendors, suppliers, and associated personnel shall only be allowed to park in area noted on the Drawings. It shall be the responsibility of the Contractor to provide sufficient parking facilities in authorized area(s) other than the Site for the above-mentioned personnel.
2. In addition, the Contractor shall be allowed to stockpile and store equipment only in the areas noted on the Drawings. The Contractor shall coordinate his schedule so that all equipment and materials shall be brought to the construction site only when they are to be used or installed.
3. If additional storage areas are necessary, the Contractor shall provide storage of equipment and materials at an offsite, bonded warehouse, to be approved by the Owner. The Contractor shall pay all costs associated with off-site delivery, storage, and transfer to the construction site.

1.03 TEMPORARY UTILITIES

A. ELECTRICAL SERVICE

1. Where surplus capacity is available, the Contractor may use the Owner's existing 120 V electrical outlets as long as the Contractor's electrical loads do not exceed the circuit capacity serving each outlet. The Contractor must supply any required temporary electrical equipment (cords, breakers, etc.) Any required electric power needs greater than the Owner's existing circuit capacities (i.e., climate control equipment for special coatings application, etc.) shall be furnished by the Contractor at no cost to the Owner.
2. During certain power outages or other events the Owner will not have power available for Contractor use. Contractor shall provide his own power source at no cost to the Owner.
3. Means and methods for establishing temporary electric service to the work area shall be the responsibility of the Contractor. Coordinate with and obtain the Owner's approval for the proposed temporary electric service methods required for the project prior to starting the work.

4. Temporary electric power installation shall meet the construction safety requirements of WISHA and local governing agencies.
5. Contractor shall remove devices, conductors, conduits, and other items used for temporary electric service as part of final cleaning. None shall be abandon in place.

B. TELEPHONE

1. The Contractor shall provide maintain and pay for telephone service at the Site for the use of his Superintendent. Cellular telephone service is acceptable to meet this requirement.

C. WATER

1. Non-Potable, Reclaimed, and Plant Water: The Owner will make available non-potable, reclaimed, and plant water to the Contractor to be used for flushing, cleanup, startup, and operational testing for this project. The Contractor shall endeavor to use as little of this water as practical throughout the project. The Contractor shall comply with all permit requirements for non-potable and reclaimed water use including labeling water as non-potable or reclaimed and training employees as to its source and use. No water shall be used without first coordinating with the Owner.
2. Potable Water: The Owner will not be responsible for supplying potable water to the Contractor. The Contractor shall pay for and shall construct facilities necessary to furnish any potable water for its use during construction. Water used for human consumption shall be kept free from contamination and shall conform to the requirements of the State and local authorities for potable water.
3. The Contractor shall provide all temporary piping and hoses necessary to convey water to the point of use.

D. LIGHTING

1. The Contractor shall provide temporary lighting in work areas sufficient to maintain a lighting level during working hours not less than the lighting level required by WISHA standards. As permanent lighting facilities are completed they may be used in lieu of temporary facilities, provided however, that bulbs, lamps, or tubes of such facilities used by the Contractor shall be replaced prior to final acceptance of the Work.
2. If night work is required temporary lights and generator will be the sole responsibility of the Contractor.

E. HEATING AND VENTILATION

1. The Contractor shall provide means for heating and ventilating work areas as may be required to protect the Work from damage by freezing, high temperatures, weather, or to provide a safe environment for workers.

F. SANITARY CONVENIENCES

1. The Contractor shall provide suitable and adequate sanitary conveniences for the use of persons at the Site. The Owner's restrooms are not for use by the contractor's employees. Such conveniences shall include chemical toilets or water closets and shall be located at appropriate locations at the Site. Sanitary conveniences shall conform to the regulations of the public authority having jurisdiction over such matters. At least one handwashing station shall be provided for the Contractor's use. At the completion of the Work, such sanitary conveniences shall be removed and the Site left in a sanitary condition.
2. The Contractor shall also make provisions for safe storage of waste materials and removal of materials from the site at least once per week.

1.04 TEMPORARY CRANES AND HOISTS

- A. If temporary cranes and hoists will be used on the project, the Contractor shall submit a plan showing the location, proposed swing, and estimated ground loads imposed for all cranes and hoists. Contractor shall coordinate placement of the crane with the Owner to ensure that the placement of the crane does not impose excessive loads on underground infrastructure including large diameter pipe systems, utilidors, storage tanks, or other underground structures. Crane and hoist location must also be coordinated with the Owner to ensure that access can be maintained to the facility. The Contractor is responsible for complying with all state and federal requirements related to crane and hoist set up and operation. Contractor shall also submit relevant crane inspection and operator certification documentation.

PART 2 – PRODUCTS

2.01 STORAGE SHEDS

- A. The Contractor shall provide storage for the protection of equipment, materials, supplies, and tools and shall ensure that a building be used for the storage of materials that deteriorate when exposed to moisture. Workshops and storage buildings shall be located in the general area of the work and shall be clean and in proper order. Storage of materials at the project sites shall not obstruct access or use by the Owner's employees of existing facilities.

PART 3 – EXECUTION

3.01 MAINTENANCE AND REMOVAL OF TEMPORARY FACILITIES

- A. All temporary facilities shall be maintained as long as required for the safe and proper completion of the work. The Contractor shall remove such temporary facilities as rapidly as progress of the work will permit or as directed by the Engineer. The Construction Manager's field office and accessories shall remain in service until the project is accepted by the Owner as Physically Complete.

3.02 SECURITY

- A. The Contractor shall be responsible for the security of all temporary facilities and materials and equipment stored on the Site.

***** END OF SECTION *****

SECTION 01 74 00

CLEANING

PART 1 – GENERAL

1.01 DESCRIPTION

- A. This section specifies the requirements for maintaining a clean site during construction and for final cleaning of the Site.

1.02 QUALITY ASSURANCE

- A. CODES AND STANDARDS
 - 1. Conduct cleanup and disposal operations to comply with the requirements of all authorities having jurisdiction.
 - 2. Comply with all safety laws and the requirements of the Contractor's safety plan.

PART 2 – PRODUCTS

2.01 CLEANING MATERIALS

- A. Only materials recommended by manufacturers of surfaces to be cleaned shall be used. Use cleaning materials only on surfaces recommended by cleaning material manufacturer.

PART 3 – EXECUTION

3.01 DURING CONSTRUCTION

- A. Clean up all waste materials, rubbish, and debris resulting from the Work daily or at such frequencies as required by the Owner.
- B. Place waste materials, rubbish, and debris from ground floor operations outside of buildings in an area designated by the Owner.
- C. Oversee cleaning and ensure that building and grounds are maintained free from accumulations of waste and rubbish.
- D. Store volatile waste in covered metal containers. Remove from premises daily.
- E. Dust of all kinds, including concrete dust produced by construction activities, shall be controlled to avoid damage to existing, operating equipment and equipment installed as part of the Work. Enclosures, ventilation, and air scrubbing may be required where significant potential for damage is determined by the Owner. Sprinkle dusty debris with water.

- F. At reasonable intervals as directed by the Owner, minimum once a week, clean up site and access and dispose of debris.
- G. Remove debris from site. Legally dispose of off-site. Do not burn or bury rubbish and waste on site.
- H. Provide secondary containment of all hazardous liquid materials stored on site. Maintain spill response kits on site.
- I. Remove grease, dust, dirt, stains, labels, fingerprints, and other foreign materials from interior and exterior surfaces of fixtures, hardware, and equipment as necessary to prevent permanent damage to surfaces
- J. Repair, patch, and touch up marred surfaces to match adjacent finishes.
- K. Vacuum interior areas when ready for painting.
- L. Schedule cleaning operations so that contaminants resulting from cleaning do not fall on wet painted surfaces.
- M. Remove snow and ice from access to buildings as necessary to obtain access to work areas and perform the Work.
- N. Contractor is responsible for all cleaning required for its on-site office facilities and shall clean them at a minimum of weekly.
- O. All streets, driveways, and parking areas in the vicinity of the project shall be kept free of material tracked from the project site(s) or dropped from vehicles entering and leaving the site(s). The Contractor shall inspect roads in each active area daily, and all material deposited on the road from the Contractor's activities shall be removed prior to the end of the workday. This shall include sweeping, as required to collect any mud, dirt and dust from the surface.
- P. Unless otherwise specified, when modifications to existing tanks, channels or piping systems are required, plant staff will be responsible for draining process fluid. All cleaning required in order to perform work shall be the responsibility of the Contractor. The plant water utility system is available for use by the Contractor for this cleaning purpose, provided five working days advance notification is given to the Owner. The Contractor is responsible for all other materials and labor required for cleaning.

3.02 FINAL CLEANING

- A. Clean all items installed under this Contract. Leave free of stains, damage, or other defects prior to final acceptance. Include washing, sweeping, polishing, or otherwise cleaning of all new and existing finished wall surfaces, floors, windows, doors hardware, mirrors, lighting fixtures, and items of equipment. Replace damaged, defaced, or marred items not acceptable to the Owner at no additional expense to the Owner.

- B. Use experienced workers, or professional cleaners, for final cleaning.
- C. Perform final cleaning at completion of construction, just prior to acceptance or occupancy.
- D. Remove dirt, stains, foreign materials, and labels, except UL and testing laboratory labels.
- E. Repair and touch up marred areas. Touch-up paints must match the color and gloss of base paint or adjacent surfaces.
- F. Broom clean paved surfaces; rake clean other surfaces of grounds. Finished floors shall be thoroughly cleaned, sealed, and given a final coat of wax, where applicable.
- G. Replace filters in air handling units if units were operated during construction.
- H. Clean ducts, blowers, and coils.
- I. Vacuum clean inside of all panels and electrical equipment. Pressurized air shall not be used to clean electrical equipment. Where existing panels have collected dirt and debris as a result of construction activities, these panels shall also be vacuum cleaned.
- J. Clean pits, sumps, storm drains, and catch basins of silt, sand, debris, and construction materials.
- K. Ductwork air intakes and exhaust grills shall be inspected and cleared of extraneous material.
- L. Remove all excess construction materials from the site.
- M. Remove all construction equipment and temporary facilities from the site.

***** END OF SECTION *****

SECTION 01 78 23

OPERATING AND MAINTENANCE INFORMATION

PART 1 – GENERAL

1.01 SUMMARY

- A. This section specifies the requirements for preparing and submitting operations and maintenance (O&M) information for each piece of equipment, valves and gates, electrical devices, instruments, probes, analyzers, and electrical equipment and components provided or modified as a part of this project. O&M information shall also be submitted for building materials, applied materials, and finishes for maintenance and replacement purposes.
- B. O&M manuals shall be submitted for each project component that has an asset number. An Equipment Summary Form and Asset Specification Form are required for all asset numbers. For items without asset numbers, refer to the specification section for submittal requirements (example, finishes). See “Asset Log” following Section 01 78 23.01 (Asset Management Identification) for more information on asset numbers.
- C. Provide at a minimum the preliminary O&M manual for relevant equipment no less than 15 working days prior to training or commissioning.
- D. The preliminary O&M manual shall contain all information except for start up settings, parameters, and as-built redlines that occur after start up. A place holder shall be provided in the front of the manual for this information and provided prior to Physical Completion.

1.02 SUBMITTALS

A. SUBMITTAL INFORMATION

- 1. Submit O&M manuals in accordance with Section 01 33 00 (Submittals).
- 2. Each O&M manual submittal shall be accompanied by the Owner’s Submittal Transmittal Form showing the date of transmittal, specification section or drawing number to which the submittal pertains, submittal number, and a brief description of the submitted item.
- 3. File names shall include the project number, submittal number, and submittal name to include “OM”. Example:

AM1311_Sub059_Electrical_OM

- 4. The Owner shall review the O&M manual submittal and provide comments to the Contractor within 15 working days after receipt of the O&M manual submittal. The review days begin on the day following the O&M manual submittal receipt and ends on the day the O&M manual submittal is in transit to the Contractor.

B. FORMAT

1. O&M manuals shall be provided in Portable Document Format (PDF), with Optical Character Recognition (OCR) and bookmarks for each section. Scanning is to be used only where actual file conversion is not possible. Images shall only be scanned at a resolution of 600 dpi or greater. Perform OCR capture on all images. Word searches of the PDF document must operate successfully to demonstrate OCR compliance.
2. Orientation: Rotate pages that must be viewed in landscape to the appropriate position for easy reading.
3. Each O&M manual shall start with the following pages:
 - a. The first page shall be a title page. The title page shall include project name, project number, contract number, specification sections and specification titles, and general contractor contact information.
 - b. The second page shall be the table of contents. Include a table of contents in each section if applicable.
 - c. The third page shall be a manufacturer/supplier summary sheet. This page should include manufacturer contact information, local representative contact information, and nearest supplier (if applicable).
 - d. The fourth page shall be the "Equipment Summary Form". The Equipment Summary Form is included at the end of this specification section.
 - e. The fifth page shall be the "Asset Specifications Form". The Asset Specifications Form is included at the end of this specification section.
4. The "O&M Checklist Form" is intended to be used as a resource to ensure the manual is complete and shall be included with each O&M submittal. The O&M Checklist Form is included at the end of this specification section.
5. If manufacturers' standard brochures and manuals are used to describe O&M procedures, such brochures and manuals shall be modified to reflect only the model or series of equipment used on this project. Only relevant data shall be shown. **Extraneous material shall be crossed out neatly or otherwise annotated or eliminated.**
6. The final O&M manual must be submitted and approved by the Owner in order for payment to be made in accordance with Specification Section 01 20 00 (Measurement and Payment).

C. EQUIPMENT SUMMARY FORM

1. **Submittals that do not include the completed Equipment Summary Form will be rejected without further content review. The Equipment Summary Form shall include all assets covered in the O&M manual.** The Equipment Summary Form is included at the end of this specification section.
2. Initial cost and estimated service life are for planning purposes only. The replacement cost shall not include labor or installation. The Contractor shall not be held accountable for extra warranty or replacement cost based on any of the information provided.

D. Asset Specification Forms

1. **Submittals that do not include the completed Asset Specification Form will be rejected without further content review. The Asset Specification Form shall be completed for assets covered in the O&M manual.** The Asset Specification Form is included at the end of this specification section.
2. The Asset Specification Form shall include specific information describing mechanical and electrical data for the asset or asset components.

1.03 INDIVIDUAL MANUAL REQUIREMENTS

A. Equipment O&M manuals shall include, but are not necessarily limited to, the following:

1. **BILL OF MATERIALS:** A comprehensive inventory of raw materials, components, parts and quantities of each item needed to manufacture each system.
2. **OPERATING INSTRUCTIONS:** Specific instructions, procedures, and illustrations shall be provided for the following phases of operations:
 - a. **SAFETY PRECAUTIONS:** List personnel hazards for equipment and list safety precautions for all operating conditions.
 - b. **OPERATOR PRESTART:** Provide requirements to set up and prepare each system for use.
 - c. **START-UP, SHUTDOWN, AND POSTSHUTDOWN PROCEDURES:** Provide a control sequence for each of these operations.
 - d. **NORMAL OPERATIONS:** Provide control diagrams with data to explain operation and control of systems and specific equipment.
 - e. **EMERGENCY OPERATIONS:** Provide emergency procedures for equipment malfunctions to permit a short period of continued operation or to shut down the equipment to prevent further damage

to systems and equipment. Include emergency shutdown instructions for fire, explosion, spills, or other foreseeable contingencies. Provide guidance on emergency operations of all utility systems including valve locations and portions of systems controlled.

- f. ENVIRONMENTAL CONDITIONS: Provide a list of environmental conditions (temperature, humidity, and other relevant data) which are best suited for each product or piece of equipment and describe conditions under which equipment should not be allowed to run.
3. PREVENTIVE MAINTENANCE: The following information shall be provided for preventive and scheduled maintenance to minimize corrective maintenance and repair:
 - a. LUBRICATION DATA: Provide lubrication data, other than instructions for lubrication.
 - b. A table showing recommended lubricants for specific temperature ranges and applications;
 - c. Charts with a schematic diagram of the equipment showing lubrication points, recommended types and grades of lubricants, and capacities; and
 - d. A lubrication schedule showing service interval frequency.
4. PREVENTIVE MAINTENANCE PLAN AND SCHEDULE: Provide manufacturer's schedule for routine preventive maintenance, inspections, tests, and adjustments required to ensure proper and economical operation and to minimize corrective maintenance and repair.
5. CORRECTIVE MAINTENANCE: Manufacturer's recommendations shall be provided on procedures and instructions for correcting problems and making repairs.
 - a. Provide instructions and list tools required to restore product or equipment to proper condition or operating standards.
6. REMOVAL AND REPLACEMENT INSTRUCTIONS: Provide step-by-step procedures and list required tools and supplies for removal, replacement, disassembly, and assembly of components, assemblies, subassemblies, accessories, and attachments. Provide tolerances, dimensions, settings, and adjustments required. Instructions shall include a combination of text and illustrations.
7. TROUBLESHOOTING GUIDES AND DIAGNOSTIC TECHNIQUES: Provide step-by-step procedures to promptly isolate the cause of typical malfunctions. Describe clearly why the checkout is performed and what conditions are to be sought. Identify tests or inspections and test equipment

required to determine whether parts and equipment may be reused or requires replacement.

8. FABRICATION DRAWINGS: A detailed drawing of items that are assembled together and show essential and necessary information required for fabrication.
9. WIRING DIAGRAMS AND CONTROL DIAGRAMS: Wiring diagrams and control diagrams shall be point-to-point drawings of wiring and control circuits including factory-field interfaces. Provide all equipment drawings, details, wiring diagrams, loop diagrams, interconnect diagrams, elementary diagrams, and other drawings as necessary to depict the 'as-built' and 'as-installed' condition. Include installed field and panel conduit and piping/tubing runs and routing, tray systems, supports, mounting details, interconnection diagrams with cable, wire, tube, and termination location numbers. Supply all drawings in editable electronic format. AutoCAD DWGs are preferred. See Section 01 78 39 (As-Built Redlines). Also supply as PDF in the manual.
10. INSTRUCTIONS FOR MAINTENANCE AND REPAIR:
 - a. Include manufacturer's recommendations for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.
 - b. Moisture protection and weather exposed products: Include product data listing, applicable reference standards, chemical composition, and details of installation. Provide recommendations for inspections, maintenance, and repair.
 - c. Include additional requirements as specified in individual product specifications.
11. APPENDICES: The following information shall be provided. Include information not specified in the preceding paragraphs but pertinent to the maintenance or operation of the product or equipment.
 - a. TEST DATA AND PERFORMANCE CURVES (Provided in Final O&M)
 - i. INITIAL PARAMETERS AND SET POINTS: Provide a list of all initial parameters and set points that are established during start-up.
 - ii. Provide factory test reports and field test reports.
 - b. SPARE PARTS AND SUPPLY LISTS:
 - i. Provide identification and coverage for all parts of each component, assembly, subassembly, and accessory of the end items subject to replacement. Include special hardware

requirements, such as requirement to use high-strength bolts and nuts. Identify parts by make, model, serial number, and source of supply to allow reordering without further identification. Provide information for re-ordering custom manufactured products.

- ii. Provide clear and legible illustrations, drawings, and exploded views to enable easy identification of the items. When illustrations omit the part numbers and description, both the illustrations and separate listing shall show the index, reference, or key number which will cross-reference the illustrated part to the listed part. Parts shown in the listings shall be grouped by components, assemblies, and subassemblies.
- iii. Special consideration is required for facilities at remote locations. List spare parts and supplies that have a long lead time to obtain. List recommended spare parts to be maintained in inventory.
- c. **WARRANTY INFORMATION:** Provide all warranties exceeding one year past Substantial Completion and include the servicing and technical precautions prescribed by the manufacturers' or contract documents to keep warranties in force.
- d. **PERSONNEL TRAINING REQUIREMENTS:** Provide information available from the manufacturers to use in training designated personnel to operate and maintain the equipment and systems properly.
- e. **TESTING EQUIPMENT AND SPECIAL TOOL INFORMATION:** Provide information on test equipment required to perform specified tests and on special tools needed for the operation, maintenance, and repair of components.
- f. **HANDLING/STORAGE:** Provide manufacturer's instructions.
- g. Additional information as specified in the associated equipment or system specification section.

PART 2 – PRODUCTS

NOT USED

PART 3 – EXECUTION

NOT USED

***** END OF SECTION *****

Operation & Maintenance Checklist

Project Name: _____ Contractor: _____ Spec#: _____

Submittal Number: _____ Submittal Name: _____

Checklist	Contractor		Owner	
	Satisfactory	N/A	Acceptable	Incomplete
TITLE PAGE				
TABLE OF CONTENTS				
MANUFACTURER/SUPPLIER SUMMARY SHEET				
EQUIPMENT SUMMARY FORMS (REQUIRED FOR ALL EQUIPMENT/SYSTEMS WITH ASSET NUMBERS)				
ASSET SPECIFICATION FORM (REQUIRED FOR ALL EQUIPMENT/SYSTEMS WITH ASSET NUMBERS)				
BILL OF MATERIALS				
OPERATING INSTRUCTIONS				
SAFETY PRECAUTIONS				
OPERATOR PRESTART				
START-UP, SHUTDOWN, AND POST SHUTDOWN PROCEDURES				
NORMAL OPERATIONS				
EMERGENCY OPERATIONS				
ENVIRONMENTAL CONDITIONS				
PREVENTATIVE MAINTENANCE				
LUBRICATION DATA				
PREVENTIVE MAINTENANCE PLAN AND SCHEDULE				
CORRECTIVE MAINTENANCE				
REMOVAL AND REPLACEMENT INSTRUCTIONS				
TROUBLESHOOTING GUIDES AND DIAGNOSTIC TECHNIQUES				
FABRICATION DRAWINGS				
WIRING DIAGRAMS AND CONTROL DIAGRAMS				
INSTRUCTIONS FOR MAINTENANCE AND REPAIR				
APPENDICES				
TEST DATA AND PERFORMANCE CURVES				
INITIAL PARAMETERS AND SET POINTS				
FACTORY TEST RESULTS				
VFD CONFIGURATION PARAMETERS				
TESTING PROCEDURES				
CURVES, DATA				
SPARE PARTS AND SUPPLY LIST				
PARTS IDENTIFICATION				
WARRANTY INFORMATION				
PERSONNEL TRAINING REQUIREMENTS				
TESTING EQUIPMENT AND SPECIAL TOOL INFORMATION				
HANDLING / STORAGE				
EXTRANEIOUS MATERIAL CROSSED OUT OR ELIMINATED				

Equipment Summary Form

Project Name:								
Project Number:								
Contract: Number:								

Asset No.	Short Description	Specification Section	Submittal No.	Manufacturer	Model No.	Serial No.	Estimated Service Life	Cost

Asset Specification Form

Project Name:	
Project Number:	
Contract No.:	

[illegible]

SECTION 01 78 23.01

ASSET MANAGEMENT IDENTIFICATION

PART 1 – GENERAL

1.01 SUMMARY

- A. This section specifies products, procedures, and installation requirements for identifying and labeling each new piece of mechanical and electrical equipment, valves, gates, electrical devices, instruments, probes, analyzers, and other equipment and components provided or modified as a part of this project.
- B. Provide and install labels as specified below for all items with an asset number and/or conduits, wires, and devices unless otherwise noted. Contractor to coordinate with equipment suppliers regarding supply of labels for their equipment. Tags shall be installed in an easily visible position.

1.02 SUBMITTALS

- A. Provide the following submittals for review and approval prior to production:
 - 1. Nameplate schedules, include all lines on name plates and tags
 - 2. Raceway/conduit schedules
 - 3. Wire marker schedules
 - 4. Pipe marker schedules
 - 5. Materials for items described in this section
- B. Provide two physical samples for each label, tag, or nameplate type per submittal, and wire marker example if requested.
- C. See Section 01 33 00 (Submittals) for submittal procedures.

PART 2 – PRODUCTS

2.01 POWERED MECHANICAL AND ELECTRICAL EQUIPMENT IDENTIFICATION

- A. Equipment: Powered mechanical equipment including, but not limited to, process equipment, pumps, mixers, and control valves. Electrical Panels / MCC's; includes automatic transfer switches, switchgear, switchboards, panel boards, UPS, transformers, control panels, electrical equipment enclosures, disconnect switches, motors, fire alarm panels, and other electrical items that have an asset number as shown on the Asset Log and/or Drawings.

1. Name Plate Legend

- a. Line 1: Asset Tag Number (e.g., "CEN04-031")
- b. Line 2: Equipment Name (e.g., "Centrifuge 1")
- c. Line 3: Electrical unit that supplies power to the equipment/panel and/or DCU number (e.g., "MCC XX: LCPXXX-XX")
- d. Line 4: Voltage (e.g., "480 V")

For multiple sources of power provide a separate name plate for each source.

- e. Line 5 (if applicable): WARNING 2 SOURCES OF POWER
- f. Line 6 (if applicable): Other electrical source (e.g. "DCU04-03" or "UPS04-01")

2. Specifications

- a. Material: Laminated Engraved Plastic.
 - 1) Scratch resistant.
 - 2) UV stable and fade resistant for a 10 year minimum durability.
 - 3) Stainless Steel self-tapping screws or as manufacturer recommends attaching
- b. Color:
 - 1) Background: Black.
 - 2) Lettering: White.
 - 3) Owner may direct different color specifications.
- c. Size:
 - 1) Surface: As required by text.
 - 2) Thickness: 1/16-inch (minimum).
- d. Fabrication:
 - 1) Letter Height: 1/4-inch (minimum).
 - 2) Rounded corners.
 - 3) Drilled 3/16-inch holes in corners for mounting.

2.02 NON-POWERED MECHANICAL AND ELECTRICAL / AND CONDUIT TAGS

- A. Equipment: Manually operated mechanical equipment including, but not limited to, isolation valves, stop logs, manual gates, static mixers, gauges, conduit / raceways, and other non-powered devices with an asset number as shown on the Asset Log and/or Drawings.

1. Legend

- a. For equipment, provide Asset number (e.g., "CEN04-031").
- b. For conduits, provide the conduit identification number as shown in the conduit schedule.

2. Specifications

- a. Material: 304 Stainless Steel minimum
- b. Plate Size:
 - 1) 1-inch by 3-inch minimum.
 - 2) Thickness: 22 gauge minimum.
- c. Fabrication:
 - 1) Lettering: ¼-inch tall, laser etched with black fill
 - 2) Two holes at each end for wire attachment.
- d. Tag attachment
 - 1) Stainless Steel self-tapping screws if applicable
 - 2) 304 or 316 Stainless Steel wire size (conduit) 22 AWG minimum
 - 3) Attach with 2 wires for conduit and 1 wire for valves

2.03 PIPE SYSTEM COLORS AND LABELS

A. Pipe colors shall be per LOTT System Identification Color Standard at the end of this section.

B. Pipe Markers

1. Pipe markers shall be Seton “Opti-Code” Self-Adhesive Vinyl Pipe Marker with custom colors and legends. Provide matching arrow.
2. Pipe marker size, color field, and lettering shall be as follows:

Size	Length of Color Field	Letter Height
8SM – Pipe OD 0.75” to 1.375”	8”	0.5”
8LG – Pipe OD 1.5” to 2.375”	8”	0.75”
12 – Pipe OD 2.5” to 7.875”	12”	1.25”
24 – Pipe OD 8” to 10”	24”	2.5”
32 – Pipe OD over 10”	32”	3.5”

C. See Division 09 for paint materials, preparation, and application.

2.04 PERMANENT WIRE MARKERS AND DEVICES

A. MEDIUM VOLTAGE CABLE IDENTIFICATION

1. Name Plate text:
 - a. PSPL <circuit #> - <north or south> - <phase>
 - b. Cable tag text example: “PSPL #26–N–AØ”

2. Specification:
 - a. Phenolic engraved cable marker plate:
 - b. Marker plate thickness: 22 gauge.
 - c. 1.5-inches by 9-inches with 0.1875-inch-high by 0.5-inch-wide holes at each corner for securing to medium voltage cable.
3. Yellow background with black numbers and lettering:
 - a. Text height: 1 inch.
4. Optional: Plastic slide-on or sleeve-type cable identification marker.
 - a. Vinyl Sleeve Marker, 1 inch
5. Tie wrapped at both ends using minimum 0.25-inch-wide, nylon, cable tie.
6. Location of Medium voltage label
 - a. Provide medium-voltage cable identification tags on all cable ends and any exposed intermediate locations such as manholes and pull boxes.
 - b. Install tags such that they are visible without adjusting cable positions.
 - c. Install tags to be visible from grade level opening of manhole/hand-hole.
 - d. Cable Tags shall be located at points of termination, and at least once in each accessible enclosure (i.e., manhole).
7. Phase Tape
 - a. Premium grade, 7-mil, flame-retardant, cold- and weather-resistant, 3/4-inch minimum width. Meets requirements of UL510. Recommended for use on PVC jacketed cable.
 - b. Apply phase tape to exposed medium-voltage cable at each accessible enclosure, termination, and splice. Helically wrap phase tape with 25 percent overlap for a length of 12 inches. Phase tape shall not be applied over identification labels.

B. LOW-VOLTAGE WIRE AND CABLE IDENTIFICATION

1. Identify each wire or cable at each termination and in each pull box, junction box, hand-hole, and manhole using numbered and lettered wire markers. Electrically common conductors shall have the same number. Each electrically different conductor shall be uniquely numbered. Identify panel board circuits using the panel board 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.

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.
3. Wire markers shall be heat shrink type (Raychem, T&B, or approved equal) or self-laminating where conductors are not spliced or terminated. Wire numbers shall be permanently imprinted on the markers.

C. SIGNAL AND CONTROL CABLE IDENTIFICATION

1. Identify each wire or cable at each termination, using numbered and lettered wire markers. Electrically common conductors shall have the same number. Each electrically different conductor shall be uniquely numbered. Identify panel board circuits using the panel board 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.
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.
3. Wire markers shall be heat shrink type (Raychem, T&B, or approved equal) or self-laminating where conductors are not spliced or terminated. Wire numbers shall be permanently imprinted on the markers.
4. Examples for wire tags for signal and control are at the end of this section.

D. COMMUNICATIONS AND FIRE

1. Communication fiber shall have a unique identification for each termination. Numbering shall correspond to patch panel numbering or as directed. Each termination shall have the same numbering on corresponding cover.
2. Device covers shall be labeled with the unique address on cover or base of device with adhesive label or permanent marker. (example, "S01" "M02").
3. Wire markers shall be heat shrink type (Raychem, T&B, or approved equal) or self-laminating where conductors are not spliced or terminated. Wire numbers shall be permanently imprinted on the markers.

E. RECEPTACLES AND LIGHTING JUNCTION BOXES

1. For receptacle circuits, provide self-adhesive tape label on receptacle face plate with panel and circuit number (example DP05-33).
2. Interior lighting and fixtures, provide self-adhesive tape label with circuit number on boxes and common distribution locations (example LP05-23).

PART 3 – EXECUTION

3.01 INSTALLATION LOCATION AND ATTACHMENT OF EQUIPMENT/ASSET LABELS

- A. Laminated plastic plate equipment/asset label (Powered Mechanical and Electrical equipment):
 1. Locate on the enclosure face or in a visible location as not to interfere with equipment usage.
 2. If equipment is located in a non-visible location (i.e. operated with a chain wheel), tag shall be installed in a location as directed by the Owner and shall be upsized as needed for visibility.
- B. Stainless steel tag equipment/asset label (Non-Powered Mechanical and Electrical equipment and Conduits):
 1. Valves and other mechanical equipment
 - a. Attach to valve stem.
 - b. If equipment is located in a non-visible location (i.e. operated with a chain wheel), tag shall be installed in a location as directed by the Owner.
 2. Exposed conduit
 - a. Marker shall be placed within 24-inches of termination or wall penetration.
 - b. A single marker will be allowed when the entire length of conduit is clearly visible from one location. Otherwise at every change of direction, at each point of wall or floor penetration, and every 50'.
 - c. Neatly attach at both ends of marker.

3. Electrical Appurtenances

- a. For vaults, handholds, pull boxes, and J-Boxes, label on conduit or bushing if possible. Label on conduit bushing (preferred) with a stainless steel tag and stainless steel wire, or above each conduit with a stainless steel tag epoxied or with stainless steel hardware to wall of vault.
- b. If any unlabeled existing conduits are encountered, bring to the immediate attention of the Owner.

4. Wire labels

- a. Must be visible without moving wires.
- b. As already described per type of application above or at every accessible termination, splice (if allowed).

3.02 PIPE MARKER LAYOUT

- A. Provide arrows immediately before and after pipe markers. Arrows shall wrap full circumference of the pipe and overlap 1" minimum.
- B. Provide system lettering and directional arrows at minimum 10' intervals and within 5' of all transitions, changes in direction, or penetrations. System lettering shall be per LOTT System Identification Color Standard at the end of this section.
- C. Provide system code and directional arrows when there is not adequate space for full system lettering as noted in Paragraph 3.02.B above. System codes shall be per LOTT System Identification Color Standard at the end of this section.

***** END OF SECTION *****

LOTT SYSTEM IDENTIFICATION COLOR STANDARDS

	System Description	Approx. Color	Pipe Paint Color	Pipe Marker Background Color	Pipe Marker Lettering & Arrow Color	System Code	System Lettering
1	Aeration Air		Light Green	Green	White	AER	AERATION AIR
2	Agitation Air		Light Green	Green	White	AA	AGITATION AIR
3	Air High Pressure		Green	Green	White	AHP	HIGH PRESS AIR
4	Air Low Pressure		Light Green	Green	White	ALP	LOW PRESS AIR
5	Boiler Code Piping		Orange	Orange	Black	BCP	BOILER CODE
6	Brine		Orange	Orange	Black	BR	BRINE
7	Centrate		Gray	Gray	White	CN	CENTRATE
8	Centrate Sludge		Light Brown	Brown	White	CNS	CENTRATE SLUDGE
9	Channel Aeration Air		Light Green	Green	White	CAA	CHANNEL AER AIR
10	Chemical Drain		Red	Red	White	CD	CHEMICAL DRAIN
11	Circulating Sludge		Tan	Brown	White	CS	CIRC SLUDGE
12	Citric Acid		Orange	Orange	Black	CA	CITRIC ACID
13	Class A Water **See Note 1b**		** Purple **	Purple	Black	CLA	CLASS A WATER
14	Dewatered Sludge		Light Brown	Brown	White	DWS	DEWATERED SLDG
15	Digested Sludge		Light Brown	Brown	White	DS	DIGESTED SLUDGE
16	Distilled Water		White	White	Black	DIS	DISTILLED WATER
17	Drain		Light Gray	Gray	White	D	DRAIN
18	Engine Air Supply		Green	Green	White	EAS	ENGINE AIR SUP
19	Engine Exhaust		Orange	Orange	Black	EE	ENGINE EXHAUST
20	Enzyme Solution		Orange	Orange	Black	ENZ	ENZYME SOLUTION
21	Exhaust Air		Gray	Gray	White	EA	EXHAUST AIR
22	Filter to Waste		Gray	Gray	White	FTW	FILTER TO WASTE
23	Final Effluent		Light Blue	Blue	White	FE	FINAL EFFLUENT
24	Fire Sprinkler System		Red	Red	White	FSS	FIRE SPRINKLER SYS
25	Fire Water		Red	Red	White	WF	FIRE WATER
26	Foam		Dark Brown	Brown	White	FO	FOAM
27	Foul Air		Gray	Gray	White	FA	FOUL AIR

28	Foul Air Exhaust		Gray	Gray	White	FAE	FOUL AIR EX
29	Fuel Oil Return		Orange	Orange	Black	FOR	FUEL OIL RETURN
30	Fuel Oil Supply		Orange	Orange	Black	FOS	FUEL OIL SUPPLY
31	Fuel Oil Vent		Orange	Orange	Black	FV	FUEL OIL VENT
32	Glycol Heat Recovery Supply		Orange	Orange	Black	HRRS	HEAT RECOVERY SUPPLY
33	Glycol Heat Recovery Return		Orange	Orange	Black	HRRR	HEAT RECOVERY RETURN
34	Grit		Gray	Gray	White	GR	GRIT
35	Grit Overflow		Gray	Gray	White	GRO	GRIT OVERFLOW
36	High Temperature Heat Reservoir Return		Light Blue	Blue	White	HHRR	HIGH HEAT RES RTN
37	High Temperature Heat Reservoir Supply		Light Blue	Blue	White	HHRS	HIGH HEAT RES SUP
38	Hypochlorite		Yellow	Yellow	Black	HOCL	HYPOCHLORITE
39	Instrument Air		Green	Green	White	IA	INSTR AIR
40	Irrigation Nonpotable Water		Light Blue	Blue	White	WNI	IRR NONPOT WTR
41	Low Pressure Sludge Gas		Red	Red	White	LSG	LOW PRESS SLDG GAS
42	Low Temperature Heat Reservoir Return		Light Blue	Blue	White	LHRR	LOW HEAT RES RTN
43	Low Temperature Heat Reservoir Supply		Light Blue	Blue	White	LHRS	LOW HEAT RES SUP
44	Medium Pressure Gas		Red	Red	White	MSG	MEDIUM PRESS GAS
45	Methanol		Yellow	Yellow	Black	METH	METHANOL
46	Mixed Liquor		Tan	Brown	White	ML	MIXED LIQUOR
47	Mixed Sludge		Tan	Brown	White	MS	MIXED SLUDGE
48	Natural Gas		Yellow	Yellow	Black	NG	NATURAL GAS
49	Nonpotable Hot Water		Light Blue	Blue	White	WNH	NONPOT HOT WTR
50	Nonpotable Water		Light Blue	Blue	White	WN	NONPOTABLE WTR
51	Nonpotable Softened Water		Light Blue	Blue	White	WNS	NONPOT SOFT WTR
52	Oil (Equipment)		Orange	Orange	Black	OIL	EQUIP OIL
53	Overflow		Gray	Gray	White	OF	OVERFLOW
54	Oxygen High Pressure		Green	Green	White	OHP	OXY HIGH PRESS
55	Oxygen Low Pressure		Light Green	Green	White	OLP	OXY LOW PRESS
56	Ozone		Red	Red	White	OZ	OZONE
57	Ozone Vent		Red	Red	White	OZV	OZONE VENT
58	Permeate		Light Blue	Blue	White	PRM	PERMEATE
59	Polyaluminum Chloride		Orange	Orange	Black	PAX	PAX
60	Polymer		Red	Red	White	POL	POLYMER

61	Polymer Solution		Red	Red	White	PSO	POLY SOLUTION
62	Potable Hot Water		Blue	Blue	White	WPH	POTABLE HOT WTR
63	Potable Water		Blue	Blue	White	WP	POTABLE WATER
64	Preaeration Air		Light Green	Green	White	PA	PREAERATION AIR
65	Primary Effluent		Light Gray	Gray	White	PE	PRIMARY EFFLUENT
66	Primary Scum		Dark Brown	Brown	White	PSC	PRIMARY SCUM
67	Primary Sludge		Dark Brown	Brown	White	PS	PRIMARY SLUDGE
68	Process Sample		Gray	Gray	White	PRS	PROCESS SAMPLE
69	Pump Seal Purge Water		Light Blue	Blue	White	WS	PUMP SEAL WTR
70	Pumped Drainage		Light Gray	Gray	White	PD	PUMPED DRAINAGE
71	Rain Water Pipe		Light Gray	Gray	White	RWP	RAIN WATER PIPE
72	Raw Degritted Sewage		Light Gray	Gray	White	RDS	RAW DEGRIT SEWAGE
73	Raw Sewage		Gray	Gray	White	RS	RAW SEWAGE
74	Reclaimed Water		Light Blue	Blue	White	WR	RECLAIMED WATER
75	Refrigerant Liquid		Gray	Gray	White	RL	REFRIG LIQUID
76	Refrigerant Suction		Gray	Gray	White	RS	REFRIG SUCTION
77	Return Activated Sludge		Tan	Brown	White	RAS	RETURN ACT SLDG
78	Return Air		Gray	Gray	White	RA	RETURN AIR
79	Sanitary Drain		Light Gray	Gray	White	SD	SANITARY DRAIN
80	Screenings		Dark Brown	Brown	White	SC	SCREENINGS
81	Secondary Effluent		Light Blue	Blue	White	SE	SECONDARY EFFLUENT
82	Secondary Scum		Light Brown	Brown	White	SSC	SECONDARY SCUM
83	Septage Waste		Dark Brown	Brown	White	SEP	SEPTAGE WASTE
84	Service Air		Green	Green	White	SA	SERVICE AIR
85	Sludge Gas Recirculation		Red	Red	White	SGR	SLDG GAS RECIRC
86	Sodium Hydroxide		Orange	Orange	Black	NaOH	CAUSTIC
87	Steam Clean Supply		Red	Red	White	SCS	STM CLEAN SUP
88	Storm Drain		Light Gray	Gray	White	STD	STORM DRAIN
89	Strained Reclaimed Water		Light Blue	Blue	White	WRS	RECL WTR STRAINED
90	Supernatant		Gray	Gray	White	SN	SUPERNATANT
91	Tank Drain		Gray	Gray	White	TD	TANK DRAIN

92	Thickened Scum		Dark Brown	Brown	White	TSC	THICKENED SCUM
93	Thickened Sludge		Tan	Brown	White	THS	THICK SLUDGE
94	Thickener Underflow		Gray	Gray	White	TU	THICK UNDERFLOW
95	Transfer Sludge		Light Brown	Brown	White	TS	TRANSFER SLUDGE
96	Vacuum		Gray	Gray	White	VAC	VACUUM
97	Vent		Light Gray	Gray	White	V	VENT
98	Waste Activated Sludge		Tan	Brown	White	WAS	WASTE ACT SLDG

NOTES:

1) Pipe Painting:

- See the project specific technical specifications for pipe painting requirements.
- For Class A Water (CLA) color shall be Pantone 522C. Submit color sample for approval.
- For painted piping other than CLA submit color samples for approval.
- Piping not normally painted includes; Stainless, Galvanized, Copper, Interior PVC, HDPE, and Conduit. Refer to project specific specifications for further details.

2) Pipe Markers:

Pipe markers shall be Seton "Opti-Code" Self-Adhesive Vinyl Pipe Marker with custom colors and legends. Provide matching arrow banding.

Size 8SM - Pipe OD 0.75" to 1.375"	Length Color Field = 8"	Letter Ht = 0.5"
Size 8LG - Pipe OD 1.5" to 2.375"	Length Color Field = 8"	Letter Ht = 0.75"
Size 12 - Pipe OD 2.5" to 7.875"	Length Color Field = 12"	Letter Ht = 1.25"
Size 24 - Pipe OD 8" to 10"	Length Color Field = 24"	Letter Ht = 2.5"
Size 32 - Pipe OD over 10"	Length Color Field = 32"	Letter Ht = 3.5"

3) Marker Layout:

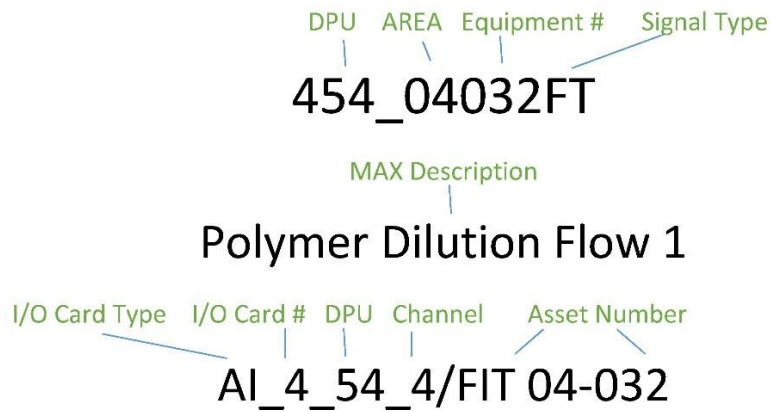
- Provide arrows immediately before and after pipe markers. Arrows shall wrap full circumference of the pipe and overlap 1" min.
- Provide System Lettering and directional arrows at min 10' intervals and within 5' of all transitions, changes in direction, or penetrations.
- Provide System Code and directional arrows when there is not adequate space for full System Lettering as noted in 3b above.

MAX DCS WIRE TAG EXAMPLE

454_04032FT

Polymer Dilution Flow 1

AI_454_54_4/FIT 04-032



JUNCTION BOX WIRE TAG EXAMPLE
(Interconnect)

454_04032 FT

FIT 04-032/JB10-8

MAX TAG

454_04032FT

Asset # Junction Box Name/#!/Wire #

FIT 04-032/JB10-8

Asset Log

Log Item #	Asset #	Work Area	Asset – Full Description	Specification	Associated Equipment	Action Item Code *
1	T18-410	18	TANK, SUPPLEMENTAL CARBON 1	M18-001		NEW
2	T18-420	18	TANK, SUPPLEMENTAL CARBON 2	M18-001		NEW
3	P18-410	18	PUMP, SUPPLEMENTAL CARBON 1, FEED	M18-004		NEW
4	P18-425	18	PUMP, SUPPLEMENTAL CARBON 2, FEED	M18-004		NEW
5	LIT18-410	18	TRANSMITTER, LEVEL, TANK 1, SUPPLEMENTAL CARBON	E18-001		NEW
6	LIT18-420	18	TRANSMITTER, LEVEL, TANK 2, SUPPLEMENTAL CARBON	E18-001		NEW
7	LSH18-410	18	SWITCH, HIGH LEVEL, TANK 1	M18-002		NEW
8	LSH18-420	18	SWITCH, HIGH LEVEL, TANK 2	M18-002		NEW
9	LSL18-410	18	SWITCH, LOW LEVEL, TANK 1	M18-002		NEW
10	LSL18-420	18	SWITCH, LOW LEVEL, TANK 2	M18-002		NEW
11	BLDG18-401	18	BUILDING, SUPPLEMENTAL CARBON PUMPS	M18-004		NEW
12	PNL18-410	18	PANEL, SUPPLEMENTAL CARBON	E18-001		NEW
13	CB18-001	18	CATCH BASIN, SOUTH of Area 18, NORTH of Area 08	C18-005		NEW
14	EWS18-001	18	EYEWASH STATION	M18-111		NEW
15	HTR08-001	08	WATER HEATER, EYEWASH STATION	M08-110	Eyewash Station	NEW
16	FSH18-001	18	SWITCH, EYEWASH STATION, FLOW	E18-001	Eyewash Station	NEW
17	SWD18-401	18	SWITCH, SERVICE DISCONNECT, EYEWASH STATION	E08-002	Eyewash Station	

			WATER HEATER			
18	SWD18-402	18	SWITCH, SERVICE DISCONNECT, 480-240/120, 1PH, SUPPLEMENTAL CARBON PUMPS BLDG TRANSFORMER	26 28 16		
19	XFMR18-4010	18	TRANSFORMER, 480-240/120, 1PH, MICRO C PUMPS BUILDING	26 46 00		
20	IV18-410	18	VALVE, ISOLATION 1	40 05 53		
21	IV18-420	18	VALVE, ISOLATION 2	40 05 53		
22						
23						

*Item Action codes: (blank) = New Asset; REP = Replaced; REL = Relocated; MOD = Modified; REN = Renamed (assigned new Asset #)

SECTION 01 78 39

AS-BUILT REDLINES

PART 1 – GENERAL

1.01 SUMMARY

- A. This section refers to those documents maintained and annotated by the Contractor during construction as well as any hand drafted or electronically created drawings, produced by the Contractor, subcontractors, and product vendors.
- B. As defined in Section 00 72 05 (General Conditions), As-Built Redlines are a set of Contract Drawings that depict the actual constructed conditions of the Work. Contract Drawings are not limited to the drawings included in the Project Manual. They also include other documents such as modified drawings issued by Owner as part of a Change Order, COP, WCD, Field Order, or response to an RFI, shop drawings, and drawings submitted by the Contractor and accepted by the Owner.

1.02 QUALITY ASSURANCE

- A. Contractor As-Built Redlines are defined as (1) a neatly and legibly marked set of Contract Drawings showing the final location of structures, piping, equipment, conduits, outlet boxes, and cables; (2) additional documents such as schedules, lists, drawings, and electrical and instrumentation diagrams included in the specifications; (3) Contractor layout, shop drawings, 3D models, and installation drawings; (4) vendor drawings of equipment, electrical and control panels, and custom specialty skids which drawings were produced during the fabrication submittal approval process.
 - 1. Unless otherwise specified, horizontal and vertical locations to within ± 0.25 ft. are acceptable.
 - 2. Sanitary and storm sewer elevations within ± 0.08 ft.
 - 3. Water and gas pipe elevations within ± 0.25 ft.
 - 4. Horizontal and vertical alignment within ± 0.25 ft.
 - 5. Structural, Equipment and Piping within ± 0.25 ft.
 - 6. The As-Built Redlines shall be marked to the same level of detail as provided in the Contract Drawings.
- B. All existing facilities found during construction but not shown or shown incorrectly on the Drawings shall also be noted and reflected on the Contractor As-Built Redlines.
- C. The PDF As-Built Redlines shall be kept up to date at all times during construction so that the Owner may review the Contractor As-Built Redlines at any time to ensure

compliance with these requirements. Failure to properly maintain the Contractor As-Built Redlines may result in the Owner not approving the whole or part of the Contractor's Application for payment.

- D. Keep the Contractor As-Built Redlines separate from other construction drawings and do not use for other purposes. The Contractor As-Built Redlines shall be maintained in a clean, dry, and legible condition.

1.03 GENERAL REQUIREMENTS FOR AS-BUILT REDLINES

- A. Submit to the Owner the final consolidated As-Built Redline set in PDF format. The consolidated set shall be created and neatly marked up as specified in a PDF program such as Bluebeam Revu or equivalent.
- B. In addition, submit copies of all fabrication, layout, and installation drawings and 3D models prepared or modified for use during construction. Include notes and markings to make it clear where the change in the Work occurred. Supply the fabrication, layout, and installation drawings in PDF format with the final consolidated Contractor As-Built Redline set. The Contractor shall also supply drawing or model source files in native format (AutoCAD, Revit, etc.) when available.
- C. Vendor and Subcontractor Drawings – Supply all equipment drawings, details, wiring diagrams, loop diagrams, interconnect diagrams, elementary diagrams, and other drawings as necessary to depict the 'as-built' and 'as-installed' condition. Include installed field and panel conduit and piping/tubing runs and routing, tray systems, supports, mounting details, interconnection diagrams with cable, wire, tube, and termination numbers. Supply all drawings in PDF format.
- D. By providing electronic drawings in PDF format, the Contractor, Subcontractors, and Vendors agree to allow the Owner to use and edit the electronic drawings only for the purposes of operations, maintenance, and future design and construction of the Owner's facilities.

