City of Hailey, ID

Woodside WRF Equipment Procurement – Screens

Procurement Documents
Project Manual

Issued for Review

April 11, 2025

HDR Project No. 10381996

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DIVISION 00

PROCUREMENT AND CONTRACTING REQUIREMENTS

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SECTION 00 01 07

SEALS AND SIGNATURES

	I hereby certify that the portion of this technical submission described below was prepared by me or under my direct supervision and that I am a duly registered Professional Engineer under the laws of the State of Idaho. *Bradley S. Bjerke* _____ Bradley S. Bjerke Idaho PE #P-8778 HDR Engineering (208) 387-7073

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SECTION 00 11 13

NOTICE OF ADVERTISEMENT FOR BIDS

Sealed bids will be received by the City Clerk of the City of Hailey (Buyer), Idaho, at Hailey City Hall, 115 Main Street South, Hailey, Idaho 83333, on the **4th** day of **June 2025** until the hour of **2 p.m.**, local time, of said day for supply of in-channel drum screens for the Woodside Water Reclamation Facility (WRF) consisting of the following:

Furnish Goods and Special Services consisting of two (2) 6-mm perforated plate, fully automatic self-cleaning in-channel mounted drum screens for wastewater applications. Screens shall have a drum diameter of 55-inches (1,400 mm) and each be capable of handling 3.2 MGD.

Each screen shall include a 2-inch Y strainer, solenoid valves as required by manufacturer, two radar level transmitters for differential level control, and interconnecting piping/tubing from the Y strainer to spray wash connection points. Two control panels shall be provided. One control panel will control each channel with two screens in series. The first screen has 6-mm openings and the second future screen has 2-mm openings. No 2-mm screen will with this procurement although the panels shall be fully functional for two screens. All system components delivered to the project site assembled. Special Services shall include: installation certification, operations and maintenance manuals, start-up services and training of Buyer's personnel.

Bids will be opened at the office of the City Clerk at **2:00** o'clock **p.m.** on said date. The Project Manual, including bid forms, bidder's instructions, contract forms, specifications, and figures, is available to interested bidders at the office of the City Clerk. Electronic versions of the Project Manual in PDF format will be available at no cost.

All bids shall be presented or delivered in a sealed envelope or delivered electronically as a pdf in an attachment to an e-mail. If delivered in an envelope, address to Mary Cone / Hailey City Clerk, 115 Main Street South, Hailey, ID 83333. The sealed envelope shall identify the in-channel drum screens bid inside. Likewise, for electronic bidding the subject line shall identify the bid contained in the attachment. The electronic bid e-mail shall be addressed only to mary.cone@haileycityhall.org. Mary Cone shall send a return acknowledgement of receiving the e-mail. The attachment will not be opened until the designated bid opening date and time.

The Project Manual may be examined at:

- Hailey City Hall, 115 Main Street South, Idaho 83333. 208-788-4221. mary.cone@haileycityhall.org.
- HDR, 412 East Parkcenter Blvd, Ste. 100, Boise, ID 83706. 208-387-7073. brad.bjerke@hdrinc.com.

The successful bidder (Seller) shall be required to provide performance bond per Idaho statutes. Questions regarding this Project Manual should be submitted in writing via email to Mary Cone with cc to Brad Bjerke.

The right is reserved to reject any or all bids.

Dated: May 14, 2025

_____

Mary Cone / Hailey City Clerk

Publish**:** **May 14, 2025**
May 21, 2025

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SECTION 00 21 13
INSTRUCTIONS TO BIDDERS

1. Defined Terms

Terms used in these Instructions to Bidders will have the meanings indicated in the General Conditions and Supplementary Conditions. Additional terms used in these Instructions to Bidders have the meanings indicated below which are applicable to both the singular and plural thereof:

1.1 Bidder - The individual or entity who submits a Bid directly to Buyer.

1.2 Buyer – City of Hailey.

1.3 Issuing Office - The office from which the Bidding Documents are to be issued and where the bidding procedures are to be administered. For this project, the Issuing Office is the office of the City Clerk of the City of Hailey as listed in the Notice of Advertisement for Bids.