1.04 MAINTENANCE OF AS-BUILT REDLINES

- A. Identify each drawing sheet with a watermark or stamp with the words: "AS-BUILT".
- B. Record the following on the Contractor As-Built Redlines:
 - 1. Actual dimensions, arrangement, and materials used when different than shown on the Contract Drawings.
 - 2. Changes made by Change Order, COP, WCD, Field Order, or Request for Information.
 - 3. Accurate locations of existing facilities shown incorrectly on the Contract Drawings.
 - 4. When a choice of materials is the Contractor's choice, record the actual material used (ductile iron, PVC, etc.) on the Contract Drawings.

5. Changes made to mechanical, HVAC, electrical, or other schedules (e.g., valve or conduit schedules).
- C. Making Entries on the Contractor As-Built Redlines:
1. Field copies used during construction may be paper or PDF.
 2. All markings are to be per the following color code:
 - a. Red - Information to be added to the drawing.
 - b. Green - Information to be deleted from the drawing.
 - c. Blue - Explanatory notes to the Owner regarding the change (for example, noting dimensions that would not be shown on the Contract Drawings, Change Orders, COPs, WCDs, Field Orders, or responses to RFIs but are necessary to accurately record the changed Work).
 3. Provide the applicable reference for all entries, such as the Change Order, COP, WCD, or Field Order number, the Request For Information (RFI) number, or the approved shop drawing number. Mark this information in blue.
 4. Date all entries.
 5. Clearly identify all items in the entry with notes similar to those in the Contract Drawings (such as pipe symbols, centerline elevations, materials, pipe joint abbreviations, etc.).

1.05 SUBMITTAL OF AS-BUILT REDLINES

- A. Submit in accordance with Section 01 33 00 (Submittals).
- B. The final consolidated set of Contractor As-Built Redlines are to be submitted no later than the time of Physical Completion. Acceptance by Owner of As-Built Redlines shall be required to achieve Physical Completion. The Owner may request that they be submitted at an earlier date if only minor changes in the Work are anticipated prior to Physical Completion. Final shop drawings and vendor drawings may need to be submitted sooner to be incorporated in equipment O&M manuals.
- C. In the event that further changes in the Work occur or are discovered after the submittal of the As-Built Redlines to the Owner, it is the Contractor's responsibility to record these changes on copies of the Contract Documents and provide this information to the Owner in PDF format for incorporation into the Record Drawings.

PART 2 – PRODUCTS

NOT USED

PART 3 – EXECUTION

NOT USED

***** END OF SECTION *****

SECTION 01 91 00

INSTALLATION, START-UP, TESTING, COMMISSIONING, AND TRAINING

PART 1 – GENERAL

1.01 DESCRIPTION

- A. This section specifies the installation, testing, commissioning, and training to be provided by the Contractor for this project.
- B. Construction of this project will need to be phased to meet the construction timing limitations specified in Section 01 11 00 (Summary of Work). These limitations may require the Contractor to test, start-up, and commission individual equipment at different times throughout the project.

1.02 CONFLICTS WITH MANUFACTURER'S INSTALLATION RECOMMENDATIONS

- A. Equipment provided under this Contract shall be installed in conformity with the details shown and specified and with the manufacturer's requirements. Should the manufacturer's installation recommendations conflict with specific requirements of these Contract Documents, the Contractor shall bring the matter to the attention of the Owner within 24 hours. Any costs incurred by the Contractor through failure to timely notify the Owner of a difference between the Contract Documents and manufacturer's installation requirements shall be borne by the Contractor.

1.03 SUBMITTALS

- A. Logbook: A master test logbook shall be maintained by the Contractor, which shall cover all tests conducted for this project. The master test logbook shall be maintained by the Contractor during testing and transmitted to the Owner prior to submitting the final payment application.
- B. Start-up, Testing, and Commissioning Procedures: Prior to completing 50% of the Work, the Contractor shall submit to the Owner details of the start-up, testing, and commissioning procedures. Final start-up, testing, and commissioning procedures shall be submitted at least 15 working days prior to the beginning of start-up and testing. The procedures shall be divided into three distinct phases: installation checkout, operational testing, and commissioning.
 - 1. Testing procedures shall be designed to duplicate, as nearly as possible, all conditions of operation and shall be carefully selected to ensure that the equipment is not damaged. The Contractor shall be responsible for coordinating with all manufacturers to determine the required start-up procedures to fulfill the requirements of this specification. All means and methods for start-up testing shall be developed by the Contractor and submitted to the Owner for acceptance.

2. Once the testing procedures have been reviewed by the Owner, the Contractor shall develop and produce sign-off forms for each item of equipment being tested. The content of these forms shall be such to ensure that each piece of equipment, mechanical item, and instrumentation has been properly installed and tested. The Owner reserves the right to add checks and tests to the prestart-up and start-up schedule submitted by the Contractor, if the Owner feels that the Contractor testing and start-up schedule is not adequate or complete.
3. Contractor shall develop an operational testing plan fulfilling the requirements specified herein. Testing plan shall be in sufficient detail such that the Owner is fully aware of all the requirements that need to be provided to the Contractor-operated items during operational testing. Contractor shall be responsible for all coordination with the Owner and Owner's operations staff required for development of this testing plan.

PART 2 – PRODUCTS

2.01 MATERIALS

- A. Installation: Materials employed in the installation shall conform to the requirements of these Contract Documents and the recommendations of the equipment manufacturers.
- B. TESTING
 1. Instrumentation and Testing Equipment: Any instrumentation (i.e., gauges) and equipment required to properly demonstrate that all equipment fully satisfies the requirements of these Contract Documents shall be provided by the Contractor at no expense to the Owner. The adequacy of all gauges, meters, recorders, and monitors shall be subject to review of the Owner.
 2. Records: The Contractor shall provide sign-off forms for all installed and operational testing to be accomplished under this Contract. Sign-off forms shall be provided for each item of mechanical, electrical, and instrumentation equipment provided or installed under this Contract and shall contain provisions for recording relevant performance data for original testing and not less than three retests. Separate sections shall be provided to record values for the preoperation checkout, initials or representatives of the equipment manufacturers, the Contractor, and the Owner.

2.02 METHODS

- A. Installation: All equipment and apparatus used in testing shall be installed by specialists skilled in the proper trades and profession. Where required by detailed specifications, the Contractor shall cause the installation of specific equipment testing items to be accomplished under the supervision of factory-trained installation specialists furnished by the equipment manufacturers. The Contractor shall be prepared to document the skills and training of all workmen

engaged in the installation of all testing equipment furnished either by the Contractor or the Owner.

B. TESTING

1. Testing shall proceed on a step-by-step basis in accordance with the Contractor's written testing procedures. The Contractor's testing work shall be accomplished by a skilled team of specialists under the direction of a coordinator whose sole responsibility shall be the orderly, systematic testing of all equipment, systems, structures, and the complete facility as a unit. Each individual step in the procedures shall be witnessed by a representative of the Owner.
2. During the plant operational testing period, all equipment and systems in operation shall be operated to the greatest extent practicable and at conditions that represent the full range of operating parameters as defined by this Contract Document.

PART 3 – EXECUTION

3.01 TESTING – GENERAL

- A. All equipment and partially complete or fully complete portions of the work included in this Contract shall be tested and inspected to prove compliance with the requirements of these Specifications.
- B. See individual Specification sections for specific testing requirements for this project.
- C. See Article 13 of Section 00 72 05 (General Conditions) for testing and inspections
- D. No tests specified herein shall be applied until the item to be tested has been inspected and approval given by the Owner for the application of such test.
- E. Tests and inspection for this project shall include:
 1. Factory Testing
 2. Delivery inspections. See Section 01 11 00 (Summary of Work).
 3. Installation Check-out.
 4. Operational testing.
 5. Commissioning.

- F. Tests and inspections, unless otherwise specified or accepted, shall be in accordance with the recognized standards of the industry. The Contractor shall see that scheduling and performance of all tests are coordinated with involved subcontractors and suppliers.
- G. The Contractor shall assume all risk and costs for addressing, repairing, and replacing all equipment, piping, electrical devices and systems, and instrumentation devices and systems that fail the testing procedures specified herein.
- H. All equipment shall be delivered in operating condition by the Contractor, and the Contractor shall repair any defects which may be present or may be caused by the testing procedure.
- I. Testing and start-up procedures shall include detailed checkout of all electrical and instrumentation prior to actual equipment operations. Electrical circuits and control devices shall be considered in testing procedures and a specific step-by-step sequence shall be presented to ensure that the equipment is properly operational and adjusted prior to operation.
- J. If in the performance of the test, it is determined that the equipment, in order to perform properly, requires replacement, adjustment, or modification, testing shall be repeated following such alteration, so that the testing procedures will relate to the equipment as finally delivered to the Owner.

3.02 NOT USED

3.03 INSTALLATION CHECK-OUT

- A. General: After the installation of an individual equipment piece or system is completed, all items shall be inspected and tested by the Contractor to the satisfaction of the Owner before being placed into operation. Tests shall be as specified herein and shall be made to determine whether the equipment has been properly assembled, aligned, adjusted, and connected. Any changes, adjustments, or replacements required to make the equipment operate as specified shall be carried out by the Contractor as part of the work. The startup testing procedures shall consist of pre-operation checkout and installed testing as specified below.
- B. PRE-OPERATION CHECKOUT
 - 1. The installed tests and inspection procedures shall incorporate all requirements of these Specifications and shall proceed in a logical, step-wise sequence to ensure that all equipment has been properly serviced, aligned, connected, calibrated, and adjusted prior to operation.

C. INSTALLATION CERTIFICATION FORMS

1. If applicable, submit a manufacturer's installation certification form for installed equipment. When requested, the Manufacturer's Installation Certification Form that is included at the end of this section shall be used.

D. Prior to Installed Testing, the contractor shall ensure that all digital control inputs and outputs are checked and verified and all analog signals are checked and verified. The Loop Check-out Form that is included at the end of this specification section shall be completed for each loop. This work shall be scheduled with the Owner a minimum of 5 working days in advance.

E. INSTALLED TESTING

1. Once all items have been subjected to pre-operation checkout procedures, and the Owner has witnessed and not found deficiencies in that portion of the work, individual systems may be started and operated under simulated operating conditions to determine whether the equipment and systems meet the requirements of these Specifications. The Contractor shall be wholly responsible for developing and providing the means and methods to furnish these simulated operating procedures. Contractor shall coordinate with the manufacturer(s) of the items being tested to verify the simulated procedures are in accordance with the manufacturers' recommendations.
2. The equipment shall be operated for a sufficient period of time to determine equipment operating characteristics, to observe performance characteristics, and to permit initial adjustment of the equipment as required.
3. If any portion of the work should fail to fulfill the contract requirements and is adjusted, altered, renewed, or replaced, tests on that portion when so adjusted, altered, removed, or replaced, together with all other portions of the work as are affected thereby, shall, if so required by the Owner, be repeated within reasonable time and in accordance with the specified conditions. The Contractor shall pay to the Owner all reasonable expenses incurred by the Owner as a result of repeating such tests.
4. Once simulated operation has been completed, all equipment shall be rechecked for proper alignment and realigned if necessary. All equipment shall be checked for loose connections, unusual movement, or other indication of improper operating characteristics. Any deficiencies shall be corrected to the satisfaction of the Owner. All machines or devices that exhibit unusual or unacceptable operating characteristics shall be disassembled and inspected. They shall then be repaired or replaced at no cost to the Owner.

5. Test results shall be within the tolerances set forth in the detailed Specification sections of these Contract Documents. If no tolerances have been specified, test results shall conform to tolerances established by recognized industry practice.
 6. The Contractor shall provide, at no expense to the Owner, all temporary hose, piping, valves, and connections, power, fuel, compressed air equipment, labor, and all other necessary items and work required to complete all start-up testing and inspections specified herein. Temporary facilities shall be maintained until permanent systems are in service, at which time the temporary facilities shall be removed by the Contractor.
- F. At the completion of testing each piece of equipment, a detailed written record of all testing results shall be furnished to the Owner. A checkout form shall be supplied for each piece of equipment which can be subsequently used to ensure that the checkout test is performed prior to subsequent equipment start-up.

3.04 OPERATIONAL TESTING

- A. After completion of all installed testing and certification by the Owner that all equipment complies with the requirements of the Specifications, the Contractor shall perform operational testing.
- B. During operational testing, all components furnished and installed by the Contractor for this project must perform through their complete operating range. Operational testing shall first be completed using water for a period of 3 working days. Once the system is demonstrated to operate successfully with water, the process fluid can be added and operational testing shall be completed with the process fluid for an additional 2 working days. The Contractor shall be fully responsible for operating and maintaining these components during operational testing. It shall be the Contractor's responsibility to coordinate any operational needs of the upstream and downstream unit processes and utilities with the Owner 15 working days in advance of operational testing to ensure all of the Contractor's components are operating properly. Any delays due to the Contractor not properly coordinating with the Owner for testing will be entirely the responsibility of the Contractor.
- C. After completion of all operational testing, the Contractor shall repaint, hose, scrub, clean up, and otherwise return all work to a "like new" condition.
- D. Should the operational testing period(s) be halted for any reason related to the facilities constructed or the equipment furnished under this Contract, or the Contractor's temporary testing systems, the operational testing program shall be repeated until the specified continuous period has been accomplished without interruption.
- E. Owner's Systems Integrator:
The Owner will perform programming modifications to integrate the Contractor-furnished equipment, electrical and instrumentation items with the Owner's existing

DCS. Contractor shall be responsible for coordinating their work and scheduling all control system testing with the Owner.

1. In the presence of the Owner and Owner's Systems Integrator, Contractor shall perform operational testing of each entire equipment control system, which includes:
 - a. System interlocks and controls.
 - b. Equipment status.
 - c. Alarm functions.
 - d. Emergency shutdown and restarting of the system.
2. Submit a written report to the Owner within one week after testing has been completed certifying the equipment control system functions as specified.

3.05 COMMISSIONING

- A. After successful completion of operational testing of the entire individual mechanical, electrical, and instrumentation systems specified in the Contract Documents and upon certification by the Owner that these systems did meet all performance requirements, commissioning of each new piece of equipment shall be performed.
- B. The commissioning period for this project shall be 5 working days. If the commissioning period is stopped or interrupted due to an issue with Contractor supplied equipment or workmanship, the commissioning period shall be restarted from the beginning.
- C. No unit process or part thereof shall be commissioned until it has successfully completed operational testing. The Contractor shall provide the appropriate construction trades and the services of authorized Manufacturer's Representatives for operational testing and as necessary, to correct faulty equipment operation as required.
- D. Prior to each commissioning period, the Contractor shall remove any temporary items that may have been used during operational testing and shall submit O&M Manuals per Section 01 78 23 (Operating and Maintenance Information).
- E. During the commissioning periods, the Owner's operations and maintenance personnel will be responsible for operation of all new equipment and systems. The Contractor shall be available at all times during the commissioning periods to provide immediate assistance in case of failure of any portion of the system being tested.
- F. During the commissioning periods, the Owner shall be responsible for all normal operational costs, and the Contractor shall bear the costs of all necessary

repairs or replacements, including labor and materials required to keep the work operational during commissioning.

3.06 NOT USED

3.07 TRAINING OF OWNER PERSONNEL

- A. Operation and maintenance training of Owner personnel shall be provided for mechanical, electrical, and instrumentation and control equipment as listed in this section or elsewhere in the Specifications. These training services shall be conducted by the manufacturer's representative and shall emphasize theory of operations, start-up instructions, emergency and normal shutdown instruction, lockout procedures, troubleshooting, preventative maintenance, and alarm and control logic.
- B. The Contractor shall coordinate training periods with the Owner and manufacturer's representatives. A training schedule and training materials for each piece of equipment or system shall be submitted to the Owner for review and acceptance, no later than 15 working days prior to planned training. Training shall not take place on Fridays or Mondays. Training shall not commence until acceptance of the schedule and training materials by the Owner. All training shall be completed at the beginning of commissioning periods specified herein.
- C. The Contractor shall confirm the date of each training period a minimum of five working days prior to the scheduled time.
- D. Training Personnel: Training of the Owner's personnel shall be performed by technical manufacturer's representatives experienced in the operation and maintenance of the equipment. These representatives shall generally follow the outline presented below and submit the Manufacturer's Instruction/Training Form that is included at the end of this specification section, duly executed, for each piece of installed equipment.
- E. The classroom portion of training will be virtual unless otherwise allowed by Owner. The Owner reserves the right to record any and all training sessions and to make recordings available to LOTT staff for training purposes.

**LOTT CLEAN WATER ALLIANCE
GENERAL OUTLINE FOR MANUFACTURER PRESENTATIONS**

1. Familiarization:
 - a. Show catalog, parts lists, drawings, etc., in the plant files and O&M manuals.
 - b. Check out the installation of the specific equipment items.
 - c. Demonstrate the unit and show that all parts of the specifications are met.
 - d. Answer questions.
2. Safety:
 - a. Point out safety references.
 - b. Discuss proper precautions around equipment.
3. Operation:
 - a. Point out reference literature.
 - b. Explain all modes of operation (including emergency).
 - c. Check out Owner's personnel on proper use of the equipment (let them do it).
4. Preventive Maintenance (PM):
 - a. Pass out PM list including:
 - 1) Reference material.
 - 2) Daily, weekly, monthly, quarterly, semiannual, and annual jobs.
 - b. Show how to perform PM jobs.
 - c. Show Owner's personnel what to look for as indicators of equipment problems.
5. Corrective Maintenance:
 - a. List possible problems.
 - b. Discuss repairs – point out special problems.
 - c. Open up equipment and demonstrate procedures, where practical.
6. Parts:
 - a. Show how to use parts list and order parts.

- b. Check over spare parts on hand. Make recommendations.
7. Local Representatives:
- a. Where to Order Parts: Name, address, telephone.
 - b. Service Problems:
 - 1) Who to call.
 - 2) How to get emergency help.

***** END OF SECTION *****

MANUFACTURER'S INSTALLATION CERTIFICATION FORM

Contract Name: _____

Contract No.: _____ **Specification Section:** _____

Contractor: _____

Equipment Name: _____ **Equipment No.:** _____

Manufacturer: _____

The undersigned manufacturer of the equipment item described above hereby certifies that it has checked the installation of the equipment and that the equipment, as specified in the Contract, has been provided in accordance with the manufacturer's recommendations and that the trial operation of the equipment item has been satisfactory.

Comments: _____

Date Signature of Manufacturer's Representative

Date Signature of Contractor Representative

Date Signature of Project Representative

MANUFACTURER'S INSTRUCTION/TRAINING FORM

Project Name: _____ Project No: _____

Contract No: _____ Specification Section: _____

Equipment Name: _____ Equipment Tag (Asset Number): _____

Contractor: _____

Manufacturer of equipment item: _____

The undersigned manufacturer's representative certifies that he/she has instructed maintenance and operating personnel in the proper maintenance and operation of the equipment designated herein.

Operations Check List (check appropriate spaces)

_____ Safety procedures reviewed
_____ Start-up procedure reviewed
_____ Shutdown procedure reviewed
_____ Normal operation procedure reviewed
_____ Others: _____

Maintenance Check List (check appropriate spaces)

_____ Safety procedures reviewed
_____ Described normal oil changes (frequency)
_____ Described greasing frequency
_____ Described preventive maintenance and frequency
_____ Described repair procedures
_____ Described special tools required
_____ Described normal items to be inspected/reviewed for wear
_____ Reviewed spare parts, provide a complete list of spare parts and lead times (minimal down time) with identification of parts already provided to Owner
_____ Others: _____
_____ Reviewed guarantee information

Contact Information: _____

Signature of Manufacturer's Representative

Date

Signature of Contractor Representative

Date

Signature of Owner's Representative

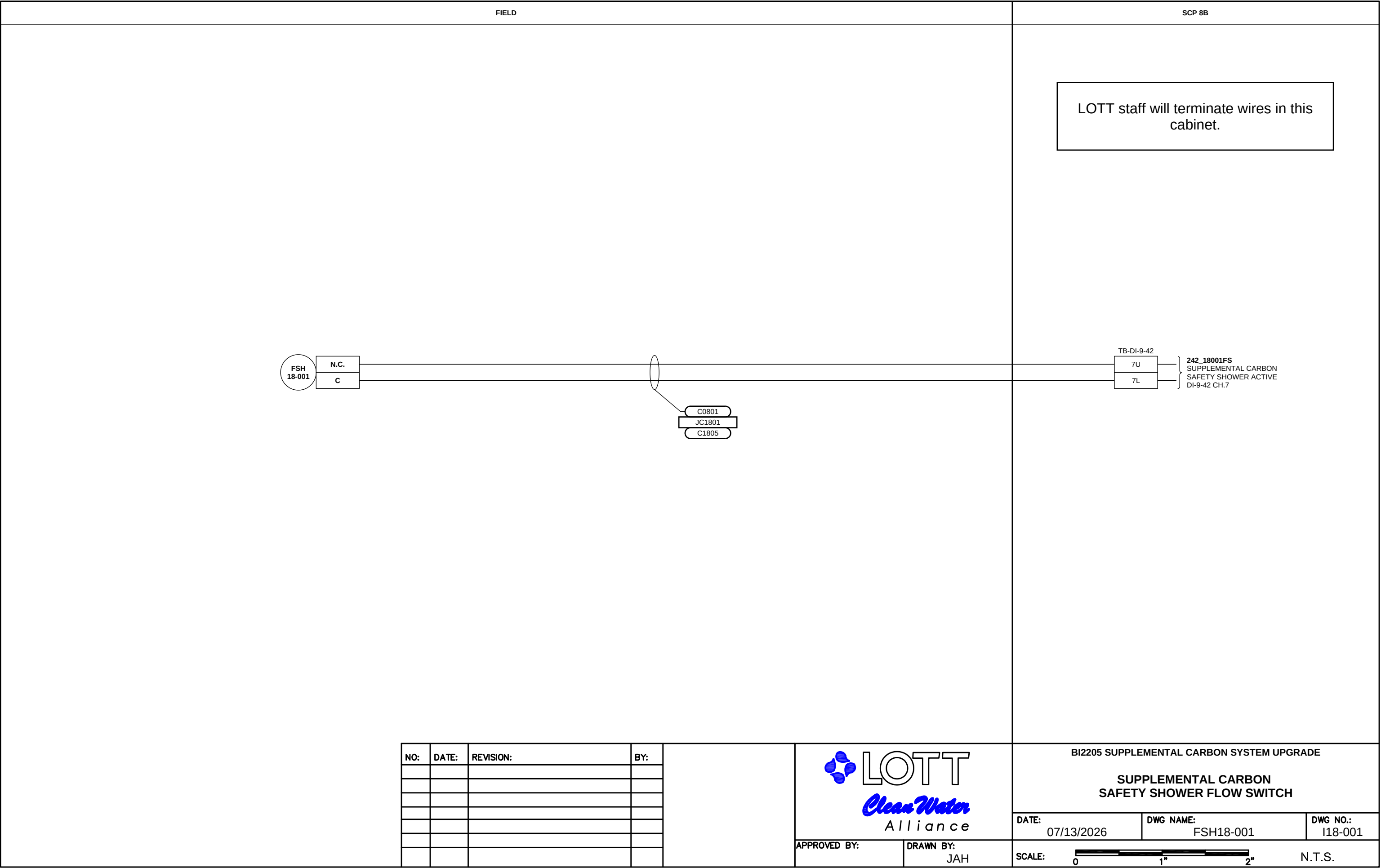
Date

Project Name: BI2205- Supplemental Carbon System Upgrade

Equipment Tag	Description	DCS Tag	Description of Command	Cabinet	Terminal Board	Channel	Terminal	Terminal	Shield
P18-410	SUPPLEMENTAL CARBON PUMP 1	242_18410MN	SUPP. CARBON PUMP 1 START CMD	SCP 8B	DO-2-42	7	7U	7L	
		242_18410MF	SUPP. CARBON PUMP 1 FAULT	SCP 8B	DI-7-42	7	7U	7L	
		242_18410MM	SUPP. CARBON PUMP 1 RUN FDBK	SCP 8B	DI-7-42	8	8U	8L	
		242_18410YS	SUPP. CARBON PUMP 1 IN REMOTE	SCP 8B	DI-7-42	9	9U	9L	
		242_18410TA	SUPP. CARBON PUMP 1 LEAK	SCP 8B	DI-7-42	10	10U	10L	
		242_18410SC	SUPP. CARBON PUMP 1 SPEED CMD	SCP 8B	AO-3-42	1	1U	1L	2U
		242_18410ST	SUPP. CARBON PUMP 1 SPEED FDBK	SCP 8B	AI-1-42	10	15U	15L	14L
LSH18-410	SUPPLEMENTAL CARBON TANK 1 HIGH LEVEL SWITCH	242_18410LH	SUPP. CARBON TANK 1 HIGH LEVEL	SCP 8B	DI-9-42	1	1U	1L	
		242_18410LA	SUPP. CARBON TANK 1 HIGH LEVEL ALARM OUT	SCP 8B	DO-2-42	8	8U	8U	
LSL18-410	SUPPLEMENTAL CARBON TANK 1 LOW LEVEL SWITCH	242_18410LL	SUPP. CARBON TANK 1 LOW LEVEL	SCP 8B	DI-9-42	2	2U	2L	
ZSO18-410	SUPPLEMENTAL CARBON TANK 1 ISO. VALVE LIMIT SWITCH	242_18410ZD	SUPP. CARBON TANK 1 ISO VLV OPEN LIMIT	SCP 8B	DI-9-42	3	3U	3L	
LIT18-410	SUPPLEMENTAL CARBON TANK 1 LEVEL TRANSMITTER	242_18410LT	SUPP. CARBON TANK 1 LEVEL	SCP 8B	AI-1-42	11	16U	16L	17U
P18-425	SUPPLEMENTAL CARBON PUMP 2	242_18425MN	SUPP. CARBON PUMP 2 START CMD	SCP 8B	DO-3-42	7	7U	7L	
		242_18425MF	SUPP. CARBON PUMP 2 FAULT	SCP 8B	DI-8-42	11	11U	11L	
		242_18425MM	SUPP. CARBON PUMP 2 RUN FDBK	SCP 8B	DI-8-42	12	12U	12L	
		242_18425YS	SUPP. CARBON PUMP 2 IN AUTO	SCP 8B	DI-8-42	13	13U	13L	
		242_18425TA	SUPP. CARBON PUMP 2 LEAK	SCP 8B	DI-8-42	14	14U	14L	
		242_18425SC	SUPP. CARBON PUMP 2 SPEED CMD	SCP 8B	AO-3-42	2	3U	3L	2L
		242_18425ST	SUPP. CARBON PUMP 2 SPEED FDBK	SCP 8B	AI-2-42	11	16U	16L	17U
LSH18-420	SUPPLEMENTAL CARBON TANK 2 HIGH LEVEL SWITCH	242_18420LH	SUPP. CARBON TANK 2 HIGH LEVEL	SCP 8B	DI-9-42	4	4U	4L	
		242_18420LA	SUPP. CARBON TANK 2 HIGH LEVEL ALARM OUT	SCP 8B	DO-3-42	8	8U	8L	
LSL18-420	SUPPLEMENTAL CARBON TANK 2 LOW LEVEL SWITCH	242_18420LL	SUPP. CARBON TANK 2 LOW LEVEL	SCP 8B	DI-9-42	5	5U	5L	
ZSO18-420	SUPPLEMENTAL CARBON TANK 2 ISO. VALVE LIMIT SWITCH	242_18420ZD	SUPP. CARBON PUMP 2 ISO VLV OPEN LIMIT	SCP 8B	DI-9-42	6	6U	6L	
LIT18-420	SUPPLEMENTAL CARBON TANK 2 LEVEL TRANSMITTER	242_18420LT	SUPP. CARBON TANK 2 LEVEL	SCP 8B	AI-2-42	12	18U	18L	17L
FSH18-001	SUPPLEMENTAL CARBON EYEWASH STATION FLOW SWITCH	242_18001FS	SUPP. CARBON EYE/SHOWER STATION ACTIVE	SCP 8B	DI-9-42	7	7U	7L	

Project Name: BI2205- Supplemental Carbon System Upgrade

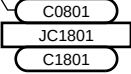
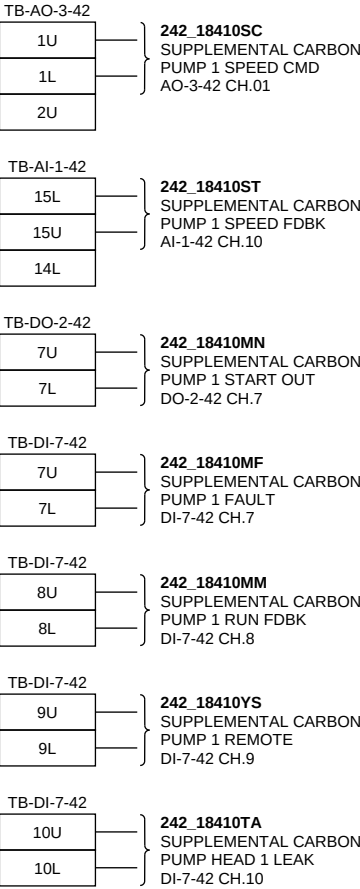
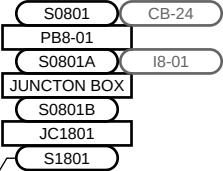
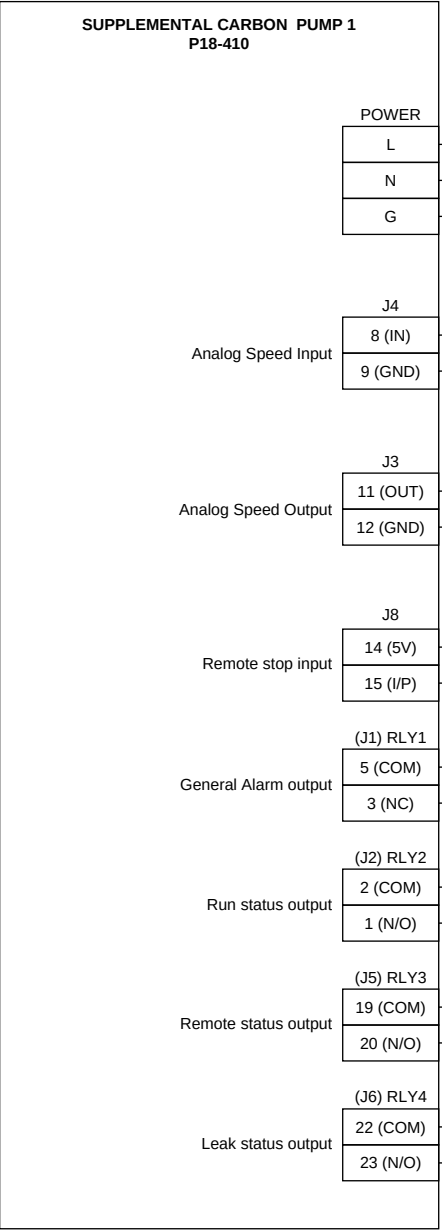
Equipment Tag	Description	DCS Tag	Description of Command	Cabinet	Terminal Board	Channel	Terminals	Terminals	Loop Check	4ma (0%)	12ma (50%)	20ma (100%)	Date
P18-410	SUPPLEMENTAL CARBON PUMP 1	242_18410MN	SUPP. CARBON PUMP 1 START CMD	SCP 8B	DO-2-42	7	7U	7L	X				
		242_18410MF	SUPP. CARBON PUMP 1 FAULT	SCP 8B	DI-7-42	7	7U	7L	X				
		242_18410MM	SUPP. CARBON PUMP 1 RUN FDBK	SCP 8B	DI-7-42	8	8U	8L	X				
		242_18410YS	SUPP. CARBON PUMP 1 IN REMOTE	SCP 8B	DI-7-42	9	9U	9L	X				
		242_18410TA	SUPP. CARBON PUMP 1 LEAK	SCP 8B	DI-7-42	10	10U	10L	X				
		242_18410SC	SUPP. CARBON PUMP 1 SPEED CMD	SCP 8B	AO-3-42	1	1U	1L		X	X	X	
		242_18410ST	SUPP. CARBON PUMP 1 SPEED FDBK	SCP 8B	AI-1-42	10	15U	15L		X	X	X	
LSH18-410	SUPPLEMENTAL CARBON TANK 1 HIGH LEVEL SWITCH	242_18410LH	SUPP. CARBON TANK 1 HIGH LEVEL	SCP 8B	DI-9-42	1	1U	1L	X				
		242_18410LA	SUPP. CARBON TANK 1 HIGH LEVEL ALARM OUT	SCP 8B	DO-2-42	8	8U	8U	X				
LSL18-410	SUPPLEMENTAL CARBON TANK 1 LOW LEVEL SWITCH	242_18410LL	SUPP. CARBON TANK 1 LOW LEVEL	SCP 8B	DI-9-42	2	2U	2L	X				
ZSO18-410	SUPPLEMENTAL CARBON TANK 1 ISO. VALVE LIMIT SWITCH	242_18410ZD	SUPP. CARBON TANK 1 ISO VLV OPEN LIMIT	SCP 8B	DI-9-42	3	3U	3L	X				
LIT18-410	SUPPLEMENTAL CARBON TANK 1 LEVEL TRANSMITTER	242_18410LT	SUPP. CARBON TANK 1 LEVEL	SCP 8B	AI-1-42	11	16U	16L		X	X	X	
P18-425	SUPPLEMENTAL CARBON PUMP 2	242_18425MN	SUPP. CARBON PUMP 2 START CMD	SCP 8B	DO-3-42	7	7U	7L	X				
		242_18425MF	SUPP. CARBON PUMP 2 FAULT	SCP 8B	DI-8-42	11	11U	11L	X				
		242_18425MM	SUPP. CARBON PUMP 2 RUN FDBK	SCP 8B	DI-8-42	12	12U	12L	X				
		242_18425YS	SUPP. CARBON PUMP 2 IN AUTO	SCP 8B	DI-8-42	13	13U	13L	X				
		242_18425TA	SUPP. CARBON PUMP 2 LEAK	SCP 8B	DI-8-42	14	14U	14L	X				
		242_18425SC	SUPP. CARBON PUMP 2 SPEED CMD	SCP 8B	AO-3-42	2	3U	3L		X	X	X	
		242_18425ST	SUPP. CARBON PUMP 2 SPEED FDBK	SCP 8B	AI-2-42	11	16U	16L		X	X	X	
LSH18-420	SUPPLEMENTAL CARBON TANK 2 HIGH LEVEL SWITCH	242_18420LH	SUPP. CARBON TANK 2 HIGH LEVEL	SCP 8B	DI-9-42	4	4U	4L	X				
		242_18420LA	SUPP. CARBON TANK 2 HIGH LEVEL ALARM OUT	SCP 8B	DO-3-42	8	8U	8L	X				
LSL18-420	SUPPLEMENTAL CARBON TANK 2 LOW LEVEL SWITCH	242_18420LL	SUPP. CARBON TANK 2 LOW LEVEL	SCP 8B	DI-9-42	5	5U	5L	X				
ZSO18-420	SUPPLEMENTAL CARBON TANK 2 ISO. VALVE LIMIT SWITCH	242_18420ZD	SUPP. CARBON PUMP 2 ISO VLV OPEN LIMIT	SCP 8B	DI-9-42	6	6U	6L	X				
LIT18-420	SUPPLEMENTAL CARBON TANK 2 LEVEL TRANSMITTER	242_18420LT	SUPP. CARBON TANK 2 LEVEL	SCP 8B	AI-2-42	12	18U	18L	X	X	X	X	
FSH18-001	SUPPLEMENTAL CARBON EYEWASH STATION FLOW SWITCH	242_18001FS	SUPP. CARBON EYE/SHOWER STATION ACTIVE	SCP 8B	DI-9-42	7	7U	7L	X				



FIELD

SCP-8B

LOTT staff will terminate wires in this cabinet.



NO:	DATE:	REVISION:	BY:



APPROVED BY:

DRAWN BY:
JAH

BI2205 SUPPLEMENTAL CARBON SYSTEM UPGRADE

SUPPLEMENTAL CARBON
PUMP 1

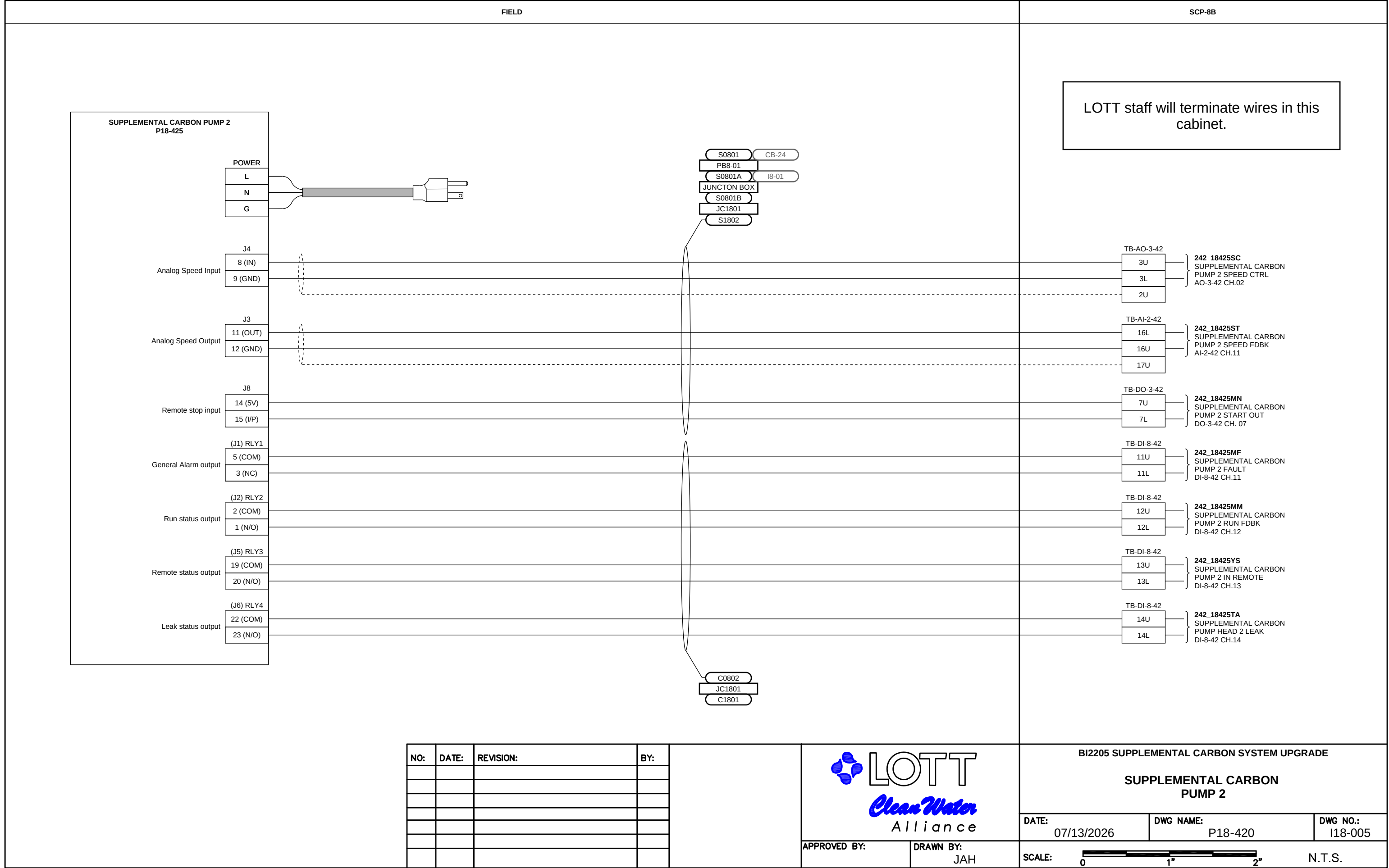
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07/13/2026

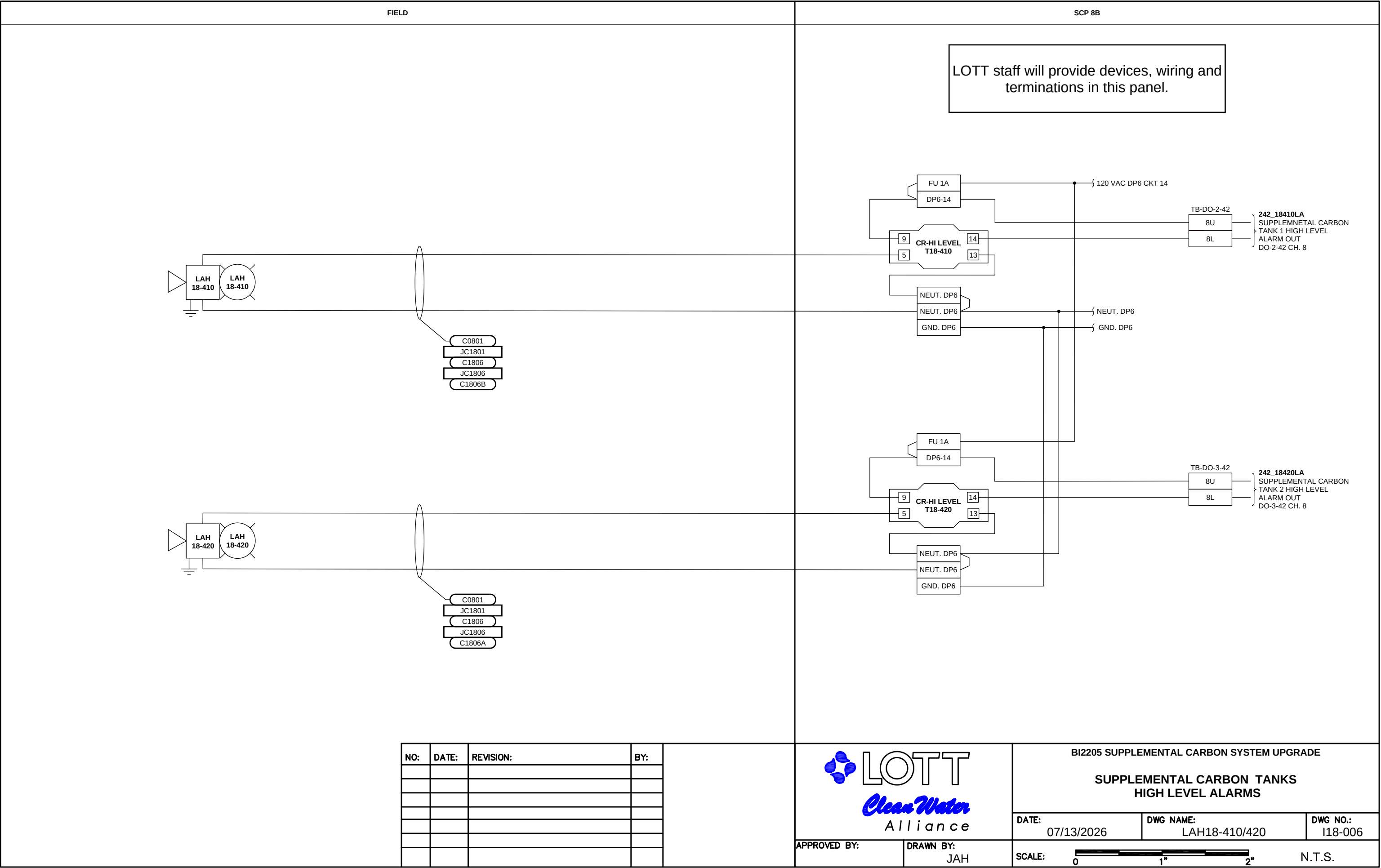
DWG NAME:
P18-410

DWG NO.:
I18-002

SCALE: 0 1" 2"

N.T.S.





Division 2

Existing Conditions

SECTION 02 41 00

SALVAGE AND DEMOLITION

PART 1 GENERAL

1.1 SCOPE

The work specified in this Section covers the demolition of existing structures, piping, equipment, and sitework as indicated on the Plans and as specified herein.

The Plans show the major items to be demolished and removed. The Contractor shall, however, remove any other incidental above-grade items, which are not to be used in the completed project.

1.2 DEMOLITION

The Contractor shall be responsible for compliance with current City, County, State, and Federal codes and regulations related to demolition.

The Contractor shall notify all affected utilities and comply with their respective requirements for abandonment of such utilities including power, telephone, natural gas, water, sanitary sewer, and storm sewer utilities.

The Contractor shall maintain access for the Owner's employees during the demolition period and provide barricades, fences, etc., as required for job site safety.

Demolition of concrete, masonry, roofing, asphalt, and other materials shall be done so as to avoid damage to existing structures intended to remain. Demolition or cutting required to add to or modify existing structures shall be done in such a manner that the appearance and utility of the existing structure is not impaired and so that a neat transition from new to old material may occur.

All piping and appurtenances located less than 2 feet below finished grade shall be removed and hauled to an approved disposal site. All piping and appurtenances located two feet or more below finished grade may be abandoned in place, unless shown otherwise on the Plans, as long as Contractor fully seals all pipe and appurtenance openings with grout.

All waste materials from demolition or cutting shall become the property of the Contractor and shall be removed from the site and hauled to an approved waste disposal site, unless noted on the Plans to be salvaged to the Owner.

***** END OF SECTION *****

Division 3

Concrete

SECTION 03 20 00

CONCRETE REINFORCEMENT

PART 1 GENERAL

1.1 SCOPE

The work specified in this Section includes reinforcement and associated items for all concrete, including, but not necessarily limited to: reinforcing steel bars, wire fabric, and accessories for cast-in-place concrete.

1.2 REFERENCES

This Section references the latest revisions of the following documents:

<u>Reference</u>	<u>Title</u>
ACI 301	Structural Concrete for Buildings
ACI 318	Building Code Requirements for Structural Concrete
ACI SP-66	American Concrete Institute - Detailing Manual
ANSI/ASTM A82	Cold Drawn Steel Wire for Concrete Reinforcement
ANSI/ASTM A185	Welded Steel Wire Fabric for Concrete Reinforcement
ANSI/AWS D1.4	Structural Welding Code for Reinforcing Steel
ASTM A615	Deformed and Plain Billet Steel Bars for Concrete Reinforcement

1.3 SUBMITTALS

Submit in accordance with provisions of Section 01 33 00.

A. SHOP DRAWINGS

Indicate bar sizes, spacings, locations, and quantities of reinforcing steel and welded wire fabric, bending and cutting schedules, and supporting and spacing devices.

B. MANUFACTURER'S CERTIFICATE

Certify that reinforcing bar and welded wire fabric meet or exceed specified requirements.

Submit certified copies of mill test reports of reinforcement materials analysis.

1.4 QUALITY ASSURANCE

Perform Work in accordance with ACI 301.

1.5 COORDINATION

Coordinate with placement of formwork, formed openings, and other Work.

PART 2 PRODUCTS

2.1 REINFORCEMENT

A. REINFORCING STEEL

ASTM A615, deformed bars: Grade 40 for #3 bars and smaller, Grade 60 for #4 bars and larger, unless noted otherwise on the Plans.

B. WELDED STEEL WIRE FABRIC

ASTM A185 Plain Type; in flat sheets; plain.

2.2 ACCESSORY MATERIALS

A. TIE WIRE

Minimum 16-gauge annealed type.

B. CHAIRS, BOLSTERS, BAR SUPPORTS, SPACERS

Sized and shaped for strength and support of reinforcement during concrete placement conditions including load-bearing pad on bottom where required to prevent vapor barrier puncture.

C. SPECIAL CHAIRS, BOLSTERS, BAR SUPPORTS, SPACERS ADJACENT TO WEATHER EXPOSED CONCRETE SURFACES

Plastic-coated steel type; size and shape as required.

D. MECHANICAL BAR SPLICES

Comply with ACI 318 requirement of minimum tensile strength of 125 percent of specified yield for reinforcement.

Subject to compliance with the requirements and approval of the Engineer, products, which may be incorporated into the work include, but are not limited to, the following:

BAR-LOCK (MBT) Coupler Systems
"ERICO" REBAR SPLICING

E. ADHESIVE ANCHORS

Injection adhesive system shall consist of a dual-cylinder adhesive refill pack, a mixing nozzle, and dispenser. The adhesive shall be formulated to include resin and hardeners.

1. Subject to compliance with the requirements, products which may be incorporated in the work include, but are not limited to, the following:
 - a. HIT RE 500 Injection Adhesive Anchor, Hilti, Inc.
 - b. SET-3G, Simpson Strong Tie, Inc.
 - c. PE1000+, Powers Fasteners, Inc.

2.3 FABRICATION

Fabricate concrete reinforcing in accordance with ACI SP-66. Obtain written approval from the Engineer prior to welding reinforcing steel. Weld reinforcement in accordance with ANSI/AWS D1.4.

PART 3 EXECUTION

3.1 PLACEMENT

Comply with Concrete Reinforcing Steel Institute's recommended practice for "Placing Reinforcing Bars" for details and methods of reinforcement placement and supports, and as herein specified. Avoiding cutting or puncturing vapor barrier during reinforcement placement and concreting operations.

Clean reinforcement of loose rust and mill scale, earth, ice, and other materials that reduce or destroy bond with concrete. Accurately position, support, and secure reinforcement against displacement by formwork, construction, or concrete placement operations. Locate and support reinforcing by metal/plastic chairs, runners, bolsters, spacers, and hangers, as required.