1.4 Seller – The individual or entity furnishing the Goods and Special Services.

1.5 Successful Bidder – The lowest responsible Bidder submitting a responsive Bid to whom Buyer makes an award (on the basis of Buyer's evaluation as herein provided).

2. Copies of the Project Manual

2.1 Project Manuals for a fee, if any, stated in the Notice of Advertisement for Bids shall be obtained from the Issuing Office.

2.2 Complete Project Manuals must be used in preparing Bids; neither Buyer nor Engineer assumes any responsibility for errors or misinterpretations resulting from the use of incomplete information.

2.3 Buyer and Engineer in making copies of the Project Manuals available on the above terms do so only for the purpose of obtaining Bids for the Goods and Special Services and do not confer a license or grant for any other use.

3. Qualification of Bidders

3.1 To demonstrate Bidder's qualifications to furnish Goods and Special Services, Bidder shall submit written evidence of Bidder's qualifications with the bid.

4. Examination of Project Manual, Other Related Data, and Site.

4.1 It is the responsibility of each Bidder before submitting a Bid, to:

4.1.1 Examine and carefully study the Project Manual, any Addenda, and other related data identified in the Bidding Documents.

4.1.2 Understand the equipment layout to become familiar with and satisfy Bidder as to the general, local and site conditions that may affect equipment design, cost, progress, performance or furnishing of the Goods and Special Services.

4.1.3 Consider federal, state, and local Laws and Regulations that may affect costs, progress, performance, and furnishing of the Goods and Special Services.

4.1.4 Carefully study, consider, and correlate the information known to Bidder; information commonly known to sellers of similar goods doing business in the locality of the Point of Destination and the site where the Goods will be installed or

where Special Services will be provided; information and observations obtained from Bidder's visits, if any, to the Point of Destination and the site where the Goods are to be installed or Special Services are to be provided; and any reports and drawings identified in the Bidding Documents regarding the Point of Destination and the site where the Goods will be installed or where Special Services will be provided, with respect to the effect of such information, observations and documents on the cost, progress, and performance of Seller's obligations under the Contract Documents.

4.1.5 Promptly notify Engineer of all conflicts, errors, ambiguities or discrepancies which Bidder has discovered in or between the Project Manual and such other related documents.

4.2 The submission of a Bid will constitute an incontrovertible representation by Bidder that Bidder has complied with every requirement of this Article 4, that without exception the Bid is premised upon furnishing Goods and Special Services required by the Bidding Documents, that Bidder has given Engineer written notice of all conflicts, errors, ambiguities and discrepancies that Bidder has discovered in the Bidding Documents and the written resolutions (if any) thereof by Engineer are acceptable to Bidder, and that the Bidding documents are generally sufficient to indicate and convey understanding of all terms and conditions for furnishing Goods and Special Services.

5. Availability of Lands for Work, etc. (NOT USED)

6. Interpretations and Addenda

6.1 All questions about the meaning or intent of the Project Manual are to be submitted to the Engineer in writing. Interpretations or clarifications considered necessary by Engineer in response to such questions will be issued by Addenda mailed or delivered to all parties recorded by Engineer as having received the Project Manual. Questions received less than ten days prior to the date for opening of Bids may not be answered. Only questions answered by formal written Addenda will be binding. Oral and other interpretations or clarifications will be without legal effect.

6.2 Addenda may also be issued to clarify, correct, or change the Project Manual as deemed advisable by Buyer or Engineer.

7. Contract Times

7.1 The number of days within which, or the dates by which, furnishing of the Goods and Special Services is to be (a) Substantially Completed and (b) also completed and ready for final payment are set forth in the Agreement Between Buyer and Seller.

8. Liquidated Damages

8.1 Any provisions for liquidated damages, such as those for Seller's failure to attain a Milestone, or to deliver the Goods or furnish Special Services within the Contract Times, are set forth in the Agreement Between Buyer and Seller.