Install reinforcing bars with clearance indicated on the Plans. Provide laps as shown and stagger locations to minimize the concentration of multiple reinforcing at joints. Bar lap splicing shall have full contact. Where full contact cannot be achieved, the maximum space between the spliced bars shall not exceed 2 inches. Unless noted otherwise on the Plans, provide two #5 minimum trim bars around all openings and penetrations. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position during concrete placement operations. Set wire ties so ends are directed into concrete, not toward exposed concrete surfaces. Install welded wire fabric in lengths as long as practicable. Lap adjoining pieces at least one full mesh and lace splices with tie wire. Offset end laps in adjacent widths to prevent continuous laps in either direction.

***** END OF SECTION *****

SECTION 03 30 00

CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.1 SCOPE

The work specified in this Section includes schedules, notes, and details for the construction of cast-in-place concrete structures, landings, equipment piers, housekeeping pads and slabs on grade.

1.2 REFERENCES

This Section references the latest revisions of the following documents:

<u>Reference</u>	<u>Title</u>
ACI 117	Specifications for Tolerances for Concrete Construction and Materials and Commentary
ACI 212.3	Chemical Admixtures for Concrete
ACI 301	Specifications for Structural Concrete
ACI 304	Guide for Measuring, Mixing, Transporting, and Placing Concrete
ACI 305	Hot Weather Concreting
ACI 306	Cold Weather Concreting
ACI 309	Guide for Consolidation of Concrete
ACI 318	Building Code Requirements for Structural Concrete and Commentary
ACI 350	Code Requirements for Environmental Engineering Concrete Structures and Commentary
ACI 347	Guide to Formwork for Concrete
ACI 350.1	Tightness Testing of Reinforced Engineering Concrete Structures and Commentary
ASTM C31	Making and Curing Concrete Test Specimens in the Field
ASTM C33	Concrete Aggregates
ASTM C39	Compressive Strength of Cylindrical Concrete Specimens
ASTM C42	Obtaining and Testing Drilled Cores and Sawed Beams of Concrete
ASTM C94	Ready-Mixed Concrete
ASTM C131	Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
ASTM C143	Slump of Hydraulic Cement Concrete
ASTM C150	Portland Cement
ASTM C172	Sampling Freshly Mixed Concrete
ASTM C173	Air Content of Freshly Mixed Concrete by the Volumetric Method
ASTM C231	Air Content of Freshly Mixed Concrete by the Pressure Method
ASTM C260	Air-Entraining Admixtures for Concrete
ASTM C309	Liquid Membrane-Forming Compounds for Curing Concrete
ASTM C494	Chemical Admixtures for Concrete
ASTM C535	Resistance to Degradation of Large-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine

ASTM C618	Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Concrete
ASTM C881	Epoxy-Resin-Base Bonding Systems for Concrete

1.3 SUBMITTALS

Submittals shall be in accordance with Section 01 33 00.

A. GENERAL

The submittal for each included concrete mix shall include, as a complete package, the following as defined below:

1. Concrete Mix Design
2. Certified Test Results
3. Sieve Analysis
4. Product Data

An incomplete concrete mix submittal package may render a rejection of the mix or could delay the review process.

B. CONCRETE MIX DESIGN

Submit mix design for the proposed mix to be used on the Project, indicating components, and proportions by weight, including any admixtures. Mix design shall state chloride content. Mix designs to be provided are:

1. Unspecified Concrete
2. Cement Grout

C. CERTIFIED TEST RESULTS

Submit laboratory test results indicating compressive strength of concrete in compliance with requirements specified herein and in accordance with ACI 301.

D. SIEVE ANALYSIS

Submit sieve analysis for proposed coarse and fine aggregates indicating components, source, gradation, and WSDOT aggregate source approval report, including WSDOT Aggregate Source ID.

E. PRODUCT DATA

Provide product data on all proposed admixtures, accessories, and embedded items to be used on the Project, including, but not limited to:

1. Cement; source and type
2. Air Entraining Agent
3. Water Reducing Admixtures
4. Pozzolans
5. Bonding Agents
6. Curing Compounds/Floor Hardeners
7. Non-Shrink Grout; Non-metallic and Metallic
8. Waterstops
9. Plastic Joint Formers

For admixtures other than those proposed for air entrainment, submit a letter from the manufacturer describing the benefits of its use for the project and effect of its use on the properties of the concrete. Product data shall expressly state admixtures are chloride free, or the manufacturer shall submit a letter certification stating the same.

F. MATERIAL DELIVERY TICKETS

Provide copies of all concrete and grout material delivery tickets for the Project to the Engineer.

1.4 QUALITY ASSURANCE

Perform work in accordance with ACI 301. Acquire cement and aggregates from same source for all work performed on the Project. Conform to ACI 305 when concreting during hot weather. Conform to ACI 306 when concreting during cold weather. Provide or coordinate field and laboratory testing as described later in this Section and under provisions of Section 01 45 16.13.

1.5 COORDINATION

Coordinate work in accordance with provisions of Section 01 31 19. Coordinate the placement of embedded items with erection of concrete formwork and placement of form accessories.

PART 2 PRODUCTS

2.1 FORM MATERIALS

A. FORMS FOR EXPOSED FINISH CONCRETE

Plywood, metal, metal-framed plywood faced, or other acceptable panel-type materials, to provide continuous, straight, smooth, exposed surfaces. Furnish in largest practicable sizes to minimize number of joints and to conform to joint system shown on the Plans.

B. FORMS FOR UNEXPOSED FINISH CONCRETE

Plywood, lumber, metal, or other acceptable material. Provide lumber dressed on at least two edges and one side for tight fit.

C. FORM COATINGS

Provide commercial formulation form-coating compounds that will not bond with, stain, or adversely affect concrete surfaces, and will not impair subsequent treatments of concrete surfaces.

D. FORM TIES

Factory-fabricated, adjustable-length, removable or snapoff metal form ties, designed to prevent form deflection and to prevent spalling of concrete upon removal. Provide units, which will leave no metal closer than 1-1/2 inches to surface. Unless noted otherwise on Plans, provide ties with plastic cone devices which, when removed, will leave holes not larger than 1-inch diameter in concrete surface.

2.2 CONCRETE MATERIALS

A. CEMENT

ASTM C150, Type II – Moderate or Type I - II. Use one brand of cement throughout the project, unless otherwise approved by the Engineer. Provide low alkali cement where Alkali-Silica Reaction (ASR) mitigation measures are required by WSDOT Aggregate Source Approval.

B. FINE AND COARSE AGGREGATES

Comply with ASTM C33. Provide aggregates from a single source. Coarse aggregate shall be size designation 67 (Nominal size 3/4-inch to No. 4 sieve) for all concrete. Aggregates shall show a loss of weight not exceeding 35 percent after 500 revolutions in a Los Angeles wear machine, when tested in accordance with ASTM C131 or ASTM C535. Aggregates shall be from a WSDOT approved source.

C. WATER

Clean, potable, and not detrimental to concrete, in compliance with ASTM C94.

2.3 ADMIXTURES

Except for air entrainment, use of all other admixtures used shall be subject to approval of the Engineer and at no additional cost to the Owner. Only admixtures expressly stated by the manufacturer as being chloride-free shall be used. Subject to compliance with requirements, products, which may be incorporated into the work include, but are not limited to, the following:

A. AIR ENTRAINMENT

ASTM C260 certified by manufacturer to be compatible with other proposed admixtures.

Master Builders MB AE 90 or MICRO-AIR
Sika AER
W.R. Grace Daravair or Darex Series

B. WATER REDUCING ADMIXTURE

ASTM C494 Type A.

Master Builders PolyHeed
Sika Plastocrete 161
W.R. Grace WRDA Series

C. ACCELERATING ADMIXTURE

ASTM C494 Type C.

Master Builders Pozzolith NC534
Sika Plastocrete 161 FL
W.R. Grace Polarsset or DCI

D. WATER REDUCING, RETARDING ADMIXTURE

ASTM C494, Type D.

Master Builders Pozzolith 100XR
Sika Plastiment
W.R. Grace Daratard Series

E. WATER REDUCING, ACCELERATING ADMIXTURE

ASTM C494, Type E.

Euclid Chemical Co. Accelguard 80
Master Builders Pozzutec 20
W.R. Grace Daraccel

F. HIGH RANGE WATER REDUCER (HRWR)

ASTM C494, Type F.

Master Builders Rheobuild 1000/3000 FC
Sika Sikament 10 ESL
W.R. Grace ADVA 100

G. HIGH RANGE WATER REDUCER AND RETARDER

ASTM C494, Type G.

Master Builders Pozzolith 440N
W.R. Grace Daracem-100

H. POZZOLAN

ASTM C618 - CLASS F, with a CaO maximum content of 10 percent.

2.4 ACCESSORIES

A. BONDING AGENT

ASTM C881, Type I and II, Grade 2, Class C, Epoxy Resin. Subject to Contract requirements, provide one of the following or equal:

Sika Armattec 110
Conspec SpecBond 100
W.R. Meadows Sealtight Rezi Weld 1000

B. CURING COMPOUND/CHEMICAL FLOOR HARDENER

ASTM C309, Type I, Class A and B. Subject to Contract requirements, provide one of the following or equal:

W.R. Meadows Sealtight 1100-Clear
Conspec RX cure
Chemrex, Inc. Masterkure
Burke Spartan-Cote WB

C. GENERAL PURPOSE NON-SHRINK NON-METALLIC GROUT

Premixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing agents; capable of developing minimum compressive strength of 2,400 psi (17 Mpa) in 48 hours and 7,000 psi (48 Mpa) in 28 calendar days. Subject to Contract requirements, provide one of the following or equal:

Sika SikaGrout 212
Conspec 100 Non Metallic
Chemrex, Inc. Masterflow 928 Grout
W.R. Meadows Sealtight 588

D. WATERSTOPS

Provide waterstop of type and size at construction joints and other joints as indicated on the Plans.

1. Cold Joint Waterstop

Install where shown on the Plans or at locations approved by the Engineer. Cold joint waterstop shall be certified by the manufacturer to be compatible for use in wastewater (sewage) containment structures. Unless otherwise shown in the Plans, size shall be 1-inch thick and 1-inch wide.

Subject to compliance with requirements, manufacturers offering products, which may be incorporated in the work, include, but are not limited to, the following:

Hydrotite, Greenstreak

E. PLASTIC JOINT FORMER

Provide and install, per manufacturer's recommendations, where shown on the Plans or at locations approved by the Engineer. Subject to compliance with requirements, manufacturers offering products, which may be incorporated in the work, include, but are not limited to, the following:

Greenstreak
Vinylex Corporation
W.R. Meadows

2.5 CONCRETE MIX

A. GENERAL

Prepare design mixes for each type and strength of concrete by either laboratory trial batch or field experience methods as specified in ACI 301. If trial batch method is used, use an independent testing facility acceptable to the Engineer

for preparing and reporting proposed mix designs. The testing facility shall not be the same as that used for field quality control testing.

The maximum water soluble chloride ion content, expressed as a percent of the cement, contributed from all ingredients of the concrete mix, including water, aggregates, cementitious materials, and admixtures, shall not exceed 0.10 percent. Pozzolans may be counted as part of the total cementitious material in the concrete mix design. The cementitious material is the "minimum cement content" specified in the mix design for each type of concrete. When pozzolans are used as part of this "cement content," the minimum content shall be 15 percent by weight of the total cementitious materials (Portland cement and pozzolans) and not more than 20 percent.

Where ASR mitigation measures are required by WSDOT, provide a minimum of 15 percent pozzolan included in the cementitious material in the design mix.

B. MIX DESIGNS

Provide normal weight concrete with the following properties, unless noted otherwise on the Plans.

1. Unspecified Concrete

Structural concrete of general use in structures, sidewalks, and where no specific class of concrete is designated.

Minimum compressive strength @ 28 calendar days: 3,500 psi
Minimum cement content: 5.5 sacks per cubic yard
Maximum water cement ratio by weight: 0.45
Nominal coarse aggregate size: 3/4" to No. 4 (size designation 67)

2. Cement Grout

Material for filling guard posts, grouting of clarifier bottoms or for other uses as shown on the Plans. Cement grout shall be sand and cement only and shall not contain coarse aggregate.

Minimum compressive strength @ 28 calendar days: 2,500 psi
Minimum cement content: 6.5 sacks per cubic yard
Maximum water cement ratio by weight: 0.54

C. ADMIXTURES

1. Air Entrainment

Use air-entraining admixture complying with ASTM C260 in all exterior exposed concrete. Add air-entraining admixture at manufacturer's prescribed rate to result in concrete at point of placement in accordance with ASTM C173 or C231 having total air content with a tolerance of plus or minus 1 percent within the following limits:

5.5 percent for 1.5 inch max. coarse aggregate size
6.0 percent for 1.0 inch max. coarse aggregate size
7.0 percent 0.50 inch or less max. coarse aggregate size

2. Other Admixtures

Use of all other admixtures shall be subject to the approval of the Engineer, and shall be in accordance with ACI 212.3 and Manufacturer's recommendations. Only admixtures stated by the manufacturer to be chloride free shall be used.

D. SLUMP LIMITS

Proportion and design mixes to result in concrete slump (1 inch $\pm$ of the maximum) at the point of placement in accordance with ASTM C143 as follows:

Ramps, slabs, and sloping surfaces: 3 inches.

Reinforced foundation systems: 3 inches.

Other concrete: 4 inches.

Concrete containing HRWR admixture (super-plasticizer): Not more than 8 inches after addition of HRWR to site-verified 2- to 3-inch slump concrete.

E. CONCRETE MIXING

Comply with requirements of ASTM C94, and as herein specified.

During hot weather, or under conditions contributing to rapid setting of concrete, a shorter mixing time than that specified in ASTM C94 may be required.

PART 3 EXECUTION

3.1 GENERAL

Coordinate the installation of joint materials and vapor barriers with placement of forms and reinforcing steel.

3.2 FORMS

Design, erect, support, brace, and maintain formwork to support vertical and lateral, static, and dynamic loads that might be applied until such loads can be supported by concrete structure. Construct formwork so concrete members and structures are of correct size, shape, alignment, elevation, and position. Maintain formwork construction tolerances complying with ACI 347.

Design formwork to be readily removable without impact, shock, or damage to cast-in-place concrete surfaces and adjacent materials.

Construct forms to sizes, shapes, lines, and dimensions shown, and to obtain accurate alignment, location, grades, level and plumb work in finished structures. Provide for openings, offsets, sinkages, keyways, recesses, moldings, rustications, reglets, chamfers, blocking, screeds, bulkheads, anchorages and inserts, and other features required in the work. Use selected materials to obtain required finishes. Solidly butt joints and provide back up at all joints to prevent leakage of cement paste.

Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush plates or wrecking plates where stripping may damage cast-in-place concrete surfaces. Provide top forms for inclined surfaces where slope is too steep to place concrete with bottom forms only. Provide Kerf wood inserts for forming keyways, reglets, recesses, and the like, to prevent swelling and for easy removal.

Provide temporary openings where interior area of formwork is inaccessible for cleanout, for inspection before concrete placement, and for placement of concrete. Securely brace temporary openings and set tightly to forms to prevent loss of concrete mortar. Locate temporary openings in forms at inconspicuous locations.

Chamfer all exposed corners and edges and other areas shown on the Plans, using wood, metal, PVC, or rubber chamfer strips fabricated to produce uniform smooth lines and tight edge joints.

Provisions for Other Trades: Provide openings in concrete formwork to accommodate work of other trades. Determine size and location of openings, recesses, and chases from trades providing such items. Accurately place and securely support items built into forms.

A. CONSTRUCTION JOINTS

Locate and install construction joints where indicated, or locate so as not to impair strength and appearance of the structure, as acceptable to the Engineer. Place construction joints perpendicular to main reinforcement. Continue reinforcement across construction joints, except as otherwise shown on the Plans.

B. WATERSTOPS

Provide waterstops in construction joints of all water containment structures and where shown on the Plans. Install waterstops to form continuous diaphragm in each joint in accordance with manufacturer's recommendations. Make provisions to support and protect exposed waterstops during progress of work. Fabricate field joints in waterstops in accordance with manufacturer's printed instructions and recommendations. All waterstops shall be tied into place using hog rings and/or tie wire to keep the waterstop from moving during placement of concrete. Provide manufacturer's written warranty for all waterstop installations.

C. ISOLATION JOINTS IN SLABS-ON-GRADE

Unless otherwise noted, construct isolation joints in slabs-on-grade at points of contact between slabs-on-grade and vertical surfaces, such as column pedestals, foundation walls, grade beams, and elsewhere as shown on the Plans.

D. SLAB (CONTROL) JOINTS

Construct joints in slabs-on-grade as shown on the Plans. Use saw cuts 1/8 of an inch wide x 1/4 of the slab depth or inserts 1/4-inch wide x 1/4 of the slab depth.

E. PREMOLEDDED (CONTROL) JOINTS

Insert premolded plastic, hardboard or fiberboard strip into fresh concrete until top surface of strip is flush with slab surface. Tool slab edges round on each side of insert. After concrete has cured, remove inserts and clean groove of loose debris.

F. EDGE FORMS AND SCREED STRIPS FOR SLABS

Set edge forms or bulkheads and intermediate screed strips for slabs to obtain required elevations and contours in finished slab surface. Provide and secure units sufficiently to support types of screed strips by use of strike-off templates or accepted compacting type screeds.

G. PREFORMED FLEXIBLE JOINT MATERIAL

Provide a closed-cell, polyolefin preformed foam joint material. Foam joint material shall meet ASTM D7174. Performance characteristics shall include an expansion recovery greater than 99-percent, a maximum 50-percent compression strength of 15 psi, and a maximum water absorption of 0.25-percent by volume.

Foam joint material shall be Ceramar, as manufactured by W.R. Meadows, or equal.

H. PREFORMED FLEXIBLE JOINT BACKER MATERIAL

Provide a closed-cell, polyolefin preformed foam backer rod material. Backer rod material shall meet ASTM D5249 and shall be compatible with the proposed cold-applied sealant.

Backer rod material shall be Kool-Rod, as manufactured by W.R. Meadows, or equal.

3.3 INSTALLATION OF EMBEDDED ITEMS:

A. GENERAL

Set and build into work anchorage devices and other embedded items required for other work that is attached to, or supported by, cast-in-place concrete. Use installation drawings, diagrams, instructions, and directions provided by suppliers of items to be embedded.

B. CLEANING AND TIGHTENING

Thoroughly clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, or other debris just before concrete is placed. Retighten forms and bracing after concrete placement as required to eliminate mortar leaks and maintain proper alignment.

C. REGLETS

Install reglets to receive top edge of foundation sheet waterproofing, and to receive thru-wall flashing as shown at lintels, relieving angles, and other conditions.

3.4 PLACING REINFORCEMENT

See Section 03 20 00.

3.5 PREPARATION OF FORM SURFACES

Clean reused forms of concrete matrix residue, repair and patch as required to return forms to acceptable surface condition. Coat contact surfaces of forms with a form-coating compound before reinforcement is placed.

Thin form coating compounds only with thinning agent of type, amount, and under conditions of form-coating compound manufacturer's directions. Do not allow excess form-coating material to accumulate in forms or to come into contact with in-place concrete surfaces against which fresh concrete will be placed. Apply in compliance with manufacturer's instructions.

Coat steel forms with a non-staining, rust-preventative form oil or otherwise protect against rusting. Rust-stained steel formwork is not acceptable.

3.6 PREPARATION OF EXISTING CONCRETE SURFACES

The Contractor shall bush hammer all existing concrete surfaces that are to have new concrete cast against them. Apply epoxy bonding agent prior to placing concrete.

3.7 CONCRETE PLACEMENT

A. GENERAL

Comply with ACI 304 and as herein specified.

Before placing concrete, inspect and complete formwork installation, reinforcing steel, and items to be embedded or cast-in. Notify other crafts to permit installation of their work; cooperate with other trades in setting such work. Apply temporary protective covering to lower 2 feet of finished walls adjacent to poured floor slabs and similar conditions, and guard against spattering during concrete placement.

B. PLACING CONCRETE IN FORMS

Deposit concrete in forms in horizontal layers not deeper than 24 inches and in a manner to avoid inclined construction joints. Where placement consists of several layers, place each layer while preceding layer is still plastic to avoid cold joints.

Consolidate placed concrete by mechanical vibrating equipment supplemented by hand-spading, rodding, or tamping. Use equipment and procedures for consolidation of concrete in accordance with ACI 309.

Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations not farther than visible effectiveness of machine. Place vibrators to rapidly penetrate placed layer and at least 6 inches into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to set. At each insertion limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing segregation of mix.

C. PLACING CONCRETE SLABS

Deposit and consolidate concrete slabs in a continuous operation, within limits of construction joints, until the placing of a panel or section is completed. Consolidate concrete during placing operations so that concrete is thoroughly worked around reinforcement and other embedded items and into corners. Bring slab surfaces to correct level with straightedge and strikeoff. Use bull floats or darbies to smooth surface, free of humps or hollows. Do not disturb slab surfaces prior to beginning finishing operations. Maintain reinforcing in proper position during concrete placement operations.

D. COLD WEATHER PLACING

Protect concrete work from physical damage or reduced strength, which could be caused by frost, freezing actions, or low temperatures, in compliance with ACI 306 and as herein specified.

When air temperature has fallen to or is expected to fall below 40 degrees F (4 degrees C), uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 degrees F (10 degrees C), and not more than 80 degrees F (27 degrees C) at point of placement.

Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials. Do not use calcium chloride, salt, and other materials containing antifreeze agents or chemical accelerators, unless otherwise accepted in mix designs.

E. HOT WEATHER PLACING

When hot weather conditions exist that would seriously impair quality and strength of concrete, place concrete in compliance with ACI 305 and as herein specified.

Cool ingredients before mixing to maintain concrete temperature at time of placement below 90 degrees F (32 degrees C). Mixing water may be chilled, or chopped ice may be used to control temperature provided water equivalent of ice is calculated to total amount of mixing water. Use of liquid nitrogen to cool concrete is at Contractor's option.

Cover reinforcing steel with water-soaked burlap if it becomes too hot, so that steel temperature will not exceed the ambient air temperature immediately before embedment in concrete. Fog spray forms, reinforcing steel, and subgrade just before concrete is placed. Upon approval, water-reducing retarding admixture (Type D) may be used when required by high temperatures, low humidity, or other adverse placing conditions.

3.8 FINISH OF FORMED SURFACES

Provide smooth form finish for all formed concrete surfaces exposed-to-view including all surfaces exposed to water or wastewater, or that are to be covered with a coating material applied directly to the concrete, or a covering material applied directly to concrete, such as veneer plaster, painting, or other similar type of system.

Provide smooth form finish for surfaces to be waterproofed or dampproofed. Surfaces must comply with recommendations of the manufacturer of the product being utilized.

Provide rough form finish for formed concrete surfaces not exposed-to-view in the finished work or by other construction, unless otherwise indicated.

A. SMOOTH FORM FINISH

This is to be the as-cast concrete surface obtained utilizing selected form facing material, arranged orderly and symmetrically with a minimum of seams, and as specified herein.

Repair and patch tie holes and defective areas, with all fins or other projections completely removed and smoothed, by one of the following methods:

1. Provide smooth rubbed finish to concrete surfaces after form removal. Moisten concrete surfaces and rub with carborundum brick or other abrasive until a uniform color and texture is produced. Do not apply cement grout other than that created by the rubbing process.
2. Provide grout "sacked" cleaned finish. The sacking grout shall be one part Portland cement to 1-1/2 parts fine sand by volume, and mixed with water to consistency of thick paint. Proprietary additives such as epoxy bonding agents or adhesives may be used at Contractor's option. Blend standard Portland cement and white Portland cement, amounts to be determined by trial patches, so that final color of dry grout matches adjacent surfaces. Thoroughly wet concrete surfaces and apply grout to coat surfaces and fill small holes. Remove excess grout by scraping and rubbing with clean burlap. Keep sacked surfaces damp by fog spray or other acceptable method so surfaces do not dry out.

B. ROUGH FORM FINISH

This is the concrete surface having texture imparted by form facing material used, with tie holes and defective areas repaired and patched and fins and other projections exceeding 1/8 of an inch in height rubbed down or chipped off. All "bug holes" exceeding 1/2 inch in diameter and exceeding 1/4-inch depth shall be repaired or filled in.

C. RELATED UNFORMED SURFACES

At tops of walls, horizontal offsets, and similar unformed surfaces occurring at adjacent formed surfaces, continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces, unless otherwise indicated.

D. TOLERANCES FOR FORMED SURFACES

1. Variations from the plumb:
 - a. In the lines and surfaces of columns, pier, walls and in arises In any 10 feet of length – 1/4 inch. Maximum for entire length – 1 inch
 - b. For exposed corner columns, control-joint grooves, and other conspicuous lines In any 20 feet of length – 1/4 inch. Maximum for entire length – 1/2 inch

2. Variations from level or from the grades indicated on the Plans:
 - a. In slab soffits, ceilings, beam soffits, and in arises, measured before removal of supporting shores

In any 10 feet of length – 1/4 inch. In any bay or opening, or in any 20 feet of length – 3/8 of an inch. Maximum for entire length – 3/4 inch
 - b. In exposed lintels, sills, parapets, horizontal grooves, and other conspicuous lines

In any bay or opening, or in any 20 feet of length – 1/4 inch. Maximum for entire length – 1/2 inch
3. Variations in the linear building lines from the established position in plan view

In 20 feet of length – 1/2 inch. Maximum for entire length – 1 inch
4. Variations in distance between walls, columns and partitions

In any 10 feet of distance – 1/4 inch. In any bay or opening – 1/2 inch. Maximum total variation – 1-inch.
5. Variations in the sizes and locations of sleeves, floor openings and wall openings

Minus – 1/4 inch
Plus – 1/2 inch
6. Variations in cross-sectional dimensions of columns and beams and in the thickness of slabs and walls

Minus – 1/4 inch
Plus – 1/2 inch
7. Variations in footings:
 - a. Variation from dimensions on Plans when formed or plus 3-inches when placed against unformed excavations

Minus – 1/2 inch
Plus – 2 inches
 - b. Misplacement of eccentricity

2 percent of the footing width in the direction of the misplacement, but not more than 2 inches

- c. Reduction in thickness of specified thickness Minus – 5 percent
- 8. Variations in steps:
 - a. In a flight of stairs Riser – 1/8 of an inch
Tread – 1/4 inch
 - b. In consecutive steps Riser – 1/16 of an inch
Tread – 1/8 of an inch

3.9 MONOLITHIC SLAB FINISHES:

A. SCRATCH FINISH

Apply scratch finish to monolithic slab surfaces that are to receive concrete floor topping, including grout finishes where indicated on plans, or mortar setting beds for tile, Portland cement terrazzo, and other bonded applied cementitious finish flooring material, and as otherwise indicated. Slope surfaces uniformly to floor drains where required. After leveling, roughen surface before final set, with stiff brushes, brooms, or rakes.

B. FLOAT FINISH

Apply float finish to monolithic slab surfaces to receive trowel finish and other finishes as hereinafter specified, and slab surfaces which are to be covered with membrane or elastic waterproofing, membrane or elastic roofing, or sand-bed terrazzo, and as otherwise indicated.

After screeding, consolidating, and leveling concrete slabs, do not work surface until ready for floating. Begin floating when surface water has disappeared or when concrete has stiffened sufficiently to permit operation of power-driven floats, or by hand-floating if area is small or inaccessible to power units. Check and level surface plane. Cut down high spots and fill low spots. Uniformly slope surfaces to drains. Immediately after leveling, refloat surface to a uniform, smooth, granular texture.

C. TROWEL FINISH

Apply trowel finish to monolithic slab surfaces to be exposed-to-view, and slab surfaces to be covered with resilient flooring, carpet, ceramic or quarry tile, paint, or other thin film finish coating system. After floating, begin first trowel finish operation using a power-driven trowel. Begin final troweling when surface produces a ringing sound as trowel is moved over surface. Consolidate concrete surface by final hand-troweling operation, free of trowel marks and uniform in texture and appearance. Grind smooth surface defects that would telegraph up through applied floor covering system.

D. TROWEL AND FINE BROOM FINISH

Where ceramic or quarry tile is to be installed with thin-set mortar, apply trowel finish as specified, then immediately follow with slightly scarifying surface by fine brooming.

E. NON-SLIP BROOM FINISH

Apply non-slip broom finish to exterior concrete platforms, landings, steps, and ramps, sidewalks and elsewhere as indicated. Immediately after float finishing, slightly roughen concrete surface by brooming with fiber bristle broom perpendicular to main traffic route. Coordinate required final finish with Owner before application.

F. CHEMICAL-HARDENER FINISH

Apply chemical-hardener finish to interior exposed concrete floors and steps, unless noted otherwise. Apply liquid chemical-hardener after complete curing and drying of the concrete surface. Evenly apply each coat, and allow 24 hours for drying between coats. Apply proprietary chemical hardeners, in accordance with manufacturer's printed instructions. After final coat of chemical-hardener solution is applied and dried, remove surplus hardener by scrubbing and mopping with water.

G. TOLERANCES FOR MONOLITHIC SLAB FINISHES

The flatness of the concrete shall be carefully controlled and the tolerances shall be measured by the straight edge system as specified in paragraph 4.5.7 of ACI 117, using a 10-foot straight edge, within 72 hours after floor slab installation and before shores and/or forms are removed. The tolerances listed below shall be met at any and every location at which the straight edge can be placed.

Bullfloated	1/2 inch
Float Finish	3/16 inch
Trowel Finish	1/8 inch
Straightedges	5/16 inch

3.10 CONCRETE CURING AND PROTECTION

A. GENERAL

Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Start initial curing as soon as free water has disappeared from concrete surface after placing and finishing. Weather permitting, keep concrete continuously wet for not less than 7 calendar days. Begin final curing procedures immediately following initial curing and before concrete has dried out. Continue final curing for at least 7 calendar days in accordance with ACI 301 curing methods. Avoid rapid drying of concrete at the end of final curing period.

B. CURING METHODS

Perform curing of concrete by use of curing and sealing compound, by moist curing, by moisture-retaining cover curing, or by combinations thereof, as herein specified.

Provide moisture curing by the following methods. Keep concrete surface continuously wet by covering with water, or provide continuous water-fog spray.

Covering concrete surface with absorptive cover, thoroughly saturating cover with water and keeping continuously thoroughly saturating cover with water and keeping continuously wet. Place absorptive cover to provide coverage of concrete surfaces and edges, with 4-inch lap over adjacent absorptive covers.

Provide moisture-cover curing as follows: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in wide as practicable width with sides and ends lapped at least 3 inches and sealed by waterproof tape or adhesive. Immediately repair any holes or tears during curing period using cover material and waterproof tape.

Provide curing and sealing compound to exposed interior slabs and to exterior slabs, walls, sidewalks, and curbs, as follows:

Apply curing and sealing compound to concrete slabs and walls as soon as initial curing operations are complete or immediately after the forms have been stripped (within 2 hours). Apply uniformly in continuous operation by power-spray or roller in accordance with manufacturer's directions. Completely cover the concrete surfaces with curing and sealing compound. Recoat areas subjected to heavy rainfall within 3 hours after initial application. Maintain continuity of coating and repair any damage during curing period.

Do not use membrane curing compounds on surfaces which are to be covered with coating material applied directly to concrete, liquid floor hardener, waterproofing, dampproofing, membrane roofing, flooring (such as ceramic or quarry tile, glue-down carpet), painting, and other coatings and finish materials, unless otherwise acceptable to the Engineer.

C. CURING FORMED SURFACES

Cure formed concrete surfaces, including undersides of beams, supported slabs, and other similar surfaces by moist curing with forms in place for full curing period and until forms are removed. When forms are removed, continue curing by methods specified above, as applicable.

D. CURING UNFORMED SURFACES

Cure unformed surfaces, such as slabs, floor topping, and other flat surfaces by application of an appropriate curing method.

Final cure concrete surfaces to receive liquid floor hardener or finish flooring by use of moisture retaining cover.

3.11 SHORES AND SUPPORTS

A. GENERAL

Comply with ACI 347 for shoring, and as herein specified. Extend shoring from ground to roof for structures four stories or less, unless otherwise permitted. Remove shores and reshore in a planned sequence to avoid damage to partially cured concrete. Locate and provide adequate reshoring to safely support work without excessive stress or deflection.

Keep reshores in place a minimum of 15 calendar days after placing upper tier, and longer if required, until all concrete has attained its required 28-day strength and heavy loads due to construction operations have been removed.

B. REMOVAL OF FORMS

Formwork not supporting weight of concrete, such as sides of beams, walls, columns, and similar parts of the work, may be removed after cumulatively curing at not less than 50 degrees F (10 degrees C) for 24 hours after placing concrete, provided concrete is sufficiently hard to not be damaged by form removal operations, and provided curing and protection operations are maintained.

Formwork supporting weight of concrete, such as beam soffits, joints, suspended slabs, and other structural elements, may not be removed in less than 14 calendar days and until concrete has attained 70 percent of the design minimum compressive strength at 28 calendar days. Determine potential compressive strength of in-place concrete by testing field-cured specimens, representative of concrete location or members.

Form facing material may be removed 4 calendar days after placement, only if shores and other vertical supports have been arranged to permit removal of form facing material without loosening or disturbing shores and supports.

3.12 REUSE OF FORMS

Clean and repair surfaces of forms to be reused in work. Split, frayed, delaminated, or otherwise damaged form facing material will not be acceptable for exposed surfaces. Provide new form facing material. Apply new form coating compound as specified for new formwork prior to reuse of forms.

When forms are extended for successive concrete placement, thoroughly clean surfaces, remove fins and laitance, and tighten forms to close joints. Align and secure joint to avoid offsets. Do not use "patched" forms for exposed concrete surfaces, unless approved by the Engineer and acceptable to the Owner.

3.13 MISCELLANEOUS CONCRETE ITEMS

A. FILLING-IN

Fill-in holes and openings left in concrete structures for passage of work by other trades, unless otherwise shown or directed, after work of other trades is in place. Mix, place, and cure concrete as herein specified, to blend with in-place construction. Provide other miscellaneous concrete filling shown or required to complete work. Fill-in all form tie holes and other forming system holes with non-shrink grout.

B. CURBS

Provide monolithic finish to interior curbs by stripping forms while concrete is still green and steel-troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.

C. BASE PLATE, EQUIPMENT BASES AND FOUNDATIONS

Provide machine and equipment bases (housekeeping pad/pier) and foundations, as shown on the Plans. Set anchor bolts for machines and equipment with template at correct elevations, complying with certified diagrams or templates of manufacturers furnishing machines and equipment.

Provide 4-inch-high, square or rectangular concrete pad around all conduits and small diameter pipes that penetrate through floor slabs.

Provide leveling grout under base plates and equipment frames using non-metallic, non-shrink grout. Minimum thickness for leveling grout shall be 1/2 inches unless noted otherwise on the Plans or specified by equipment manufacturer.

3.14 CONCRETE SURFACE REPAIRS

A. PATCHING DEFECTIVE AREAS

Repair and patch defective areas immediately after removal of forms. Cut out honeycomb, rock pockets, voids or bugholes over 1/4 inch in any dimension, and holes left by tie rods and bolts, down to solid concrete but, in no case to a depth of less than 1 inch. Make edges of cuts perpendicular to the concrete surface. Thoroughly clean, dampen with water, and brush-coat the area to be patched with specified bonding agent. For water and wastewater containment structures, utilize an epoxy resin bonding agent. Place patching mortar after bonding compound has dried.

For exposed-to-view surfaces, blend white Portland cement and standard Portland cement so that, when dry, patching mortar will match surrounding color. Provide test areas at inconspicuous location to verify mixture and color match before proceeding with patching. Compact mortar in place and strike-off slightly higher than surrounding surface.

B. REPAIR OF FORMED SURFACES

Remove and replace concrete having defective surfaces if defects cannot be repaired to satisfaction of the Engineer. Surface defects, as such, include color and texture irregularities, cracks, spalls, air bubbles, bug holes, honeycomb, rock pockets; fins and other discolorations that cannot be removed by cleaning. Flush out form tie holes and form bolt holes, fill with non-shrink grout, or precast concrete cone plugs or rubber plugs secured in place with bonding agent or epoxy adhesive.

Repair concealed formed surfaces, where possible, that contain defects that affect the durability of concrete. All repairs shall be approved by the Engineer. If defects cannot be repaired, the Contractor shall remove and replace the concrete.

C. REPAIR OF UNFORMED SURFACES

Test unformed surfaces, such as monolithic slabs, for smoothness and verify surface plane to tolerances specified for each surface and finish. Correct low and high areas as herein specified. Test unformed surfaces sloped to drain for trueness of slope, in addition to smoothness using a template having required slope.

Repair finished unformed surfaces that contain defects, which affect durability of concrete. Surface defects, as such, include crazing, cracks in excess of 0.01 inches wide or which penetrate to reinforcement or completely through non-reinforced sections regardless of width, spalling, pop-outs, honeycomb, rock pockets, and other objectionable conditions.

Correct high areas in unformed surfaces by grinding, after concrete has cured at least 14 calendar days. Correct low areas in unformed surfaces during or immediately after completion of surface finishing operations by cutting out low areas and replacing with fresh concrete. Finish repaired areas to blend into adjacent concrete. Proprietary patching compounds may be used when acceptable to the Engineer.

Repair defective areas, except random cracks and single holes not exceeding 1-inch diameter, by cutting out and replacing with fresh concrete. Remove defective areas to sound concrete with clean, square cuts and expose reinforcing steel with at least 3 inches of clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding agent. Mix patching concrete of same materials to provide concrete of same type or class as original concrete. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.

Repair isolated random cracks and single holes not over 1 inch in diameter by dry-pack method. Groove top of cracks and cutout holes to sound concrete and clean off dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding agent. Mix dry-pack, consisting of one part Portland cement to

2-1/2 parts fine aggregate passing a No. 16 mesh sieve, using only enough water as required for handling and placing. Place dry pack after bonding agent has dried. Compact dry-pack mixture in place and finish to match adjacent concrete. Keep patched area continuously moist for not less than 72 hours.

Perform structural repairs with prior approval of the Engineer for method and procedure, using specified epoxy adhesive and mortar. Repair methods not specified above may be used, subject to approval of the Engineer. If acceptable repairs cannot be made, the Contractor shall remove and replace the concrete at no cost to the Owner.

3.15 QUALITY CONTROL TESTING DURING CONSTRUCTION

A. GENERAL

Sampling and testing for quality control during placement of concrete shall include the following:

1. Sampling Fresh Concrete

ASTM C172, except modified for slump to comply with ASTM C94.

2. Slump

ASTM C143: one test at point of discharge for each day's placement of each type of concrete; additional tests when concrete consistency seems to have changed.

3. Air Content

ASTM C173, volumetric method for lightweight or normal weight concrete; ASTM C231 pressure method for normal weight concrete; one for each day's placement of each type of air-entrained concrete.

4. Concrete Temperature

Test hourly when air temperature is 40 degrees F (4 degrees C) and below, and when 80 degrees F (27 degrees C) and above; and each time a set of compression test specimens is made.

5. Compression Test Specimen

ASTM C31; one set of four standard cylinders for each compressive strength test, unless otherwise directed. Mold and store cylinders for laboratory cured test specimens except when field-cure test specimens are required.

6. Compressive Strength Tests

ASTM C39; one set for each day's placement exceeding 5 cubic yards plus additional sets for each 50 cubic yards over and above the first 25 cubic yards of each concrete class placed in any 1 day; one specimen tested at 7 calendar days, two specimens tested at 28 calendar days, and one specimen retained in reserve for later testing if required.

When total quantity of a given class of concrete is less than 50 cubic yards, Engineer may waive strength test if, in their judgment, adequate evidence of satisfactory strength is provided.

When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, evaluate current operations and provide corrective procedures for protecting and curing the in-place concrete. Strength level of concrete will be considered satisfactory if averages of sets of three consecutive strength test results equal or exceed specified compressive strength, and no individual strength test result falls below specified compressive strength by more than 500 psi.

Test results will be reported via email to Owner and Contractor within 24 hours after testing. Reports of compressive strength tests shall contain the project identification name and number, date of concrete placement, name of concrete testing service, concrete type and class, location of concrete batch in structure, design compressive strength at 28 calendar days, concrete mix proportions and materials; compressive breaking strength and type of break for both 7-day tests and 28-day tests.

7. Nondestructive Testing

Impact hammer, sonoscope, or other nondestructive device may be permitted but shall not be used as the sole basis for acceptance or rejection of concrete.

8. Additional Tests

The testing service will make additional tests of in-place concrete when test results indicate specified concrete strengths and other characteristics have not been attained in a structure, as directed by the Owner. Testing service may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C42, or by other methods as directed. Contractor shall pay for cost of such tests when unacceptable concrete is verified.

***** END OF SECTION *****

Division 5

Metals

SECTION 05 52 00

GUARDRAIL SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Aluminum guardrails to provide fall protection for building roofs, vault openings, and as shown on the Plans.

1.02 REFERENCES

- A. AA – Aluminum Association.
- B. ASTM B 209 – Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
- C. ASTM B 221 – Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
- D. Occupational Safety and Health Administration (OSHA) 29 CFR 1910.29 – Subpart D, Walking-Working Surfaces; Fall Protection Systems and Falling Object Protection.
- E. ASCE 7.

1.03 SUBMITTALS

- A. PRODUCT DATA

Manufacturer's data sheets on each product.

- B. SHOP DRAWINGS

- 1. Detail fabrication and erection. Include plans, elevations, sections, and details of metal fabrications and their connections.
- 2. Provide anchor and bolt design required for installation.
- 3. Provide reaction loads for each hanger and bracket.
- 4. Design shall be stamped by a structural engineer licensed in the State of Washington.

1.04 QUALITY ASSURANCE

- A. Product Qualification: Product design shall comply with WAC 296-880-40005 and OSHA 1910.29 Guardrails.

1.05 PROJECT CONDITIONS

- A. Field Measurements: Verify dimensions by field measurement before fabrication and indicate established dimensions on shop drawing submittal.
- B. Work is at an active wastewater treatment plant. Contractor shall be aware of building and space classification associated with a wastewater treatment plant and shall ensure compliance with classified space requirements, when applicable.
- C. Contractor shall coordinate the work as to not obstruct the continued operation of the treatment plant.

1.06 WARRANTY

- A. Contractor shall warrant installation work for a period of no less than 1 year following substantial completion.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Acceptable Manufacturers:
 - 1. Golden Railings, Inc., Broomfield CO (303) 279-5807. No like, equivalent, or "or equal" item or no substitution is permitted.

2.02 EQUIPMENT TYPE

- A. All guardrail railings and removable railings: 4-Rail System with Toe Board, 1-1/2" Sch. 40 6061-T6 Rail and Posts with Arch. Class 1 Clear Satin Anodized Finish, .7 Mil (AA-M10/M12-C22-A41).
- B. Guardrail swinging gate as shown on the Plans shall be by guardrail railings manufacturer.

2.03 MATERIALS

- A. Aluminum Extrusions: Alloy 6063-T6 to comply with ASTM B221.

2.04 FABRICATION

- A. Guardrails shall meet OSHA and local jurisdiction requirements. Design shall be stamped by structural engineer licensed in the State of Washington and submitted to Owner for review and approval.
- B. Roof edge railings: GRI Standard 2-Rail System without Toe Board, 1-1/2" Sch. 40 6061-T6 Rail and Posts with Arch. Class 1 Clear Satin Anodized Finish, 0.7 Mil (AA-M10/M12-C22-A41) utilizing Part Extended wall anchor, installed per details in the Plans.
- C. Interior walkway railings, removable railings, and exterior railings: 4-Rail System with Toe Board, 1 1/2" Sch. 40 6061-T6 Rail and Posts with Arch. Class 1 Clear Satin Anodized Finish, .7 Mil (AA-M10/M12-C22-A41). Installed per details in the Plans.

2.05 ANCHORING

- A. Anchors shall be designed by a professional engineer licensed in the state of Washington. Anchors shall be stainless steel. Contractor shall submit engineering design per owner submittal process.

2.06 FASTENERS AND ACCESSORIES

- A. Roof edge railings: GRI Standard 2-Rail System without Toe Board, 1-1/2" Sch. 40.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Contractor shall verify actual dimensions prior to starting the work.
- B. Contractor shall verify location of all rebar and other concrete reinforcements prior to construction using GPR or other nondestructive method approved by owner and attachment points shall be located to avoid all existing reinforcement.

3.02 INSTALLATION

- A. Contractor shall remove and properly dispose of existing guardrails. Cut off anchor bolts flush with concrete. Grind existing anchor bolts 1/2" below surface and patch with owner approved grout.
- B. Install in accordance with manufacturer's instructions and per approved design. Guardrails shall be level and true.
- C. Contractor shall be responsible to provide all required fall protection measures necessary to complete the work.

- D. Contractor shall protect adjacent surfaces from damage and/or falling tools, equipment, or other material.
- E. At all conditions where aluminum will be installed against face of concrete, install 1/16" thick butyl rubber sheet with adhesive backing as needed to maintain separation between aluminum and concrete.

***** END OF SECTION *****

Division 6

Wood, Plastics and Composites Manufacturers

SECTION 06 70 00

PRE-ENGINEERED FIBERGLASS BUILDING

PART 1 GENERAL

1.1 SCOPE

The work specified in this Section includes furnishing and installing a prefabricated fiberglass building as shown on the Plans and as specified herein.

1.2 EQUIPMENT LIST

Equipment numbers are as follows:

<u>Item</u>	<u>Equipment Number</u>
Supplemental Carbon Pump Building	BLDG18-401

1.3 DELIVERY, STORAGE, AND HANDLING

All equipment shall be completely factory assembled (where possible), crated, and delivered to protect against damage during shipment. Finished iron or steel surfaces not painted shall be properly protected to prevent rust and corrosion.

All equipment delivered to the site shall be stored as specified in accordance with the manufacturer's instructions.

1.4 SUBMITTALS

Submit under provisions of Section 01 33 00.

Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories. Include erection drawings, elevations, and details where applicable.

1.5 WARRANTY

The building shall be provided with a minimum ten (10) year manufacturer's warranty against defects in material and workmanship.

PART 2 PRODUCTS

2.1 APPROVED MANUFACTURERS

The pre-fabricated fiberglass building shall be manufactured by Tracom, Model OPB-72-48-90-01 with the "Chem Package" or approved equal. The building is available through Correct Equipment 425-869-1233.

2.2 BUILDING REQUIREMENTS

The prefabricated fiberglass building shall have meet the following requirements:

Parameter	Performance Requirements
Building	Material: one-piece, fiberglass Dimensions: 6'-0" W x 4'-0" D x 7'-6" H Mounting Flange: internal w/ neoprene rubber gasket Color: gel coat color Gray, polyester w/UV inhibitors Insulation: foam core, polyisocyanurate, 1" thick (R~7) Lifting Eyes: galvanized steel, removable
Door	Dimensions: 36" W x 78" H Hinges: strap hinges Door Handle: 304 SS lever, key-locked Door Stop: SS, overhead, compression spring Door Sweep: SS door sweep Door Seal: neoprene Seal
Power	Wire: pre-wired 12 gauge THHN in Sch. 40 PVC conduit Load center: 125 A, NEMA1 Metallic, 16 circuit, 1P, circuit breaker panel (Siemens E0816ML1125S) 40A main circuit breaker Washdown Enclosure: fiberglass NEMA 4X Circuit Breakers: 15A/20A, 1P, two 30 mA GFCI 20A, 1P Switch: NEMA 3R cover, single toggle (fan and light) Outlets: two (2) 30 mA GFCI duplex receptacles for chemical pumps
Lighting	Light Fixture: Jelly Jar, NEMA 4X, A21, 150W max, tempered glass, FRP housing
HVAC	Fan: 10", corrosion resistant, shutter mounted, 650 CFM Heater: 1,500 watt, 304 S.S., surface mount, 95 CFM, single pole thermostat Shutter: 10" x 10", fiberglass, gravity shutter with removable insect screen Hood: fiberglass, 14" W x 7" D x 14" H
Shelf	2' x 6' FRP equipment shelf, with support arm underneath
Mounting	Mounting Panel: marine grade plywood, 60" L x 42" H x 3/4" T

Modular buildings constructed in factories and at other offsite locations, which are then shipped to Washington State must be approved by L&I.

2.3 FOUNDATION DESIGN AND ANCHORAGE

Structural calculations shall be provided for the pre-engineered fiberglass building. The calculations shall be stamped by a professional engineer registered in the State of Washington. The calculations shall show the anchorage and demonstrate suitability for all applicable wind and seismic standards as outlined below.

Anchors shall comply with Section 43 20 00. Supports and anchorage shall comply with the requirements of the 2021 International Building Code (IBC) and ASCE 7-16 Minimum Design Loads for Buildings and Other Structures, Chapter 13 Seismic Design for Nonstructural Components, as referenced and amended by the IBC. For the following design parameters:

1. Wind Design Data
 - a. Ultimate wind speed: 103
2. Seismic Design Data
 - Site Class D
 - Seismic Importance Factor: $I_p = 1.25$
 - Design response acceleration coefficients:
 $S_{DS} = 1.130g$
 $S_{D1} = 0.628g$

PART 3 EXECUTION

3.1 INSTALLATION

Contractor shall install building in strict accordance with manufacturer's instructions.

All cut or machined edges, holes and notches shall be sealed with resin products to provide maximum corrosion resistance. Seal cut any drilled, scratched, or other abrasion surfaces in accordance with manufacturer's instructions. Follow manufacturer's instructions when cutting or drilling fiberglass products or using resin products; provide adequate ventilation.

The manufacturer shall include the services of a factory-trained field engineer for the purposes of installation inspection, making field adjustments necessary to ensure proper system operation, equipment start-up, performance testing, and training of plant personnel regarding proper operation and maintenance of the equipment. Manufacturer's services shall include one (8 hour) day at the site and shall be included in the bid price. This trip shall include inspection, certification, testing, startup, and training.

***** END OF SECTION *****

Division 9

Painting

SECTION 09 90 00

PAINTING

PART 1 GENERAL

1.1 SCOPE

The work specified in this Section covers the furnishing and installation of protective coatings on pipe and other metal items, complete-in-place. Special shop coatings and/or factory-applied finishes on manufactured or fabricated items may be specified elsewhere. Regardless of the number of paint coats previously applied, at least two field coats of paint shall be applied to all surfaces unless otherwise specified herein. Field painting is not required for factory prefinished equipment items such as pumps, blowers, motors, valves, etc. Touchup of the factory applied coatings may be required.