9. "Or-Equal" Items

9.1 The Contract, if awarded, will be on the basis of material and equipment specified or described in the Bidding documents without consideration of possible "or-equal" items. Whenever it is specified or described in the Bidding documents that an "or-equal" item of material or equipment may be furnished or used by Seller if acceptable to Engineer, application for such acceptance will not be considered by Engineer until after the Effective Date of the Agreement. The procedure for submittal of any such application by Seller and

consideration by engineer is set forth in the General Conditions and may be supplemented in the Supplementary Conditions.

9.2 Bidders may propose "or equal" materials and equipment, which if approved by Engineer will be identified by Addendum. The materials and equipment described in the Bidding Documents establish a standard of required type, function, and quality to be met by any proposed "or-equal" unless written request for approval has been submitted by Bidder and has been received by Engineer at least 15 days prior to the date for receipt of Bids. Each such request shall conform to the requirements of Paragraph 5.04 of the General Conditions. The burden of proof of the merit of the proposed item is upon Bidder. Engineer's decision of approval or disapproval of a proposed item will be final. Bidders shall not rely upon approvals unless set forth in an Addendum.

10. Subcontractors, Suppliers and Others (NOT USED)

11. Preparation of Bid

11.1 The Procurement Bid Form is included with the Bidding Documents. Additional copies of Bidding Documents may be obtained from the City Clerk.

11.2 All blanks on the Procurement Bid Form shall be completed in ink and the Procurement Bid Form signed in ink. Erasures or alterations shall be initialed in ink by the person signing the Procurement Bid Form. A Bid price shall be indicated for each item listed therein. In the case of optional alternates the words "No Bid," "No Change", or "Not Applicable" may be entered.

11.3 A Bid by a corporation shall be executed in the corporate name by the president or a vice-president or other corporate officer accompanied by evidence of authority to sign. The corporate seal shall be affixed and attested by the secretary or an assistant secretary. The corporate address and state of incorporation shall be shown.

11.4 A Bid by a partnership shall be executed in the partnership name and signed by a partner (whose title must appear under the signature), accompanied by evidence of authority to sign. The official address of the partnership shall be shown.

11.5 A Bid by a limited liability company shall be executed in the name of the firm by a member and accompanied by evidence of authority to sign. The state of formation of the firm and the official address of the firm shall be shown.

11.6 A Bid by an individual shall show the Bidder's name and official address.

11.7 A Bid by a joint venture shall be executed by each joint venture in the manner indicated on the Procurement Bid Form. The official address of the joint venture shall be shown.

11.8 All names must be typed or printed in ink below the signature.

11.9 The Bid shall contain an acknowledgment of receipt of all Addenda, the numbers of which shall be filled in on the Procurement Bid Form.

11.10 Each Bidder shall list the postal address, e-mail address, and telephone number for communications regarding the Bid.

11.11 The Bidder shall include adequate information on the proposed equipment supply for the bid items (in-channel drum screens, drum cover, Y strainers, solenoid valves, control panels, etc.).

12. Submittal of Bid

12.1 A bid shall be submitted no later than the date and time prescribed, and in the manner indicated in the Notice of Advertisement for Bids.

13. Modification and Withdrawal of Bid

13.1 A Bid may be modified or withdrawn by an appropriate document duly executed (in the manner that a Bid must be executed) and delivered to the place where Bids are to be submitted prior to the date and time for the opening of Bids.

13.2 If, within 24 hours after Bids are opened, any Bidder files a duly signed, written notice with Buyer and promptly thereafter demonstrates to the reasonable satisfaction of Buyer that there was a material and substantial mistake in the preparation of its Bid, that Bidder may withdraw its Bid, and the Bid Security will be returned. Thereafter, if the Goods and Special Services are rebid, that Bidder will be disqualified from further bidding on the Goods and Special Services as described in this Project Manual.

14. Opening of Bids

14.1 Bids will be opened at the time and place indicated in the Notice of Advertisement for bids and, unless obviously non-responsive, read aloud publicly. An abstract of the amounts of the Base Bids and Alternate Bids, if any, will be made available to Bidders after the opening of Bids.

15. Bids to Remain Subject to Acceptance

15.1 All Bids will remain subject to acceptance for sixty days after the day of the Bid opening, but Buyer may, in its sole discretion, release any Bid prior to the end of this period.

16. Award of Contract

16.1 Buyer intends to award the contract to the lowest responsive, responsible Bidder(s) on the basis of the lump sum total bid price as described in Section 00 41 13 Procurement Bid Form. The Buyer may also evaluate the cost impact of required existing channel modifications to accommodate the Sellers equipment on the total project price.

16.2 If the Contract is to be awarded, Buyer will give Successful Bidder a Notice of Award within sixty (60) days after the day of the Bid opening. The form for Notice of Award for Procurement Contracts is included in the Project Manual for reference.

16.3 Buyer reserves the right to reject any or all Bids, including without limitation the rights to reject any or all nonconforming, nonresponsive, unbalanced or conditional Bids. Buyer also reserves the right to waive all informalities not involving price, time or changes in the Goods and Special Services. Discrepancies between the indicated sum of any column of figures and the correct sum thereof will be resolved in favor of the correct sum. Discrepancies between words and figures will be resolved in favor of the words.

16.4 The Buyer reserves the right to reject any Bid if the information submitted by, or investigation of, the Bidder fails to satisfy the Buyer that such Bidder is sufficiently qualified to carry out the obligations of the Agreement and has a history of successfully furnishing similar projects with goods and special of the type contemplated herein. A Bid may be rejected for any one or more of the following, or similar, reasons:

16.4.1. More than one proposal on the same project from a bidder, under the same or different names.

16.4.2 Evidence of collusion with any other bidder or bidders. Participants in such collusion shall be disqualified from submitting bids on any future work.

16.4.3 Insufficient experience and organization to establish a proven history of responsibility for satisfactory furnishing of similar goods and special services.

16.4.4 An unsatisfactory performance record which may indicate disregard for project schedules, specifications, necessary skills, quality of work, laws, regulations, or safety.

16.4.5 Projects in progress, whether for the Buyer or others, which might hinder or prevent the furnishing of the goods and special services being bid.

16.4.6 Failure to pay or settle bills for labor or materials on any previous contracts.

16.4.7 Default in the performance of any previous written public contract, or conviction of a crime arising from a previous public contract.

16.4.8 Failure to comply with the requirements of the Instructions to Bidders.

17. Contract Security and Insurance

17.1 Article 4 of the General Conditions, as may be modified by the Supplementary Conditions, sets forth Buyer's requirements as to Bonds and Insurance. When the Successful Bidder delivers the executed Agreement Between Buyer and Seller to Buyer, it must be accompanied by the required Bonds and the evidence of insurance as required.

18. Execution of Contract

18.1 Notice of Award for Procurement Contracts will obligate the Successful Bidder to immediately return acknowledgement of receipt of Notice of Award for Procurement Contracts and, within fifteen (15) days, execute and return the Agreement Between Buyer and Seller, furnish the required Performance Bond, and provide evidence of insurance as required.

18.2 If the lowest responsive, responsible Bidder fails to execute and deliver the Agreement Between Buyer and Seller and furnish the required Bonds and satisfactory evidence of insurance within fifteen (15) days after the Notice of Award, Buyer may annul the Notice of Award for Procurement Contracts and may award a contract to the next lowest responsive, responsible Bidder, or may reject all bids.

18.3 The Buyer, within fifteen (15) days of receipt of the Agreement Between Buyer and Seller, signed by the Seller, and acceptable forms of security as required, shall sign the Agreement Between Buyer and Seller, specify the effective date of the agreement, and return a fully executed duplicate to the Seller. Should the Buyer not execute the Agreement Between Buyer and Seller within such period, the Bidder may by written notice withdraw its signed Agreement Between Buyer and Seller. Such notice of withdrawal shall be effective upon receipt by the Buyer.