The word "paint" as used herein shall be taken to include all protective coatings and incidental materials as required with the exception that anodized aluminum or zinc galvanized coatings shall not be considered as paint.

Unless specifically noted otherwise in these Specifications or on the Plans, all work performed under this Contract (both new work and modifications to existing facilities) shall be painted. If an existing wall or ceiling (or similar surface) is modified in someway, the entire wall or ceiling surface is to be painted.

1.2 REFERENCED STANDARDS

The following standards are referenced and shall be considered a part of these Specifications:

American National Standards Institute (ANSI):

- A159.1, Surface Preparation Specifications;
- Z53.1, Safety Color Code for Marking Physical Hazards

American Society for Testing and Materials (ASTM):

- D4263, Standard Test Method for Indicating Moisture in Concrete by the Plastic Sheet Method
- E84, Standard Test Method for Surface Burning Characteristics of Building Materials

National Fire Protection Association (NFPA):

- 101, Life Safety Code

Steel Structures Painting Council (SSPC):

- SP-1, Solvent Cleaning
- SP-2, Hand Tool Cleaning
- SP-3, Power Tool Cleaning
- SP-5, White Metal Blast Clearing
- SP-6, Commercial Blast Cleaning
- SP-7, Brush-off Blast Cleaning

SP-10, Near-White Blast Cleaning
SP-11, Power Tool Cleaning
SP-13 Surface Preparation for Concrete Surfaces
VIS-89, Visual Standard

1.3 DEFINITIONS

A. PAINT

Includes fillers, primers, sealers, emulsions, oils, alkyds, latex, enamels, thinners, stains, epoxies, vinyls, urethanes, shellacs, varnishes and any other applied coating specified within these Specifications or shown on the Plans.

B. PAINTING COVERAGE RATE

Coverage's expressed in SF/GAL/coat are the manufacturer's published theoretical coverage's in square feet per gallon per coat.

1.4 SUBMITTALS

In addition to the general submittal requirements listed in Section 01 33 00, the following shall be submitted:

1. Written acknowledgment and certification that products submitted meet requirements of standards referenced in this Section.
2. Manufacturer's application instructions for primer and finish coats.
3. Manufacturer's surface preparation instructions.
4. Manufacturer's full line of color samples for color selection by Owner.
5. If products being used are manufactured by a company other than the specified reference standard, the Contractor must provide a complete comparison of the proposed products with the specified reference products per Part 2.1 REQUIREMENTS, including application procedure, coverage rates, and verification that product is designed for intended use. Information must be provided that demonstrates that manufacturer's products are equal to the performance standards of products manufactured by the Tnemec Company, which is the reference standard.
6. Manufacturer's approval of protective coating systems applicator.
7. List of Applicator's experience and qualifications. A minimum of 5-years of experience in the painting of wastewater treatment plant facilities required.

PART 2 PRODUCTS

2.1 APPROVED MANUFACTURERS

The following is an approved coating systems manufacturers list subject to compliance with the Specifications contained herein:

1. Ameron Protective Coatings Division.
2. Sherwin Williams.
3. Tnemec Company.
4. Or equal.

The specified coating shall be understood as establishing the type and quality of coating desired. Other manufacturers' products will be accepted provided sufficient information is submitted to allow the Engineer to determine that the coatings proposed are equivalent to those named. Proposed coatings shall be submitted for review in accordance with these Specifications. Requests for review of equivalency will not be accepted from anyone except the Contractor, and such requests shall not be considered until after the Contract has been awarded.

No substitutions shall be allowed that change the number of coats, thickness or generic type of paint required. All materials shall be brought to the jobsite in the original sealed and labeled containers of the paint manufacturer and shall be subject to inspection by the Engineer.

No coating materials other than those specified shall be brought to the jobsite. Thinners, driers and oils brought to the jobsite shall be only those recommended and approved by the paint manufacturer.

All paint shall conform to the applicable air quality regulations at the point of application. Any paint material which cannot be guaranteed by the manufacturer to comply, whether specified by product designation or not, shall not be used.

It shall be the responsibility of the Contractor to ensure the compatibility of the field painting products which will be in contact with each other or which will be applied over shop painted or previously painted surfaces. Paint used in successive field coats shall be produced by the same manufacturer. 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.

All paint used for intermediate and finish coats shall be guaranteed by the paint manufacturer to be fumeproof and suitable for wastewater plant atmospheres containing hydrogen sulfide. Any paint that cannot be so guaranteed shall not be used. Paint shall be lead-free and mercury-free if available, but in no case shall the lead or mercury content cause discoloration in a wastewater plant atmosphere.

Tnemec Company products are the reference standard and Tnemec designations for product type are used herein. Requirements for an approved equal product are listed below:

1. For approval of an equal manufacturer. The Contractor shall provide to the Owner in writing a detailed side-by-side comparison of the proposed equal Products Characteristics, Performance Characteristics, and Application Conditions for each Tnemec coating specified in this specification. For consideration for approval this written comparison shall be certified and notarized by an officer of the proposed manufacturer as true and correct.
2. For Products Characteristics this detailed side-by-side comparison shall include for example, but not limited to, Volume Solids, Weight Solids, VOC, Mix Ratio, Zinc Content in Dry Film (by Weight), Spreading Rate per coat, Drying Schedule, Shelf Life and Flash Point.
3. For Performance Characteristics this detailed side-by-side comparison shall include for example, but not limited to, Abrasion Resistance, Corrosion Weathering, Direct Impact Resistance, Dry Heat Resistance, Flexibility, Moisture Condensation Resistance, Pencil Hardness, Salt Fog Resistance, Slip Coefficient and Wet Heat Resistance
4. In addition to the detailed side-by-side comparison for approval of an equal manufacturer, The Contractor shall provide to the Owner in writing five similar installations that have had the proposed or equal coating system and date coating system was put into service. In addition the installations names, locations, and owner's name with contact person and telephone number shall be provided.
5. For consideration for approval as an equal coating system the detailed side-by-side comparison shall be submit, with successful bidder's Shop Drawing at the time of the Preconstruction Conference, along with any proposed monetary adjustments to the contract price. As with all shop drawings, final approval rests with the Owner.
6. As a minimum standard any equal coating system shall have a 5-year service history on its coating system.

2.2 PAINT SYSTEMS

A. NON-SUBMERGED METAL - MILD CONDITIONS

1. Scope

This Section shall apply to all metal which is not submerged but is located indoors which is not subject to splashing from sewage, water, sludge, oil and grease or other corrosive materials unless specified otherwise.

2. Surface Preparation

Commercial blast cleaning, SSPC-SP-6.

3. Coatings

Shop Primer System:

Coat One

Product: Omnithane Series 1

MDFT: 2.5 to 3.5 mils

Field Finish System:

Coat One

Product: Hi-Build Epoxoline Tnemec Series N69

MDFT: 4 to 6 mils

Coat Two

Product: Hi-Build Epoxoline Tnemec Series N69

MDFT: 4 to 6 mils

Total MDFT: 11.0 mils

B. NON-SUBMERGED METAL - SEVERE CONDITIONS

1. Scope

This Section shall apply to all metal which is not submerged but is located outdoors or is subject to splashing from sewage, water, sludge, oil and grease or other corrosive materials unless specified otherwise.

2. Surface Preparation

Near-white blast cleaning, SSPC-SP-10.

3. Coatings

Shop Primer System:

Coat One

Product: Omnithane Series 1

MDFT: 2.5 to 3.5 mils

Field Finish System:

Coat One

Product: Hi-Build Epoxoline Tnemec Series N69

MDFT: 4 to 6 mils

Coat Two

Product: Endura-Shield III Tnemec Series 73

MDFT: 3 to 5 mils

Total MDFT: 10.0 mils

C. GALVANIZED SURFACE TOUCHUP

1. Scope

This Section shall apply to all galvanized surfaces, which have received minor damage to the galvanized surface during construction.

2. Surface Preparation

Power tool cleaning, SSPC-SP-3.

3. Coatings

Paint System:

Product: Tnemec-Zinc Tnemec Series 90-97

MDFT: 3 to 5 mils

Total MDFT: 3.5 mils

2.3 COLORS

A. GENERAL

All finishes shall be glossy unless otherwise specified. Factory coatings which are damaged during shipment or installation, as determined by the Owner, shall be recoated in the field in accordance with these Specifications. Color samples shall be submitted to the Owner for approval prior to application of any field coatings.

B. PIPING COLOR SCHEDULE IDENTIFICATION TAGS

Piping Identification: Exposed piping and piping in accessible chases shall be painted and identified with lettering or tags designating the service of each piping system, shall have flow directional arrows, and shall be color coded as described in the LOTT System Identification Color Standard in Section 01 78 23.01.

Piping scheduled to be color coded shall be completely painted with the indicated colors, except surfaces specified to be unpainted shall have segments painted with the specified coding color long enough to accommodate the required lettering and arrows. All other piping specified to be painted shall match adjacent surfaces, unless otherwise approved by the Owner.

Electrical conduit shall be painted to match adjacent ceiling or wall surfaces as approved by the Owner. Vent lines shall be painted to match surfaces they adjoin, otherwise gray.

PART 3 EXECUTION

3.1 GENERAL

It is the intent of these Specifications that materials and workmanship be provided such that the highest quality job is obtained. The completed work, prior to acceptance, must be free from runs, skips, mars and any other disfiguring mark due to faulty workmanship or care of the completed work.

It is the responsibility of the Contractor to ensure that all surfaces are prepared in accordance with the written recommendations and directions of the paint manufacturer whose paint is applied.

Approval of conditions shall be obtained from the Owner prior to applying any or all coats of paint; however, such approval shall not relieve the Contractor of his responsibility of conformance with these Specifications and conformance with the manufacturer's recommendations.

It shall be the responsibility of the Contractor to prevent settling of dust or the occurrence of other conditions detrimental to the finished quality of the job and to repair any damaged paint at no additional cost to the Owner.

Materials or equipment delivered with prime coats shall be touched up as required prior to the application of additional coating(s).

The Contractor shall apply each coating at the rate and in the manner specified by the paint manufacturer. If material has thickened or must be diluted for application by spray gun, the coating shall be built-up to the same thickness achieved with undiluted material. Deficiencies in film thickness shall be corrected by the application of an additional coat(s) of paint. Film thickness shall be determined when dry by the Owner with a magnetic dry film thickness gauge. The thickness gauge shall be calibrated with test shims.

Where thinning is necessary, only the products of the manufacturer furnishing the paint and for the particular purpose shall be allowed. All thinning shall be done strictly in accordance with the manufacturer's instructions as well as with the full knowledge and approval of the Owner.

No paint shall be applied when the surrounding air temperature, as measured in the shade, is below 40 degrees F. No paint shall be applied when the temperature of the surface to be painted is below 35 degrees F. Paint shall not be applied to wet or damp surfaces and shall not be applied in rain, snow, fog or mist or when the relative humidity exceeds 85 percent. No paint shall be applied when it is expected that the relative humidity will exceed 85 percent or that the air temperature will drop below 40 degrees F within 18 hours after the application of the paint. Dew or moisture condensation should be anticipated and if such conditions are prevalent, painting shall be delayed until conditions improve to be certain that the surfaces are dry prior to application of paint. No paint shall be applied when the ambient temperature is less than 5 percent F. above the dewpoint. Further, the day's painting shall be completed well within advance of the

probable time of day when condensation will occur, in order to permit the paint film an appreciable drying time prior to the formation of moisture.

Manufacturer's recommended drying time shall be construed to mean "under normal conditions." Where conditions are other than normal because of the weather or because painting must be done in confined spaces, longer drying times shall be necessary. The manufacturer's recommendations for recoating time intervals shall be strictly adhered to.

Adequate ventilation, which will effectively remove solvents, shall be provided for proper drying of paints on interior surfaces. A minimum of 7-consecutive calendar days at 70 degrees F following the application of the final coat on submerged surfaces shall be required before submergence. Longer periods shall be allowed prior to submergence if recommended by the paint manufacturer or if weather conditions require a longer curing time.

3.2 MIXING AND THINNING

Paint shall be thoroughly mixed each time any is withdrawn from the container. Paint containers shall be kept tightly closed except while paint is being withdrawn.

Paint shall be factory mixed to proper consistency and viscosity for hot weather application without thinning. Thinning will be permitted only as necessary to obtain recommended coverage at lower application temperatures. Only thinners approved by the paint manufacturer shall be used. In no case shall the wet film thickness of applied paint be reduced, by addition of paint thinner or otherwise, below the thickness recommended by the paint manufacturer.

3.3 SURFACE PREPARATION

A. GENERAL

Surfaces shall be dry and thoroughly cleaned of foreign materials with all defects filled or removed. All trades employed shall leave the surfaces of their work in such a condition that only minor cleaning, sanding and filling is required of the painting trade for surface preparation.

Hardware, switchplates, machined surfaces, nameplates, lighting fixtures and all other surfaces not to be painted shall be removed or otherwise protected. Drop cloths shall be provided, where necessary, to avoid spotting of surfaces adjacent to the item being painted. Working parts of electrical equipment shall be protected from damage during surface preparation and painting operations.

Ferrous metal cleaning shall be in accordance with Steel Structures Painting Council Specifications (SSPC).

<u>Description</u>	<u>SSPC</u>
White Metal Blast Cleaning	SP-5
Commercial Blast Cleaning	SP-6
Brush-Off Blast Cleaning	SP-7
Near-White Blast Cleaning	SP-10
Preparation of Concrete	SP-13

The words "blast cleaning" or equivalent phrases of equal intent shall be taken to refer to the applicable SSPC specification when used in the paint manufacturer's recommendations or these Specifications.

Hand tool cleaning shall be used when power tool cleaning is not possible. Hand and power tool cleaning shall be in accordance with SSPC Specifications SP-2, SP-3 or SP-11, respectively.

The blast cleaning profile depth shall be not less than 1 mil or greater than 2 mils. In the case of equipment to which the manufacturer applies a primer coating in the shop after fabrication, the blast profile depth needs to be as noted above.

B. FERROUS METAL, GALVANIZED METAL AND HOLLOW METAL SURFACES

The Contractor shall assure that fabrication, welding or burning is completed prior to the sandblasting operation. The Contractor shall chip or grind off flux, splatter, slag or other laminations left from welding. The Contractor shall remove all mill scale. The Contractor shall grind smooth rough welds and other sharp projections.

The Contractor shall near-white blast clean, in accordance with SSPC SP-10, submerged surfaces and surfaces to 12 inches above highest liquid level, and areas subject to splash or spillage.

The Contractor shall commercial blast clean, in accordance with SSPC SP-6, all interior and exterior structural steel surfaces, surfaces located 12 inches above submerged areas, and surfaces located in areas not subject to splash or spillage where exposed to open bodies of liquids.

The Owner reserves the right to accept preparation of these surfaces in accordance with SSPC SP-3 for areas not practical or possible to sandblast to SSPC SP-6 requirements.

The Contractor shall near-white blast clean, in accordance with SSPC SP-10 surfaces, subject to heat in excess of 600 degrees F. The Contractor shall power tool or hand clean in accordance with SSPC SP-2 or SSPC SP-3. The Contractor shall apply prime coat on cleaned surfaces within 2 hours of cleaning. The Contractor shall solvent clean galvanized surfaces in accordance with SSPC SP-1.

3.4 APPLICATION

A. GENERAL

The Contractor shall mix and apply coatings by brush, roller or spray in accordance with the manufacturer's installation instructions. Spraying equipment shall be inspected and approved in writing by the coating manufacturer. The Contractor shall provide complete coverage's to the mil thickness specified. The thickness specified shall be dry film mil thickness. All paint systems are "to cover." In situations of discrepancy between the manufacturer's square footage coverage rates and mil thickness, mil thickness requirements govern. When color or undercoats show through, the Contractor shall apply additional coats until paint film is of uniform finish and color. The Contractor shall not apply consecutive coats until the Engineer has had an opportunity to observe and approve previous coats.

The Contractor shall apply materials under adequate illumination, shall evenly spread and flow on to provide full, smooth coverage, shall work each application of material into corners, crevices, joints and other difficult to work areas, shall avoid degradation and contamination of blasted surfaces and avoid intercoat contamination, shall clean contaminated surfaces before applying next coat and shall immediately smooth out runs or sags, or remove and recoat entire surfaces. The Contractor shall assure that preceding coats are dry before recoating, shall recoat within the time limits specified by the coating manufacturer and shall allow coated surfaces to cure prior to allowing traffic or other work to proceed.

During application of either prime or finish coats, brush coat all weld seams, edges, angles, fasteners and other irregular surfaces to insure a monolithic film, pinhole free surface. Finish coats of paint shall be uniform in color and sheen without streaks, laps, runs, drips, sags or missed areas.

All submerged or intermittently submerged materials shall have surface preparation and coatings applied prior to installation unless otherwise approved by the Engineer. All pipe, pipe supports, and pipe hangers that will be painted shall have surface preparation and coatings applied prior to installation.

B. PRIME COAT INSTALLATION

The Contractor shall prime all surfaces indicated to be painted, shall touch-up damaged primer coats prior to finish coats and shall assure field-applied coatings are compatible with factory-applied coatings. If coatings are not compatible, and if approved in writing by the Owner, the Contractor shall apply a 2-mil-thick universal barrier coat recommended by the paint manufacturer prior to applying field coats or completely remove factory coatings and reprime.

The Contractor shall prime ferrous metals bedded in concrete to a minimum of 1 inch below exposed surfaces. The Contractor shall brush or spray bolts, welds, edges and difficult access areas with primer prior to primer application over the entire surface being coated.

C. FINISH SCHEDULE

The items to be painted under this Contract shall include:

1. All steel piping.
2. All PVC or CPVC piping exposed to sunlight.
3. Exposed ferrous metals.

The Contractor shall not paint the following elements unless specifically noted on the Plans to be painted:

1. Stainless steel surfaces except as required to identify piping.
2. Galvanized metal surfaces.
3. Interior of pipe, ductwork, and conduits.
4. Moving parts of mechanical and electrical units.
5. Code labels and equipment identification and rating plates.
6. The following piping shall not be painted: Stainless Steel, Galvanized Steel, Copper, Interior PVC, HDPE, and Conduit.

3.5 FIELD QUALITY CONTROL

The Contractor shall be responsible for performing, testing and assuring conformance with all requirements of these Specifications.

The Contractor shall maintain daily records showing:

- Start date of work in each area.
- Date of application for each following coat.
- Moisture content and surface temperature of substrate. Also record weather conditions, ambient air temperature and dew point.
- Provisions utilized to maintain temperature and humidity of work area within paint manufacturer's recommended ranges.

The Contractor shall measure the surface temperature of items to be painted with surface temperature gauges specifically designed for such use. The Contractor shall measure substrate humidity with humidity gauges specifically designed for such use. The Contractor shall measure wet paint with wet film thickness gauges. The Contractor shall measure paint dry film thickness with a Mikrotest gauge calibrated against the National Bureau of Standards "Certified Coating Thickness Calibration Standards." The

Owner may direct measurement of paint thickness at any time during the project to ensure conformance with these Specifications. A sufficient number of dry film thickness measurements shall be made so that there is approximately one measurement for each 100 square feet of surface area painted.

Where a wall or ceiling or other type of surface is disturbed and patched, the Contractor shall repaint entire wall or ceiling. The Contractor shall provide wet paint signs as necessary. The Contractor shall touch up damaged finish coats using the same material as specified for the finish coat.

At the conclusion of all painting activities, Contractor shall submit a painting field test report to the Owner showing the above information plus results of wet film and dry film thickness tests. Provide four copies of final test report.

3.6 PAINTING SITE

Either shop painting or field painting and surface preparation shall be acceptable when painting work is performed in conformance with this Section, unless the painting is activity specified elsewhere in these Specifications.

3.7 PAINT THICKNESS

All paint thicknesses specified herein are minimum dry film thickness (MDFT). The thickness of paint over metallic surfaces shall be measured with a magnetic thickness gauge; paint thickness over wood or masonry shall vary in accordance with surface texture, but in no case shall the manufacturer's recommended coverage rate be exceeded. The minimum thicknesses given are total coating thickness for the coating specified, including multiple coats of the same material, where applicable.

3.8 FINISH SCHEDULE AS-BUILT

- A. Submit Finish Schedule As-built in accordance with Section 01 33 00 (Submittals).
- B. At the completion of the project, the Contractor shall prepare and submit Finish Schedule As-built documenting all paints, coatings, and finishes applied. The schedule shall include product names, manufacturers, color codes, and application locations, clearly correlating to the project's drawings and specifications. The table must be accurate, complete, and submitted for review and approval prior to final acceptance of the work. The Finish Schedule As-built form is included at the end of this specification section.
- C. The Finish Schedule As-built is intended to be used as a resource to ensure that the final paintings and coatings used on project are documented for asset management use.

***** END OF SECTION *****

As-Built Finish Schedule

Reference Specification Section 01 33 00, 09 00 00

At the completion of the project, the Contractor shall prepare and submit an As-Built Finish Schedule table documenting all paints, coatings, and finishes applied. The schedule shall include product names, manufacturers, color codes, and application locations, clearly correlating to the project's drawings and specifications. The table must be accurate, complete, and submitted for review and approval prior to final acceptance of the work.

ITEM	Product Name	Manufacturer	Color Code	Location
Piping				
Galvanized Touch-Up				

Division 22

Plumbing

SECTION 22 45 16

EMERGENCY DRENCH SHOWER SYSTEM

PART 1 GENERAL

1.1 SCOPE

The work specified in this Section includes furnishing and installing new emergency shower and eye wash fixture along with an instantaneous water heater as shown on the Plans and as specified herein.

1.2 EQUIPMENT LIST

Equipment numbers are as follows:

<u>Item</u>	<u>Equipment Number</u>
Emergency Shower and Eye Wash	EWS18-001
Instantaneous Water Heater	HTR08-001

1.3 SUBMITTALS

Submit under provision of Section 01 33 00.

1.4 WARRANTY

Instantaneous water heater shall be provided with a minimum two (2) year manufacturer's warranty on electrical components and a minimum six (6) year manufacturer's warranty on the heat exchanger.

PART 2 PRODUCTS

2.1 APPROVED MANUFACTURERS

The emergency shower and eye wash unit shall be the HAWS Company Model 8315CTFP, or equal. The instantaneous water heater shall be the Stiebel Eltron Model CES Plus, 60 kW, or equal.

2.2 EMERGENCY SHOWER/EYE WASH UNIT

The emergency drench shower and eye wash unit shall be a floor mounted, electrically heat-traced emergency eyewash and shower safety, ABS plastic shower head with integral self-regulating 20 gpm flow control, and 3-way valve. Unit shall include eye/face wash head supplied by an integral 4 gpm flow control. Unit shall also include thermostatically controlled 120 VAC electric heat traced cable protected by 1" insulation and an ABS plastic green jacket that prevents freezing down to ambient temperatures of -30° F, powder-coated cast-iron 9" diameter floor flange, ANSI compliant universal sign, and 1-1/4" NPT supply.

Unit shall be provided with 120 VAC emergency alarm and light system with 1-1/4" NPT supply connection that activates at 3 GPM. Alarm shall be operated by a double pole, double throw flow switch, which contains multiple sets of contacts for remote activation, and activates an amber flashing light and buzzer at 90 db, audible at 10 feet. Provide integral silencing switch.

Unit shall be provided with optional freeze-protection valve kit, and complete foot control assembly, including chain, clamp, nut, ring, screw, spring, and treadle.

Unit shall be 100% assembled and tested to meet or exceed ANSI Z358.1-2014.

2.3 INSTANTANEOUS WATER HEATER

Instantaneous water heaters shall be wall mounted, electric, commercial, on demand water heaters. Enclosure shall be NEMA 3 powder-coated steel. Electric heating element shall be heavy duty, low watt density Incoloy 840 sheathed electric resistance element. Heat exchanger shall be 316L stainless steel. Temperature control shall be by internal microprocessor with PID logic and dual display of setpoint and actual water outlet temperatures. Safety controls shall include four over-temperature protection circuits utilizing dry-mounted, manually resettable temperature cut-offs. Integral isolation valves, pressure relief valve, and air purge valves shall be included. Connections shall be 1" inlet and outlet. Design flow, temperature rise, and electrical requirements are per the Water Heater Schedule.

PART 3 EXECUTION

3.1 INSTALLATION

The equipment shall be installed as shown on the Plans and in strict accordance with pump manufacturer's recommendations. All equipment delivered to the site shall be stored as specified in accordance with the manufacturer's instructions.

The manufacturer shall include the services of a factory-trained field engineer for the purposes of installation inspection, making field adjustments necessary to ensure proper system operation, equipment start-up, performance testing, and training of plant personnel regarding proper operation and maintenance of the equipment. Manufacturer's services shall include one (8 hour) day at the site and shall be included in the bid price. This trip shall include inspection, certification, testing, startup, and training.

***** END OF SECTION *****

Division 26

Electrical

SECTION 26 00 00

BASIC ELECTRICAL MATERIALS AND METHODS

PART 1 GENERAL

1.01 SCOPE

The work specified in this Section includes the requirements and methods for furnishing and installing the basic electrical materials, and other associated items as shown on the Plans, and as further specified herein.

1.02 DEFINITIONS

A. ADJUSTABLE SPEED DRIVE CONTROLLERS

Adjustable speed drives are variable frequency AC drives used to power AC squirrel-cage induction motors at variable frequencies, which relate directly to variable speed. These drives are also commonly known as Variable Frequency Drives (VFDs).

Basic design typically consists of AC to DC conversion followed by AC output wave simulation using pulse-width modulation (PWM). This simulated output power signal will appear to the motor as a representation of an adjustable frequency sine wave. This output may be electrically noisy.

B. ANALOG I/O

Analog I/O are PLC input/output electronic signals that are contiguous over time. Analog signals represent a large number of values within a specific range.

C. ATTICS

Attics shall be considered those closed environments between ceilings and roofing that allow full entry of personnel by use of ladders, pull-down stairs, or other special means.

ATTICS are considered dry crawl spaces (see CRAWL SPACES).

Tight spaces between ceilings and roofs that do not allow full entry of personnel are considered concealed areas (see CONCEALED AREAS).

D. CHEMICAL AREAS

Locations where process chemicals are stored or used within a process in either a confined or open manner. Chemical areas may be exposed to chemical solids, liquids, or gases as a result of normal operation, system maintenance, or spills/leaks.

E. CONCEALED AREAS

Locations that are underground, within walls, or within other areas that do not allow full entry of personnel are considered concealed. Concealed areas are not exposed (see EXPOSED AREAS) or accessible (see ATTICS and CRAWL SPACES).

F. CONTROL PANELS

Control Panels shall be defined as enclosures that contain electrical devices capable of controlling, altering, indicating or displaying the function or conditions of electrical circuits. Unlike junction boxes, Control Panels are not just used for the redirection or reconnection of electrical circuits.

G. CONVENIENCE RECEPTACLES

120 Vac general-purpose receptacles that are not dedicated to a specific function or piece of equipment. Receptacles dedicated to computers, heat tracing, fans, louvers, and etc., are not considered convenience receptacles.

H. CRAWL SPACES

Crawl spaces shall be considered those closed environments that are not normally accessible to personnel, but that allow full entry of personnel by special means.

Crawl spaces are considered exposed areas and may be dry or wet (see ATTICS).

I. DAMP AREAS

Damp areas are considered wet (see WET AREAS).

J. DEDICATED RECEPTACLES

Dedicated receptacles are provided for a specific receptacle load such as computers, heat tracing, fans, louvers, metering pumps, sump pumps, and etc. Dedicated receptacles are not intended for general use.

K. DIGITAL I/O

A digital I/O point consists of a single input or output binary bit at one of two possible states, which may be represented as 1's or 0's, ON or OFF, YES or NO, TRUE or FALSE, etc. Digital I/O may also be called "discrete" I/O. Within these specifications, both terms are synonymous.

L. DCS

Distributed Control System – A distributed control system is a computerized control system for a process or plant with many control loops, in which autonomous controllers are distributed throughout the system.

M. DRY AREAS

Locations not normally subject to dampness or wetness. A location classified as dry may be temporarily subjected to dampness or wetness, as in the case of a building under construction (see FINISHED AREAS).

Rooms containing process water, chemical piping, or related equipment are not considered DRY. Areas that are not considered DRY are considered WET.

N. EXPOSED AREAS

Locations that are visible, outdoors, or exposed to a process or room environment. Exposed areas are not concealed (see CONCEALED AREAS).

O. FINISHED AREAS

Indoor confined areas that are not directly exposed to a process or process chemicals. They typically include closed offices, bathrooms, laboratories, lunch/break rooms, etc. Finished areas are considered DRY.

P. HAZARDOUS AREAS

Class I, Divisions 1, and 2; Class II, Divisions 1 and 2; Class III, Divisions 1 and 2 locations where fire or explosion hazards may exist due to flammable gases or vapors, flammable liquids, combustible dust, or ignitable fibers or flyings (reference National Electrical Code, Article 500).

Q. HIM

Human Interface Module – A programmable operator interface directly associated with, or integral to, an electrical control device (such as a VFD or Soft Start drive). This interface displays device setpoints and status with a keypad for data entry.

R. HMI

Human Machine Interface – The way a person interacts with a computer or electronic device. It comprises the screen menus and icons, keyboard shortcuts, command language, and help functions. Peripheral support devices, such as a mouse, keyboard, touch screen, and remote controls are also included. The HMI system is typically PC based, located in an office or lab environment.

S. HOT SPARE

A “Hot Spare” is a PLC analog or digital channel in a PLC card that is powered but the channel is unassigned.

T. INDOOR AREAS

Confined locations where the equipment is normally protected from wind, dust, rain, snow, and other natural elements. INDOOR areas are not the same as DRY areas.

U. I/O

Inputs/Outputs – Input and output signals into and out of a PLC or RTU.

V. LEGALLY REQUIRED STANDBY SYSTEMS

Those systems required and so classed as legally required to have standby power by Government requirements. All projects that have a generator or receptacle for a generator are considered to be a legally required standby system unless stated otherwise.

W. OIU

Operator Interface Unit – A graphical display of industrial plant system variables and status. It may also allow for process control adjustments. Navigation of its programming may be via keypad, touch screen, or a combination of both. An OIU is typically located on a field control panel or control panel in an electrical equipment room.

An Operator Interface Unit is considered a possible extension of a PLC, like an I/O or network card. PLC installations may or may not include an OIU.

X. OUTDOOR AREAS

Locations where the equipment is normally exposed, or partially exposed, to weather in the form of wind, dust, rain, snow, and other natural elements.

Y. PROCESS AREAS

Process areas are those areas that are directly exposed to process moisture, or that may be subjected to moisture in the event of a process leak or failure. They typically include pump rooms, chemical rooms, and direct process-exposure areas such as clearwells, open filters, and reservoirs. Process areas are considered WET.

Z. PLC

Programmable Logic Controller – A device used to monitor and control system process. It can be used stand-alone or in conjunction with other systems such as SCADA. It may provide telemetric functions or interface with telemetric equipment.

AA. RTU

Remote Telemetry Unit/Remote Terminal Unit – A device that reads the status of process devices and transmits them to another telemetric unit. RTUs may transmit a command from another source but will not alter or interpret the command. RTUs differ from PLCs in that they do not control a process.

BB. SCADA

Supervisory Control and Data Acquisition (SCADA) systems are data monitoring and control stations that allow operators to visualize and adjust live process conditions at a centralized HMI. These systems often include process historical data tracking and alarming capabilities. SCADA systems can be used for data monitoring locally, remotely, or both.

CC. SHOP FABRICATED

Manufactured or assembled equipment for which a UL test procedure has not been established.

DD. SOFT START MOTOR CONTROLLERS

See SOLID STATE MOTOR CONTROLLERS in this Section.

EE. SOLID STATE MOTOR CONTROLLERS

Solid State motor controllers provide an electronically controlled acceleration and deceleration of AC squirrel-cage induction motors. Once the motor has reached full speed, the electronics are switched off and replaced with a motor drive contactor that connects the motor directly to line power, thus assuring continuous full voltage to the motor. Solid State motor controllers are also referred to Soft Start motor controllers.

Unlike VFD drives, Solid State motor controllers do not alter the sine wave *frequency* to the motor; instead they alter the portion of the sine wave that reaches the motor. This controls the amount of power sent to the motor and affects the motor's ability to create torque. The electronic Solid State control is only used during acceleration and deceleration. During acceleration the controller switches the waveform from 0 up to 100 percent (full voltage) and during deceleration switches the waveform from 100 down to 0 percent (no voltage).

FF. TELEMETRY

Telemetry is the transfer of data between remote sites. Typical methods of data transfer are utility phone lines, radio transmission, and fiber optics.

GG. VARIABLE FREQUENCY DRIVES (VFDs)

See ADJUSTABLE SPEED CONTROLLERS in this Section.

HH. VIBRATING EQUIPMENT

Equipment that is subject to vibration under normal operating conditions, such as motors, transformers, electrically operated valves, etc.

II. WET AREAS

Locations outdoors, underground, directly or indirectly exposed to the process, in concrete slabs or masonry in direct contact with the earth, or in any other way subject to saturation with water or other liquids.

1.03 REFERENCES

Unless otherwise noted, the requirements of the following code-making authorities and standard organizations apply:

<u>References</u>	<u>Title</u>
ANSI	American National Standards Institute
ASTM	American Society for Testing and Materials
IEEE	Institute of Electrical and Electronics Engineers
IES	Illuminating Engineering Society of North America
ISA	Instrument Society of America
NEC	National Electric Code
NEMA	National Electrical Manufacturers Association
NFPA	National Fire Protection Association
NRTL	National Recognized Testing Laboratory
OSHA	Occupational, Health, and Safety Administration
UL	Underwriters Laboratories, Inc.
UL 508	Safety Industrial Control Equipment
UL 698	Industrial Control Equipment for Use in Hazardous Locations
WAC 296-46B	Washington Administrative Code, Electrical Safety Standards, Administration, and Installation

In case of conflict or disagreement between codes, standards, laws, ordinances, rules, regulations, plans, and specifications, the more stringent condition shall govern.

1.04 SUBMITTALS

A. Submit under provisions of Section 01 33 00.

B. EXPERIENCE AND QUALIFICATIONS FOR ELECTRICAL CONTRACTOR

Provide a list of a minimum of three projects, within the last 5 years, of similar complexity for wastewater treatment plant facilities that have been successfully completed by the Electrical Contractor.

C. Prior to submittal of shop plans, coordinate all electrical equipment, particularly motor control equipment, process and control panels, and instrumentation, with related manufacturers and with other applicable equipment and systems specified in other divisions of the Specifications.

- D. Provide submittals in the following manner:
1. Organize the submittals by type.
 2. Clearly show the Tag Number associated with each submittal within each grouping.
 3. Include non-tagged devices such as grounding systems, conduits, wireway, ductbank details, wire, cable, boxes, fittings, switches and receptacles.
 4. Clearly show the specific part, part number, order code, etc. associated with the device. Use pointers, highlights, circles, etc. to clearly identify the specific part.
 5. Submit on distribution equipment, including but not limited to: Unit substations, Medium voltage switching equipment, motor control centers and control equipment, low voltage switchboards, safety switches, dry-type (specialty) transformers, panelboards, and grounding.
 6. Submit on generators and automatic transfer switches.
 7. Submit on lamps, lighting, site lighting, and wiring devices.
- E. Provide manufacturer's product technical data including, but not limited to:
1. Manufacturer's name, address, and contact number.
 2. Manufacturer's product descriptive bulletin.
 3. Nameplate data, current, voltage, load, impedance, and other electrical data pertinent to the Project and necessary to assure compliance with the Specifications and Plans.
- E. Provide elementary wiring diagrams for the electrical control systems showing the wiring of electrical control items, such as starters, control systems, interlocks, switches, and relays as they apply to this Contract.
- F. Provide schematic interconnection diagrams and/or PID diagrams for each control system and each control panel. Each control diagram shall show a schematic representation of the process equipment and the locations of the switches, meters, automatic valves, indicators, controllers, and recorders. Show correct operating settings and ranges for each control instrument on the diagrams.
- G. Use diagrams and symbols in shop plans, which conform to JIC Electrical Standards for Industrial Equipment and/or NEMA, ICS, ANSI, and IEEE standards, latest revisions. Prepare plans on 22" x 34", or ANSI size A, B, or D in a format similar to the Contract Documents or other nationally recognized drawing standard.

- H. Clearly, indicate on submittals that the equipment or material is NRTL listed or is constructed of listed or recognized components. Where a NRTL standard has not been established, clearly identify that no NRTL standard exists for that equipment.
- I. OPERATION AND MAINTENANCE MANUALS

Provide Operations and Maintenance Manuals per Section 01 78 23
- J. Upon completion of the work, provide as-built red-lines per Section 01 78 39.

1.05 SYSTEM DESCRIPTION

- A. Provide the labor, materials, and equipment necessary to furnish, install, and place into operation complete power, lighting, control, alarm, communications, and instrumentation electrical system of this Contract as shown on the Plans or Specifications herein.
- B. Provide a functioning system(s) in compliance with manufacturer's instructions, performance requirements as specified or indicated, and modifications resulting from reviewed shop plans and field coordinated plans.
- C. Provide complete wiring and controls for all equipment specified under other divisions and that comply with Division 26.
 - 1. Connect motors, controls, meters, and any other electrical device installed or provided as part of the project.
- D. Pay and make arrangements for necessary permits, licenses, and inspections.

1.06 QUALITY ASSURANCE

- A. ELECTRICAL CONTRACTOR QUALIFICATIONS
 - 1. The Electrical Contractor shall have successfully completed a minimum of 3 projects of similar complexity in wastewater treatment plant facilities within the previous 5-year period prior to bid submittal.
- B. TESTING AGENCY QUALIFICATIONS

A "Nationally Recognized Testing Laboratory" (NRTL) recognized and approved by the State of Washington.
 - 1. Testing Agency Field Supervision: Use persons currently certified by NETA or the National Institute for Certification in Engineering Technologies, or equal, to supervise onsite testing specified in Part 3.
- C. Comply with NFPA 70 (NEC) for components and installation.

D. LISTING AND LABELING

Provide products specified in this Section that are listed and labeled.

1. The Terms "Listed and Labeled:" As defined in the National Electrical Code, Article 100.
2. Listing and Labeling Agency Qualifications
 - a. A NRTL recognized and approved by the State of Washington.

1.07 DELIVERY, STORAGE AND HANDLING

Ensure that equipment is not used as steps, ladders, scaffolds, platforms, or for storage – either inside or on top of enclosures. Protect nameplates on electrical equipment from being defaced. Repair or replace damaged, corroded, and rejected items at no additional cost to the Owner.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Refer to individual Division 26 sections.
 1. Similar equipment shall be provided by only one manufacturer throughout the project unless otherwise noted in the Specifications.
- B. Submit requests for substitution in accordance with Section 01 33 00.
- C. Trade names and catalog numbers may be used in the Plans or Specifications to establish quality standards and basis of design:
 1. Other listed manufacturers in the applicable specification sections with equal equipment may be acceptable.

2.02 GENERAL PRODUCT REQUIREMENTS

- A. Except as otherwise indicated, provide new materials and equipment, which are standard products of manufacturers, regularly engaged in production of such equipment. Provide material or equipment approved and labeled for the purpose for which it is to be used by NRTL or other organizations acceptable to the State of Washington Department of Labor and Industries.
- B. Where voltage, current, power, temperature or other ratings are specified that do not correspond to standard ratings of the manufacturer selected by the Contractor, furnish the next rating level which is more conservative or increases the capacity of the device or material in question.
- C. Furnish materials, devices, and equipment that are non-corrosive or coat them in a manner that renders them non-corrosive and acceptable to the Engineer. Do not provide materials, which contain polychlorinated biphenyls, asbestos, or other

hazardous or detrimental materials. Do not install materials in a location or construction manner that produces galvanic action or do not install material combinations with corroding or eroding action.

- D. Where changes in the work, or substitutions in material are proposed, ensure that sizes, weights, openings, etc., are provided that do not require changes in the work outside this Division.
- E. All terminals shall be suitable for 75 degrees C rated copper conductors.

2.03 FABRICATION

- A. When equipment is shop fabricated specifically for this Project, use electrical devices and enclosures, which are NRTL, listed and labeled or recognized.
- B. SHOP OR FACTORY FINISHES
 - 1. Interiors of other painted electrical equipment shall be either white or light gray.
- C. Fabricate equipment or devices in the field equivalent in every respect to manufactured items used for the same purpose. Where cutting, drilling, grinding, etc., is done to galvanize or painted metal, regalvanize, or paint to match original finish.

2.04 SUPPORTING DEVICES

- A. Channel and angle support systems, hangers, anchors, sleeves, brackets, fabricated items, and fasteners are designed to provide secure support from the building structure for electrical components.
 - 1. Indoor Locations

Channel strut, conduit straps, and bolt hardware shall be hot dipped galvanized.

Outdoor Locations

Channel strut, conduit straps, and bolt hardware shall be zinc coated.
- B. ANCHORS
 - 1. Adhesive anchors, reference Specification 03 20 00 2.2E.
- C. SHEET-METAL SLEEVES

0.0276 of an inch or heavier galvanized sheet steel, round tube, closed with welded longitudinal joint.

D. PIPE SLEEVES

ASTM A53, Type E, Grade A, Schedule 40, galvanized steel, plain ends.

2.05 ELECTRICAL IDENTIFICATION

A. For electrical equipment and device identification reference Specification Section 01 78 23.01.

B. MANUFACTURER'S STANDARD PRODUCTS

Where more than one type is listed for a specified application, selection is Installer's option but provide single type for each application category. Use colors prescribed by ANSI A13.1, NFPA 70, and Specifications.

C. FLASH PROTECTION WARNING

Provide Arc Flash Warning Label on all equipment as required by 110.16 NEC (2023). The label is to contain the following text:

WARNING or DANGER
Arc Flash Hazard!
Follow requirements in NFPA 70E for safe
work practices and appropriate PPE.
Failure to comply can result in death or
injury.

D. Provide nameplates/data plates/identification per Specification section 01 78 23.01 and 43 20 00.

2.06 TOUCHUP PAINT

Use touchup paint on equipment provided by equipment manufacturer and select color to match existing equipment finish.

A. FOR NON-EQUIPMENT SURFACES

Matching type and color of undamaged, existing adjacent finish.

B. FOR GALVANIZED SURFACES

Zinc-rich paint recommended by equipment manufacturer.

PART 3 EXECUTION

3.01 ELECTRICAL SUPPORTING METHODS

A. WET AREAS

1. For pullboxes and equipment vaults, reference Specification Section 26 05 33.

2. For wet areas which are not pullboxes or equipment vaults, hot-dip galvanized materials, stainless steel materials, or nonmetallic, U-channel system components unless otherwise noted on the Plans.

B. DRY AREAS

Hot-dip galvanized materials unless otherwise noted on the Plans.

C. METHODS

Support raceway, equipment, and devices from framing members or building structure with sufficient clearance for maintaining and servicing. Provide backing plates, and/or framing material to support equipment, devices, and materials, which are located between the building or facility structure-framing members.

3.02 RECORDS

- A. Maintain and annotate on the job at all times a separate set of As-Built Redlines in accordance with the General Conditions. Show changes from the Contract Documents, routing of hidden raceways, actual fixture and equipment locations, equipment sizes and dimensions and building outline changes. At the end of the Project, provide the Owner a complete set of Plans marked in red pencil in a manner consistent with the Contract Plans, indicating the changes made on the job.
- B. Record voltage, current, and megohmmeter and ground ohmic resistance test measurements made on the electrical work, the trip units, fuses, and overload relay elements installed in the equipment and the setting of all pressure, flow, level, etc., control devices. When the Project is completed and operating, turn over these records to the Owner.
- C. Equipment and raceways installed under this contract for future work shall be dimensioned on the As-Built Redlines.

3.03 COORDINATION

- A. Arrange for chases, slots, and openings in building structure during progress of construction to allow for electrical installations. Obtain approval from structural Engineer for penetration of structural components prior to penetrating the component.
- B. Coordinate installation of supporting devices and set sleeves in poured-in-place concrete and other structural components as they are constructed.
- C. Sequence, coordinate, and integrate installing electrical materials and equipment for efficient flow of the work. Coordinate installation of large equipment requiring positioning prior to closing in the building.

- D. Coordinate the location of motors, switches, panel connections, and other points of connection with the equipment manufacturers or vendors prior to conduit installation. Route circuits to the actual connection point. Even if removal and reinstallation of building materials is necessary, remove and reinstall conduit, outlet boxes, and other electrical connections, if initial electrical connections are not made to the appropriate equipment location.
- E. Coordinate and schedule connecting electrical systems with exterior underground and overhead utilities and services. Comply with requirements of governing regulations, franchised service companies, and controlling agencies.
- F. Coordinate and verify work under Division 26 with work under other Divisions, cooperate in locating equipment to avoid interference with work of others, and plan work to harmonize with the work of other trades so that all work may proceed as expeditiously as possible. Coordinate the installing of built-in work, attaching items to buildings, and cutting and patching. Coordinate connecting electrical circuits to components furnished under other Divisions. (Portions of the electrical design are based upon the equipment specified in other Divisions.) No extras are allowed because of moving work required to avoid interference with work of other Contractors.
- G. Electrical shutdowns shall conform with Section 01 11 00 1.05.
- H. Coordinate installing electrical identification after completion of finishing work where identification is applied to field-finished surfaces.
- I. Where changes in the work, or substitutions in material are proposed, ensure that sizes, weights, openings, etc., are provided that do not require changes in the work outside this Division.
- J. Legally required standby system(s) overcurrent devices shall be selectively coordinated with all supply side overcurrent devices per NEC 701.18. Do an engineering coordination study of all overcurrent devices and provide copies for review by the Engineer and retention by Owner.

3.04 INSTALLATION

A. ENCLOSURES FOR USE WITH ELECTRICAL EQUIPMENT

Unless specifically called out otherwise on the Plans, electrical enclosures shall meet the following specification:

- 1. Dry Areas
 - NEMA 1.
- 2. Wet Areas
 - a. Indoors
 - NEMA 4X no exceptions.

b. Outdoors

NEMA 4X no exceptions.

3. Corrosive Locations

NEMA 4X.

4. Exceptions

a. As otherwise indicated on the Plans.

b. As modified in other Division 26 sections.

5. Standards

a. NEMA ICS-6, Enclosures for Industrial Controls and Systems.

b. UL 508A, Standard for Industrial Control Panels.

c. UL 698, Industrial Control Equipment for use in Hazardous Locations.

B. WORKMANSHIP

Install the equipment and materials in a neat and workmanlike manner employing workers skilled in the particular trade and in accordance with the manufacturer's instructions, the National Electric Code, National Electric Safety Code, applicable local regulations, ordinances, and industry standards. A person in charge at the site shall maintain adequate supervision of the work under this division when necessary for coordination with other work.

C. SELF-SUPPORTED EQUIPMENT

Install self-supporting equipment in a level and plumb manner, shimming with full width stainless steel shims, as necessary. Bolt units to the floor with stainless steel expansion anchors and bolts, or weld units to embedded steel channels. Floor or pad shall be level within plus or minus 1/8 of an inch in a square yard before installing equipment. Grout or caulk enclosure to floor or pad. Provide bushings on conduits entering from above or at the side. For conduits entering from below, install grounded insulating bushings bonded to the ground bus or pad.

Install concrete pads and bases according to requirements of Section 03 30 00 Cast-in-Place Concrete.

Provide concrete foundations or pads required for electrical equipment as indicated or specified:

1. Floor-mounted equipment shall be mounted on a 4-inch-high concrete housekeeping pad. Pad shall be poured on top of the finished floor or slab.

D. MOUNTING HEIGHT

Install components and equipment to provide the maximum possible headroom where mounting heights or other location criteria are not indicated. Mount enclosures for individual units at 54 inches above floors to centerline of controls unless otherwise indicated in the Plans.

E. ACCESSIBILITY

Install equipment to facilitate service, maintenance, and repair or replacement of components. Connect for ease of disconnecting, while minimizing interference with other installations. Install explosion proof unions or removable fittings between the seal-off and the field device enclosure to allow removal of the device without cutting conductors chipping out seal material or spinning of the device.

F. EQUIPMENT ORIENTATION

Install items parallel and/or perpendicular to other building systems and components, except where otherwise indicated.

G. EQUIPMENT MOUNTED ENCLOSURES

Attach enclosures mounted on equipment with machine screws or clamps as required. Do not drill equipment frames or sheets without permission of supplier/manufacture or the Engineer.

Do not mount safety switches and external equipment to other equipment enclosures, unless enclosure mounting surface is properly braced to accept mounting of external equipment.

H. COORDINATION

Give right of way to raceways and piping systems installed at a required slope.

I. WALL MOUNTED ENCLOSURES

Stand equipment off wall surfaces a minimum of 1/4 of an inch where enclosures are mounted on walls in WET AREAS with neoprene or plastic shim washers.

J. MISCELLANEOUS SUPPORTS

Install metal channel racks for mounting cabinets, panelboards, disconnects, control enclosures, pull boxes, junction boxes, transformers, and other devices, except where components are mounted directly to a structural member of adequate strength.

K. SLEEVES

Install for cable and raceway penetrations of concrete slabs and walls, except where core-drilled holes are used. Install for cable and raceway penetrations of masonry and fire-rated gypsum walls and of all other fire-rated floor and wall assemblies. Install sleeves during erection of concrete and masonry walls.

L. FASTENING

Unless otherwise indicated, securely fasten electrical items and their supporting hardware to the building structure.

1. Welding to steel structure may be used only for threaded studs, not for conduits, pipe straps, or any other items.
2. Select fasteners so the load applied to any fastener does not exceed 25 percent of the proof-test load.

M. FIREPROOFING

1. Do not remove or damage fireproofing materials.
2. Install hangers, inserts, supports, and anchors prior to installation of fireproofing.
3. Repair or replace fireproofing removed or damaged.

N. PENETRATIONS

Make all penetrations of electrical work through walls and roofs water and weather-tight.

O. MISCELLANEOUS REQUIREMENTS

1. Screen or seal all openings into outdoor equipment to prevent the entrance of rodents and insects.
2. Equipment fabricated from aluminum shall not be placed in direct contact with earth or concrete.
3. Do not exceed the dimensions indicated for equipment except as approved in writing by the Engineer.

4. Do not use equipment or arrangements for equipment that reduce the required clearance or exceed the space allocations.

P. DIMENSIONS

Dimensions indicated for electrical equipment and dimensions indicated for the installation of electrical equipment are restrictive dimensions.

1. Field measurements take precedence over dimensioned plans.

3.05 IDENTIFICATION

A. LABELS

Install labels where indicated and at locations for best convenience of viewing without interference with operation and maintenance of equipment. Reference Specification Sections 01 78 23.01, 43 20 00, 26 05 19, and 26 05 33.

Conduit labeling is further described in section 26 05 33. The labeling of conductors is further described in section 26 05 19.

B. NOMENCLATURE

Coordinate names, abbreviations, colors, and other designations used for electrical identification with corresponding designations indicated on the Contract Documents or required by codes and standards. Use consistent designations throughout the Project.

C. SELF-ADHESIVE IDENTIFICATION PRODUCTS

Clean surfaces of dust, loose material, and oily films before applying.

D. IDENTIFY PATHS OF UNDERGROUND ELECTRICAL LINES

During trench backfilling, for exterior underground power, control, signal, and communication lines, install continuous underground plastic line marker located directly above power and communication lines. Where multiple lines installed in a common trench or concrete envelope, do not exceed an overall width of 16 inches, use a single line marker.

E. ENGRAVED, PLASTIC-LAMINATED LABELS, SIGNS, AND INSTRUCTION PLATES

Engraving stock shall be melamine plastic laminate punched for mechanical fasteners with a minimum thickness of 1/16 of an inch for signs up to 20 square inches, and 1/8 of an inch thick for larger sizes. Engraved legend in white letters on black face. Provide nameplates on equipment enclosures giving the name and circuit identification of the enclosed device/equipment in 1/2 of an inch lettering.

F. PANELBOARD SCHEDULES

For panelboards, provide framed, typed circuit schedules with explicit description and identification of items controlled by each individual breaker.

G. ARC FLASH HAZARD

Provide and install warning labels for arc flash hazard on all switchboards, panelboards, control panels, motor control centers, and other equipment per the requirements of the NEC and Washington State Administrative Code (WAC).

3.06 DEMOLITION

A. EQUIPMENT TO BE DEMOLISHED

Demolish all existing electrical devices and circuits, which are noted for demolition. Demolition includes, but is not limited to:

1. Removing all conduit, conductors, fittings, device boxes, hangers, panels, devices, etc., which are not concealed in the building structure or below grade/slab.

B. DAMAGED ELECTRICAL EQUIPMENT

Where remaining electrical work is damaged or disturbed in the course of the work, remove damaged portions, and install new products of equal capacity, quality, and functionality.

C. ABANDONED WORK

Remove existing conductors from conduits, unless otherwise indicated. Cut and cap buried raceway indicated to be abandoned in place 2 inches below the surface. Cap and patch surface to match existing surface finish.

D. REMOVAL

See section 02 40 00 Salvage and Demolition.

E. TEMPORARY DISCONNECTION

Remove, disconnect, store, clean, reinstall, reconnect, and make operational those components that are indicated for relocation and/or reconnection. Coordinate the process, mechanical, HVAC, and other equipment scheduled to be relocated and/or reused with other Divisions.

3.07 CUTTING AND PATCHING

Cut, channel, chase, and drill floors, walls, partitions, ceilings, and other surfaces necessary for electrical installations. Perform cutting by skilled mechanics of the trades involved.

Repair disturbed surfaces to match adjacent undisturbed surfaces.

3.08 TOUCHUP PAINTING

Thoroughly clean damaged areas and provide primer, intermediate, and finish coats to suit the degree of damage at each location.

Follow paint manufacturer's written instructions for surface preparation and for timing and application of successive coats.

3.09 REQUEST FOR INFORMATION

Contractor shall locate all relevant information pertaining to the question prior to submission to the Engineer for review.

The Electrical Contractor shall review and approve all RFIs concerning electrical topics before submission.

3.10 TESTING, THIRD PARTY

Test electrical equipment before energization and placing into service. Report all test results in writing. Where tests disclose a defect in the work, rework, or repair the work at no additional expense to the Owner and retest to confirm the rework or repair until testing confirms that the defect has been corrected. Test in accordance with the manufacturer's installation and testing instructions and the applicable electrical standards (i.e., NEMA, NFPA, IEEE, ISA, ANSI) for the class of equipment

A. THIRD-PARTY ENGINEERING ARC FAULT AND SHOCK HAZARD STUDY

Engage an independent engineering company to perform the study below.

1. Provide a third-party engineering study to determine the arc flash levels, shock hazard, and required PPE, at each key piece of electrical equipment including:
 - a. All Motor Control Centers (MCCs)
 - b. All panelboards and/or switchboards
 - c. All process control panels listed under UL 508/ UL 508A or similar WA state approved agency.
 - d. All field control panels listed under UL 508/ UL 508A or similar WA state approved agency.
 - e. All manual or automatic transfer switches
 - f. All service entrance devices (SUSE rated) with bonded neutral connections.

2. A copy of these signed test results shall be submitted to the Owner prior to project completion and shall be included in the O&M Manual.
3. Provide and install OSHA and NEC compliant labels with the information provided by the study. Labels shall contain the following information as a minimum.

<b style="font-size: 2em;">WARNING	
Arc Flash & Shock Hazard Appropriate PPE Required	
FLASH PROTECTION Arc Flash Boundary _____ Hazard Risk Category _____ Incident Energy (cal/cm ²) _____ Corresponding Work Distance _____ _____ VAC Shock Hazard When: Minimum Arc Rating of Clothing _____ Nominal System Voltage _____ PPE: ○ Arc-rated long sleeve shirt and long pants OR arc-rated coverall ○ Arc-rated face shield or arc flash suit hood ○ Leather gloves and shoes ○ Safety glasses or safety goggles ○ Hard hat ○ Hearing protection (ear canal inserts) ○ Arc-rated hardhat liners AN	SHOCK PROTECTION Limited Approach Boundary _____ Restricted Approach Boundary _____ Prohibited Approach Boundary _____ PPE: ○ Class _____ ○ V-rating _____ ○ _____
Equipment ID: _____	
BRADY® #121085 BRADYID.COM Y1894701	

3.11 TESTING NOT REQUIRING THIRD PARTY

Test electrical equipment before energization and placing into service. Report all test results in writing. Where tests disclose a defect in the work, rework, or repair the work at no additional expense to the Owner and retest to confirm the rework or repair until testing confirms that the defect has been corrected. Test in accordance with the manufacturer's installation and testing instructions and the applicable electrical standards (i.e., NEMA, NFPA, IEEE, ISA, ANSI) for the class of equipment

A. CONDUCTOR MEGGER TEST

1. Power Conductor Testing

After pulling and prior to connection perform a Megger test between all power conductors (including the equipment ground) and between each power conductor and earth ground in the following manner:

- a. Perform megger tests at 600 V.
- b. Record ambient temperature and humidity during testing.
- c. Cables or conductors with a steady-state value less than 100 megohms shall be considered "failed".

- d. Failed cables and conductors shall be removed and replaced with new and retested per these specifications.
 - e. Provide a Power Conductor Megger Testing Report. A blank copy of this report, specifically associated with this contract, is available from the Owner on request. A copy of these signed test results shall be submitted to the Owner for approval prior to startup and shall be included in the O&M Manual.
- 2. Control Conductor Testing
 - a. Control conductor insulation testing is not required.
 - 3. Instrumentation Conductor Testing
 - b. Instrumentation conductor insulation testing is not required.

B. CONDUCTOR INSPECTION

On installation of wires and cables and before electrical circuitry has been energized, demonstrate product capability and compliance with requirements.

- 1. Procedures
 - a. Perform each visual and mechanical inspection and electrical test stated in NETA ATS, Section 7.3.2. Certify compliance with test parameters.
 - b. Remove and replace conductors with visible insulation damage on conductor ends due to installation in an incomplete or damaged conduit system such as, but not limited to, missing bushings or burrs on conduit ends.

3.12 GENERAL TESTING AND INSPECTION

A. PRIOR TO ENERGIZATION

- 1. After installing disconnect switches and circuit breakers, perform visual and mechanical inspection of enclosures and devices.
- 2. Test the equipment and electrical circuits for proper connection, tightness, and absence of undesirable shorts and grounds.
- 3. Check for continuity, visual damage, marking, and proper phase sequence.
- 4. Remove any burrs, filings, or other foreign materials from all enclosures; completely wipe down and vacuum.

5. Run a magnet around the bottom of each enclosure and around surfaces that may have collected metal shavings during manufacturing or construction.

B. AFTER ENERGIZATION

1. After electrical circuitry has been energized, demonstrate product capability and compliance with requirements.
2. Correct malfunctioning units on site where possible and retest to demonstrate compliance; otherwise, remove and replace with new units and retest.
3. Test operation, calibration, and settings of the meters, relays, and indicating devices.
4. Test all operating controls for proper operation.
5. Test all auxiliary equipment, i.e., heaters, thermostats, lights, all illuminated indicating devices and lamps, and all audible alarm devices which are an integral part of transformers and panels to verify that they function properly.
6. Check field connections to field devices, PLCs, and motor starters..
7. Verify proper communication reliability and data transfer speed on local networks.
8. Rework or repair equipment, which performs unsatisfactorily during, or as a result of, testing at no additional expense to the Owner.
9. Additional testing requirements specific to other sections are specified in those sections.

3.13 TEST DOCUMENTS

Test documents, as described above, shall be signed and submitted to the Owner for review prior to energizing associated electrical circuits.

3.14 DEMONSTRATION

Demonstrate to the Owner that the electrical installation is working by operating all electrical systems and equipment. Simulate control and emergency conditions, artificially where necessary, for complete system tests. Demonstrate equipment in accordance with each section in Division 26.

3.15 CLEANING

Clean dirt and debris from all internal and external surfaces. Vacuum out the interior of electrical panels.

Apply touchup paint as required to repair scratches, etc.

Replace nameplates damaged during installation. Thoroughly vacuum the interior of all enclosures to remove dirt and debris.

**** END OF SECTION ****

SECTION 26 05 19

CONDUCTORS AND CABLES

PART 1 GENERAL

1.01 SCOPE

The work specified in this Section includes building wires, cables, and associated connectors, splices, and terminations for wiring systems rated 600 V and less.

1.02 SUBMITTALS

See Section 01 33 00.

Indicate Field Test Reports and interpret their results for compliance with performance requirements.

1.03 QUALITY ASSURANCE

See Section 01 45 16.13 for Contractor Quality Control.

PART 2 PRODUCTS

2.01 BUILDING WIRES AND CABLES

A. STRANDING

1. All power, control, and instrumentation conductors larger than #20 AWG shall be stranded.
2. All equipment ground conductors larger than #16 AWG shall be stranded.
3. All grounding electrode conductors larger than #10 AWG shall be stranded.

B. POWER AND CONTROL WIRE

All power conductors in raceways shall be rated 600 VAC.

1. XHHW, XHHW-2

a. Conductor

Class B, stranded, annealed, uncoated copper. Conductors shall comply with:

- i. UL Standard 44.
- ii. ASTM-B3, ASTM-B8, and ASTM-B7B8.

b. Insulation

Cross-Linked Polyethylene (XLP) High Heat Water Resistant. Insulation shall comply with:

- i. UL-83 Thermoplastic-Insulated Wires and Cables.
- ii. UL-1063 Machine-Tool Wires and Cables.

c. The cable shall meet the following Standards and Agency approvals:

- i. NEMA WC70/ICEA S-95-658.
- ii. ASTM Stranding Class B3, B8, B7B8
- iii. Federal Specification A-A-59544

2. THHN, THWN, THHN/THWN-2

a. Conductor

Copper, annealed, uncoated. Conductors shall comply with:

- i. ASTM-B3, ASTM-B8, and ASTM-B7B8.

b. Insulation

Polyvinyl Chloride (PVC), Nylon jacket. Insulation shall comply with:

- i. UL-83 Thermoplastic-Insulated Wires and Cables.
- ii. UL-1063 Machine-Tool Wires and Cables.

c. The cable shall meet the following Standards and Agency approvals:

- i. NEMA WC70/ICEA S-95-658.

d. Control conductors shall be multiple colors with three different colors minimum. Colors shall be equally distributed.

3. MTW (Machine Tool Wiring)

a. Conductor

Copper, annealed, uncoated. Conductors shall comply with:

- i. ASTM-B3, ASTM-B8, and ASTM-B7B8.

b. Insulation

Polyvinyl Chloride (PVC). Insulation shall comply with:

- i. UL-83 Thermoplastic-Insulated Wires and Cables.
- ii. UL-1063 Machine-Tool Wires and Cables.

c. The cable shall meet the following Standards and Agency approvals:

- i. NEMA WC70/ICEA S-95-658.
- ii. UL Standard UL 83, UL 1063, UL 758 cUL file: E156879 and E123744
- iii. AWM Specification 1316, 1317, 1318, 1319, 1320, 1321
- iv. ASTM Stranding Class B3, B8, B7B8
- v. Federal Specification A-A-59544
- vi. CSA 22.2 No. 75, UL E156879 and E123744

C. INSTRUMENTATION, COMMUNICATION, AND NETWORKING CABLES

All instrumentation, communication, and networking cables and conductors in raceway shall be rated 300 VAC.

1. Analog Instrument Cables

Paired and triad analog instrument cables shall be #18 AWG stranded tinned copper 300 V tray cable, rated for wet applications at 75 degrees C in a sunlight resistant PVC jacket. Cables shall be plenum rated, and shall be provided with individual pair/triad isolated 100 percent foil shields with independent drain wires and an overall isolated shield with drain wire.

These cables shall also be used for totalizing pulse signals from flow meters.

The following cables shall be used for multiple conductor applications:

- a. 2-Conductor, 1 twisted pair, 100 percent overall shield. Huston Wire & Cable Company HW101 01801 or equivalent.
- b. Multi pair conductor, Belden 28328A and 1529A or equivalent.

2.02 SPLICES, TAPS AND TERMINAL BLOCKS

SPLICES ARE ONLY ALLOWED WITH THE CONSENT OF THE OWNER.

A. SPLICES TO POWER CONDUCTORS

1. Splices in Outdoor Areas, Handholes, Vaults, or Direct Buried
 - a. For inline butt splices, use inline resin splice kits for non-shielded cables, 600 V; 3M Scotchcast 82-A series or equal. UL listed 486D.
 - b. For odd-shaped and odd sized splices, use multi-mold resin splice kits for non-shielded cables, 600 V; 3M Scotchcast 85-14CP or equal. UL listed 486D
2. Indoor Splices and Taps for Receptacles and Lighting
 - a. Use quick spin, wing torque Electrical Spring and Grounding Connectors; 3M 312, 412, 512, and 512G or equal.
3. Motor Lead Connectors
 - a. Motor terminal connectors shall be wire nuts, Kerneys, or lugs.
4. Power/Control Terminal Blocks
 - a. All power terminals shall be 600 Vac, suitable for 75 degrees C rated copper conductor.
 - b. Power terminal blocks may be copper or aluminum and shall have a short circuit current withstand rating following the guidelines described in UL 1059 and shall meet or exceed the available bolted fault current at the point of application.
 - c. Control terminal blocks shall be 600 Vac, suitable for 75 degrees C rated copper conductors, ABB No. 0115 116.07.

B. SPLICES TO CONTROL CONDUCTORS

1. In Junction Boxes and Handholes

Splices to control conductors in junction boxes and handholes shall be made with 600 V, UL, 3M Performance Plus wire connector or equal, with strain relief.

C. SPLICES TO INSTRUMENTATION CABLES AND CONDUCTORS

1. In Junction Boxes

Strip back the cable outer sheath exposing cable conductors and shield lengths to 1-inch or less. Twist the wires together and solder. Insert and engage into 600 V, UL, 3M Performance Plus wire connector or equal.

2.03 INSULATING MATERIALS

A. ELECTRICAL INSULATION PUTTY

Scotchfill, or equal.

B. INSULATING ELECTRICAL TAPE

7 Mil/0.18 mm Plasticized PVC, rubber-based adhesive, 200 percent elongation, 26 N/cm tensile strength, 8 kV breakdown voltage, meeting CE, CSA, UL certifications.

C. CONDUCTOR COLOR-MARKING TAPE

7 Mil/0.18 mm Plasticized PVC, rubber-based adhesive, 200 percent elongation, 26 N/cm tensile strength, 8 kV breakdown voltage, meeting CE, CSA, UL certifications, in required color.

D. ELECTRICAL HEAT SHRINK TUBING

Heat shrink tubing shall be dual-wall polyolefin, 3-1 shrink ratio, 600 Vac, -55 to 110 degrees C operating range meeting UL 224 600V, 125 degrees C.

PART 3 APPLICATIONS

3.01 WIRE APPLICATIONS

A. CABLE AND CONDUIT SCHEDULE

The Cable and Conduit Schedule shall be considered absolute. No changes to wire sizes, wire count, insulation type, or circuit type shall be allowed without approval from the Engineer.

B. WIRES IN RACEWAYS

Wires installed in raceways shall be considered "FIELD" wiring and shall be installed and terminated by qualified and licensed electrical contractors.

Exceptions:

- *Installation and termination may be by the owner under the provisions of "RCW 19.28.261, Exemptions from RCW 19.28.161 through RCW 19.28.271."*

- *If the raceway is installed inside a control panel fabricated by a certified UL 508 shop, then these wires may be installed and terminated per the provisions of WIRES IN CONTROL PANELS as listed below.*

1. Power Wire

a. Insulation

All service, feeder, and branch circuit conductors shall be XHHW-2 or THHN.

Exceptions:

- *Unless called out otherwise in the Cable and Conduit Schedule.*
- *Unless approved in writing by the Electrical Engineer.*
- *Unless both ends of wire are installed in the same control panel.*

2. Class 1 and 2 Control Wire

a. Insulation

All control circuits in raceways shall be THHN.

Exceptions:

- *Unless called out otherwise in the Cable and Conduit Schedule.*
- *Unless approved in writing by the Electrical Engineer.*

b. Minimum control wire size in conduits and raceways

The minimum control wire size in conduits and raceways shall be #16 AWG.

C. WIRES IN CONTROL PANELS

Wires in control panels are those that are terminated within a control panel, and do not extend beyond the control panel enclosure. Wires that extend beyond the control panel enclosure shall be installed and terminated per the provisions of "WIRES IN RACEWAYS," above.

1. Control Panel Power and Control Wire

a. Insulation

Power and control conductors in control panels shall be MTW or THHN/THHN-2.

b. Wires shall have the following minimum sizes and colors:

Circuit Type	Wire Size ⁽¹⁾	Wire Color
120 VAC Power Circuits		
120 VAC, Line	#14 AWG	Black
120 VAC, Neutral	#14 AWG	White
120 VAC, Equipment Ground	#14 AWG	Green
120 VAC Control Circuits		
120 VAC, Line	#16 AWG	(5)
120 VAC, Neutral	#16 AWG	(5)
Low-Voltage AC Control Circuits		
Low-Voltage, Line	#16 AWG	(5)
Low-Voltage, Neutral	#16 AWG	(5)
24 VDC Power Circuits		
+24 VDC Power	#16 AWG	Blue
24 VDC Common	#16 AWG	White with Blue stripe
24 VDC Equipment Ground	#16 AWG	Green
Isolated (Shield) Ground	#16 AWG	Yellow with Green stripe ⁽²⁾
24 VDC Control Circuits		
+24 VDC Control	#16 AWG	(5)
24 VDC Common	#16 AWG	(5)
PLC I/O Circuits		
DC I/O	#16 AWG ⁽³⁾	(5)
DC I/O Common	#16 AWG	(5)
Analog Inputs	#18 AWG	Analog Instrument Cable ⁽⁴⁾
Analog Outputs	#18 AWG	Analog Instrument Cable

Notes:

- (1) Wire sizes are minimums; size wires to comply with NEC and UL 508.
- (2) Isolated (Shield) ground wires shall be of a color scheme that is approved for ground wires but distinct from equipment grounds.
- (3) For PLC digital outputs, conductors may be #16 AWG between the PLC output terminal and the buffer relay coil when fused at not more than 5A. Wiring from the buffer relay output contacts to field terminals shall be #16 AWG minimum. For retrofit panels without buffer relays, digital output wiring shall be #16 AWG.
- (4) Contractor shall provide one of the Analog Instrument Cables described in the "PRODUCTS" section of this specification.
- (5) Control conductors shall be multiple colors with three different colors minimum. Colors shall be equally distributed.

2. Where panels are required to be manufactured and certified to a particular standard (such as UL 508A), the contractor shall substitute wire colors where required to meet the standard.

D. POWER CORDS

SO power cords shall be allowed in control panels for circuits not greater than 120 Vac or 48 Vdc. Such applications require installation by a UL 508 shop.

E. SPECIALTY WIRE

Refer to the Plans for specifications regarding "Specialty Wire".

PART 4 EXECUTION

4.01 EXAMINATION

Examine raceways and surfaces receiving wires and cables for compliance with requirements for installation tolerances and other conditions affecting performance of wires and cables. Do not proceed with installation until unsatisfactory conditions have been corrected.

4.02 INSTALLATION

A. GENERAL INSTALLATION METHODS

1. Install wires and cables in raceway system, according to manufacturer's written instructions and NECA's "Standard of Installation," after raceway system is complete.
2. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.
3. Install cables and conductors neatly in all enclosures. Bend or form wires in neat runs from conduits to terminals. Arrange wires so that they may be grouped by conduit or function in the enclosure. Install cable ties and straps to support and bundle wires in enclosures. Arrange wires to allow wire tags and numbers to be easily read without bending or flexing wiring.
4. Leave 6 inches or more of free conductor at each connected device or equipment terminal and 9 inches of free conductor at each unconnected outlet. Tape free ends of conductors at unconnected outlets and coil neatly in outlet box.
5. Install wiring to equipment neutral and grounding blocks on the bottom or furthest back row first. Leave unconnected blocks accessible for future neutral or grounding connections.

6. Provide individual neutral conductors for each associated circuit. Common neutral conductors for multi branch circuits are not permitted.
7. All power distribution raceways shall contain at least one continuous copper grounding conductor with a minimum size as per NEC 250.122. Larger sizes shall be used if identified in the Cable and Conduit Schedule on the Plans.

B. CONDUCTORS SHARING RACEWAYS

1. Power conductors shall not be run in the same raceway with control conductors.

Exception:

- *Unless specifically shown otherwise in the Cable and Conduit Schedule.*

2. Power conductors shall not be run in the same conduit or raceway with instrumentation cables/conductors.
3. Control conductors shall not be run in the same conduit or raceway with instrumentation cables/conductors.

Exception:

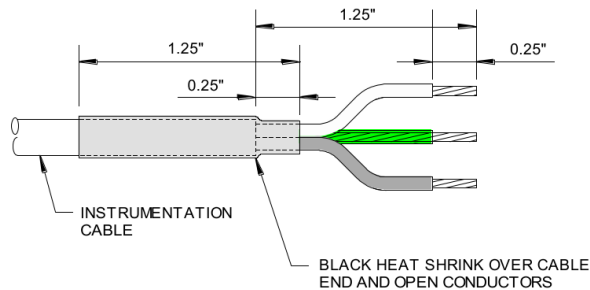
- *Unless specifically shown otherwise in the Cable and Conduit Schedule.*

C. CONDUCTORS IN CONTROL PANELS

1. Control Panel Instrumentation (Signal) Wiring
 - a. Signal cables between analog input and output field terminals and the DCS shall be connected to the field terminals.
 - b. All cables shields shall be terminated at the field terminal end. Connections to the DCS analog input and output terminals shall not land the shield.
 - c. Signal cable conductors and their shields/drains shall not be separated greater than as described below.
2. Control Panel Communication and Networking Wiring
 - a. All communication and networking cables inside control panels shall have their ends made up with terminal connectors. No cables shall be left open-ended.
 - b. Cables shall be routed inside Panduit™ or neatly tied to other conductor bundles.

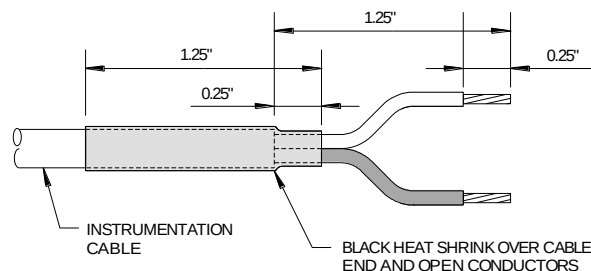
D. INSTRUMENTATION (SIGNAL) CABLES

1. Preparing the Shielded End



- Neatly trim the end of the cable.
- Strip back 1.25 inch of the outer jacket taking care not to cut into the conductor insulation.
- Neatly trim the foil back to the edge of the outer jacket taking care not to damage the drain wire.
- For signal cables with a braided shield over a foil shield, carefully cut the braid back to the edge of the outer jacket.
- Provide a green heat shrink tube over the drain wire, leaving 0.25 inch of exposed conductor.
- Provide a 1.25-inch black heat shrink over the jacket, covering 0.25 inch of the exposed conductors. This properly insulates and protects the ends of the shields and the outer jacket.
- Strip the signal conductors exposing 0.25 inch of conductor.

2. Preparing the Unshielded End



- Neatly trim the end of the cable.
- Strip back 1.25 inch of the outer jacket taking care not to cut into the signal conductor insulation.

- c. Neatly trim the foil back to the edge of the outer jacket.
- d. Cut the drain wire at the edge of the outer jacket taking care not to damage the signal conductor insulation.
- e. For signal cables with a braided shield over a foil shield, carefully cut the braid back to the edge of the outer jacket.
- f. Provide a 1.25-inch black heat shrink over the jacket, covering 0.25 inch of the exposed conductors. This properly insulates and protects the ends of the shields and the outer jacket.
- g. Strip the signal conductors exposing 0.25 inch of conductor.

E. SPLICING CONDUCTORS

1. Install service, feeder, and motor circuits continuous without splices from equipment terminal to equipment terminal or motor lead.

Exceptions:

- *Service entry feeders at weatherheads.*
- *Branch circuits at taps for convenience receptacles and lighting.*
- *With written permission from the Owner.*

2. Install instrumentation and control circuits continuous without splices or terminations from source equipment terminal to destination equipment terminal.

Exceptions:

- *On terminal strips in control panels.*
- *On terminal strips in termination panels.*
- *With written permission from the Owner.*

3. Where splicing is allowed, or specifically called out, install in the following manner:

- a. Splicing Inside Vaults, Handholes, Outdoor J-Boxes, or J-Boxes in Wet Areas

Power and control conductors shall be spliced per Section 2.02.A. Provide a minimum of 24 inches of length on both wires for future resplicing.

b. Splicing Inside Motor J-Boxes

Power connections inside motor j-boxes shall be made using Wire nuts, Kerneys, or lugs. Cover the splice with a minimum of three layers of black insulating electrical tape. Provide a single band with a minimum of two wraps of the appropriate phase color tape to the entry T-lead. Bend the connections away from the sides of the j-box and motor frame to prevent abrasion from motor vibration.

Control connections inside motor j-boxes shall be made with wire nuts, Kerneys, or lugs. Cover the splice with a minimum of three layers of black insulating electrical tape.

c. Splicing in J-Boxes and Control Panels Mounted Indoors in Dry Rooms

i. Conductors size #12 AWG through #6 AWG:

For conductors less than #6 AWG, provide terminal strips or wire nuts. Cover the splice with a minimum of three layers of black electrical tape. Provide a 2-wrap (minimum) single band of the appropriate phase color tape.

Exception:

- *For receptacles and lighting, reference Section 2.02.B.*

ii. Conductors size #4 AWG and larger:

(1) Terminal Connectors

For conductors larger than #6 AWG, connections shall be made using wire nuts, Kerneys, or lugs rated for 500Vac.

Cover the splice with a minimum of three (3) layers of black electrical tape. Provide a 2-wrap (minimum) single band of the appropriate conductor color tape.

(2) Terminal Blocks

All power terminals shall be 600 Vac, suitable for 75 degrees C rated copper conductor.

Connect using properly sized terminal blocks.

Exception:

- *If splices are allowed by the Owner, then use plated copper alloy compression splicing sleeves installed by high-pressure compression tools and insulated with heat shrink Raychem sleeves.*

F. REPLACING FAULTY CONDUCTORS

When replacing a faulty conductor or cable that shares a raceway with other conductors or cables, all conductors and cables must be removed and replaced with new.

Exceptions:

- *If the raceway is straight and without bends or offsets and its length is less than 30 feet, and the conductors are not bound together in the raceway, then only the faulty cable must be pulled and replaced with new. A manufacturer-approved pulling compound or lubricant must be used to minimize degradation to the remaining conductors. The contractor is responsible for the integrity of the remaining conductors.*
- *With specific approval by the Owner.*

G. CONDUCTOR LABELLING

All conductors shall be labeled per Section 01 78 23.01.

H. CONDUCTOR COLORS

1. For conductor colors inside control panels, reference Section 3.01.C.1.
2. Do not use white, gray, green, or green with yellow stripes color for any power, lighting, or control conductor not intended for neutral or equipment grounding purposes.

Exception:

- *Instrumentation and control multi-conductor cables may use white, gray, or green singly or as part of a trace color in addition to the base color.*
3. Equipment grounding conductors: Green or green with yellow stripes.

4. 480/277 volt, 3-phase systems:

Phase A	Phase B	Phase C	Neutral A	Neutral B	Neutral C
Brown	Orange	Yellow	Gray/Brown Stripe	Grey/Orange Stripe	Grey/Yellow Stripe

5. 208/120 or 240/120 volt, 3-phase systems:

Phase A	Phase B	Phase C	Neutral A	Neutral B	Neutral C
Black	Red	Blue	White/Black Stripe	White/Red Stripe	White/Blue Stripe

6. 240/120 volt, single phase systems:

Phase A	Phase B	Neutral A	Neutral B
Black	Red	White/Black Stripe	White/Red Stripe

7. Use wire with insulation of required color for conductors of #6 AWG and smaller. For wire larger than #6 AWG, where not available in specified colors, use conductor color marking tape per Section 2.3.C. When conductors are marked in this manner, mark each conductor at all accessible locations such as panelboards, junction boxes, pullboxes, auxiliary gutters, outlets, switches, and control centers.
8. Connect power conductors of the same color to the same phase throughout the installation. Viewing all equipment from the front, make connections so phase color sequence is in the same order as that for panelboards, switchboards, motor control centers, etc.
9. Control conductors shall be multiple colors with three different colors minimum. Colors shall be equally distributed.

I. PULLING CONDUCTORS

1. Instrumentation, Communication, Networking, and Fiber Cables

Make all cable pulls by hand using a manufacturer-approved pulling compound or lubricant where necessary.

2. Power and Control Conductors

- a. Make all cable pulls by hand where possible. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips, or wrapping extra conductor into an eye, that will not damage cables or raceway.
- b. On mechanically-assisted pulls use a manufacturer-approved pulling compound or lubricant where necessary. The compound used must not deteriorate the conductors or insulation. Do not exceed manufacturer's recommended maximum pulling tensions

and sidewall pressure values. Install pullboxes where necessary to prevent exceeding manufacturer's recommendations.

3. Cut cable or conductor ends off after pulling and clean all pulling compound from exposed conductors before terminating.

J. CABLE SUPPORTS

Support cables according to Section 26 00 00.

Provide vertical conductor support per NEC Table 300.19(A).

K. WIRING AT OUTLETS

1. Install conductor at each outlet, with at least 6 inches of slack. Connect only to receptacle screw terminals using insulated spade-type lugs.
2. Connect outlets and components to wiring and to ground as indicated and instructed by manufacturer, and in compliance with other Sections of Division 26.

4.03 FIELD QUALITY CONTROL

A. TESTING

1. Provide conductor megger testing per Specification 26 00 00, Section 3.

**** END OF SECTION ****

SECTION 26 05 26

GROUNDING AND BONDING

PART 1 GENERAL

1.01 SCOPE

The work specified in this Section includes grounding of electrical systems, equipment, and basic requirements for grounding, and protection of life, equipment, circuits, and systems. Grounding requirements specified in this Section may be supplemented in other Sections of these Specifications.

1.02 DEFINITIONS

- A. BONDING JUMPER (from NEC 2017, Article 100 - Definitions, Bonding Jumper, Main)

The connection between the GROUNDED CIRCUIT CONDUCTOR and the EQUIPMENT GROUNDING CONDUCTOR at the service.

- B. EQUIPMENT GROUNDING CONDUCTOR (from NEC 2017, Article 100 - Definitions)

The conductive path installed to connect normally non-current-carrying metal parts of equipment together and to the SYSTEM GROUNDED CONDUCTOR or to the GROUNDING ELECTRODE CONDUCTOR, or both. Code requirements associated with equipment grounding is referenced to NEC 250, Section VI – Equipment Grounding and Equipment Grounding Conductors.

- C. GROUNDED SERVICE CONDUCTOR

Also called “utility neutral.” A conductor used to connect the neutral point of the utility transformer to the neutral point of the service entrance.

See SUSE, SYSTEM GROUNDING.

- D. GROUNDING ELECTRODE (from NEC 2017, Article 100 - Definitions)

A conducting object through which a direct connection to earth is established.

- E. GROUNDING ELECTRODE CONDUCTOR (from NEC 2017, Article 100 - Definitions)

A conductor used to connect the SYSTEM GROUNDED CONDUCTOR or the equipment to a GROUNDING ELECTRODE or to a point on the grounding electrode system.

F. SUSE

The term SUSE is an acronym for “SUITABLE FOR USE AS SERVICE EQUIPMENT.” It is the point in the electrical grounding system where the SYSTEM GROUNDING CONDUCTORS connect to the EQUIPMENT GROUNDING CONDUCTORS, or the GROUNDED SERVICE CONDUCTOR, or both. For each separately-derived source, this shall occur at the SUSE point. These two points are connected by a BONDING JUMPER.

G. SYSTEM GROUND GRID

The SYSTEM GROUND GRID refers to all portions of SYSTEM GROUNDING. It may be as simple as a pair of ground rods and their associated GROUNDING ELECTRODE CONDUCTORS or a complex ground system with multiple types of GROUNDING ELECTRODES.

H. SYSTEM GROUNDING

System Grounding (also referred to as a GROUNDING ELECTRODE SYSTEM) consists of all GROUNDING ELECTRODES, GROUNDING ELECTRODE CONDUCTORS, and associated connecting devices. The GROUNDED SERVICE CONDUCTOR, typically referred to as the “utility neutral”, is also associated with the system ground. Code requirements associated with system grounding is referenced to NEC 250.50 – Grounding Electrode System.

1.03 SUBMITTALS

Submit under provisions of Section 01 33 00, and Section 26 00 00.

1.04 QUALITY ASSURANCE

See Section 26 00 00.

PART 2 PRODUCTS

2.01 GROUNDING AND BONDING PRODUCTS

Where types, sizes, ratings, and quantities indicated are in excess of National Electrical Code (NEC) requirements, the more stringent requirements and the greater size, rating, and quantity indications govern.

2.02 WIRE AND CABLE GROUNDING CONDUCTORS

Comply with Section 26 05 19.

A. EQUIPMENT GROUNDING CONDUCTORS

1. Insulated Conductors

Color coded green, per section 26 05 19.

2. Sized in compliance with NEC Table 250.122 or as shown on the Plans, whichever is larger.

PART 3 APPLICATION

There are two types of grounding systems covered in this specification; (1) Grounding Electrode Systems and (2) Equipment Grounding Circuits.

1. Grounding Electrode Systems shall comply, as a minimum, to the requirements of NEC Sections 250.50 through 250.104, including Table 250.66, "Grounding Electrode Conductor for Alternating-Current Systems."
2. Equipment Grounding Circuits shall comply, as a minimum, to the requirements of NEC Sections 250.110 through 250.148, including Table 250.122, "Minimum Size Equipment Grounding Conductors for Grounding Raceway and Equipment."

3.01 GROUNDING ELECTRODE SYSTEMS

Comply with NEC Article 250, Section III for types, sizes, and quantities of Grounding Electrode Conductors, except where specific types, larger sizes, or more conductors than required by NEC are shown on the Plans.

3.02 EQUIPMENT GROUNDING

Comply with NEC Article 250, Section VI for sizes of Equipment Grounding Conductors, except where specific larger sizes are shown on the Cable and Conduit Schedule in the Plans.

A. EQUIPMENT GROUNDING CIRCUITS

Install insulated Equipment Grounding Conductors with circuit conductors in the manner listed below and in compliance with Code.

1. Service and Feeders.

Bond the Equipment Grounding Conductor to the equipment to which the circuit connects and to the raceway if it is metallic.
2. Single-phase motor or appliance branch circuits.
3. Three-phase motor or appliance branch circuits.
4. Flexible raceway runs.

B. EQUIPMENT GROUNDING CONDUCTORS

Equipment Grounding Conductors shall be insulated and color-coded green.

C. ISOLATED GROUNDING-RECEPTACLE CIRCUITS

Install a separate insulated Equipment Grounding Conductor connected to the receptacle grounding terminal. Isolate grounding conductor from raceway and from panelboard grounding terminals. Terminate at the Equipment Grounding Conductor terminal of the applicable derived system or service, except as otherwise indicated.

D. NONMETALLIC RACEWAYS

Install an Equipment Grounding Conductor in nonmetallic raceways unless they are designated for telephone or data cables. Bond the conductor at each end to grounded metallic raceway or equipment.

E. METALLIC RACEWAYS

Install grounding bushings at the end of each conduit and connect to the equipment ground.

PART 4 EXECUTION

4.01 CONNECTIONS

A. GENERAL

Make connections so possibility of galvanic action or electrolysis is minimized. Select connectors, connection hardware, conductors, and connection methods so metals in direct contact will be galvanically compatible.

1. Use electroplated or hot-tin-coated materials to assure high conductivity and to make contact points closer in order of galvanic series.
2. Make connections with clean, bare metal at points of contact.
3. Coat and seal connections having dissimilar metals with inert material to prevent future penetration of moisture to the contact surfaces.

B. EQUIPMENT GROUNDING-WIRE TERMINATIONS

Make the grounding conductor connections to motors or equipment 10 hp and above or 20 amperes and above, with conductor termination and a 5/16 of an inch minimum bolt tapped to the motor frame or equipment housing. Ground connection to smaller motors and equipment may be made by fastening the conductor termination to a connection box.

C. METAL RACEWAY TERMINATIONS

Where metallic raceways terminate at metallic or non-metallic enclosures, panels, or housings, terminate each conduit with a grounding bushing. Connect grounding bushings with a bare grounding conductor to grounding bus or terminal in housing. Bond electrically noncontinuous conduits at both entrances and exits with grounding bushings and bare grounding conductors, except as otherwise indicated.

D. CONNECTION TORQUE

Tighten screws and bolts for grounding and bonding connectors and terminals according to manufacturer's published torque-tightening values. Where these requirements are not available, use those specified in UL 486A and UL 486B.

E. COMPRESSION-TYPE CONNECTIONS

Use hydraulic compression tools to provide correct circumferential pressure for compression connectors. Use tools and dies recommended by manufacturer of connectors. Provide embossing die code or other standard method to make a visible indication that a connector has been adequately compressed on grounding conductor.

**** END OF SECTION ****

SECTION 26 05 33

RACEWAY AND BOXES

PART 1 GENERAL

1.01 SCOPE

The work specified in this Section includes raceways, fittings, boxes, enclosures, and cabinets for electrical wiring.

1.02 DEFINITIONS

A. 100 PERCENT CONTINUOUS

100 percent continuous means that electrical continuity shall be maintained over a conduit's entire length and that such conduits shall consist of only RGS (whether PVC-coated or not).

B. CONDUIT BODIES

A separate portion of a conduit system that provides access through a removable cover to the interior of the system at a junction of two or more sections of the system.

C. CONTROL CONDUITS

Control conduits typically contain cables or conductors in the range of 12 Vdc to 120 Vac. These cables/conductors are used to provide discreet field inputs and outputs to motor drives, PLC controllers, operator stations, etc. They typically connect to discreet I/O field devices like local panel pushbuttons, indicating lights, selector switches, field limit switches, relay circuits, etc.

D. CONTROL PANELS

Control panels are enclosures in which one or more circuits are changed, unlike junction boxes where circuits are simply routed through the panel. Control panels may be as simple as an enclosure with a pilot light or they may be very complicated with hundreds of I/O terminations. For Control Panel considerations, reference Specification 40 95 00.

E. CONVENIENCE RECEPTACLES

Reference Section 26 27 26, Definitions.

F. DEVICE BOXES

Device boxes are electrical boxes used for receptacles, light switches, dimmers, and other similar devices. Selector switches, indicating lights, displays, etc., are mounted in control panels and equipment enclosures, not in device boxes.

G. DRIP FITTINGS

Drip fittings are used to drain water from conduit entry points, junction boxes, or other enclosures where accumulation of moisture must be removed. They are also intended to disable the entry of foreign materials, including tools and fingers, through the drain.

H. DRY LOCATIONS

Reference Section 26 00 00, Definitions.

I. EQUIPMENT VAULT

An Equipment Vault is a VAULT that contains one or more electrical devices that are terminated within the vault; such as flow meters, control valves, control or power panels, lighting, and etc.

SEE VAULTS

J. FINISHED AREAS

Reference Section 26 00 00, Definitions.

K. FMC

Flexible Metal Conduit (a type of RMC).

L. FRP

Fiberglass Reinforced Plastic (a type of RNC).

M. HANDHOLES

A handhole is a pullbox that is not sufficiently sized for entrance of personnel (reference PULLBOXES).

N. HAZARDOUS AREAS OF LOCATIONS

Reference Section 26 00 00, Definitions.

O. INSTRUMENTATION CONDUITS

Instrumentation conduits contain cables and conductors that carry low-power modulated or communication signals. They may include 4-20 mA current loops, 0–10 volt analog signals, 5 to 12 Vdc digital (TLL) data, analog or digital communications signals, etc. They may also include low-voltage compliance power to instruments such as 5 Vdc, ± 15 Vdc, or 24 Vdc.

P. INTRINSICALLY SAFE CIRCUIT

A circuit in which any spark or thermal effect, produced either normally or in specified fault conditions, is incapable of releasing sufficient electrical or thermal energy to cause ignition of a specific hazardous atmospheric mixture in its most easily ignitable concentration.

Q. JUNCTION BOXES

Junction boxes are electrical enclosures used for combining, splitting, pulling, or redirecting electrical circuits. Junction boxes may terminate one conduit or join multiple conduits. Circuits are not *altered* inside a junction box. Enclosures where circuits are altered are called CONTROL PANELS. With the exception of terminal strips, junction boxes do not contain electrical devices.

1. Junction Boxes, Type J1

Junction boxes identified as TYPE J1 can contain only non-linear power circuits.

2. Junction Boxes, Type J2

Junction boxes identified as TYPE J2 can contain only intrinsically safe circuits.

3. Junction Boxes, Type J3

Junction boxes identified as TYPE J3 can contain only instrumentation circuits that are not intrinsically safe.

Junction boxes not containing circuits of the types identified for TYPE J1, TYPE J2, or TYPE J3 are simply called "junction boxes" (without a TYPE identifier).

R. LFNC

Liquidtight Flexible Non-metallic Conduit. Also called NMLT.

S. LINEAR POWER LOADS

Linear power loads are those that are not VFD circuits (both line or load), and are not UV ballast circuits. Although actually non-linear, fluorescent lighting circuits shall be considered linear power loads.

T. NON-LINEAR POWER LOADS

Non-linear power loads shall include all VFD circuits (both line or load) and all UV ballast circuits. Although actually non-linear, fluorescent lighting circuits shall be considered linear.

U. POWER CONDUITS

Power conduits contain branch and feeder conductors with voltages 120 Vac and above. These conductors provide operating power to MCCs, panels, motors, lighting, receptacles, HVAC, etc. Conductors can be of #12 AWG wire gauge and larger, either separate or in power cables.

V. PROCESS AREAS

Reference Section 26 00 00, Definitions.

W. PULLBOXES

Pullboxes are underground electrical enclosures, sufficiently sized to allow the entrance of personnel, used for combining, splitting, pulling, or redirecting electrical circuits. Pullboxes may terminate one conduit or join multiple conduits. A pullbox can be considered an underground junction box.

Circuits are not altered or terminated inside a pullbox. Pullboxes do not contain electrical equipment or devices.

Exception:

- *Pull boxes may include a sump pump.*

Handholes are types of pull boxes but are not sufficiently sized to allow the entrance of personnel (reference HANDHOLES).

X. PVC

Polyvinyl Chloride Conduit (a type of RNC).

Y. PVC-RGS

Polyvinyl chloride, externally coated RGS (a type of RMC).

Alias: May be called or shown on Plans and elsewhere in specifications as PVC-Coated RGS or PVC-RMC.

Z. PVC-RMC

Reference PVC-RMC.

AA. RAC

Rigid Aluminum Conduit (a type of RMC).

BB. RGS

Rigid Galvanized Steel (a type of RMC).

CC. RMC

Rigid Metal Conduit (General NEC Category).

DD. RNC

Rigid Nonmetallic Conduit (General NEC Category).

EE. SURFACE RACEWAYS

A metallic raceway that is intended to be mounted to the surface of a structure, with associated couplings, connectors, boxes, and fittings for the installation of electrical conductors.

FF. VAULTS

A vault is an underground structure, serviceable or accessible only from the top. Handholes, Equipment Vaults, and Pullboxes are considered vaults.

GG. WET LOCATIONS

Reference Section 26 00 00, Definitions.

HH. WIREWAYS

Sheet metal troughs with hinged or removable covers for housing and protecting electric wires and cable in which conductors are laid in place after the wireway has been installed as a complete system.

1.03 SUBMITTALS

- A. Submit under provisions of Section 01 33 00.
- B. Provide data for surface raceways, wireways and fittings, hinged-cover enclosures, and cabinets.

1.04 QUALITY ASSURANCE

See Section 26 00 00.

1.05 COORDINATION

Coordinate layout and installation of raceways and boxes with other construction elements to ensure adequate headroom, working clearance, and access.

Coordinate electrical work with outside utilities associated with the project.

Non electrical piping and structural has priority over underground conduit routing.

Exception:

- *Unless specifically coordinated otherwise with the General Contractor.*

PART 2 PRODUCTS

2.01 METALLIC CONDUIT TYPES

A. FMC

1. Conduit

Flexible, galvanized steel convolutions forming a continuous raceway.

2. Connectors

Galvanized steel, screw in, approved for grounding.

B. RGS

1. Conduit

Hot dipped galvanized with threaded ends meeting ANSI C80.1.

2. Couplings

Couplings shall be threaded type. Setscrew-type and compression-type are not acceptable. Union couplings for conduits shall be the three-piece (Erickson) type. Threadless couplings shall not be used.

a. Nipples

Factory made through 8 inches, no running threads.

b. Conduit bodies shall be galvanized, or epoxy coated cast iron with galvanized, or epoxy coated cast cover, gasket, and threaded hubs. Use stainless steel screws or other approved non-corroding screws to hold cover in place. Hazardous locations conduit bodies shall be listed for Class 1, Division 1/2, Group D locations.

3. Conduit Clamps

Conduit clamps for RGS shall be cast malleable iron, Hot Dip Galvanized, one-hole pipe straps used with clamp backs and nesting backs.

C. PVC-COATED RGS

1. General

- a. A proprietary colored urethane coating shall be uniformly and consistently applied to the interior of all conduit and fittings. This internal coating shall be a nominal 2 mil thickness. Conduit or fittings having areas with thin or no coating shall be unacceptable.
- b. The PVC exterior and urethane interior coatings applied to the conduit shall afford sufficient flexibility to permit field bending without cracking or flaking at temperatures above 30 degrees F (-1 degrees C).
- c. All male and female threads on conduit, elbows, and nipples shall be protected by application of an electronically conducting corrosion resistant compound.
- d. Installation of the PVC coated conduit system shall be performed in accordance with the manufacturer's installation manual.
- e. Conduits and fittings shall meet the following standards:
 - i. ASTM D870
 - ii. ASTM D1151
 - iii. ASTM D3359
 - iv. ASTM D1308
 - v. NEMA RN1

2. Conduit

- a. The PVC coated rigid metal conduit must be UL listed. The PVC coating must have been investigated by UL as providing the primary corrosion protection for the rigid metal conduit. Ferrous fittings for general service locations must be UL listed with PVC as the primary corrosion protection. Hazardous location fittings, prior to plastic coating must be UL listed. All conduit and fittings must be new, unused material. Applicable UL standards may include: UL 6 Standard for Safety, Rigid Metal Conduit or Rigid Metal Aluminum Conduit, UL 514B Standard for Safety, Fittings for Conduit and Outlet Boxes.
- b. Rigid Metal Conduit shall be hot dip galvanized inside and out with hot dipped galvanized threads.

3. Fittings and Accessories

The design shall be equipped with a positive placement feature to ease and assure proper installation. Certified results confirming seal performance at 15 psig (positive) and 25 inches of mercury (vacuum for 72 hours shall be available).

- a. A PVC sleeve extending one pipe diameter or 2 inches, whichever is less, shall be formed at every female fitting opening except unions. The inside sleeve diameter shall be matched to the outside diameter of the conduit.
- b. The PVC coating on the outside of conduit couplings shall have a series of longitudinal ribs 40 mils in thickness to protect the coating from tool damage during installation.
- c. Conduit Form 8 or Form 35 Bodies shall be 1/2 inch through 2-inch diameter, shall have a tongue-in-groove "V-Seal" gasket to effectively seal against the elements. Conduit bodies shall be Form 8 or form 35 and shall be supplied with plastic encapsulated stainless steel cover screws.
- d. Right angle beam clamps and U bolts shall be specially formed and sized to snugly fit the outside diameter of the coated conduit. All U bolts will be supplied with plastic encapsulated nuts that cover the exposed portions of the threads.
- e. Conduit clamps and fittings for PVC-Coated RGS conduits shall be 316L stainless steel.
- f. Located in hazardous location shall be listed for Class 1, Division 1/2, Group D locations.

4. Approved Material

- a. Plasti-Bond REDH2OT, Perma-Cote, or KorKap manufactured by Robroy Industries.
- b. Ocal-Blue Steel conduit and fittings as manufactured by Ocal, Inc.

2.02 NONMETALLIC CONDUIT TYPES

A. PVC

1. Conduits

NEMA TC 2, Schedule 40 or 80 PVC.

2. Fittings and Accessories

NEMA TC 3; match to conduit type and material, but elbows shall be RMC.

3. Conduit bodies

Where allowed, shall match type, material, and gauge of conduit.

B. LFNC

1. Conduit

Flexible, non-metallic PVC surface with reinforcing member(s) forming a continuous liquid tight raceway.

2. Fittings

3-piece LFNC by Arlington, no substitutions is permitted.

C. FIBERGLASS/REINFORCED THERMOSETTING RESIN (RTR) ELBOWS

1. General

- a. Listed by UL to the UL 2420 Below Ground standard. The resin system shall be epoxy based, with no fillers. The fiberglass shall consist of continuous E-glass Grade "A" roving.
- b. Carbon black shall be used as ultra violet inhibitor to protect the elbows and fittings during storage and exposure to the outdoors. Elbows shall be black in color.
- c. The internal elbow walls shall be smooth with all fibers embedded in the epoxy.
- d. All shall meet the nominal radius of + or - 2°. The wall thickness shall meet the tolerances as shown in NEMA TC 14.
- e. Elbows shall meet the following standards
 - i. Volume and Surface Resistivity: ASTM D257
 - ii. Dielectric Constant and Dissipation Factor: ASTM D150
 - iii. Dielectric Strength: ASTM D149
 - iv. Tensile Strength, Axial: ASTM D2105
 - v. Compressive Strength: ASTM D695

vi.	Modulus of Elasticity and Thermal Conductivity:	ASTM D2105
vii.	Thermal Conductivity:	ASTM D5930-1
viii.	Specific Gravity:	ASTM D792
ix.	Glass Content:	AP1 15LR
x.	Water Absorption:	ASTM D570
xi.	Barcol Hardness:	ASTM D2583
xii.	Coefficient of Thermal Expansion:	ASTM D696
xiii.	Impact Resistance:	ASTM D2444
xiv.	Stiffness at 5 Percent Deflection:	ASTM D2412

2.03 OUTLET AND DEVICE BOXES

A. CAST BOXES

1. Cast Iron

Cast iron with electro-galvanized, one piece, with mounting lugs, with threaded holes or hubs, with internal green ground screw and with neoprene gaskets.

B. DEVICE COVERS

1. Cast Iron: Iron alloy.

C. SWITCH ACTUATORS

1. Cast Iron: Lever-arm type, raintight, cast iron alloy matching the metallurgy of the device box.

D. WEATHERPROOF COVERS AND PLATES

Weather proof, self-closing, die-cast aluminum, UL listed.

E. IN-SERVICE COVERS

Shall be weather proof and hinged from top with removable cord slots.

2.04 JUNCTION BOXES, HANDHOLES, AND VAULTS

A. JUNCTION BOXES

1. Cast iron

Cast iron with electrogalvanized, one piece, with threaded cover of the same metallurgy and finish, with mounting lugs, with threaded holes or hubs, with internal green ground screw and with neoprene gaskets.

2. Stainless Steel

NEMA 4X 316L stainless steel with gasketed screw down cover.

PART 3 APPLICATION

3.01 CONDUIT BODIES

This section describes the types of raceways, junction boxes, and device boxes that can be used for different circuits and different environments. Reference Section 4.1 for methods and practices required for installation.

A. CABLE AND CONDUIT SCHEDULE

The Cable and Conduit Schedule shall be considered absolute. No changes to wire sizes, wire count, insulation type, circuit type, or conduit size shall be allowed without approval from the engineer.

The Cable and Conduit Schedule does not indicate conduit type (PVC, RAC, RGS, etc.) since, in many cases, a conduit's type may change between its source and destination. The rules stated in this specification define the necessary and allowed conduit type(s) for various applications and routes.

B. RACEWAY REQUIREMENTS

The term "RGS and RAC conduits" refers to a type of conduit body and does not imply whether the conduit is PVC-coated or not. Certain applications require RGS or RAC conduits with PVC coating, others do not. Reference, "RGS RACEWAY PROTECTIVE COATINGS" for these requirements.

1. Circuit Types and Categories

a. Circuit Types

Conduits are broken into three general circuit types; 1) Power, 2) Control, and 3) Instrumentation (see Definitions).

On the Cable and Conduit Schedule, Power conduits are those starting with the letter "P", Control conduits are those starting with

the letter "C", and Instrumentation conduits are those starting with the letter "S".

b. Circuit Categories

Power circuits are broken into two categories, those that contain linear loads and those that contain non-linear loads (see Definitions).

Control and Instrumentation circuits are broken into two categories, those that contain intrinsically safe circuits and those that do not (see Definitions).

These types and categories are listed below in Table 3.01.B.1 below.

c. Relationships Between Circuit Categories and Conduit Types

Many electrical circuit types do not require special conduit routing considerations. However, Table 3.01.B.1 shows the circuit types where the conduit route must be 100 PERCENT CONTINUOUS (reference Definitions).

Table 3.01.B.1

Circuit		
Type	Category	100% Continuous?
Power	Linear	No
Power	Non-linear	Yes
Control	Non-intrinsic	No
Control	Intrinsic	Yes
Instrumentation	Non-intrinsic	Yes
Instrumentation	Intrinsic	Yes

2. Conduit Shape

Wiring shall be routed in pipe or tubular conduits, NOT in fabricated wireways or gutters.

Exception:

- *Unless specifically called out otherwise in the Plans.*

C. PVC SCHEDULE 40 RACEWAY APPLICATIONS

1. All straight portions of conduits completely concealed in concrete, below ground (not exposed), or where specified shall be PVC Schedule 40.

Exceptions:

- *Power conduits containing non-linear loads shall be 100 percent continuous over their entire length.*
- *Control conduits containing intrinsically safe circuits shall be 100 percent continuous over their entire length.*
- *All Instrumentation conduits shall be 100 percent continuous over their entire length.*
- *PVC conduit areas under roads or heavy traffic areas shall be Schedule 80, unless cast in concrete.*
- *Where specifically called out otherwise in the Cable and Conduit Schedule.*

2. All portions of power and control conduits completely concealed inside a reservoir shall be PVC Schedule 40.

D. PVC SCHEDULE 80 RACEWAY APPLICATIONS

1. All portions of conduits which contain grounding electrode conductors shall be PVC Schedule 80 and shall contain no metal fittings, connectors, or devices. Such conduits containing grounding electrode conductors shall contain no other types of conductors.
2. PVC conduit areas under roads or heavy traffic areas.
3. As stated in the Cable and Conduit Schedule.

E. RMC RACEWAY APPLICATIONS

1. All conduits requiring 100 percent continuity per Section 3.01.B.1 shall be RGS over their entire length. For coating requirements, reference Section 3.2.

Exception:

- *LFNC or FMC conduit shall be allowed per the "LFNC Raceway Applications" section herein.*

2. All portions of conduits exposed outdoors shall be RGS.

Exception:

- *All conduits containing grounding electrode conductors shall be PVC Schedule 80 over their entire length.*

3. All portions of conduits under covered structures open on any side shall be RGS.

Exceptions:

- *All conduits containing grounding electrode conductors shall be PVC Schedule 80 over their entire length.*
- *LFNC conduit shall be allowed per the "LFNC Raceway Applications" section herein.*

4. All portions of conduits exposed on the inside of below-ground pullboxes, equipment vaults, wet wells, and dry wells (vaults) shall be RGS.

Exceptions:

- *All conduits containing grounding electrode conductors shall be PVC Schedule 80 over their entire length.*
- *LFNC conduit shall be allowed per the "LFNC Raceway Applications" section herein.*

5. All portions of conduits exposed on the inside of below-ground pullboxes, equipment vaults, wet wells, and dry wells (vaults) shall be RGS.

Exception:

- *All conduits immediately terminating after penetration a vault wall. That are allowed to be PVC Schedule 40 underground, shall be PVC conduit bell-end.*

6. All portions of conduit penetrating concrete floors, walls, ceilings or from grade shall be PVC-RGS.

Exception:

- *In below grade vaults as described above.*
- *All conduits containing grounding electrode conductors shall be PVC Schedule 80 over their entire length.*

7. All portions of exposed conduits inside closed buildings shall be RGS.

Exceptions:

- *All conduits containing grounding electrode conductors shall be PVC Schedule 80 over their entire length.*
- *Unless otherwise specifically called out on a separate plan or detail.*

F. FLEXIBLE RACEWAY APPLICATIONS

1. Flexible raceways shall be rated for the environment that they are installed in.
2. LFNC conduit shall be used for the last 36 inches of connection to motors, transformers and other vibrating equipment.
3. LFNC conduit shall be used for the last 36 inches of connection to field instruments such as flow meters in vaults and radar level transmitters.
4. LFNC conduit shall be used for the last 36 inches of connection to any device that may require minor movement during maintenance or repair or that may require physical adjustment.

G. FIBERGLASS/RTR ELBOW APPLICATIONS

1. Fiberglass conduit shall not be used.
2. Fiberglass elbows may be used in underground applications with or without concrete encasement.

3.02 RGS RACEWAY PROTECTIVE COATINGS

Protected RGS conduits are used to minimize conduit degradation from moisture and chemicals.

Where called in the Plans or Specifications as "Protected RGS," "PVC-Coated RGS," "PVC-Coated," "PVC-RGS," or "PVC-RMC," all such conduits, elbows, and fittings shall be factory coated PVC as defined in Section 2.1.

A. PVC-COATED RGS CONDUIT APPLICATIONS

1. All portions of RGS elbows, bends, straight pipes, couplings, and fittings buried underground shall be PVC-Coated.
2. All portions of RGS elbows, bends, straight pipes, couplings, and fittings encased in concrete shall be PVC-Coated.
3. All portions of RGS elbows, bends, straight pipes, couplings, and fittings exposed outdoors shall be PVC-Coated.
4. All portions of RGS elbows, bends, straight pipes, couplings, and fittings exposed in Chemical Rooms (reference Definitions) shall be PVC-Coated.
5. All portions of RGS conduits transitioning to/from below grade, or penetrating concrete floors and below-ground walls and ceilings shall be

PVC-Coated at least 12" into the exposed area and extending at least 24" underground.

Exceptions:

- *Where specifically noted to be otherwise in the Plans.*
- *Non-metallic conduits that terminate at the wall of a pullbox.*

3.03 JUNCTION AND DEVICE BOX APPLICATIONS

A. JUNCTION BOXES

1. Junction boxes for Instrumentation, Intrinsically Safe, and Non-Linear Power circuits (see Definitions) shall be hinged steel, 6" x 6" x 4" minimum.
2. Dry Areas (see Definitions).
 - a. Flush-mounted junction boxes may be the standard type.
 - b. Wall-mounted junction boxes shall be the NEMA 1 gasketed.
3. Wet Areas (see Definitions).
 - a. NEMA 4X 316L stainless steel.

B. DEVICE BOXES, ACTUATORS, AND COVERS

All exposed boxes shall be of cast construction.

All aluminum and cast iron covers shall be provided with a weatherproof gasket.

1. Outdoors, In Pullboxes, In Equipment Vaults
 - a. Receptacles

Cast iron device box body with cast iron or cast aluminum gasketed cover and top-opening "in-service" cover.
 - b. Light Switches

Cast iron device box body with cast iron or cast aluminum gasketed cover and lever-arm actuator.

2. Indoor, Wet Areas (see Definitions).

Flush-mounted (recessed) junction boxes may be the standard metal type.

These boxes will usually be mounted in wood or steel stud framed walls with gypsum plasterboard or similar surfacing cover. Boxes mounted in Concrete Masonry Unit (Block) walls shall be Masonry type boxes.

a. Receptacles

- i. Recessed (flush-mount) – standard device box body with gasketed die cast aluminum, snap-action, weatherproof cover.
- ii. Surface-mounted – cast aluminum device box body with gasketed die cast aluminum, snap-action, weatherproof cover. Crouse-Hinds series FS or FD.

b. Light Switches

- i. Recessed (flush-mount) – standard device box body with gasketed cast aluminum switch cover.
- ii. Surface-mounted – cast aluminum device box body with gasketed cast aluminum, snap action, weatherproof cover. Crouse-Hinds series FS or FD.

3. Indoor, Dry Areas (See Definitions)

a. Receptacles

- i. Recessed (flush-mount) – standard device box body with plastic cover.
- ii. Surface-mounted – cast aluminum device box body with plastic cover.

b. Light Switches

- i. Recessed (flush-mount) – standard device box body with cast aluminum switch cover.
- ii. Surface-mounted – cast aluminum device box body with cast aluminum switch cover.

PART 4 EXECUTION

4.01 EXAMINATION

Examine surfaces and spaces to receive raceways, boxes, for compliance with installation tolerances and other conditions affecting performance of raceway installation. Do not proceed with installation until unsatisfactory conditions have been corrected.

4.02 INSTALLATION, GENERAL

A. COORDINATION WITH OTHER WORK

Wherever practical, route conduit with adjacent ductwork or piping.

1. Keep raceways at least 6 inches away from parallel runs of flues and steam or hot-water pipes or other heat sources operating at temperatures above 100 degrees F.
2. When installing utility conduits, comply with the spacing and depth requirements of the utilities.
3. Non-electrical buried piping has routing priority over electrical burials.

B. MOUNTING PRACTICES

1. All conduits in process areas shall be surface mounted unless specifically called out otherwise on the Plans.
2. Install raceways, boxes, enclosures, and cabinets as indicated, according to manufacturer's written instructions.
3. Where several conduits follow a common route, stagger pull boxes, junction boxes, pulling sleeves, and fittings.

C. DEVICE BOX INSTALLATION

1. Coordinate box locations with building surfaces and finishes to avoid bridging wainscots, joints, finish changes, etc.
2. Recess boxes in the wall, floor, and ceiling surfaces in finished areas. Set boxes plumb, level, square and flush with finished building surfaces within 1/16 of an inch for each condition. Set boxes so that box openings in building surfaces are within 1/8 of an inch of edge of material cut-out and fill tight to box with building materials. Back boxes with structural material to prevent rotation on studs or joists. Use gang boxes wherever more than one device is used at one location.
3. Surface mount boxes to building structures with a minimum of 1/4-inch spacing and with a minimum of two fasteners. Provide attachments to withstand an additional force of 100 pounds applied vertically or horizontally.
4. Set recessed boxes at the following heights to the bottom of the box, except where noted otherwise in the Plan Set:
 - a. Convenience outlet receptacles in finished areas at 18 inches above floor.

- b. Lighting switches, dimmers, etc., at 42 inches above floor.
 - c. Wall mounted telephones at 60 inches above floor.
 - d. Boxes for outlets on cabinets, countertops, shelves, and above countertops at 2 inches above the finished surface or 2 inches above the back splash. Verify size, style, and location with the supplier or installer of these items before installation.
- 5. Set surface-mounted receptacle and lighting boxes in wet areas 42 inches above the finished floor to the center of the box, unless called out otherwise in the Plan Set.
 - 6. Set surface-mounted boxes for lighting switches within 12 inches of the door opening on the strike or lock side of the door or on the side closing last unless indicated otherwise in the Plan Set.
 - 7. Arrange boxes used in wet areas to drain moisture away from devices or enclosures for equipment and make conduit connections from below.
 - 8. Set floor boxes level and adjust to finished floor surface.

D. CONDUIT INSTALLATION

Install conduit as a complete and continuous system without wires. Mechanically secure to boxes, fittings, and equipment. Electrically connect conduits to all metal boxes, fittings, and equipment.

- 1. All field or manufactured ferrous metal threaded connections of conduits and fittings shall be installed with a coating of electrically conductive, corrosion resistant, copper colloidal compound such as "Shamrock Kopr-Shield™ Compound" or equivalent.
- 2. Keep conduits clean and dry. Close each exposed end.
- 3. Properly ground each metallic box, cover, lid, hatch, conduit, etc., in compliance with the National Electrical Code and Specification Section 26 05 26.
- 4. When blowing through conduits, cover electrical components installed in enclosures to avoid blowing dirt, shavings, or moisture into equipment.
- 5. Install pull wires in empty raceways. Use No. 14 AWG zinc-coated steel, monofilament plastic line, or woven polyester pull line with not less than 200-lb tensile strength. Leave at least 8 inches of slack at each end of the pull wire.

6. Install exposed raceways in lines parallel or perpendicular to the building or structural member's lines except if structure is not level then follow the surface contours as much as practical. Do not crossover or use offsets if they can be avoided by installing the raceway in a different routing.
7. Run parallel or banded conduits together, on common supports where practical.
8. Make bends in parallel or banded runs concentric (common radius point, expanding radius). Use factory elbows only where elbows can be installed concentrically; otherwise, provide field bends for parallel raceways.
9. Select surface raceway outlet boxes to which lighting fixtures are attached of sufficient diameter to provide a seat for the fixture canopy.
10. Provide surface metal raceway outlet box and the backplate and canopy at the feed-in location of each end-stem suspension fluorescent lighting fixture.
11. Labeling

Labeling shall be per Specification Section 01 78 23.01.

E. RACEWAY TERMINATIONS AND CONNECTIONS

1. Join raceways with fittings designed and approved for the purpose and make joints tight.
2. Make connections waterproof and rustproof by application of a watertight, conductive thread compound. Clean threads of cutting oil before applying thread compound.
3. PVC-RGS Conduits

Use only fittings approved for use with that material. Patch all nicks and scrapes in PVC coating after installing conduits.
4. Apply PVC adhesive by brush.
5. Make raceway terminations tight. Use bonding bushings or wedges at connections subject to vibration. Use bonding jumpers where joints cannot be made tight.
6. Cut ends of conduit square with hand or power saw or pipe cutter. Ream cut ends to remove burrs and sharp ends. Make conduit threads cut in the field with the same effective length and same thread dimensions and taper as specified for factory-cut threads.

7. Flexible Connections

Use maximum of 36 inches of flexible conduit for equipment subject to vibration, noise transmission, removal, or movement; and for all motors. Do not use flexible conduit in place of elbows, offsets, or fittings to attach to fixed equipment. Recessed and semirecessed lighting fixtures may use up to 6 feet of flexible conduit, or 11 feet of premanufactured lighting "whips." Use LFNC in wet or damp locations. Do not strap flexible conduit to structures or other equipment.

8. Provide double locknuts and insulating bushings at conduit connections to boxes and cabinets. Align raceways to enter squarely and install locknuts with dished part against the box. Use grounding type bushings where connecting to concentric or eccentric knockouts.

Exception:

- *In wet areas, use Myers hubs.*

9. Where raceways are terminated with threaded hubs, screw raceways or fittings tightly into the hub so the end bears against the wire protection shoulder. Where chase nipples are used, align raceways so the coupling is square to the box and tighten the chase nipple so no threads are exposed.

10. Support conduit connections to motors or other equipment independently of the motor or equipment. Raise or drop vertically to the nearest practicable point of connection to the unit. Run vertical drops to the floor and fasten with a floor flange. Unsupported drops are not permitted. Horizontal runs on the floor or on equipment are not permitted. Drop or raise at the appropriate closest location. Run conduit on equipment frames or supports to closely follow the contours of the equipment. Locate conduit to maintain access to all equipment services and adjustment points and so as not to interfere with operation of the equipment.

11. Connect conduit to hubless enclosures, cabinets, and boxes with double locknuts and with insulating type bushings. Use grounding type bushings where connecting to concentric or eccentric knockouts. Make conduit connections to enclosures at the closest point possible where the devices are located to which the circuits contained in the conduit will connect.

Exception:

- *In wet areas, connect to enclosures, boxes, and devices from the bottom side using Myer-type hubs.*

F. EXPANSION FITTINGS

Where conduits cross building expansion joints, use suitable sliding or offsetting expansion fittings. Unless specifically approved for bonding, use a suitable bonding jumper.

G. RACEWAY SUPPORT

Support raceways as specified in Section 26 00 00.

1. Provide anchors, hangers, supports, clamps, etc., to support the raceways from the structures in or on which they are installed. Do not space supports further apart than 10 feet.
2. Provide sufficient clearance to allow conduit to be added to racks, hangers, etc., in the future.
3. Support raceway within 3 feet of every outlet box, junction box, panel, fitting, etc.
4. Support raceway and boxes in an approved manner by:
 - a. Expansion shields in concrete or solid masonry;
 - b. Toggle bolts on hollow masonry units;
 - c. Wood screws on wood;
 - d. Metal screws on metal.
5. Raceway in wet areas shall have clamp backs or other appropriate spacers to hold them a minimum of 1/2 inch off the surface. Horizontal runs on the roof surface shall be blocked at every 5 feet to hold them a minimum of 2 inches above roof surface.
6. Raceway in dry areas shall have clamp backs or other appropriate spacers to hold them a minimum of 1/4 inch off the surface.

H. INSTALLING PVC-COATED RMC CONDUITS

1. Follow the manufacturer's requirements and recommendations when installing PVC-Coated RMC conduits.
2. Seal the connections to protect the conduit.
3. Provide manufacturer's PVC repair compound where the thickness of the conduit coating has been reduced or damaged (from bending, threading, nicking, etc.)

I. BENDS AND OFFSETS

1. Fabricated bends and offsets shall be made with manufacturer-approved bending tools, by manufacturer-certified personnel.
2. Where possible, use standard elbows, conduit fittings, or junction boxes to avoid fabricated bends.
3. Make bends and offsets uniform and symmetrical. Make bends and offsets so that the inner diameter is not reduced. Use expanding plugs for bends in PVC conduit of 2-inch trade size or larger. Keep legs of bends in the same plane and straight legs of offsets parallel, unless otherwise indicated.

J. PENETRATIONS FOR RACEWAYS

1. Building walls may contain pretension panels. Perform x-ray inspection or similar method to determine location of pretension cables prior to cutting into walls.
2. Do not bore holes in floor and ceiling joists outside center third of member depth or within 2 feet of bearing points. Holes shall be 1-inch diameter maximum.

Exception:

- *Unless specifically approved by Structural Engineer.*

3. Penetrate through roofs with core drill hole 1/2 to 1 inch larger than conduit, flash with neoprene, caulk conduit in place and seal with silicone sealant under flashing. Sleeve roof opening where non-concrete roof construction occurs.

4.03 PROTECTION

Provide final protection and maintain conditions, in a manner acceptable to manufacturer and installer that ensures coatings, and finishes are without damage or deterioration at the time of Substantial Completion.

- A. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
- B. Repair damage to PVC or paint finishes with matching touchup coating recommended by manufacturer.

4.04 CLEANING

On completion of installation, including outlet fittings and devices, inspect exposed finish. Remove burrs, dirt, and construction debris and repair damaged finish, including chips, scratches, and abrasions.

4.05 QUALITY CONTROL

A. TESTS

1. Conduits identified as meeting the requirements of 100 percent continuity shall be tested between source and destination as follows:
 - a. Testing shall be performed using a Digital Voltmeter or Biddle ohmmeter.
 - b. Testing values shall not exceed 5 ohms.
 - c. If testing values exceed 5 ohms, then corrective action shall be taken to reduce the resistance to 5 ohms or below.
 - d. These measurements shall be documented, signed, and submitted to the Engineer for approval.

**** END OF SECTION ****

SECTION 26 27 26

WIRING DEVICES

PART 1 GENERAL

1.01 SCOPE

The work specified in this Section includes the various types of receptacles, connectors, switches, and finish plates.

1.02 SUBMITTALS

See Section 01 33 00.

1.03 QUALITY ASSURANCE

See Section 26 00 00.

1.04 DEFINITIONS

Reference Section 26 00 00, "Definitions."

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. AVAILABLE MANUFACTURERS

Subject to compliance with requirements, manufacturers offering products that may be incorporated in the work include the following:

1. Wiring Devices
 - a. Arrow Hart Div., Cooper Industries.
 - b. Bryant Electric, Inc.
 - c. Hubbell Inc.
 - d. Killark Electrical Mfg. Co.
 - e. Leviton Mfg. Co., Inc.
 - f. Pass & Seymour/Legrand.
 - g. Appleton Electric Co.
 - h. Crouse – Hinds

2. Multi-Outlet Assemblies

a. Wiremold Co.

2.02 WIRING DEVICES

Comply with NEMA Standard WD 1, "General Purpose Wiring Devices." Terminals shall be rated for 75 degrees C (min.).

A. ENCLOSURES

NEMA 1 equivalent, except as otherwise indicated.

B. COLOR

Red for generator powered receptacles and blue for UPS powered receptacles use. Ivory for others except as otherwise indicated or required by Code.

C. RECEPTACLES, STRAIGHT-BLADE AND LOCKING TYPE

Except as otherwise indicated, comply with Federal Specification W-C-596 and heavy-duty grade of UL Standard 498, "Electrical Attachment Plugs and Receptacles." Provide NRTL labeling of devices to verify compliance.

1. General Purpose Convenience Outlets

- a. Duplex receptacle configuration
- b. Nylon face
- c. Staked screw terminals for line, neutral, and ground connections.
- d. Provisions for split bus
- e. NEMA 5-20R

2. Special Purpose Receptacles

- a. Staked screw terminals for line, neutral, and ground connections.
- b. NEMA configuration as indicated.

D. RECEPTACLES, STRAIGHT-BLADE, SPECIAL FEATURES

Comply with the basic requirements specified above for straight-blade receptacles of the class and type indicated, and with the following additional requirements:

1. Ground-Fault Circuit Interrupter (GFCI) Receptacles – Class A (5 mA) Personal Protection

UL Standard 943, "Ground Fault Circuit Interrupters," with integral NEMA 5-20R duplex receptacle arranged to protect only the connected receptacle and no other receptacles connected on the same circuit. Design units for installation in a 2-3/4-inch-deep outlet box without an adapter.

E. RECEPTACLES, INDUSTRIAL HEAVY-DUTY

Conform to NEMA Standard PK 4 "Plugs, Receptacles, and Cable Connectors of the Pin and Sleeve Type for Industrial Use."

F. RECEPTACLES IN HAZARDOUS (CLASSIFIED) LOCATIONS

Comply with NEMA Standard FB 11 "Plugs, Receptacles, and Connectors of the Pin and Sleeve Type for Hazardous Locations" and UL Standard 1010 "Receptacle-Plug Combinations for Use in Hazardous (Classified) Locations."

120 VAC, 1 PH, 20 A and less, receptacles used in Class I, Divisions 1 and 2 areas, shall be dead-front, delayed action, circuit breaking type, rated for use in Class I, Division 1 and 2, Groups B, C, and D areas. These receptacles shall be rated NEMA 3, 7BCD, 9FG, and 12 and shall be suitable for use in explosion proof, dust-ignition proof, and raintight applications. Receptacles shall be rated 20 A, 125 VAC with 3/4" hubs; Crouse-Hinds #ENR 21201 with ENP 5201 plug; Killark UGR2-20231 with UGP-20231QW plug, or equivalent.

G. CONVENIENCE RECEPTACLES IN WET LOCATIONS

Convenience receptacles in wet locations shall comply with NEC Article 406.9 and shall be 20 A, 125 VAC rated terminated with binding screws.

H. PENDANT CORD/CONNECTOR DEVICES

Matching, locking type, plug and plug receptacle body connector, NEMA L5-20P and L5-20R, heavy-duty grade.

1. Bodies

Nylon with screw-open cable-gripping jaws and provision for attaching external cable grip.

2. External Cable Grip

Woven wire mesh type made of high-strength galvanized-steel wire strand and matched to cable diameter and with attachment provision designed for the corresponding connector.

I. CORD AND PLUG SETS

Match voltage, current ratings, and number of conductors to requirements of the equipment being connected.

1. Cord

Rubber-insulated, stranded copper conductors, with type SOW-A jacket. Grounding conductor has green insulation. Ampacity is equipment rating plus 30 percent minimum.

2. Plug

Male configuration with nylon body and integral cable-clamping jaws. Match to cord and to receptacle type intended for connection.

J. SNAP SWITCHES

Quiet-type ac switches, NRTL listed and labeled as complying with UL Standard 20 "General Use Snap Switches," and with Federal Specification W-S-896.

1. Lighting Switches

120/277 Vac only, rated 20 amperes.

2. Motor Rated Switches

Horsepower rated for application indicated.

3. Hazardous Area Switch

a. Rated for Class 1, Division 1, Group D.

b. UL 894 compliant

c. Switch enclosed in a separate sealing chamber.

K. WALL PLATES

Single and combination types that mate and match with corresponding wiring devices. Features include the following:

1. Color

Matches wiring device except as otherwise indicated.

2. Plate-Securing Screws

Metal with heads colored to match plate finish.

3. Material for Interior Finished Spaces
Lexan, except as otherwise indicated.
4. Material for Interior Unfinished Spaces: Galvanized steel.
5. Material for Laboratories: Stainless steel.
6. Material for Exterior or Wet Locations: Cast Aluminum.

2.03 MULTI-OUTLET ASSEMBLIES

- A. Comply with Standard UL 5, "Surface Metal Raceways and Fittings."

- B. COMPONENTS OF ASSEMBLIES

Products of a single manufacturer designed to be used together to provide a complete matching assembly of raceways and receptacles.

- C. RACEWAY MATERIAL

Metal, with manufacturer's standard corrosion-resistant finish.

- D. WIRE

No. 12 AWG.

PART 3 EXECUTION

3.01 INSTALLATION

- A. IDENTIFICATION

Each receptacle shall be labeled per Specification Section 01 78 23.01.

- B. RECEPTACLE BOXES

1. Reference Section 26 05 33 for box types.

2. Mounting Height

- a. Indoor, in DRY Areas

Indoor receptacle boxes in DRY areas shall be mounted 12 inches above the floor unless shown otherwise on the Plans.

- b. Indoor, in WET Areas

Indoor receptacle boxes in WET areas shall be mounted 42 inches above the floor unless shown otherwise on the Plans.

c. Outdoor

Outdoor receptacle boxes shall be mounted 18 inches above grade unless shown otherwise on the Plans.

3. Reference Section 26 05 33 for box cover types.

C. CONVENIENCE RECEPTACLES

Convenience receptacles shall be 20 A, duplex, white, GFCI, straight blade, 3-wire, grounding, unless called out otherwise on the Plans.

In addition to any GFCI requirements, all receptacles, convenience or dedicated, located in break rooms and kitchens shall be AFCI.

D. ARRANGEMENT OF DEVICES

Except as otherwise indicated, mount flush, with long dimension vertical, and grounding terminal of receptacles on bottom. Group adjacent switches under single, multigang wall plates.

1. See "Raceways and Boxes" Section for mounting height of devices.
2. Verify locations of outlets and switches in cabinetry with cabinet supplier and Owner prior to installation.

E. INSTALLATION PRACTICES

1. Install devices and assemblies plumb, level, flush and secure. Provide spacers on device screws to flush yokes or flanges to surface of wall within 1/16 of an inch where boxes are not flush with the wall surface. Install wiring devices such as receptacles to withstand 50 pounds force applied perpendicular to the device face with a maximum deflection of 1/16 of an inch.
2. Protect devices and assemblies during painting.
3. Use corrosion resistant devices in kitchen areas and outdoors.
4. Wiring connections shall be made by compression on the screw terminals. The wire shall be neatly and symmetrically wrapped around the screw a minimum of 180 degrees.

F. LIGHT SWITCH ORIENTATION

Install switches with the "off" position down. Install three and four way switches so the load is "off" when all switch handles are down.

G. TERMINATION PRACTICES

Connect phase, neutral, and grounding wires to devices with full loops around screws installed to tighten with tightening of the screw. Trim insulation to within 1/8 of an inch of screw terminal.

H. WALL PLATES

Install after painting is complete. Install with an alignment tolerance of 1/16 of an inch to plumb. Install at flush mounted devices so that all four edges are in continuous contact with finished wall surface without the use of mats or similar devices. Do not use plaster fillings.

3.02 GROUNDING

Connect receptacle or switch ground lug to device box for devices other than isolated ground type.

3.03 FIELD QUALITY CONTROL

Test wiring devices for proper connections, polarity, and ground continuity. Perform this testing with testing equipment designed for testing polarity and connections.

Operate each operable device at least six times.

Demonstrate charging the owner's electronic devices at each USB receptacle.

Test ground-fault circuit interrupter operation with local fault simulations, using a tester designed for such testing, and according to manufacturer recommendations. Testing with integral test switches on the receptacle is not sufficient for this testing.

Replace damaged or defective components, and retest.

**** END OF SECTION ****

SECTION 26 28 16

ENCLOSED SWITCHES AND CIRCUIT BREAKERS

PART 1 GENERAL

1.01 SCOPE

The work specified in this Section consists of individually mounted switches and circuit breakers used for the following:

- A. Feeder and equipment disconnect switches
- B. Feeder and branch-circuit protection
- C. Motor safety disconnect switches

1.03 SUBMITTALS

Submit under the provisions of Section 01 33 00.

Manufacturer's Product Data for disconnect switches, circuit breakers, and accessories specified in this Section.

Maintenance data for tripping devices to include in the operation and maintenance manual specified in Section 01 78 23.

1.04 QUALITY ASSURANCE

See Section 26 00 00.

Obtain disconnect switches and circuit breakers from one source and by a single manufacturer.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. AVAILABLE MANUFACTURERS

Subject to compliance with requirements, manufacturers offering disconnect switches and circuit breakers that may be incorporated into the work include:

1. Eaton, Corp., no substitutions permitted.

2.02 DISCONNECT SWITCHES

A. MOTOR SAFETY DISCONNECT SWITCHES

Motor safety disconnect switches shall be provided when the motor starter is not in sight of the associated motor or when shown on the Plans. Motor safety disconnect switches shall be provided with the following specifications.

1. Separately Enclosed Knife Type Switches

- a. Switches shall not be fused unless specifically shown otherwise on the Plans.
- b. Switches shall include pad lockable handles, lockable in both the open and closed positions.
- c. Switches shall be rated at 600 V.
- d. Switches shall include two auxiliary contacts, rated at 10 A at 250 Vac each, connected to the switch pivot arm that are open when the switch is open, closed when the switch is closed.
- e. Switches shall be rated at motor horsepower or as per the Plans, whichever is the larger.
- f. Switch enclosures shall be NEMA 4X stainless steel unless specifically stated otherwise in the Plans or through the approval of the Owner.

2. Switches Incorporated into a Field Control Panel

- a. Three Phase Switches, 15 HP and Smaller.

Switches shall be 2-position, OFF-ON, 90 degree, 600 VAC, 20 A, 32 A, or 40 A rating, 4-pole, front door installation; Allen Bradley 194L-E~~aa~~-1754 or equal,

where:

aa = 20 for motors less than 10 HP,
aa = 32 for a 10 HP, 460 VAC motor,
aa = 40 for a 15 HP, 460 VAC motor.

The 4th pole is reserved for switch position sensing.

Associated switch actuators shall be OFF-ON, 90 degree, front/door installation, IP66 rated, 22.5 mm central hole mount, square, grey/black handle with padlock provision, 64 mm x 64 mm; Allen Bradley 194L-HC6E-175I or equal.

2.03 ENCLOSED CIRCUIT BREAKERS

A. ENCLOSED, MOLDED-CASE CIRCUIT BREAKER

NEMA AB 1, with lockable handle in both the open and closed positions.

B. CHARACTERISTICS

Frame size, trip rating, number of poles, and auxiliary devices as indicated on the Plans with interrupting rating to meet available fault current.

1. MCC and feeder breakers shall be molded case breakers with thermal magnetic trip.
2. Motor circuit breakers shall be magnetic only trip with adjustable trip setting.
3. Branch circuit breakers shall be molded case, thermal-magnetic trip, trip-free with non-interchangeable, non-adjustable trip unless otherwise noted.

C. MOLDED-CASE SWITCH

Where indicated, molded-case circuit breaker without trip units.

D. LUGS

Mechanical lugs and power-distribution connectors suitable for copper conductors of the number and size indicated.

E. SHUNT TRIP

Where indicated.

PART 3 EXECUTION

3.01 COORDINATION OF ELECTRICAL PROTECTION DEVICES

A. The Contractor shall provide coordination of circuit breakers, fuses, and other associated protective devices.

1. For adjustable breakers, provide the values for continuous, short-time, instantaneous, ground fault, and other relevant trip and delay settings. Adjust breakers as per 3.04.

2. Provide to the Owner and Engineer calculations, plots, and overlays that clearly show proper coordination of protection circuits.

3.02 INSTALLATION

- A. Install the disconnect switches and circuit breakers level and plumb in locations as indicated, according to manufacturer's written instructions.
- B. Install wiring between disconnect switches, circuit breakers, control, and indication devices.
- C. Connect disconnect switches and circuit breakers and components to wiring system and to ground as indicated and as instructed by manufacturer.
 1. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. Where manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.
- D. Identify each disconnect switch and circuit breaker according to requirements specified in Section 26 00 00.

3.03 FIELD QUALITY CONTROL

A. TESTING

1. Prior to Energization

After installing disconnect switches and circuit breakers, perform visual and mechanical inspection of enclosure and devices.

Check connections and mounting for proper torque.

Correct or replace malfunctioning units and retest.

Remove any burrs, filings, or other foreign materials from enclosure. Completely wipe down and vacuum enclosure.

2. After Energization

After electrical circuitry has been energized, demonstrate product capability and compliance with requirements.

Correct malfunctioning units on site where possible and retest to demonstrate compliance; otherwise, remove and replace with new units and retest.

3.04 ADJUSTING

Set field-adjustable disconnect switches and circuit-breaker trip ranges as indicated.

Provide fuses for fused disconnect switches to coordinate with manufacturer's listed maximum fuse size for equipment supplied by the disconnect switch.

***** END OF SECTION *****

SECTION 26 46 00

LOW VOLTAGE TRANSFORMERS

PART 1 GENERAL

1.01 SCOPE

The work specified in this Section consists of dry-type distribution and specialty transformers rated 1000 V and less.

1.02 SUBMITTALS

Submit under the provisions of Section 01 33 00.

A. PRODUCT DATA

Submit the following:

1. Nameplate ratings
2. Mounting methods
3. Dimensioned plans, sections, elevation views and minimum clearances

B. WIRING DIAGRAMS

Submit manufacturer's wiring diagrams and clearly identify terminals for tap changing and connecting field-installed wiring.

C. FIELD TEST REPORTS

Indicate and interpret test results for tests specified in Part 3.

D. MAINTENANCE DATA

Include in the maintenance manuals specified in Division 1.

1.03 QUALITY ASSURANCE

See Section 01 45 16.13 for Contractor Quality Control.

1.04 DELIVERY, STORAGE, AND HANDLING

Apply temporary heat according to manufacturer's written instructions within the enclosure of each ventilated-type unit throughout periods during which equipment is not energized and is not in a space that is continuously under normal control of temperature and humidity.

PART 2 PRODUCTS

2.01 MANUFACTURERS

Subject to compliance with requirements, provide transformers by one the following:

- A. Cutler-Hammer/Eaton Corp.
- B. GE Electrical Distribution & Control.
- C. Siemens Energy & Automation, Inc.
- D. Square D; Schneider Electric.
- E. Federal Pacific.
- F. Or equal.

2.02 TRANSFORMERS, GENERAL

A. DESCRIPTION

Factory-assembled and -tested, air-cooled units of types and sizes specified, designed for 60-Hz service.

B. CORES

Grain-oriented, nonaging silicon steel.

C. COILS

Continuous copper windings without splices, except for taps.

D. INTERNAL COIL CONNECTIONS

Brazed or pressure type.

E. ENCLOSURE

Class complies with NEMA 250 for the environment in which installed.

F. SOUND LEVELS

Manufacturer shall guarantee not to exceed the following:

- 1. Up to 9 kVA: 40 dB.

2. 10 to 50 kVA: 45 dB.
3. 51 to 150 kVA: 50 dB.
4. 151 to 300 kVA: 55 dB.

G. EFFICIENCY

Ventilated, dry type, 15 kVA and larger: Energy efficient meeting DOE 2016 requirements.

2.03 GENERAL-PURPOSE DISTRIBUTION AND POWER TRANSFORMERS

Comply with NEMA ST 20 and list and label as complying with UL 1561.

A. CORES

One leg per phase.

B. WINDINGS

One coil per phase in primary and secondary.

C. ENCLOSURE

As follows unless otherwise indicated.

1. Indoor, ventilated.

D. INSULATION CLASS

185 or 220 degrees C class for transformers 15 kVA or smaller;
220 degrees C class for transformers larger than 15 kVA.

1. Rated Temperature Rise

150 degrees C maximum rise above 40 degrees C for 220 degrees C class insulation; 115 degrees C maximum rise for 185 degrees C class insulation.

E. TAPS

For transformers 3 kVA and larger, full-capacity taps in high-voltage windings are as follows:

1. Taps, 3 through 25 kVA

Two 5-percent taps below rated high voltage.

2. Taps, 25 through 500 kVA

Six 2.5-percent taps, 2 above and 4 below rated high voltage.

F. WALL-MOUNTING BRACKETS

Manufacturer's standard brackets for wall mounted transformers up to 75 kVA.

2.04 CONTROL AND SIGNAL TRANSFORMERS

- A. Units comply with NEMA ST 1 and are listed and labeled as complying with UL 506.

B. RATINGS

Continuous duty. If rating is not indicated, provide capacity exceeding peak load by 50 percent minimum.

C. DESCRIPTION

Self-cooled, 2 windings.

2.05 FINISHES

A. INDOOR UNITS

Manufacturer's standard paint over corrosion-resistant pretreatment and primer.

B. OUTDOOR UNITS

Comply with ANSI C57.12.28.

2.06 SOURCE QUALITY CONTROL

Design and routine factory tests comply with referenced standards.

PART 3 EXECUTION

3.01 INSTALLATION

Comply with safety requirements of IEEE C2.

Arrange equipment to provide adequate spacing for access and for circulation of cooling air.

Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

3.02 GROUNDING

Comply with NFPA 70 requirements for connecting to grounding electrodes and for bonding to metallic piping near the transformer.

Comply with Division 26 Section "Grounding and Bonding" for materials and installation requirements.

3.03 FIELD QUALITY CONTROL

Test to ensure transformer is operational within industry and manufacturer's tolerances, is installed according to the Contract Documents, and is suitable for energizing.

A. TESTS

Include the following minimum inspections and tests according to manufacturer's written instructions.

1. Inspect accessible components for cleanliness, mechanical and electrical integrity, and damage or deterioration. Verify that temporary shipping bracing has been removed. Include internal inspection through access panels and covers.
2. Inspect bolted electrical connections for tightness according to manufacturer's published torque values or, if not available, those specified in UL 486A and UL 486B.
3. Insulation Resistance: Perform megohmmeter tests of primary and secondary winding to winding and winding to ground.

B. TEST FAILURES

Compare test results with specified performance or manufacturer's data. Correct deficiencies identified by tests and retest. Verify that transformers meet specified requirements.

3.04 CLEANING

On completion of installation, inspect components. Remove paint splatters and other spots, dirt, and debris. Repair scratches and mars on finish to match original finish. Clean components internally using methods and materials recommended by manufacturer.

3.05 ADJUSTING

After installing and cleaning, touch up scratches and mars on finish to match original finish.

Adjust transformer taps to provide optimum voltage conditions at utilization equipment throughout normal operating cycle of facility. Record primary and secondary voltages and tap settings and submit with test results.

***** END OF SECTION *****

Division 31

Earthwork

SECTION 31 10 00

CLEARING AND GRUBBING

PART 1 GENERAL

1.1 SCOPE

The work specified in this Section includes the clearing, grubbing, and stripping of the proposed project areas in preparation of foundations, and pipe installation.

1.2 DEFINITIONS

"Clearing, grubbing, and stripping debris" as hereinafter used shall be considered as all material removed by the clearing, grubbing, and stripping operations.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

3.1 DISPOSAL OF CLEARING AND GRUBBING DEBRIS

Clearing and grubbing debris shall be disposed of by hauling to waste and disposal sites approved by the Owner.

3.2 CLEARING AND GRUBBING

Clearing and grubbing shall be performed as required to complete the work shown on the Plans and shall include removal and disposal of all trees, logs, brush, stumps, roots, and minor manmade structures including but not limited to concrete, asphalt abandoned metal and equipment, rubbish and debris to the limits indicated on the Plans or as required and approved by the Owner. This work shall be to a depth necessary to remove stumps, large roots and all other objectionable material. This work shall also include the protection from injury or defacement of trees, bushes, shrubs, and other objects designated to remain.

***** END OF SECTION *****

SECTION 31 20 00

SITE EARTHWORK

PART 1 GENERAL

1.1 SCOPE

The work specified in this Section includes the earthwork, including trench excavation and backfill for piping, excavation and backfill for structures, and finish grading.

PART 2 PRODUCTS

2.1 GRAVEL MATERIALS

All gravel materials shall conform to Section 31 23 23.

PART 3 EXECUTION

3.1 PREPARATION

Excavation may commence once all erosion control measures are in place in accordance with the Plans and Section 31 25 00 and to the satisfaction of the Owner.

3.2 GENERAL REQUIREMENTS

Excavation, compaction and backfill for structures, pipelines and the final site contours shall be formed by either excavating or compacting fill, as required, to provide the cross-sections as shown on the Plans.

All excavation performed on this project shall be considered unclassified. Excavation shall consist of the removal of any and all material encountered, including debris, rubble, concrete, metal, topsoil, cutting and removal of existing surfacing, tree stumps, trees, logs, abandoned rail ties, abandoned piping, piling, riprap, etc.

Excavations shall be kept free of water, both surface water and groundwater, during the excavation, installation of pipelines and structures, and the placement of backfill.

The Contractor's attention is also called to the depth of the structures and piping; for this reason, special shoring and bracing may be required. All shoring and bracing or sheeting required to perform and protect the excavation and to safeguard the employees, shall be furnished by the Contractor. For additional requirements see Section 31 40 00.

No timber bracing, lagging, sheathing or other lumber shall be left in any excavation except with permission of the Owner and in the event such permission is granted, no separate payment shall be allowed for burying such material.

All stockpiles shall be covered with plastic and no stockpile shall be higher than 6 feet above existing grade.

3.3 EXCAVATION AND BACKFILL FOR STRUCTURES

Excavation and backfill for structures shall be in conformance with Section 2-09 of the WSDOT Standard Specifications, and as further described herein. All excavation for structures shall be done to the dimensions and levels indicated on the Plans or specified herein. Excavation shall be made to such width outside the lines of the structures to be constructed as may be required for proper working methods, the erection of forms and the protection of the work.

Excavation shall consist of the removal of any and all material encountered to the elevations shown on the Plans. Excavations for structures shall be continued down to the subgrade which is defined as 12 inches below vaults or structures for the installation of foundation gravel material, unless otherwise noted on the Plans.

Fill material placed under structures, including vaults, footings and floor slabs, shall be foundation gravel free from debris and organics, as specified in Section 31 23 23.

The Contractor shall notify the Owner when excavation for compacted fill or structures is complete. No forms, reinforcing steel, or concrete shall be placed until the excavation has been inspected by the Engineer.

Backfill for structures shall be suitable native material, free of organics and particles greater than 4 inches or Bank Run Gravel as specified in Section 31 23 23.

There is no warranty that the native material is suitable for backfill or is suitable, as excavated, for placement and compaction as required by these Specifications. In the event that the Contractor is unable to find onsite, sufficient native material to accomplish the structure backfilling, the select material that he shall furnish and install shall be Bank Run Gravel, as specified in Section 31 23 23.

3.4 PROTECTION OF FOUNDATION SURFACES

Care shall be taken to preserve the foundation surfaces shown on the Plans in an undisturbed condition. If the Contractor unnecessarily over excavates or disturbs the foundation surfaces shown on the Plans or specified herein without written authorization of the Owner the Contractor shall replace such foundations with concrete fill or other suitable material approved by the Owner in a manner which will show by test an equal bearing capacity with the undisturbed foundation material. No additional payment shall be made for the added quantity of concrete fill or other suitable material used because of unnecessary over excavation caused by the Contractor or his operations.

3.5 EXCAVATION AND BACKFILL FOR TRENCHES

Excavation and backfill for trenches shall be in conformance with Sections 7-08 and 7-09 of the WSDOT Standard Specifications, and as further described herein. The following pipe materials shall be considered flexible:

- PVC
- Polyethylene Tubing
- FRP
- HDPE
- Polyethylene
- Corrugated Polyethylene

All other pipe materials shall be considered rigid.

Upon completion of work each day, all pipeline open trenches shall be completely backfilled, leveled, and temporarily patched or graveled, as herein specified. Under certain conditions, the trench may be left open at the last length of pipe laid during the day to avoid re-excavation the following morning, provided that the opening is adequately plated or covered for vehicle traffic. Special attention shall be given to barricading to keep vehicular traffic away from newly-backfilled trench areas until restored for traffic.

The Owner reserves the right to restrict the Contractor in the amount of trench for pipeline that can be opened during the working day. Should the Contractor, in the Owner's opinion, fail to diligently pursue backfilling, an allowable limit of open trench shall be 100 lineal feet and shall be strictly enforced.

The width of the trench at or below a point 12 inches above the top of the outside diameter of the pipe shall be carefully controlled and maintained to ensure the strength of the pipe and prevent pipe failures. Backfilling shall proceed as follows:

A. SUBGRADE PREPARATION

The subgrade for piping is defined as the elevation of the bottom of the pipe bedding material as shown on the Plans.

In the event unsuitable material is encountered below the subgrade shown on the Plans and described herein, the Contractor, as required by the Owner, shall over-excavate until a suitable foundation is reached. The Contractor shall then replace the material with compacted Foundation Gravel, as specified in Section 31 23 23.

Quantities, if any, shall be calculated by neat line measurement to the depth agreed to in the field by the Owner. Payment for excavation and backfill for unsuitable material will be made under Minor Changes.

B. BEDDING FOR FLEXIBLE PIPE

Above the foundation material, if any, Gravel Backfill for Pipe Bedding, as specified in Section 31 23 23, shall be placed in lifts of approximately 8 inches up to a point 12 inches above the pipe. This material shall be hand shoveled in place and carefully worked under and around the pipe.

C. BACKFILL FOR TRENCHES

Partial backfill to protect the pipe will be permitted immediately after the pipe has been properly laid in accordance with the Plans and these Specifications. Complete backfilling of trenches will not be permitted until the section of pipe installed has been inspected by the Owner.

From the point 12 inches above the top of the pipe barrel, the backfill material to be used in the trench section shall be Bank Run Gravel, as specified in Section 31 23 23, except where required or shown on the Plans to use other material. The Contractor shall place backfill in horizontal lifts not to exceed 8 inches in thickness. All backfill shall be free of large rocks, organic matter, stumps, trees, pieces of pavement, broken concrete and other deleterious substances.

The Contractor shall remedy, at his expense, any defects that appear in the backfill prior to final acceptance of the work. Cleanup operations shall progress immediately behind backfilling to accommodate the return to normal use of the trench area.

During placement of the initial lifts, the backfill material shall not be bulldozed into the trench or dropped directly over the pipe with less than 3 feet of backfill material above the top of the pipe.

3.6 DISPOSAL OF EXCAVATED MATERIAL

Excavated materials shall be hauled to an approved waste site(s), as selected by the Contractor. The Contractor shall submit a list of approved waste haul site(s) to the Owner prior to the commencement of hauling of waste materials. Any permits required for waste haul and disposal shall be the responsibility of the Contractor.

3.7 FINAL SITE GRADING

The site shall be graded consistent with the elevations shown on the Plans. The slopes between elevations shall be uniform or as shown on the Plans. Excavations and backfill shall be to the elevations required for the placement of all surface restorations, such as asphalt, concrete, gravel surfacing, or landscaping. All areas shall be graded to provide proper drainage. The final ground surface shall be smooth, raked free of debris and stones, and prepared for restoration as specified in Section 32 11 16.

3.8 STRUCTURE COMPACTION

The foundation gravel material placed underneath all structures shall be moisture conditioned to within 3 percent of optimum moisture content and shall be placed in loose, horizontal layers. The thickness of layers placed before compaction shall not exceed 8 inches for heavy equipment compactors and shall not exceed 4 inches for hand-operated mechanical compactors. Water settlement is not allowed for compaction.

Layers shall be compacted to a dense state equaling at least 95 percent of the maximum dry density, using the Modified Proctor, per ASTM D1557. Prior to the placement of fill below structures, any and all groundwater and surface water shall be drained or pumped from areas to be filled.

Wall backfill material shall be compacted to at least 90 percent of the maximum dry density, using the Modified Proctor, per ASTM D1557 within 5 feet of all walls and shall be compacted to at least 95 percent of the maximum dry density, using the Modified Proctor, per ASTM D1557 beyond 5 feet of all walls. Any and all compaction within 5 feet of all walls shall be accomplished by means of hand-operated mechanical equipment rather than heavy equipment compactors.

3.9 TRENCH COMPACTION

Trench backfill materials shall be moisture conditions to within 3 percent of optimum moisture content. Water settlement is not allowed for compaction.

Pipe bedding materials, for both rigid and flexible pipes, shall be compacted to at least 95 percent of the maximum dry density, using the Modified Proctor, per ASTM D1557.

Compaction of the backfill above the bedding material in all trenches in non-structural and non-paved areas shall be performed by using mechanical equipment to at least 90 percent of the maximum dry density, using the Modified Proctor, per ASTM D1557.

Compaction of the backfill above the bedding material in all trenches in structural or paved areas shall be performed by using mechanical equipment to at least 95 percent of the maximum dry density, using the Modified Proctor, per ASTM D1557.

***** END OF SECTION *****

SECTION 31 23 19

DEWATERING

PART 1 GENERAL

1.1 SCOPE

The work specified in this Section includes dewatering excavations of any kind and location, including but not limited to groundwater, surface water, and precipitation, until backfilling has been completed to finished grade.

1.2 SUBMITTALS

Prior to the start of construction, the Contractor shall submit a dewatering plan in accordance with Section 01 33 00 containing both a graphical and narrative presentation identifying proposed methods, equipment sizes and contingency plans should dewatering cause settlement of any adjacent facilities. The dewatering plan shall show specific locations, in plan and section, where dewatering is expected as well as a general discussion of methods to be employed should water be encountered in other locations. The plan shall detail the depth, diameter and anticipated flow for dewatering wells, well points or sumps.

Acceptance by the Owner of the method, installation, and operation and maintenance details submitted by the Contractor shall not in any way be considered to relieve the Contractor from full responsibility for errors therein or from the entire responsibility for complete and adequate design and performance of the system in controlling the water level in the excavated areas, and for control of the hydrostatic pressures to the depths specified herein. The Contractor shall be solely responsible for the proper design, installation, proper operation, maintenance, and any failure of any component of the dewatering system.

1.3 REFERENCES

"Rossum J.R., 1954, *Control of Sand in Water Systems*, Journal American Water Works Association, Volume 46, pp. 123-132"

1.4 QUALITY CONTROL

It shall be the sole responsibility of the Contractor to control the rate and effect of the dewatering efforts to avoid all objectionable settlement and subsidence. The Contractor shall comply with local codes and ordinances of governing authorities with regard to disposal of water pumped from dewatering operations.

Proposed discharge points shall be approved by the Owner prior to implementation of dewatering. The Contractor shall be responsible for taking all reasonable precautions necessary to ensure continuous, successful operation of the system.

PART 2 PRODUCTS

Dewatering shall be at the Contractor's discretion.

The Contractor shall have sufficient pumping equipment and/or other machinery available onsite before operations begin to assure that the operation of the dewatering system can be maintained. This shall include providing backup pumps of similar capacity and a standby generator of the capacity required to continuously operate the Contractor's dewatering system.

PART 3 EXECUTION

3.1 INSTALLATION AND APPLICATION

During excavation, the installation of piping, conduits and structures and during the placing of backfill, excavations shall be kept free of water, subsurface or otherwise. The Contractor shall furnish all equipment necessary to dewater the excavations and shall dispose of the water so as not to cause a nuisance or menace to the public. The dewatering system shall be installed and operated by the Contractor so that the groundwater level outside the excavation is not reduced to the extent that would damage or endanger adjacent structures or property. The release of groundwater to its static levels shall be performed so as to maintain the undisturbed state of the foundation soils, prevent disturbance of backfill and prevent movement of all structures and pipelines.

Design implementation and maintenance of any dewatering system shall be the responsibility of the Contractor.

The Contractor shall construct all dewatering wells in accordance with WAC 173-160. The dewatering system shall be sufficient to maintain the groundwater level at an elevation to protect the surface of the trench bottoms, the base of the bedding course or other foundation, and shall be accomplished prior to pipe laying and jointing or placement of reinforcing steel for concrete.

If well points or wells are used, they shall be adequately spaced to provide the necessary dewatering. The dewatering operation, however accomplished, shall be carried out so that it does not destroy or weaken the strength of the soil under or alongside the excavations.

The Contractor shall design filters and screen slot sizes for all sumps, wells and well points which prevents the movement of fines during pumping. The Contractor shall develop the wells such that they produce no more than 10-ppm silica as measured with a Rossum Sand Tester (Rossum, 1954) or equivalent.

3.2 MONITORING

The Contractor shall install water level observation wells in dewatered areas sufficient to determine whether groundwater levels are maintained as per Part 3.1 of this Section.

3.3 FIELD QUALITY CONTROL

A continual check by the Contractor shall be maintained to ensure that the subsurface soil is not being removed by the dewatering operation. The Contractor shall test all dewatering discharge using a Rossum Sand Tester or equivalent to determine the silica content of the discharge. The Contractor shall notify the Owner at least 24 hours prior to testing. Where critical structures or facilities exist immediately adjacent to areas of proposed dewatering, reference points shall be established and observed at frequent intervals to detect any settlement that could develop.

Should settlement be observed, the Contractor shall cease dewatering operations and implement contingency plans as outlined in the Contractor's approved dewatering plan. The responsibility for conducting the dewatering operation in a manner that protects adjacent structures and facilities rests solely on the Contractor. The cost of repairing any damage to adjacent structures and restoration of facilities shall be the responsibility of the Contractor. Permanent piping systems, existing or new, shall not be incorporated into the Contractor's dewatering system.

***** END OF SECTION *****

SECTION 31 23 23

GRAVEL MATERIALS

PART 1 GENERAL

1.1 SCOPE

The work specified in this Section includes the various types of granular materials that are to be used in trenches and other excavations as shown on the Plans and as specified herein.

1.2 SUBMITTALS

The Contractor shall provide certificates of laboratory tests in accordance with Section 01 33 00, indicating particle size distribution for review for each type of granular material furnished and proctor test reports for all material to be placed as pipe bedding material, trench backfill, backfill under and around structures and underneath crushed surfacing and asphalt concrete pavements.

The certificates and proctor test reports shall be provided to the Owner at least 5 calendar days prior to placement.

PART 2 PRODUCTS

2.1 FOUNDATION GRAVEL

Foundation gravel shall be Class A Gravel Backfill for Foundations in conformance with Section 9-03.12(1)A of the WSDOT Standard Specifications.

2.2 GRAVEL BACKFILL FOR PIPE BEDDING

Gravel backfill for pipe bedding shall meet the requirements of Section 9-03.12(3) of the WSDOT Standard Specifications except that no more than 5 percent passing shall pass the No. 200 Sieve.

Native granular material shall not be utilized for gravel backfill for pipe bedding.

2.3 BANK RUN GRAVEL FOR TRENCH BACKFILL

Bank run gravel for trench backfill shall be free from organic matter or other deleterious materials and in conformance with Section 9-03.19 of the WSDOT Standard Specifications.

PART 3 EXECUTION

3.1 FOUNDATION GRAVEL

Foundation gravel shall be placed and compacted underneath all structures to a minimum depth of 12 inches unless indicated otherwise on the Plans, and to a greater depth where foundations are unstable and excess suitable excavated material is unavailable to stabilize such foundations.

3.2 GRAVEL BACKFILL FOR PIPE BEDDING

Bedding material shall be placed simultaneously on both sides of the pipe for the full width of the trench in lifts not exceeding 6 inches. To assure uniform support, the material shall be carefully worked underneath the pipe haunches with a tool capable of preventing the formation of void spaces around the pipe. In the event the Contractor overexcavates the pipe trench, or if the width of the pipe trench becomes wider than shown on the Plans, all material so placed shall be at the Contractor's sole expense.

3.3 BANK RUN GRAVEL FOR TRENCH BACKFILL

Bank run gravel for trench backfill shall be used where excavated material is unsuitable or unavailable for the backfill of trenches as approved by the Owner.

***** END OF SECTION *****

SECTION 31 25 00

EROSION CONTROL

PART 1 GENERAL

1.1 SCOPE

The work specified in this Section includes the temporary erosion and sedimentation control (TESC) in and around the site caused by the actions of the Contractor as shown on the Plans and as specified herein.

Work under this Section shall be directed towards site areas disturbed during construction as well as all off-site storage and parking areas maintained by the Contractor.

PART 2 PRODUCTS

2.1 STORM DRAIN INLET (CATCH BASIN) PROTECTION

Storm drain inlet protection shall be with a "silt sack," as manufactured by ACF Environmental or equal.

PART 3 EXECUTION

3.1 PREPARATION

Site preparation work shall be performed only during periods when beneficial results can be obtained. When drought, excessive moisture or other unsatisfactory conditions prevail, the work shall be stopped.

3.2 BEST MANAGEMENT PRACTICES (BMPS)

All areas or drainage ways downstream of the construction site shall have Best Management Practices (BMPs) installed prior to the beginning of any clearing activities. Runoff from cleared or disturbed area shall be directed through the BMPs. Disturbed ground shall be stabilized at the end of each work day.

All BMPs shall be inspected, maintained and kept in a condition sufficient to provide effective erosion and sedimentation control at all times. The site shall be inspected to ensure the BMPs are properly located, constructed and operating as designed during the first storm. Any necessary adjustments or repairs shall be made immediately and be approved by the Owner. The BMPs shall be inspected thereafter as noted on the Plans and after all significant storm events.

All BMPs shall be removed no later than 30 consecutive calendar days after final site stabilization has been achieved as determined by the Owner. BMPs such as storm drain inlet protection, straw bales, silt fences and supports and plastic coverings shall be removed and properly disposed of offsite by the Contractor. Areas disturbed by removal of these BMPs shall be immediately stabilized in a manner approved by the Owner.

***** END OF SECTION *****

SECTION 31 40 00

TEMPORARY SHORING AND BRACING

PART 1 GENERAL

1.1 SCOPE

The work specified in this Section includes the temporary shoring and bracing for excavations including the trench excavation safety systems as shown on the Plans and as specified herein.

1.2 WORK INCLUDED

The extent of temporary shoring and bracing work includes, but is not limited to:

- A. Temporary shoring and bracing necessary to protect the following against loss of ground or caving embankments: existing structures, buildings, roads, walkways, utilities, electrical transmission towers and support wiring, other facilities and improvements where required to comply with codes and authorities having jurisdiction.
- B. Trench excavation safety systems, pursuant to RCW Chapter 49.17 and WAC 296-155-655.
- C. Maintenance of shoring and bracing.

1.3 QUALITY ASSURANCE

A. SHORING CONSULTANT

The Contractor shall engage the services of a qualified geotechnical engineer and qualified structural engineer registered in the State of Washington to design temporary shoring and bracing when required by applicable regulations.

B. SHORING DESIGN

The Contractor shall provide layout and design drawings and specifications for shoring and bracing when a trench box is inadequate for the purpose or will not be used and trench depth exceeds 4 feet and back sloping will not be used. Temporary shoring and bracing system design and calculations shall be prepared, stamped, and signed by a Professional Engineer registered in the State of Washington.

C. REGULATIONS

The Contractor shall design sheeting, shoring and bracing in accordance with the Washington State Safety Code and any local codes and ordinances of governing authorities having jurisdiction.

1.4 SUBMITTALS

The Contractor shall submit shoring and bracing layout and design drawings, calculations and other backup data to the Owner for review in accordance with Section 01 33 00 prior to the start of construction.

1.5 PROJECT CONDITIONS

A. SITE SURVEY

The background survey information provided on the Plans is shown for clarity only. The Contractor shall determine, before commencing work, the exact location of all existing features that may be disrupted by new construction, including existing underground utilities. The Contractor shall be fully responsible for any and all damages, which might be caused by the Contractor's failure to exactly locate and/or preserve existing site features. Prior to commencing work, the Contractor shall check and verify governing dimensions and elevations.

The Contractor shall survey adjacent structures and facilities, establishing exact elevations at fixed points to act as temporary bench marks to monitor potential settlement from the contractor's ongoing operations. Clearly identify temporary bench marks and record existing elevations from the control points shown on the Plans.

During excavation, the Contractor shall resurvey bench marks weekly. The Contractor shall maintain and make available at the job site an accurate log of surveyed elevations for comparison with original elevations, and promptly notify the Owner if changes in elevations occur or if cracks, sags or other damage is evident.

1.6 EXISTING UTILITIES

The Contractor shall protect existing active sewer, water, gas, electrical, and other utility services and structures that may be present. This shall also include all pipelines, services, and structures that are the property of the Owner.

PART 2 PRODUCTS

The Contractor shall provide suitable shoring and bracing materials, which shall support loads imposed. Materials for shoring systems need not be new, but shall be in serviceable conditions.

PART 3 EXCAVATION

3.1 VERIFICATION OF CONDITIONS

The Contractor shall notify the Owner immediately if, during construction, subsurface conditions are different from those encountered in the exploratory holes.

3.2 INSTALLATION AND APPLICATION

The Contractor shall provide shoring systems adequately anchored and braced to resist earth and hydrostatic pressures at locations as needed to support excavations during construction. The Contractor shall locate required bracing to clear all permanent work. Bracing which must be relocated shall be installed prior to the removal of original bracing. The Contractor shall not place bracing where it will be cast into or included in permanent concrete work, except as otherwise acceptable to the Owner. The Contractor shall maintain bracing until structural elements are rebraced by other bracing or until permanent construction is able to withstand lateral earth and hydrostatic pressures.

3.3 REMOVAL

The Contractor shall remove shoring and bracing in stages to avoid disturbances to adjacent and underlying soils and damage to structures, pavements, facilities and utilities. The Contractor shall repair or replace, as acceptable to the Owner, adjacent work damaged or displaced through the installation or removal of shoring and bracing work.

3.4 EXCAVATION SAFETY SYSTEMS

All work shall be carried out with due regard for public safety. Open trenches shall have proper barricades and at night they shall be distinctly indicated by adequately placed lights, as provided for elsewhere in the Specifications.

The Contractor is reminded that the Owner has not so delegated, and the Owner's Representative does not purport to be a trench or excavation system safety expert, is not so engaged in that capacity under this Contract, and has neither the authority nor the responsibility to enforce construction, safety laws, rules, regulations, or procedures or to order the stoppage of work for claimed violations of trench or excavation safety.

The furnishing by the Owner of resident representation and inspection personnel shall not make the Owner responsible for the enforcement of such laws, rules, regulations, or procedures, nor shall such make the Owner responsible for construction means, methods, techniques, sequences, procedures, or for the Contractor's failure to properly perform the work necessary for proper trench and excavation safety.

***** END OF SECTION *****

Division 32

Exterior Improvements

SECTION 32 11 16

BASE COURSES

PART 1 GENERAL

1.1 SCOPE

The work specified in this Section includes the installation of crushed surfacing materials.

1.2 SUBMITTALS

The Contractor shall provide the Owner with a certificate of laboratory test indicating gradation of each material provided in accordance with Section 01 33 00. The certificate shall be provided to the Owner 5 days prior to placement of any materials.

PART 2 PRODUCTS

2.1 CRUSHED SURFACING

Crushed surfacing base course and top course shall conform to Section 9-03.9(3) of the WSDOT Standard Specifications.

PART 3 EXECUTION

3.1 SUBGRADE PREPARATION

The subgrade shall be prepared as per Section 2-06.3 of the WSDOT Standard Specifications. As the rolling of the subgrade proceeds, all soft or spongy areas shall be removed and the resulting holes filled with ballast material or crushed surfacing base course as shown on the Plans. The Contractor shall dispose of excess materials resulting from the preparation of the subgrade. Rollers shall not be operated adjacent to structures where such use may cause damage. Where the subgrade abuts structures and compaction with a roller is not possible for practical reasons, the area shall be compacted with mechanical tampers or other approved equipment.

3.2 CRUSHED SURFACING

Gravel materials shall be placed in the layers and thickness as shown on the Plans. Gravel materials shall be placed in accordance with Section 4-04.3 of the WSDOT Standard Specifications.

The Contractor shall place gravel materials in a uniform layer over the entire area to receive gravel materials without segregation of sizes, to such depth that when compacted with the power roller, the course shall have the required thickness. The maximum layer thickness for compaction with a roller shall be 6 inches for ballast or base course and 4 inches for crushed surfacing top course. The gravel material shall be bladed with a grader and rolled while damp with a power roller until the course is thoroughly and uniformly compacted and until its surface is smooth and conforms to

grade and crown requirements shown on the Plans. The cross-section of the finished surface shall be subject to reasonable variations as approved by the Owner to meet the varying conditions encountered. The surface shall be maintained in its finished condition until the succeeding layer is placed.

The roller shall not be operated adjacent to structures where such use may cause damage. Where the gravel materials abuts structures and compaction with a roller is not possible for practical reasons, the area shall be compacted with mechanical tampers or other approved equipment.

3.3 Compaction

All materials shall be compacted to a dense, unyielding state of at least 95 percent of the maximum dry density, using the modified Proctor, per ASTM D1557.

*****END OF SECTION*****

SECTION 32 12 16

ASPHALT PAVING

PART 1 GENERAL

1.1 SCOPE

The work specified in this Section includes the construction of hot mix asphalt (HMA) paving and cold-mix for temporary repairs.

The work in this section shall be accomplished in accordance with the Standard Specifications for Road, Bridge and Municipal Construction, 2026 edition, as issued by the Washington State Department of Transportation (WSDOT) and the American Public Works Association (APWA), Washington State Chapter (hereafter "Standard Specifications"). The Standard Specifications, as modified or supplemented by the Amendments to the Standard Specifications and Technical Specifications shall govern the Work.

1.2 SUBMITTALS

The Contractor shall provide certificates of laboratory tests indicating current sieve analysis data and mix design for asphalt-treated base and hot mix asphalt pavement mix designs in accordance with Section 01 33 00 and as further specified herein. The certificates shall be provided to the Owner at least 5 consecutive calendar days prior to placement of any materials.

PART 2 PRODUCTS

2.1 HOT MIX ASPHALT PAVEMENT

A. Hot mix asphalt pavement, HMA CL. 1/2" PG 58H, shall conform to Section 5-04.2 of the WSDOT Standard Specifications. Prior to the production of HMA, the Contractor shall determine a design aggregate structure and asphalt binder content in accordance with WSDOT Standard Operating Procedure 732. Once the design aggregate structure and asphalt binder content have been determined, the Contractor shall submit the HMA mix design on DOT form 350-042 demonstrating the design meets the requirements of Sections 9-03.8(2) and 9-03.8(6) of the WSDOT Standard Specifications. Mix designs shall be accepted by commercial evaluation. The contractor shall only complete the first page of form 350-042. The contractor shall provide verification of mix design in one of the following processes:

1. Submit samples to WSDOT State Materials Lab for WSDOT verification testing in accordance with WSDOT Standard Specifications.
2. Reference a mix design that has been previously verified by the WSDOT Field Verification Testing Process or verified by WSDOT State Materials Lab on a previous project.

ESAL's

The number of ESAL's for the design and acceptance of the HMA shall be 0.3 to <3 million.

- B. Mix design verification is valid for one year from the date of verification. At the discretion of the Owner, the Owner may accept mix designs verified beyond the verification year with certification from the Contractor that the materials and sources are the same as those shown on the original mix design.
- C. In no case shall the paving begin before the determination of anti-strip requirements has been made. Anti-strip requirements will be determined by:
 - 1. Testing by Contractor in accordance with WSDOT TM 718.
 - 2. Historical aggregate source anti-strip use provided by WDOT.
 - 3. If the determination of anti-strip requirements has not been made through Item 1 or 2 above, then a minimum of 0.25 percent anti-strip will be used.
- D. The mix design will be the initial Job Mix Formula (JMF) for the HMA being produced. Any additional adjustments to the JMF will require the approval of the Owner and may be made per WSDOT Standard Specifications Section 9-03.8(7).

2.2 COLD MIX TEMPORARY REPAIR

Cold-mix material shall be MC-2 asphaltic concrete commonly referred to as "cold-mix."

PART 3 EXECUTION

3.1 GENERAL

The Contractor shall maintain access to the facility at all times. The Contractor shall coordinate all work with the Owner to insure his paving plan does not interfere with the Owners on going operations.

The Contractor shall provide, place and maintain all temporary markings and signage as required to warn and direct facility traffic as necessary during his paving operations.

3.2 ASPHALT CONCRETE PAVEMENT PLACEMENT

Asphalt concrete pavement materials shall be placed on compacted subgrade materials, as shown on the Plans, as indicated elsewhere in these Specifications, and in conformance with Sections 5-04.3(1), 5-04.3(2), 5-04.3(3), 5-04.3(4), 5-04.3(9), 5-04.3(10), 5-04.3(11), 5-04.3(12), 5-04.3(13), 5-04.3(14) 5-04.3(16) and 5-04.3(20) of the WSDOT Standard Specifications.

No material transfer devices or vehicles shall be used on this project.

3.3 COLD MIX TEMPORARY REPAIR

During the course of construction, it may be necessary to provide temporary vehicle and/or pedestrian access within the project limits. Such temporary access shall be provided by temporarily patching trench crossings or other areas with cold mix, until such time as the permanent surface restoration is installed. Locations shall include those areas specifically indicated on the Plans, directed by the Owner or as further specified herein. This material will be furnished, placed, compacted, and removed and wastehauled at various locations throughout the project. The trenches and/or subgrade shall be thoroughly compacted and brought to a smooth grade prior to placing the material. It shall be placed, maintained (daily), and removed and wastehauled by the Contractor. Provide a minimum compacted thickness of 2 inches.

3.4 ASPHALT JOINTS

All joints of hot mix asphalt pavement shall be sealed with hot poured sealant meeting the requirements of WSDOT Standard Specification 9-04.2

3.5 QUALITY CONTROL

The Owner will provide testing of the HMA. Testing may include asphalt content and grading testing of hot mix asphalt mix samples, aggregate void content, fracture, and equivalence testing, and in-place density testing.

3.6 SAWCUTTING

Where shown on the Plans or where directed in the field by the Owner, the Contractor shall make a neat vertical sawcut at the boundaries of the area to be removed. Care shall be taken during sawcutting so as to prevent damage to the existing asphalt concrete, or concrete, to remain in place. Any pavement or concrete damaged by the Contractor outside the area scheduled for removal due to the Contractor's operations or negligence shall be repaired or replaced to the Owner's satisfaction by the Contractor at no additional cost to the Owner.

All cuts shall be continuous, full depth, and shall be made with saws specifically equipped for this purpose. No skip cutting, wheel cutting or jack hammering will be allowed unless specifically approved otherwise in writing by the Owner. However, even if preapproved as a method of cutting, no payment will be made for this type of work, and it shall be considered incidental and included in the various unit contract and lump sum prices listed in the Proposal.

The location of all pavement cuts shall be preapproved by the Owner in the field before cutting commences.

All water and slurry material resulting from sawcutting operations shall not be allowed to enter the storm drainage or sanitary sewer system and shall be removed from the site and disposed of in accordance with the Washington State Department of Ecology regulations.

All existing asphalt concrete pavement edges shall be saw cut back to sound material, in uniform lines immediately prior to paving operations. Any edges broken between the time of cutting and placement of new paving shall be recut to the satisfaction of the Owner at no additional cost to the Owner. All excess excavated materials shall be hauled to waste.

3.7 ASPHALT PATCH

This work shall consist of the preparation, placing and compaction of asphalt sections, in accordance with the details included on the plans and the requirements outlined herein. The work shall be in conformance with Sections 3.3 herein unless specifically directed otherwise by the Owner.

The Contractor shall restore all asphalt surfaces excavated or disturbed to a condition acceptable to the Owner or the municipality having control of the road.

The section shall be patched as indicated on the plans and in accordance with the following steps:

- A. Crushed rock or temporary asphalt shall be removed to the depth of existing pavement or to the depth of the asphalt section specified on the plans, whichever is thicker. The area shall be paved to match the existing pavement surface. HMA trench patching shall be constructed by the Friday following pipe installation. All areas shall be patched and cleaned by close of work that day.

Before any HMA material is placed, all pavement cuts shall be trued so that marginal lines of the patch will form a rectangle with straight edges and vertical faces a minimum of 1 foot back from the maximum width.

The asphalt shall be placed and compacted in 2-inch lifts. The asphalt trench patch thickness shall match existing asphalt thickness or the minimum pavement repair section indicated on the plans whichever is thicker.

Seal all joints scheduled to not receive an asphalt overlay.

3.8 PAVEMENT MARKINGS

In those areas where the proposed work causes existing pavement with striping and/or pavement markings to be removed, the Contractor shall not only replace the pavement, as noted herein, and as shown on the Plans, but shall also re-mark and re-stripe the new pavement so as to restore the new pavement to its former condition.

Pavement markings shall conform to Section 8-22.2 and 8-22.3 of the WSDOT Standard Specifications, and the latest edition and amendments thereto of the Manual on Uniform Traffic Control Devices (MUTCD) as adopted by the State of Washington, and shall be constructed as shown in the Plans except as modified herein.

Raised pavement markers shall conform to Section 8-09.2 and 8-09.3.

3.9 ADJUSTING STRUCTURES TO GRADE

All utility castings and monuments within the existing and/or new pavement area shall be referenced by the Contractor prior to any pavement removal or planning. The Contractor shall keep a record of such references, and submit a copy to the Owner.

Existing structures and new structures shall be adjusted to the finished grade as shown on the Plans and as further specified herein. Existing boxes, rings, grates, covers, and lids shall be reset in a careful and workmanlike manner to conform to the required grades.

The new and existing utility castings and monuments shall be adjusted to grade in the following manner:

As soon as the street has been paved past each structure or casting, the asphalt concrete mat shall be scored around the location of the structure or casting. After rolling has been completed and the mat has cooled, it shall be cut along the scored lines. The structure or casting shall then be raised to finished pavement grade and the annular spaces filled as indicated on the Plans. The Contractor shall install the pavement to give a smooth finished appearance. All covers, lids, frames, and grates shall be thoroughly cleaned.

After pavement is in place, all new pavement joints shall be sealed with a 6-inch wide strip of hot asphalt sealer. A sand blanket shall be applied to the surface of the hot asphalt sealer immediately after the placement of the sealer to help alleviate the tracking of the asphalt. The sealer shall meet the requirements of Section 9-04.2 of the WSDOT Standard Specifications.

***** END OF SECTION *****

Division 33

Utilities

SECTION 33 05 00

LOCATE EXISTING UTILITIES

PART 1 GENERAL

1.1 SCOPE

The work specified in this Section includes the anticipated conflicts, which may exist with existing utilities. A reasonable attempt has been made to locate the existing utilities; however, the exact location, and/or depth are unknown in most instances. Locations and dimensions shown in the Plans for existing facilities are in accordance with available information obtained without uncovering, measuring, or other verification. It shall be the responsibility of the Contractor to locate existing utilities and their depth.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

3.1 GENERAL

The Contractor shall determine the difficulties to be encountered in constructing the Project and his locate effort based upon the information provided on the Plans, field investigation, and the Contractor's contacts with the existing utility companies. The Contractor shall determine the extent of exploration required to first prevent damage to those existing utilities, and secondly to determine if the proposed improvements are in conflict with existing utilities.

The Contractor shall locate existing utilities sufficiently ahead of construction so that the Engineer can modify the alignment, or grade prior to construction. Where underground utilities are found to be in the way of construction, such condition shall not be deemed to be a changed or differing site condition. If necessary, pipe alignment or grade shall be modified at the Contractor's expense.

The Contractor shall call the Utility Location Request Center (One Call Center), for field location, not less than 2 nor more than 10 business days before the scheduled date for commencement of excavation that may affect underground utility facilities, unless otherwise agreed upon by the parties involved. A business day is defined as any day other than Saturday, Sunday, or a legal local, State, or Federal holiday. The telephone number for the One Call Center for this project is (800) 424-5555 or 811. If no one-number locator service is available, notice shall be provided individually to those owners known to or suspected of having underground facilities within the area of the proposed excavation.

The Contractor is alerted to the existence of Chapter 19.122 RCW, a law relating to underground utilities. Any cost to the Contractor incurred as a result of this law shall be at the Contractor's expense.

No excavation shall begin until all know facilities in the vicinity of the excavation area have been located and marked.

***** END OF SECTION *****

SECTION 33 41 13

STORMWATER GRAVITY PIPING

PART 1 GENERAL

1.1 SCOPE

The work specified in this Section includes pipe, fittings, and accessories described herein and as required to completely install storm sewers as shown on the Plans.

PART 2 PRODUCTS

2.1 GENERAL

All materials delivered to the job site shall be new, free from defects, and marked to identify the material, class, and other appropriate data such as thickness for piping.

Acceptance of materials shall be subject to strength and quality testing in addition to inspection of the complete product. Acceptance of installed piping systems shall be based on inspection and leakage tests as specified in Part 3 of this Section.

2.2 PVC PIPE AND FITTINGS

All PVC pipe 3 inch and smaller shall be Schedule 80. Pipe material shall be Type 1, Grade 1, polyvinyl chloride (PVC) compound, with a minimum cell classification of 12454 in accordance with ASTM D1784. Schedule 80 PVC pipe shall be manufactured in accordance with ASTM D1785. All PVC Schedule 80 pipe must also meet the requirements of NSF Standard 14 for rigid PVC pipe in pressure applications, and shall bear the mark of this listing agency. Joints shall be solvent welded using a two-step solvent cement joining process with primer conforming to ASTM F656 and solvent cement conforming to ASTM D2564. Fittings shall conform to ASTM D2467 for socket type and ASTM D2464 for threaded pipe.

PART 3 INSTALLATION

3.1 PIPE HANDLING

All types of pipe shall be handled in a manner that will prevent damage to the pipe.

Dirt or other foreign material shall be prevented from entering the pipe or pipe joint during handling or laying operations, and any pipe or fitting that has been installed with dirt or foreign material in it shall be removed, cleaned, and relayed. A clean whiskbroom shall be used for this purpose and for brushing to remove foreign matter prior to joining of pipe ends. At times when pipe laying is not in progress, the open ends of the pipe shall be closed by a watertight plug or by other means approved by the Owner to ensure cleanliness inside the pipe.

Pipe shall be stacked in such a manner as to prevent damage to the pipe, to prevent dirt and debris from entering the pipe, and to prevent any movement of the pipe. The bottom tiers of the stack shall be kept off the ground on timbers, rails, or other similar supports.

3.2 EXCAVATION

All earthwork, excavation, bedding, backfill and compaction shall meet the requirements of Section 31 20 00.

3.3 TEMPORARY SHORING AND BRACING

Temporary shoring and bracing, including trench excavation safety systems, shall meet the requirements of Section 31 40 00.

***** END OF SECTION *****

SECTION 33 41 14

CONNECTION TO EXISTING SYSTEM

PART 1 GENERAL

1.1 SCOPE

The work specified in this Section includes the connection of pipelines being constructed under this project to existing pipelines as shown on the Plans and as specified herein.

PART 2 PRODUCTS

NOT USED.

PART 3 EXECUTION

The location, type and size of existing facilities have been determined from available records and are approximate. It is anticipated that connections to these existing facilities may be made, in general, as shown on the Plans except adjustments may be required for vertical and horizontal alignment.

It shall be the responsibility of the Contractor to determine the exact location and ascertain the type and size of the existing facilities prior to starting work on each connection and to provide any alternations as required in the connection detail.

Connections to existing facilities shall be made with the use of fittings, valves, flexible couplings, solid sleeves, shackling and other miscellaneous fittings, and thrust blocks as shown on the or with additional pipe or fittings as approved by the Owner to connect the new construction under this project to the existing pipelines.

All connections to existing mains shall be completed the same day as they are started. The Contractor shall time its operations so that the water will not be shut off overnight or over weekends or during holidays.

***** END OF SECTION *****

SECTION 33 49 00

STORMWATER DRAINAGE STRUCTURES

PART 1 GENERAL

1.1 SCOPE

The work specified in this Section includes stormwater catch basins and accessories as shown on the Plans and specified herein.

PART 2 PRODUCTS

2.1 GENERAL

The exterior finish of all precast concrete utility structures shall be smooth with no imperfections larger than 1/8-inch in diameter. The interior finish of all precast concrete utility structures shall be smooth and sacked with non-shrink cementitious materials and epoxy bonding agent. No bug holes, fins, projections, or other defects are acceptable.

2.2 CATCH BASINS

The catch basin shall be manufactured by Zurn Model Z887-24-HD Long Catch Basin with Heavy Duty Frame or approved equal.

Catch basin shall be made of 0% water absorbent High Density Polyethylene (HDPE). Shall mechanically lock into the concrete surround. Catch basin shall have rebar clips standard to secure basin in its final location. Shall be provided with standard DGC grate. Zurn wide reveal Ductile Iron Slotted Grate conforming to ASTM specification A536- 84, Grade 80-55-06. Ductile Iron grate is rated class C per the DIN EN1433 top load classifications.

PART 3 EXECUTION

3.1 CATCH BASINS

Catch basin installation shall be as shown on the Plans and in accordance with the manufacturer's installation instructions.

The catch basin rim elevation shall be set flush with the pavement or improved areas.

3.2 FINAL ADJUSTMENT AND CLEANUP

After installation is complete, the Contractor shall cleanout all structures prior to placing the new facilities into service. The adjustment of structure shall be done in a manner satisfactory to the Owner.

***** END OF SECTION *****

Division 40

Process Integration

SECTION 40 05 07

PIPE AND CONDUIT SUPPORT SYSTEM

PART 1 GENERAL

1.01 DESCRIPTION OF WORK

The work specified in this Section includes pipe and conduit hangers, brackets, and supports. Pipe and conduit support systems shall be furnished complete with all necessary inserts, bolts, nuts, rods, washers, structural attachments, and other accessories as shown on the Plans and specified herein.

This section describes support systems for pipes. Electrical conduit support systems are described in Division 26.

1.02 REFERENCES

All pipe and conduit support materials and methods shall conform to the latest, applicable requirements of documents listed hereafter. In case of conflict between this section and the listed documents, the requirements of this Section shall prevail.

ANSI A13.1	Piping and Piping System
ANSI B31.1	Power Piping
ASME	Boiler and Pressure Vessel Code
ANSI/MSS SP-58	Pipe Hangers and Supports C Materials, Design and Manufacture
ANSI/MSS SP-69	Pipe Hangers and Supports C Selection and Application
SMACNA	Seismic Restraint Manual C Guidelines for Mechanical Systems
UPC	Uniform Plumbing Code
ASCE 7-22	Seismic Design Requirements for Nonstructural Components

1.03 SUBMITTALS

In accordance with the requirements of Section 01 33 00, submit the following project data:

- A. Manufacturer's technical data for all hangers, brackets, supports and documentation of conformance with appropriate standards and these specifications.

PART 2 PRODUCTS

2.01 GENERAL

The Contractor shall provide, and install pipe and conduit support systems, which include hangers, brackets, supports, anchors, expansion joints, and structural attachments. The support system shall be pipe rack, trapeze pipe hangers or individual

pipe clamps, hangers, supports and structural attachments as shown on the Drawings and as specified herein.

In certain locations, pipe supports, anchors, and expansion joints have been indicated on the Plans, but no attempt has been made to indicate every pipe support, anchor, and expansion joint. It shall be the Contractor's responsibility to provide a complete system of pipe and conduit supports. Paragraph 2.07 of this Section sets forth minimum requirements for pipe supports spacing.

All piping, including small diameter piping, shall be seismically/laterally braced as part of the pipe support system to prevent horizontal movement. This includes piping that by code or exception is not required to be braced. Lateral bracing shall be provided at no additional cost to the Owner.

2.02 PIPE RACKS AND TRAPEZE HANGERS

Pipe and conduit racks and trapeze hangers shall be constructed of 304 stainless steel channels, rods, posts, post base, clamps, brackets, fittings, and accessories for supporting pipes. All components for pipe and conduit rack and trapeze shall be Unistrut, or equal.

2.03 PIPE CLAMPS AND HANGERS

In areas where pipe racks and trapezes are not used, pipe shall be supported with clamp hangers and stanchion saddle support system. The clamps and hangers shall be fastened to threaded rods hanging from structural attachments. Pipe supports shall be selected for the size and type of pipe to which they are applied. Strap hangers will not be acceptable. Threaded rods shall have sufficient threading to permit the maximum adjustment available in the support item.

All pipe clamps and hangers, including all accessories, shall be Type 316 stainless steel for installation outdoors.

Pipe and conduit clamps and hangers shall be as manufactured by Anvil or equal and shall be as follows:

Type	Pipe Size (In.)	Pipe Material	Anvil Figure
Swivel Ring, Split Type	3/4 to 8	All type	104
Split Clamp	1/2 to 3	All type	138R
Adjustable Ring	1/2 to 6	All type	97
Adjustable Ring	1/2 to 4	Copper	CT-269
Adjustable Clevis	3 to 24	All type	590
Pipe Clamp	3 to 42	All type	216
Socket Clamp	4 to 24	Cast Iron	595
Pipe Stanchion	4 to 24	All Type	63
Stanchion Saddle	4 to 36	All type	259
Adjustable Saddle Support	3 to 36	All type	264
Riser Clamp	2 to 24	All type	40
Adjustable Pipe Roll	6 to 12	Stainless Steel	177, 181, or 274

2.04 STRUCTURAL ATTACHMENTS

Structural attachments shall be concrete insert channels or individual inserts for new concrete, surface-mounted channel or individual inserts for existing concrete or where applicable, steel, roof plate supported attachments in the control building, complete with all accessories required. All structural attachments including all accessories shall be stainless steel Type 316 for installation outdoors, and shall be provided by a single manufacturer. Structural attachments shall be as manufactured by Unistrut Corporation or approved equal.

2.05 PIPE SUPPORT ATTACHMENTS TO CONCRETE

All pipe support attachment to concrete shall be in adhesive anchors unless noted otherwise.

Products which may be incorporated in the work include, but are not limited to, the following:

- A. HIT RE 500 Injection Adhesive Anchor, Hilti, Inc.
- B. HIT HY 200 Injection adhesive Anchor, Hilti, Inc.
- C. Power-Fast, Powers Fasteners, Inc.

2.06 PROTECTION SADDLES

Protection saddles shall be used for protecting pipe insulation against damage at pipe supports or as shown on the Plans. The nominal thickness of covering shall be the same as that of pipe insulation. The protection saddles shall be curved carbon steel plate and shall be Anvil Figure 160 through Figure 166 or approved equal.

2.07 SPACING

Maximum support spacing shall conform to the following table:

Pipe Size Inches	Pipe Material	Maximum Spacing Feet
1" & Smaller	Iron or Steel	6
	Copper	4-1/2
	Plastic	continuous
	Tubing	continuous
1-1/4 to 2"	Iron or Steel	8
	Copper or Plastic	5
2-1/2 to 4"	Iron or Steel	10
	Copper or Plastic	6
6 to 8"	Iron or Steel	12
	Plastic	8

PART 3 EXECUTION

3.01 INSTALLATION

Pipe support system shall be installed strictly in accordance with standards and codes referenced in paragraph 1.02 of this Section and piping support system manufacturer and piping manufacturer's recommendations.

In addition, all piping shall be rigidly support and anchored so that there is no movement or visible sagging between supports.

Contact between dissimilar metals, including contact between stainless steel and carbon steel, shall be prevented. Supports for brass or copper pipe or tubing shall be copper-plated. Those portions of pipe supports, which contact other dissimilar metals, shall be rubber or vinyl coated.

Anchorage shall be provided to resist thrust due to temperature changes, changes in diameter or direction, or dead-ending. Anchors shall be located as required to force expansion and contract movement to occur at expansion joints, loops, or elbows, and as required to prevent excessive bending stresses and opening of mechanical couplings. Anchorage for temperature changes shall be centered between elbows and mechanical joints used as expansion joints. Anchorage for bellows type expansion joints may be located adjacent to the joint.

*****END OF SECTION *****

SECTION 40 05 53

VALVES

PART 1 GENERAL

1.01 SCOPE

The work specified in this Section shall consist of valves and accessories as shown on the Plans, described in these Specifications, and as required to completely interconnect all equipment with piping for complete operable systems.

1.02 SUBMITTALS

Submit Catalog cuts and shop drawings in accordance with Section 01 33 00 to demonstrate that the valves and appurtenances conform to the Specifications requirements.

The Contractor shall furnish manufacturer's installation and operation manuals, bulletins, and spare parts lists for all valves.

1.03 QUALITY ASSURANCE

All materials and equipment furnished under this Section shall be by the manufacturer specified.

PART 2 PRODUCTS

2.01 CPVC BALL VALVES

Ball valves shall be CPVC Class 1245 4-B, conforming to ASTM D1784, true union type, threaded per ANSI B1.20.1, full port design, rated 150 psi, and vented, as manufactured by George Fischer, Spears, or Asahi, no other manufacturers shall be allowed.

2.02 STAINLESS STEEL BALL VALVES

Stainless steel ball valves shall be full port design, rated for 250 psi, with stainless steel body stem and cap, PTFE seats and seals, and stainless steel ball. Valves 2 inch and smaller shall be 2 piece valves. Stainless steel ball valves shall be Nibco, or equal.

Limit switches for stainless steel ball valves shall be Assured Automation YF Series or approved equal. Limit switches shall be designed to mount on a manual ball valve and provide an open and closed indication of the valve position. Limit switches shall be housed in an IP67 gasketed weatherproof enclosure, rated for outdoor use. Switches shall be SPDT rated for 16A at 125 VAC.

2.03 BRASS BALL VALVES

Brass ball valves shall be full port design, rated for 250 psi, with brass body stem and cap, PTFE seats and seals, and chrome plated brass ball. Valves 2 inch and smaller shall be 2 piece valves. Brass ball valves shall be A.Y. McDonald, or equal.

2.04 STAINLESS STEEL CHECK VALVE

Stainless steel check valves shall be Swagelok stainless steel poppet check valve with FKM o-ring, or approved equal. Check valves shall be 304 SS and rated for a minimum of 250 psi.

PART 3 EXECUTION

3.01 GENERAL

All valves and accessories shall be installed in a manner and location as shown on the Plans or as required for the application and in accordance with manufacturer's instructions. Valve size is fully equal to line piping in which the valve is installed unless otherwise noted on the Plans. Support all valves where necessary. In case of conflict between these Specifications and a governing code, the more stringent standard shall prevail.

All valves of the same style or type shall be furnished by a single manufacturer.

Provide all accessories necessary for proper valve operation as specified or required for the application. Valves shall be installed with the operator in a position for convenient operation. Particular care shall be taken to insure that space is available for operation of lever or handwheel operated valves without interference to walls, piping or equipment. Any valve which is installed, in the opinion of the Engineer, in a manner that operation is inconvenient shall be modified or removed and reinstalled in a manner suitable to the Engineer at the expense of the Contractor. Operations for manual valves shall be lever or handwheel as is standard with the manufacturer unless another type of operator is specified or required by the manufacturer.

3.02 TESTING

Each new valve in the system shall be testing during pipe testing for a duration of at least 5 minutes.

***** END OF SECTION *****

SECTION 40 23 00

PROCESS PIPING SYSTEMS

PART 1 GENERAL

1.01 SCOPE

The work specified in this Section describes process and utility piping, fittings, supports, and accessories shown on the Plans, described in these Specifications and as required to completely interconnect all equipment with piping for complete and operable systems.

The Contractor shall direct the attention of all subcontractors and suppliers of piping systems and related appurtenances for the work to the applicable provisions in the Contract Documents wherever they may occur.

1.02 STANDARDS FOR THE WORK

Pipe, fittings, and supports shall be provided to produce complete, operable systems with all elements properly interconnected as shown in schematic diagrams or to provide specified operations. If a specific dimensioned location is not shown for interconnections or smaller system elements, the Contractor shall select appropriate locations and show them on Shop Drawing submittals for review.

Piping systems and materials shall be new and without imperfections and shall be erected in a neat and workmanlike manner; aligned, leveled, cleaned and adjusted for satisfactory operation; installed in accordance with the best standard practices for this type of work so that connecting and disconnecting of piping and accessories can be readily made and so that all parts are easily accessible for inspection, operation, maintenance and repair. In order to meet these requirements minor deviation from the Plans may be made as approved by the Engineer.

1.03 PIPE MATERIALS

The materials to be utilized for the various pipe sizes and applications on the project shall be as follows, unless otherwise noted on the Plans or herein:

<u>Process</u> D	<u>Above Ground</u> ---	<u>Inside</u> ---	<u>Buried</u> PVC
SC <2"	S.S. Compression Tubing	CPVC	
SC 3"	304 S.S. (THD)	---	---
SA	Galv Steel	Galv Steel	Galv Steel
WP	Galv Steel (Insulated)	CPVC Solvent Welded	Flexible HDPE
WN	Galv Steel (Insulated)	CPVC Solvent Welded	---

1.04 SUBMITTALS

Submittal data shall be supplied in accordance with Section 01 33 00. Detailed installation drawings of all piping and connected equipment shall be submitted. The drawings shall include all piping, valves, fittings, pipe support locations and types, seismic bracing, and appurtenances.

Submit data to show that the following items conform to the Specification requirements:

- A. Pipe, fittings, and accessories.
- B. Valves.
- C. Couplings and couplers.
- D. Pipe supports and seismic braces as required herein.
- E. Pipe Testing Plan for all required testing. Include location of pipe to be tested, required testing details (type, length, duration, and pressure per specification requirements), test start and end points, test equipment proposed, and location of all temporary appurtenances.

Submit certified test reports as required herein and by the referenced standards.

PART 2 PRODUCTS

2.01 GENERAL

Pipe sizes are nominal inside diameter unless otherwise noted.

All materials delivered to the job site shall be new, free from defects, and marked to identify the material, class and other appropriate data such as thickness for piping.

Acceptance of materials shall be subject to strength and quality testing in addition to inspection of the complete product. Acceptance of installed piping systems shall be based on inspection and leakage tests as specified in Part 3 Execution of this Section.

2.02 PVC PIPE AND FITTINGS

All PVC pipe 3-inch and smaller shall be Schedule 80. Pipe shall be constructed of material that meets or exceeds ASTM D2241 and D1784 and Commercial Standard CS 256. Joints shall be solvent weld with press fit. Fittings shall conform to ASTM D2466 and D2467 for socket type and ASTM D2464 for threaded pipe.

Provisions for pipe expansion shall be as recommended by the pipe manufacturer.

Bolts for PVC pipe, where required, shall be 304 stainless steel, ASTM A193, Grade B8M, hex head with ASTM A194, Grade 8M hex nuts. Washers of the same material shall be supplied bolts shall be provided with anti-sieze compound.

2.03 CPVC PIPE AND FITTINGS

See Section 43 32 69 Chemical Feed System.

2.04 GALVANIZED STEEL PIPE AND FITTINGS

Galvanized steel pipe shall be general service, carbon steel pipe conforming to ASTM A53, Grade A, Type E. Pipe shall be Schedule 40 with threaded and coupled fittings. Pipe and fittings shall be hot-dip galvanized.

2.05 STAINLESS STEEL TUBING AND FITTINGS

Stainless Steel pipe tubing shall be 304L seamless tubing conforming to ASTM A213 and A269. Wall thickness shall be designed for a test pressure of minimum 125 psi. Joints shall be double sleeve compression type, fabricate from AISI Type 304 stainless steel as manufactured by Swagelok, No like, equivalent, or "or equal" item or no substitution is permitted.

2.06 STAINLESS STEEL PIPE

Stainless steel pipe shall be general service made of 304 stainless steel. Pipe shall be Schedule 40 with threaded

2.07 FLEXIBLE HDPE

HDPE for potable water shall meet the requirements of AWWA C901. HDPE tubing shall be high molecular mass with a 200 psi rating. Tubing shall be SR 9 (copper tubing size). Fittings shall be brass, either compression or stab type. Stab types fittings shall utilize an internal grip ring and O-ring seal. Stainless steel liners shall be used when utilizing compression fittings on HDPE tubing.

2.08 MISCELLANEOUS FITTINGS

A. AIR COUPLING

Air coupling shall be a Dixon Ram12 Air King universal hose end coupling. No like, equivalent, or "or equal" item or no substitution is permitted".

B. WALL AND FLOOR PENETRATIONS

All wall and floor penetrations shall be sealed using bolt-up type seals consisting of interlocking synthetic rubber links shaped to continuously fill the annular space between the pipe and the sleeve. When bolts are tightened the rubber sealing elements shall expand to result in a watertight seal. Bolts and pressure plate nuts shall be Type 316 stainless steel in all locations. Rubber links shall be suitable for use in water, moist environments, normal atmospheric conditions, and -40 degrees F to 250 degrees F temperatures for standard service.

2.09 PIPING INSULATION

All new above ground exterior pipe carrying liquids except the supplemental carbon piping, shall be insulated with 1-inch-thick closed cell flexible elastomeric insulation (Rubitex or equal) and 0.016-inch anodized aluminum jacket. Buried piping carrying liquids with less than 36 inches of cover shall also be insulated.

2.10 HEAT TAPE

A. SELF-REGULATING HEATING CABLE

The self-regulating heating cable shall be constructed of a semi-conductive heater matrix that is extruded between parallel 16 AWG or greater buss wires with tinned copper braid. The cable shall have a Fluoropolymer corrosion resistant jacket over the copper braid for hostile/corrosive environments. The self-regulating heating cable shall adjust its output to independently respond to temperatures all along its length, allowing the heating cable to be crossed over itself without overheating. As the temperature increases, the heating cable's resistance shall increase which lowers the total output wattage. Conversely, as the temperature decreases, the resistance shall decrease and the cable shall produce more heat. The cable shall have a maximum maintenance temperature rating of 150 degrees F. All heating cable core shall be permanently marked with the manufacturer's identification number for traceability.

Heat tape shall be labeled and listed by a recognized electrical testing laboratory for the application, or approved by the Washington State Department of Labor and Industries for installation on this Project.

<u>Pipe Size</u>	<u>Output</u>	<u>Model</u>	<u># of Runs</u>
3" or less	5 W/ft	Chromalox SRF 5-1C or equal	1

B. INTEGRATED TEMPERATURE CONTROLS

The integrated temperature controls for the heat tracing shall consist of an ambient-sensing thermostat switch, a stainless steel sheath temperature sensor, a set point adjustment knob, and a set point indicator. The temperature controls shall be NEMA 4X. The temperature controls shall be provided with a secure mounting appropriate for the heat tracing application. The temperature set point shall range from 0 to 225 degrees F. The switch shall have a scale division of at least 10 degrees F. The sensor shall have at least a 250 degrees F max. temperature exposure with at least a -40 degrees F to 160 degrees F operating range.

PART 3 EXECUTION

3.01 PIPING INSTALLATION

A. GENERAL HANDLING AND PLACING

Pipe and accessories shall be handled in such a manner as to insure delivery on site in sound, undamaged condition. Particular care shall be taken not to injure pipe coating. No other pipe or material of any kind shall be placed inside of lined pipe or fitting after lining has been applied. All pipe and fittings shall be unloaded, stored, handled in such a manner as to insure against damage. Dropping of pipe or fittings shall be cause for rejection.

The types and sizes of pipes to be used shall be as specified herein and as shown on the Plans. Where sizes of small pipe are omitted from the plans and not mentioned in the Specifications, the sizes to be used shall correspond to plumbing code requirements. In any event, undesignated pipe sizes shall be proper for the function to be performed and as accepted by the Engineer.

All pipe shall be carefully placed and supported at the proper lines and grades and where possible shall be sloped to permit complete drainage. Piping runs shown on the Plans shall be followed as closely as possible, except for minor adjustments to avoid architectural and structural features. If major relocations are required, they shall be approved by the Engineer.

Unions shall be installed in all threaded joint piping to facilitate the removal of sections for maintenance and repair in accordance with the best trade practice. Unions shall be ground joint, malleable iron type. Where unions connect dissimilar materials, the union shall be protected from reaction with dissimilar metals by installation of insulating materials and dielectric unions at contact points.

The interior of all piping shall be cleaned after assembly and before connecting to equipment.

All piping for which no location dimensions are shown shall be installed in a neat and workmanlike manner in accordance with best trade practice. Wherever possible runs and rises shall be grouped and kept parallel. Properly lay out all miscellaneous piping to clear obstructions such as passageways, equipment, larger sized pipes, ventilation ducts, lights, etc.

Whenever pipe requires field cutting to fit in line, work shall be done by a machine in a satisfactory manner so as to leave a smooth end at right angles to axis of pipe.

All pipe shall be installed in strict accordance with manufacturer's recommendations and/or specifications, and best commercial trade practice. Any special tools required for laying, jointing, cutting, etc., shall be supplied and properly used. All pipe shall be kept thoroughly clean until acceptance of completed work, and shall conform accurately to lines and grades given. At all

times during pipe laying operations keep trench free of water either by pumping, bailing, or drainage. Seal end of line with a tight-fitting plug when pipe is not being laid.

Valves shall have interiors cleaned of all foreign matter and inspected, both in open and closed positions prior to installation.

All pipes running through concrete walls below water surface or where subject to groundwater pressure shall be assembled as shown on the plans. Pipes running through concrete not subject to water pressure may be installed through standard steel sleeves, one or two pipe sizes larger than pipe in question. The pipe shall be free of all dirt and grease and thoroughly cleaned to insure a tight bond with the concrete.

All above ground outside pipe carrying liquids shall be insulated.

All buried, submerged, or intermittently submerged piping that is bolted together or uses bolts to hold materials together shall use 316 stainless steel nuts, bolts, and washers. This requirement applies to a distance of 12 inches above the highest water level in any tank, channel, or structure. Otherwise, bolts, nuts, and washers may be hot-dip galvanized steel.

B. GENERAL EXPOSED PIPING INSTALLATION

Unless shown otherwise, piping shall be installed parallel to building lines, plumb, and level.

Piping shall be installed without springing or forcing.

All pipe flanges shall be set level, plumb, and aligned. All flanged fittings shall be true and perpendicular to the axis of the pipe. All bolt holes in flanges shall straddle vertical centerline of pipes.

Flexible couplings shall be provided for all piping connections to motor-driven equipment and where otherwise shown in the Plans. The Contractor may install additional flexible couplings at approved location to facilitate piping installation, provided that he submits complete details describing location, pipe supports, and hydraulic thrust protection.

Where equipment drain connections are provided, they shall be valved, with the discharge pipe carried to the nearest floor drain, drain trench, or sump. Where no receptacle for drain exists, drain valves shall be piped to 1 inch above the floor. Drain piping and valve materials shall conform to the requirements of the system served.

3.02 PVC PIPING

PVC piping socket weld connections shall be made up in accordance with the pipe manufacturer's recommendations and as follows:

Where pipe is cut, remove all burrs and ream inside to provide smooth flow line. Bevel the plain end pipe 1/16 inch to 1/32 inch. Joints shall be first cleaned with cleaner before making up. Apply primer to the female joint. Apply primer to the male joint. Reapply primer to the female joint. Apply glue to the male joint. Apply glue to the female joint. Reapply glue to the male joint. Join pipe quickly with a 1/4 turn. If joint cannot be made up to full depth of socket, cut out and discard. Wipe off excessive cement. Hold for 30 seconds and do not move for 15 minutes after making up joint. Pipe joining below 40 degrees F will not be permitted. Cleaner and cement types shall be as recommended by the manufacturer for the size of pipe being used.

PVC glued pipe and fittings shall be assembled such that there is sufficient space to make a repair.

3.03 PIPE SUPPORTS

Provide all necessary supports, tie rods, bracing, brackets or other types of supports which may be required, as shown on the Plans, or as specified in Section 40 05 07.

3.04 FLEXIBLE COUPLINGS

Flexible couplings shall be installed in accordance with recommendations of manufacturer and used where indicated on the Plans. Finished joint shall be airtight or watertight under test pressure of pipeline. Buried flexible couplings shall be coated with asphalt base paint after assembly.

3.05 TESTING

A. GENERAL

All piping shall be tested and inspected in accordance with the provisions of Division 7 APWA/WSDOT, except as modified herein. Prior to installation of pipe, the Contractor shall submit a testing plan per Part 1.04 of this section.

All piping systems will be tested to demonstrate leak tightness prior to acceptance. The Contractor shall provide all equipment and labor necessary to perform all testing required herein, the costs to be included in the lump sum bid price.

Each particular piping system shall be tested as hereinafter specified. All leaks shall be repaired or defective material replaced and the test repeated as directed by the Engineer. After compliance with test requirements and approval of the Engineer, the field painting, where required, may be started. All pressure testing shall be done prior to any finish painting or pipe insulating.

The Contractor shall be responsible for repair of any damage resulting from or caused by leak testing.

All pipe pressure testing shall be witnessed and documented on the Pipe Test Report from included in Section 01 45 16.13.

B. TESTING REQUIREMENTS

Test pressure and duration requirements for each system shall be as shown in the Pipe Testing Schedule on the Drawings.

***** END OF SECTION *****

SECTION 40 72 13

RADAR LEVEL SENSORS/TRANSMITTERS

PART 1 GENERAL

1.01 SCOPE

The work specified in this Section includes furnishing and installing radar level sensors/transmitters and associated equipment as shown on the Plans and as specified herein. The radar level sensors/transmitters shall include all necessary accessories and hardware for a complete and workable installation.

1.02 EQUIPMENT LIST

Equipment numbers are as follows:

<u>Item</u>	<u>Equipment Number</u>
Radar Level Sensor/Transmitter Supplemental Carbon Tank 1	LIT18-410
Radar Level Sensor/Transmitter Supplemental Carbon Tank 2	LIT18-420

1.03 PERFORMANCE REQUIREMENTS

The radar level sensors shall be provided with the following operating range for the specified application and location.

Application	Parameter
Measurement Range (feet)	164
Transducer level accuracy (inch)	+/- 0.04

The radar level sensors/transmitters shall be configured to measure the liquid level as required based on its application and its mounting location.

1.04 DELIVERY, STORAGE AND HANDLING

All equipment shall be completely factory assembled, crated and delivered to protect against damage during shipment.

All equipment delivered to the site shall be stored as specified in accordance with the manufacturer's instructions.

PART 2 PRODUCTS

2.01 APPROVED MANUFACTURERS

The Radar Level Sensors/Transmitters shall be an Endress & Hauser Micropilot FMR60B. No like, equivalent, or "or equal" item or no substitution is permitted.

2.02 RADAR LEVEL SENSORS/TRANSMITTER

The radar level sensors/transmitters shall have microprocessor-based electronics, a front panel menu-driven pushbuttons, and produce an isolated 4-20 mA HART DC signal. The level sensor shall be self-compensating for ambient temperature conditions. The unit shall be capable of simulating level without any external devices for verifying outputs and calibrations.

The radar level sensors/transmitters shall be provided with a mounting SS flange. The dual compartment transmitter housing shall be provided with 316 weather protection cover. Drip-off, PTFE 50 mm (2 in) antenna.

The sensor/transmitter shall transmit and receive an acoustic signal to accurately measure fluid depth at the monitoring site. The characteristics of the specific site where the transducer will be mounted shall be taken into consideration by the manufacturer and the actual transducer model applied at each location and the mounting and/or location of the transducer shall be as recommended by the Manufacturer. If the unit fails to adequately meet the listed performance requirements, the Contractor shall replace and/or relocate the transducer until satisfactory performance is obtained. The sensor shall function over an ambient temperature of -40 degrees F to 266 degrees F.

The sensor/transmitter shall produce an accurate 4-20 mA DC level signal. The transmitter shall be supplied with touch control, Bluetooth communications and, an LCD indicator to display level. The display shall indicate if there is a fault or an alarm condition.

Accuracy of the unit shall be unaffected by temperature changes within the specified ambient temperature range. Sampling shall be a minimum of 30 samples per second and the unit shall be able to operate with as few as 2 percent of the samples taken successfully. In the event of prolonged loss of acoustic signaling, the unit shall indicate the condition by a flashing status indication on the front display panel. The unit shall be loop powered. All wiring connections shall be made via well-marked terminal blocks.

The level sensors/transmitters shall be listed and labeled by an electrical testing laboratory recognized by the Washington State Department of Labor and Industries or be acceptable to the Washington State Department of Labor and Industries for installation on this project.

2.03 ANALOG INSTRUMENTATION

The level transmitter shall be of the manufacturer's latest design. The equipment shall have 4 to 20 milliamperes standard DC (direct current) isolated floating outputs and shall conform to ISA Standard S 50.1.

Each device output shall be provided with adjustments for gain and bias. The resultant output shall be 4-20 mA DC.

Analog instruments shall operate without loss of loop accuracy due to electromagnetic interference, resistive or inductive losses or similar problems related to field interconnection of components when connected with shielded 2/conductor #18 gauge copper wire in the manner shown on the Plans.

2.04 FACTORY TESTING

The equipment shall be fully tested at the manufacturer's plant before shipment. Tests shall insure that the equipment will operate as desired under anticipated field conditions.

PART 3 EXECUTION

3.01 INSTALLATION

The radar level sensors/transmitters shall be installed as shown on the Plans and in strict accordance with Manufacturer's recommendations and instructions. The radar level transducer shall be permanently mounted at the measuring site and positioned according to the Manufacturer's approved method using a sensor mounting adapters supplied by the Manufacturer.

All mounting hardware and supports including Type 316 stainless steel fasteners shall be provided by the Contractor.

3.02 FIELD TESTING

The Contractor shall perform the field testing described in Sections 01 91 00 and 43 20 00.

The field test shall insure that the equipment will operate as desired under field conditions. The manufacturer shall provide a formal test procedure and report forms for recording data. The Contractor shall submit the report forms to the Engineer prior to operational testing.

Any defects in the equipment or failure to meet requirements of the Specification shall be promptly corrected by the Contractor.

3.03 MANUFACTURER'S SERVICES

The services of a factory-trained representative of the radar level sensor/transmitter manufacturer shall be provided. Services shall include 1 day onsite for the supervision of equipment startup, initial adjustment, and testing. The cost of these services shall be included in the bid price.

***** END OF SECTION *****

SECTION 40 72 76

LEVEL SWITCHES

PART 1 GENERAL

1.01 SCOPE

The work specified in this Section includes furnishing and installing float switches and associated equipment as shown on the Plans and as specified herein.

1.02 EQUIPMENT LIST

Equipment numbers are as follows:

<u>Item</u>	<u>Equipment Number</u>
Level Switch High Level Supplemental Carbon Tank 1	LSH18-410
Level Switch High Level Supplemental Carbon Tank 2	LSH18-420
Level Switch Low Level Supplemental Carbon Tank 1	LSL18-410
Level Switch Low Level Supplemental Carbon Tank 2	LSL18-420

PART 2 PRODUCTS

2.01 APPROVED MANUFACTURERS

The float switches shall be Flygt Model ENM-10 or approved equivalent equipment manufactured by Warrick Controls, Hydr-O-Matic, or Anchor Scientific.

2.02 FLOAT SWITCHES

Float switches shall be the tilting, non-mercury type. The switch shall be enclosed in a liquid-tight plastic casing with a cable of sufficient length to reach to the terminating device. Float switches shall have either single pole double throw contacts, or single pole single throw contacts. Pole and throw contact number will be determined based on recommendations of the Manufacturer as well as the application for which it will be used.

Mercury switches are not acceptable.

2.03 FACTORY TESTING

The equipment shall be fully tested at the manufacturer's plant before shipment. Tests shall insure that the equipment will operate as desired under anticipated field conditions. Certified copies of test report(s) shall be submitted to the Engineer prior to shipment.

PART 3 EXECUTION

3.01 DELIVERY, STORAGE AND HANDLING

All equipment shall be completely factory assembled, crated and delivered to protect against damage during shipment.

All equipment delivered to the site shall be stored as specified in accordance with the manufacturer's instructions.

3.02 INSTALLATION

The float switches shall be installed as shown on the Plans and in strict accordance with the manufacturer's recommendations. The float switches shall be mounted and positioned according to the manufacturer's approved method and at heights as directed by the Engineer (where heights are not indicated on the Plans). It shall be suspended at the proper position to hang or float, depending on the liquid level.

The electrical cable, supplied with the float, shall be connected from the float to the terminating device terminal.

3.03 FIELD TESTING

The Contractor shall perform the field testing described in Sections 01 91 00 and 43 20 00.

Any defects in the equipment or failure to meet requirements of the Specification shall be promptly corrected by the Contractor.

***** END OF SECTION *****

SECTION 40 73 13

PRESSURE GAUGES

PART 1 GENERAL

1.1 SCOPE

The work specified in this Section includes furnishing and installing pressure gauges, as shown on the Drawings and specified herein. Pressure gauges shall include all necessary connectors and hardware on all process piping for pumps and at the various locations for a complete and workable installation.

1.2 EQUIPMENT LIST

<u>Item</u>	<u>Equipment Number</u>	<u>Pressure Range</u>
Pressure Gauge 1	PG18-410	0 – 60 PSI
Pressure Gauge 2	PG18-420	0 – 60 PSI

1.3 PERFORMANCE REQUIREMENTS

Unless otherwise indicated, the discharge pressure gauge scales shall be selected so that the normal operating pressure falls between 50 and 80 percent of full scale.

1.4 DELIVERY, STORAGE AND HANDLING

All equipment delivered to the site shall be stored as specified in accordance with the manufacturer's instructions.

PART 2 PRODUCTS

2.1 APPROVED MANUFACTURERS

The pressure gauges shall be REOTEMP Hi-Vis. No like, equivalent, or "or equal" item or no substitution is permitted.

The diaphragm seals shall be REOTEMP. No like, equivalent, or "or equal" item or no substitution is permitted.

2.2 GENERAL

The pressure gauges shall be glycerin filled type and shall have all internal parts immersed. Pressure gauges shall be minimum 4 1/2-inch dial size, with non-metallic case, stainless steel bourdon tube with plastic bushings and pinion, and stainless steel selector. Gauges shall be ANSI grade A or better with an accuracy of ± 0.5 percent.

Gauges measuring liquids shall be supplied with bronze pressure snubber and diaphragm seal. Diaphragm seals shall have silicone DC200 fluid fill and shall have a Type 316 stainless steel body, with 1/4-inch flushing connection and 1/2-inch process connection.

2.4 FACTORY TESTING

The equipment shall be fully tested at the manufacturer's plant before shipment. Tests shall insure that the equipment will operate as desired under anticipated field conditions.

PART 3 EXECUTION

3.1 INSTALLATION

The pressure gauges and accessories shall be installed as shown on the Drawings and as specified herein and in accordance with the manufacturer's instructions.

3.3 FIELD TESTING

The Contractor shall perform the field testing described in Sections 01 91 00 and Division 40.

The field test shall insure that the equipment will operate as desired under field conditions. The manufacturer shall provide a formal test procedure and report forms for recording data. The Contractor shall submit the report forms to the Owner prior to operational testing.

Any defects in the equipment or failure to meet requirements of the Specification shall be promptly corrected by the Contractor.

***** END OF SECTION *****

Division 43

Liquid Handling Equipment

SECTION 43 20 00

EQUIPMENT GENERAL PROVISIONS

PART 1 GENERAL

1.01 SCOPE

The provisions of this Section apply to all Sections of Divisions 26, 40, and 43, unless specifically revised therein.

The Contractor shall direct the attention of all subcontractors and suppliers of equipment and related appurtenances for the work to the applicable provisions in the Contract Provisions wherever they may occur.

1.02 STANDARDS FOR THE WORK

Pipe, fittings, wiring and supports shall be provided to produce complete, operable systems with all elements properly interconnected as shown in schematic diagrams or to provide specified operations. If a specific dimensioned location is not shown for interconnections or smaller system elements, the Contractor shall select appropriate locations and show them on Shop Drawing submittals for review.

Equipment and material shall be new and without imperfections and shall be erected in a neat and workmanlike manner; aligned, leveled, cleaned and adjusted for satisfactory operation; installed in accordance with the recommendations of the manufacturers and the best standard practices for this type of work so that connecting and disconnecting of piping and accessories can be readily made and so that all parts are easily accessible for inspection, operation, maintenance and repair. Oil and lubrication fittings shall be located clear of and away from guards, base, and equipment and within reach from the operating floor. In order to meet these requirements with equipment as furnished, minor deviation from the Plans may be made as authorized by the Engineer. All such minor deviations from the Plans that may include extending oil and lubrication fittings for accessibility and safety shall be executed at no additional cost to the Owner.

1.03 MANUFACTURER'S INSTRUCTIONS

The recommendations and instructions of the manufacturers of products used in the work are hereby made part of these Specifications, except as they may be superseded by other requirements of these Specifications.

1.04 SUBMITTALS

A. GENERAL

Product Submittals shall be provided to the Engineer for all equipment specified in Divisions 26, 40, and 43, in accordance with Specification 01 33 00, this Section and the respective equipment specification section. Submittals shall be dated and signed as certified for use in construction of this project.

B. MANUFACTURER'S LITERATURE

Manufacturer's literature shall be submitted for equipment, including, as applicable, performance characteristics, fan curves and pump curves, motor data sheets and methods of assembly.

The following minimum requirements shall accompany all manufacturers' literature submittals:

1. Description of materials.
2. Rating data - Mechanical and Electrical as applicable.
3. Motor Data including bearing and enclosure information.
4. List of any special tools and/or spare parts required and to be furnished, if any.
5. Exceptions taken to the specification and detailed explanation why the exception is being taken.
6. Additional specific information that is specified in the equipment sections.
7. For motor driven equipment served by variable frequency drives (VFDs), provide vibration and critical speed requirements of the equipment, minimum speed requirements of motor and driven machinery, acceleration and deceleration requirements of the equipment, and torque and speed information as per Part 1.6 of this Section.

C. SHOP DRAWINGS

Shop Drawings shall be submitted showing sizes and arrangement of equipment, foundations and anchor bolts required, control diagrams, wiring diagrams, pipe hanging details, ductwork layouts and connections to other work. The arrangement of mechanical equipment and appurtenant piping shown on the Plans may be varied as necessary to fit the certified manufacturer's installation drawings. However, the manufacturer's drawings shall not deviate from the Plans and Specifications as to location, size, type and design of equipment.

The following minimum requirements shall accompany all shop drawing submittals:

1. Overall dimensions.
2. Mounting arrangement and dimensions.
3. Connection sizes and orientation.
4. Capacity and location of lifting eyes.
5. Motor arrangement showing location of electrical connections.

6. Detail electrical wiring diagrams, showing component designation and rating, and the connection points and associated terminals and cable identification for connection to the process control system.
7. The Contractor shall ascertain the location of all electrical (power and control) connections in order to properly orient electrical conduits.

D. DESIGN CALCULATIONS

Seismic design calculations shall be submitted for equipment and for supports and anchorage for equipment.

E. FACTORY TEST REPORTS

Factory tests shall be performed for each piece of equipment where specifically called for in the Section specifying that equipment. Note that factory tests are inherent in many reference standards. The requirement for a factory test in a referenced standard shall make that requirement a part of these Specifications. Conduct factory tests at the same speeds at which the equipment will operate in the field except as noted.

Where specifically noted, the Engineer may witness performance test. The Contractor shall inform the Engineer in sufficient time to allow arrangements to be made for witness of such tests. When non-witnessed tests are performed, certified results shall be supplied by the Contractor to the Engineer.

Factory testing of pumps shall be done in accordance with the requirements and standards of the Hydraulic Institute. Tests of other equipment shall conform to the requirements set forth in these Specifications.

F. IDENTIFICATION OF DELIVERED EQUIPMENT

Each piece of equipment delivered to the project site shall be accompanied by a completed form which will contain at least the following information:

1. Owner's name and location of project.
2. Contractor's name and subcontractor if applicable.
3. Name of item being submitted.
4. Specification reference by section, paragraph and page.
5. Data on item (manufacturer, general descriptive data, dimensions, size of connections, speeds, performance curves, serial number).
6. Motor data, type, voltage, frequency, phase, full load amperes, starting method, frame size, enclosure, insulation type, NEMA Code letter, dimensions, service factor, serial number.

7. Date and signature of person certifying performance.

G. MANUFACTURER'S AFFIDAVITS

Equipment manufacturers, or their authorized representatives, shall each submit a signed and dated written report with respect to his equipment certifying the following:

1. The equipment has been properly installed and lubricated.
2. The equipment is in accurate alignment.
3. The manufacturer was present when the equipment was placed into operation.
4. The manufacturer has checked, inspected, and adjusted the equipment as necessary.
5. The equipment is free from any undue stress imposed by connecting piping or anchor bolts.
6. The equipment is not imposing any undue stress on any connecting members.
7. The equipment has been operated satisfactorily under full load conditions.
8. The manufacturer has inspected his equipment during the operational demonstrations and system validation tests to the extent specified.
9. The equipment is fully covered under the terms of the guarantee.

PART 2 PRODUCTS

2.01 DESIGN

All equipment shall be designed for the service intended, of rugged construction, of ample strength for all stresses which may occur during fabrication, transportation, erection and during continuous or intermittent operation, shall be adequately stayed, braced and anchored, and shall be installed in a neat and workmanlike manner. Appearance, safety, and utility shall be given consideration in the design of equipment. Materials of construction shall be cathodically compatible.

2.02 STANDARD REQUIREMENTS

A. MATERIALS

Design, fabricate and assemble equipment and systems with new materials and in accordance with acceptable engineering and shop practices. Manufacture individual parts to standard sizes and gauges so repair parts can be installed in the field. Make like parts of duplicate units interchangeable. Do not place

equipment in service at any time prior to delivery except as required for factory or shop tests.

B. UNIFORMITY

Unless otherwise specified, equipment or material of the same type or classification used for the same purpose shall be the product of the same manufacturer and shall be the same model.

C. SEISMIC REQUIREMENTS

Supports and anchorage of equipment(s) shall comply with the requirements of the 2021 *International Building Code* (IBC) Section 1613 and ASCE 7-16 *Minimum Design Loads for Buildings and Other Structures*, Chapter 13 Seismic Design for Nonstructural Components, as referenced and amended by the IBC. For the following design parameters:

- Risk Category III
- Site Class D
- The component Importance Factor: $I_p = 1.25$
- Design response acceleration coefficients:

$$S_{DS} = 1.13g$$
$$S_{D1} = 0.628g$$

- Seismic Design Category D

D. STANDARDS

Provide equipment and materials suitable for service conditions and meeting standard requirements of ANSI, ASME, AWWA, ASTM, NEMA, UBC, NPC, UL and OSHA.

2.03 EQUIPMENT BASES AND BEDPLATES

Mount equipment assemblies on a single heavy cast iron or welded steel bedplate on a grout or concrete base unless otherwise shown or specified. Provide bases and bedplates with machined support pads, vibration pads, tapered dowels for alignment or mating of adjacent items, adequate openings to facilitate grouting, and openings for electrical conduits. Corners shall be rounded or chamfered and ground smooth. Continuously weld seams and contact edges between steel plates and shapes, and grind welds smooth. Do not support machinery or piping on bedplates other than that which is factory installed. Provide leveling screws in equipment bases and bedplates to aid in leveling prior to grouting.

2.04 ANCHORS AND FASTENERS

Each equipment manufacturer shall furnish the required anchor bolts, nuts and washers of adequate design for securing bases and bedplates to concrete bases. Provide anchor bolts of length to allow for 1-1/2 inch of grout under baseplates and adequate anchorage

into structural concrete unless otherwise shown or specified. The manufacturer shall submit to the Engineer design calculations regarding recommended sizing and type of anchor bolts, nuts, and washers for securing the equipment, in accordance with the project seismic requirements.

Anchor and assembly bolts and nuts shall be of ample size and strength for the purpose intended. All nuts, bolts and washers shall be Type 316 stainless steel. All leveling nuts shall be Type 316 stainless steel.

All motor-driven equipment shall be furnished with cast-in-place anchor bolts or drilled-in anchors set with epoxy adhesive. Do not provide expansion type anchors for motor-driven equipment, or equipment or piping subject to vibration.

Expansion type anchors are not to be used for any submerged applications unless specifically noted on the Plans.

Anchor all non-motor-driven equipment with cast-in-place anchor bolts or drilled-in anchors set with epoxy adhesive except that, where specifically allowed by note on the Plans, expansion type anchors may be used.

2.05 SAFETY GUARDS

Cover belt or chain drives, fan blades, couplings, exposed shafts and other moving or rotating parts on all sides with safety guards conforming to all applicable Federal, State, and local codes and regulations; conform to the most restrictive requirement. Design guards for easy installation and removal, complete with necessary supports, accessories, and fasteners, all hot-dip galvanized. Design guards in outdoor locations to prevent entrance of rain and dripping water. Provide tachometer test opening in line with ends of shafts. Typically, guards shall be expanded metal on a structural steel frame except that outdoor guards may be of solid material. Provide spring loaded hinged doors with latch for service and lubrication access.

All pipes, manifolds, heaters, and other surfaces, which have a surface temperature sufficient to burn human tissue, shall be covered with a thermal insulating material or otherwise guarded against contact.

Guards shall comply with the requirements of these Specifications, WISHA Standards, and "The Principles and Techniques of Mechanical Guarding" (OSHA 2057, 1973), whichever is more stringent.

2.06 LIFTING EYES

All equipment weighing over 100 pounds shall be supplied with lifting eyes. Parts of equipment assemblies, which are normally serviced separately, such as motors, shall have individual lifting eyes.

2.07 ELECTRICAL COMPONENTS

Equipment shall be manufactured, fabricated and installed in a manner which permits conduit connection to electrical power and control equipment from below the connection

point, terminal box, or connection box without offsets or bends such that the conduit will drain away from the equipment.

Electric motors, control panels, accessories, etc., shall conform to the requirements of Divisions 26, 40, and 43.

All electrical components and equipment assemblies with electrical components shall be recognized or labeled and listed by a recognized electrical testing laboratory for the application, or approved by the Washington State Department of Labor and Industries for installation on the Project per WAC 296-46B-999 requirements.

The Contractor shall record the size and/or settings of each motor protective device at the time of startup and after any subsequent adjustments of the motor characteristics and include in the list described in the preceding paragraph.

2.08 NAMEPLATES/DATA PLATES/IDENTIFICATION

Each piece of equipment and its driver shall be furnished with a stainless steel metal nameplate fastened to the item in an accessible position. This nameplate shall contain the manufacturer's name, equipment rating, capacity, size, model, serial number and speed. Data for motors shall be NEMA standard. All information written or printed shall be in English. Each item of equipment shall bear a different serial number. Measurement units shall be given for ratings and capacity.

Nameplates for tanks and pressure vessels shall give working pressure, test pressure, vessel plate thickness and ASME Code data.

Each piece of rotating equipment shall have a direction of rotation arrow.

Each piece of equipment shall be labeled using a plastic laminate label with the functional name and number of the equipment shown on the Plans or provided by the Engineer. Name and number shall correspond to those used on Motor Control Centers and Panels.

Nameplates shall meet the requirements of Section 01 78 23.0.

Units of measure shall be shown on the indicating and totalizing dials of all meters, gauges and other measuring devices.

2.09 PROTECTION AGAINST ELECTROLYSIS

Where dissimilar metals are used in conjunction with each other, suitable insulation shall be provided between adjacent surfaces so as to eliminate direct contact and any resultant electrolysis. The insulation shall be bituminous impregnated felt, heavy bituminous coatings, non-metallic separators or washers. Connections of dissimilar piping materials shall utilize dielectric unions, flanges, couplings or bushings.

2.10 PAINTING

Painting of all equipment shall be in accordance with Section 09 90 00 of these Specifications.

2.11 PRESSURE GAUGE CONNECTIONS

Provide tapped and plugged suction and discharge gauge connections on the pump nozzles or flanges. Where this is not possible, provide gauge connections on the piping immediately adjacent to the pump.

PART 3 EXECUTION

3.01 INSPECTION

Inspect each item of equipment for damage, defects, completeness, and correct operation before installing. Inspect previously installed related work and verify that it is ready for new equipment installation.

3.02 PREPARATION

Prior to installing equipment, ensure that the areas are clean and that concrete or masonry operations are completed. Maintain the areas in a broom-clean condition during installation operations. Clean, condition, and service the equipment in accordance with the Operation and Maintenance Instruction Manuals and specific requirements included in applicable Sections of these Specifications.

3.03 INSTALLATION

A. EQUIPMENT

Equipment shall conform to the approved submittals and Operation and Maintenance Instruction Manuals. Employ skilled craftsmen experienced in installation of the types of equipment specified. Use specialized tools and equipment, such as precision machinist levels, dial indicators, gauges, and micrometers, as applicable. Produce acceptable installations free of vibration or other defects.

B. ANCHOR BOLTS

Deliver bolts with templates or setting drawings and verify that bolts are correctly located before structural concrete is placed. Prior to assembly, the Contractor shall coat all stainless steel bolts and nut threads with anti-seizing compound.

C. BASE AND BEDPLATE GROUTING

Do not place grout until initial fitting and alignment of connected piping is completed. Level and align equipment on the concrete foundations, then entirely fill the space under base or bedplates with grout. Bevel exposed grout at 45-degree angle, except around exposed grout at horizontal surfaces for drainage. Trowel or point exposed grout to a smooth, dense finish and damp cure with burlap for 3 days. When grout is fully hardened, remove jacking screws and tighten nuts on anchor bolts. Check the installation for alignment and level, and perform corrective work as required to conform to the tolerances given in the applicable Operation and Maintenance Instruction Manual.

The Contractor shall make an allowance of at least 1-1/2 inches for grout under the equipment bases, whether or not shown on the Plans. Shims used to level and adjust the bases shall be steel. Shims may be left embedded in the grout, in which case they shall be installed neatly and so as to be as inconspicuous as possible in the complete work. Unless otherwise authorized, all grout shall be a non-shrink, non-metallic grout.

Where practicable, the grout shall be placed through the grout holes in the equipment base and worked outward and under the edges of the base and across the rough top of the concrete foundation to a peripheral form so constructed as to provide a suitable chamfer around the top edge of the finished foundation.

3.04 EQUIPMENT STARTUP AND ADJUSTMENT

The Contractor, at his/her own expense, shall arrange for an authorized factory-trained representative of the company or companies supplying the various items of equipment to:

- Supervise the equipment installation in accordance with the Operation and Maintenance Instruction Manual.
- Be present when the equipment is first put into operation.
- Inspect, check, adjust as necessary, and approve the installation.
- Repeat the inspection, check and adjust until all trouble or defects are corrected and the equipment installation and operation are acceptable.
- Witness and supervise operational demonstrations and system validation tests to the extent specified.
- Prepare and submit the specified Manufacturer's Affidavit.

The representative shall be experienced and knowledgeable regarding the equipment being tested.

The Contractor shall give initial lubrication to all equipment in accordance with the manufacturer's recommendations.

The manufacturer shall provide a formal test procedure and report forms for recording data. The Contractor shall submit the report forms to the Owner prior to operational testing.

All equipment shall be field tested and demonstrated to the Owner that proper operation and capacity have been fully complied with. For pumps, this shall include measurement of suction and discharge pressure at the pump and measurement of pumping rate by volumetric means, or through a suitably calibrated meter for two points on the performance curve. Current draw and voltage on the motor for each phase shall be measured for each pumping rate measurement. For two-speed pumps, such tests shall be conducted at both

speeds. For variable speed pumps, blowers or fans, these tests shall be conducted at minimum and maximum speeds and at the specified duty point.

The Contractor shall furnish and test equipment or measuring devices (including portable flow meters) required that are not part of the permanent installation. Tests for variable speed pumps, blowers, and other equipment shall be performed at 60 Hz and at the initial anticipated flow or capacity levels.

The field test shall demonstrate under all conditions of operation that the equipment:

- Has not been damaged by transportation or installation.
- Has been properly installed.
- Has no mechanical defects.
- Is in proper alignment.
- Has been properly connected.
- Is free of overheating of any parts.
- Is free of vibration in excess of the limits in Section 43 20 10.
- Is free of excessive noise.
- Is free of overloading of any parts.
- Shall operate as specified with the specified control system.
- Is free of critical speeds as specified in Section 43 20 10.

In addition, the entire facilities shall be demonstrated to be in full operating order prior to the acceptance of the work. Should any equipment or part thereof fail to operate as intended, it shall be immediately removed and replaced, all at the Contractor's expense.

Equipment start-up and adjustment shall take place before instruction of the Owner's personnel is performed. Start-up, testing, and commissioning shall be per Section 01 91 00.

3.05 INSTRUCTION OF OWNER'S PERSONNEL

Conduct an instruction program for up to six operations personnel designated by the Owner in accordance with Specification Section 01 91 00. Furnish the services of qualified instructors from the various equipment manufacturers for the duration specified in each specific Section. Include instruction covering basic system operation theory, routine maintenance and repair, and "hands on" operation of equipment.

The Contractor shall provide the Owner with any audio-visual training materials the manufacturer utilizes (i.e., DVDs, PowerPoint presentations, videocassettes etc.) per

Section 01 91 00. Cost of instruction and audio-visual training materials shall be included in the bid price for the equipment.

***** END OF SECTION *****

SECTION 43 32 69

CHEMICAL FEED SYSTEM

PART 1 GENERAL

1.01 SCOPE

The work specified in this Section covers furnishing and installing a chemical feed system as shown on the Plans and as specified herein. The chemical feed system shall be capable of pumping Supplemental Carbon.

1.02 EQUIPMENT LIST

Equipment numbers are as follows:

<u>Item</u>	<u>Equipment Number</u>
Supplemental Carbon Feed Pump 1	P18-410
Supplemental Carbon Feed Pump 2	P18-425

1.03 WARRANTY

Metering pump shall be provided with a minimum three (3) year manufacturer's warranty against defects in material and workmanship.

PART 2 PRODUCTS

2.01 METERING PUMPS

Provide two metering pumps. The metering pumps shall be installed on the shelf in the Supplemental Carbon Pump Building as shown on the drawings.

Metering Pumps shall be Qdos 120 Universal+ 120l/hr at 4 bar/60 psi. No like, equivalent, or "or equal" item or no substitution is permitted. Motor shall be powered by 115VAC.

Pumps shall be set up in a lead/lag configuration with Hand-Off-Auto (HOA) switch for each pump.

Flow Detector: A Qdos Pressure Sensing Kit shall be installed on the discharge side of the pumps. The pressure sensing kit shall indicate if the pump is not running (0 psi) or if there is an obstruction (elevated psi).

2.02 PUMP SKID ASSEMBLY

The pump skid assembly shall be manufactured by Correct Equipment. No like, equivalent, or "or equal" item or no substitution is permitted. The wall mounted skid assembly shall contain all necessary piping, valves, fitting, supports, electrical controls and accessories as specified herein and shown on the drawings.

The wall mounted skid assembly shall contain the following items:

A. BACKER BOARD

The wall mounted skid shall be a 3/8" FRP backer board with the max dimension of 60" L x 42" H.

B. CPVC PIPE AND FITTINGS

CPVC pipe shall be Schedule 80 meeting the requirements of ASTM D1784. Glue for the chemical feed piping shall meet ASTM F-493. Acceptable glue products include IPS WELD-ON 724 with P-70 primer, or approved equal.

Where chemical feed pipe joints with equipment that has threaded connections, threaded pipe joints may be used. Threaded pipe joints shall be made in accordance with the pipe manufacturer's recommendations. Pipe tape for threaded joints shall be Military Specification T-27730A tape. Pipe compound shall be used with pipe tape to make all threaded joints. When transitioning from CPVC to metal, reinforced CPVC fittings shall be used.

All plumbers and pipe fitters shall be trained in the ASTM B-31.3 pipe joining procedure by a representative of the CPVC pipe company prior to beginning construction of the chemical feed pipe.

All gaskets and o-rings shall be Viton.

All pipe and fittings shall be compatible with MicroC 2000.

C. TUBING

The tubing for the suction and discharge of the peristaltic pump shall be Tygon LFL tubing.

D. CPVC DIAPHRAGM VALVES

Diaphragm valves shall have CPVC bodies, Teflon diaphragms and PVDGF gas barriers. Sizes 2 inch and smaller shall be provided with union ends with Teflon encapsulated Viton connector seals. Valves shall come standard with a position indicator and adjustable travel stop to prevent over-tightening. Diaphragm valves shall be ASAHI/America Type 14 diaphragm valves, or approved equal.

E. CPVC BACK PRESSURE VALVES

Back pressure valves shall be 3/4" solvent welded CPVC, with a 10 – 150 psi spring, and #150 FF flanged on the injection side. Back pressure valves shall be Griffco Valve available from USA Bluebook, Stock No. 207334, or equal.

F. CPVC DIAPHRAGM CHECK VALVES

Self-sealing diaphragm check valve designed for bubble tight sealing and normally closed. The diaphragm check valve shall be CPVC with Viton diaphragm and seals. The body shall be union nut with threaded PTFE connectors. The valve is designed to open at a max of 1.5 psi and close without reverse flow. The diaphragm check valve shall be manufactured by Plast-o-Matic Model CKM, or approved equal.

G. PRESSURE RELIEF VALVE

Pressure relief valve shall be 1/2" CPVC with NPT connection and Viton seals. Pressure relief valve shall be manufactured by Plasto-o-Matic Model RVT, or approved equal.

H. CALIBRATION COLUMN

Calibration column shall be clear CPVC plastic with NPT thread connections at top and bottom, 500 milliliter capacity, and marked in units of milliliters per minute and gallons per hour. Calibration column shall be available from USA Bluebook, Stock No. 351727, or equal.

I. CPVC STRAINER

Strainer shall have a body material of CPVC, a basket material of CPVC with 1/32" perforated screen, FPM sealing material, and a pressure rating of 150 psi. Strainer shall be manufactured by Hayward, available from USA Bluebook, Stock no. 206903, or equal.

I. PULSATION DAMPENER

Pulsation dampener shall have a CPVC body and Hypalon diaphragm, 10 cu/in, NPTF, 150 psi, max 12 GPH. Pulsation dampener shall be manufactured by Griffco Valve, available from USA Bluebook, Stock no. 351130, or equal.

J. PRESSURE GAUGE

See Section 40 73 13 Pressure Gauges.

PART 3 EXECUTION

The Chemical Feed System equipment shall be installed in accordance with manufacturer recommendations as approved by the Engineer and as shown on the Drawings.

The manufacturer shall include the services of a factory-trained field engineer for the purposes of installation inspection, making field adjustments necessary to ensure proper system operation, equipment start-up, performance testing, and training of plant personnel regarding proper operation and maintenance of the equipment. Manufacturer's services shall include one (8 hour) day at the site and shall be included

in the bid price. This trip shall include inspection, certification, testing, startup, and training.

***** END OF SECTION *****

SECTION 43 41 45

POLYETHYLENE STORAGE TANK

PART 1 GENERAL

1.01 SCOPE

The work specified in this Section includes furnishing and installing new polyethylene storage tanks as shown on the Plans and as specified herein.

1.02 EQUIPMENT LIST

Equipment numbers are as follows:

<u>Item</u>	<u>Equipment Number</u>
Supplemental Carbon Tank 1	T18-410
Supplemental Carbon Tank 2	T18-420

1.03 SUBMITTALS

Submit under provision of Section 01 33 00.

1.04 WARRANTY

Storage Tank shall be provided with a minimum five (5) year manufacturer's warranty against defects in material and workmanship.

PART 2 PRODUCTS

2.01 APPROVED MANUFACTURERS

The Supplemental Carbon tanks shall be Snyder Industries, Inc. Model ASM TK 6000VNT X 102, or approved equal.

2.02 STORAGE TANK

Polyethylene tanks installed under the requirements of the project shall meet the design criteria listed below.

A. STORAGE TANK

Parameter	Design Requirements
Material	High Density Linear Polyethylene
Quantity of Tanks	2
Tank Location	Outside
Tank Diameter	102"
Height	188"

Parameter	Design Requirements
Tank Capacity (gallons)	6,000
Specific Gravity	1.9
Tank Resin	HDLPE
UV Inhibitors	Yes
Color	Black
Bottom	Flat
Top	Conical

B. FITTINGS AND TANK ACCESSORIES

1. Name Plate

Identify each tank with the fabricator's name, capacity in gallons, design maximum temperature, design pressure, chemical service, specific gravity, design minimum wall thickness, tank "tag" number, tank name resin type, percent composition and date of manufacture. Marking shall be on a 16-gauge stainless steel plate. Seal decals, labels, etc., into the laminate exterior with clear resin.

2. Top Connections

Provide (4) four top tank connection with spool lengths as required for elevations shown on the Plans. Contractor shall provide and install PVC blind flange for 3-inch and 6-inch top cover connections, drilled and notched for installation of instrumentation wiring penetration to allow removal and installation of blind flange with instrument in place.

All flanged nozzles on the tanks shall be rated at minimum 25 psi according to PS15-69. The flange outer diameters and drilling shall be per ANSI 16.5.

The back face of all flanges shall be spot-faced, flat and parallel to the flange face of sufficient diameter to accept a SAE metal washer under the bolt head or nut.

Parameter	Design Requirements
Inlet (Fill)	1 – 3" PVC flange adapter
Level Switches	1 – 6" PVC flange adapter
Radar Level Sensor/Transmitter	1 – 6" PVC flange adapter
Reverse Level Float Gauge	1 – 6" PVC flange adapter

The inlet fill pipe shall be supported at 5 ft. maximum intervals with support structures. Standard support structure design shall utilize bulkhead fitting tank attachments or welded attachments on Type II tanks.

3. Bottom Connections

Provide (2) two bottom tank connections. Each bottom connection shall be a Snyder Unitized Molded Outlet (SUMOTM) fitting shall be an integral part of the tank and provide maximum drainage of liquid through the sidewall of a flat bottom tank.

Parameter	Design Requirements
Outlet	1 – 3" PVC flange adapter w/SUMO fitting
Future Connection	1 – 3" PVC flange adapter w/SUMO fitting

4. Manway with vent

Tank shall be provided with (1) one 18" threaded-vented w/15" access.

Each tank must be properly vented for the type of material and flow rates expected. Vents must comply with OSHA 1910.106 (f) (2) (iii) or other accepted standard. All tanks must be vented for atmospheric pressure as well as any pressure created by filling and emptying the tank. Venting equipment should be sized to limit pressure or vacuum in the tank to a maximum of 1/2" of water column (0.02 psi). 3" U-vent, PVC, w/bug screen.

5. Ladder with safety Post

Ladder shall be constructed of FRP.

Ladders shall be designed to meet applicable OSHA standards.
Reference: OSHA 1926.1053; Ladders.

Ladders must be mounted to the tank to allow for tank expansion and contraction due to temperature and loading changes. All top ladder mounts shall be connected to integrally molded-in attachment lugs that allow for tank movement due to temperature and loading changes.

6. Calibration/Level Board

Yes, stenciled, 100 gallon increments.

7. Reverse Level Float Gauge

The tank shall be provide with a reverse level float gauge.

8. Lifting Lugs

The tank shall be provided with (8) eight S.S. lifting lugs.

C. INSTRUMENTATION

See Section 40 72 13 Radar Level Sensor/Transmitter

See Section 40 72 76 Level Switches.

D. ANCHOR AND SEISMIC DESIGN REQUIREMENTS

Structural calculations shall be provided for the storage tank. The calculations shall be stamped by a professional engineer registered in the State of Washington. The calculations shall show the anchorage and demonstrate suitability for all applicable wind and seismic standards as outlined below.

Anchors shall comply with Section 43 20 00. Supports and anchorage shall comply with the requirements of the 2021 International Building Code (IBC) and ASCE 7-16 Minimum Design Loads for Buildings and Other Structures, Chapter 13 Seismic Design for Nonstructural Components, as referenced and amended by the IBC. For the following design parameters:

1. Wind Design Data
 - a. Ultimate wind speed: 103
2. Seismic Design Data
 - Site Class D
 - Seismic Importance Factor: $I_p = 1.25$
 - Design response acceleration coefficients:

$SDS = 1.130g$
 $SD1 = 0.628g$

3. Tie Down System

The tie down system shall be 316 stainless steel.

The tank shall be designed to provide eight tie-down lugs integrally molded into the top head. The tie-down lugs shall be designed to allow tank retention in wind and seismic loading situations without tank damage. The seismic tie down system base plates and anchor bolts shall be supplied and installed by the Contractor as recommended by the tank manufacturer per the approved structural calculations.

PART 3 EXECUTION

3.01 INSTALLATION

The equipment shall be installed as shown on the Plans and in strict accordance with pump manufacturer's recommendations. All equipment delivered to the site shall be stored as specified in accordance with the manufacturer's instructions.

The manufacturer shall include the services of a factory-trained field engineer for the purposes of installation inspection, making field adjustments necessary to ensure proper

system operation, equipment start-up, performance testing, and training of plant personnel regarding proper operation and maintenance of the equipment.

Manufacturer's services shall include one (8 hour) day at the site and shall be included in the bid price. This trip shall include inspection, certification, testing, startup, and training.

3.02 FIELD TESTING

After installation, tanks shall be hydro-tested for a period of at least 24 hours. LOTT shall provide clean water for this field test procedure. Tanks shall have no measurable leakage.

Leaks and/or deficiencies with tanks and their ability to store the desired liquid shall be remedied by the Contractor.

***** END OF SECTION *****