19. Notice to Proceed

19.1 The Notice to Proceed with Special Services for Procurement Contracts shall be issued by the Buyer at any time within thirty (30) days after the Effective Date of the Agreement. The form, to be issued by the Buyer, is included in the Project Manual for reference.

19.2 The Contract Times will commence to run on the day indicated on the Notice to Proceed.

19.3 In no event will the Contract Times commence to run later than sixty (60) days after Bid Opening or thirty (30) days after the Effective Date of the Agreement Between Buyer and Seller, whichever date is earlier, without mutual agreement between the Buyer and the Seller.

20. Taxes

20.1 The Buyer is tax exempt per Idaho State Tax Commission Sales Tax Resale or Exemption Certificate ST-101 item 3 (State Government Entity) or item 5 (Pollution Control). The signed copy of said certificate shall be provided with the Agreement.

END OF SECTION

SECTION 00 41 13

PROCUREMENT BID FORM

Woodside WRF Equipment Procurement – Screens
City of Hailey, Idaho

It is the intent of the Buyer to award a contract to the lowest responsive, responsible bidder on the basis of the lump sum total price written below.

The Bidder hereby certifies that the costs for all labor, services, equipment, tools, materials, licenses, permits, fees, and taxes (unless exempt) necessary for furnishing the Goods and Special Services according to the Project Manual are included in the price(s) for the items shown herein.

1. Bid Item Description:

This section, in general, describes the bid items included in the Bid Schedule. The description of Bid Items is provided for clarity purposes only. It is not intended to replace, supersede, or preclude any information in the plans and specifications. Unless specified otherwise, all lump sum Bid Items will be paid as a shown in the Agreement Between Buyer and Seller. Descriptions of the project Bid Items are provided below:

> **Bid Item No. A: In-Channel Drum Screens.** This lump sum Bid Item includes furnishing of goods and special services consisting of supply of two (2) 6-mm perforated plate, fully automatic self-cleaning in-channel mounted drum screens for wastewater applications. Screens shall have a drum diameter of 55-inches (1400 mm) and each be capable of handling 3.2 MGD.
>
> Each screen shall include a 2-inch Y strainer, solenoid valves as required by manufacturer, two radar level transmitters for differential level control, and interconnecting piping/tubing from the Y strainer to spray wash connection points. Two control panels shall be provided. One control panel will control each channel with two screens in series. The first screen has 6-mm openings and the second future screen has 2-mm openings. No 2-mm screen will be provided in one channel with this procurement although the panels shall be fully functional for two screens. All system components delivered to the project site assembled. Special Services shall include: installation certification, operations and maintenance manuals, start-up services and training of Buyer's personnel.

2. Bid Schedule:

BID ITEM NO.	DESCRIPTION	UNIT	EST QTY	UNIT PRICE	TOTAL BID PRICE
A	**In-Channel Drum Screens (two 6-mm screens and associated components)**	EA	2	$_____	$_____
Total Bid Price for Item A _____ (use words)					

3. Lowest Responsive BIDDER:

Determination of the lowest responsive BIDDER will be based on the lump sum price meeting the specification requirements.

4. Completion:

BIDDER agrees that the Goods will be furnished and Special Services will be substantially completed and ready for final payment in accordance with Paragraph 10.06 of the General Conditions on or before the dates or within the number of calendar days indicated in the Agreement Between Buyer and Seller.

BIDDER accepts the provisions of the Agreement as to liquidated damages in the event of failure to complete the Work within the times specified in the Agreement Between Buyer and Seller.

Dated:_____

Name of Business:_____

Authorized Signature:_____

Name:_____

Title:_____

SECTION 00 41 13.01

BID PROPOSAL

For

Woodside WRF Equipment Procurement – Screens
City of Hailey, Idaho

From:_____

To: Woodside Water Reclamation Facility,
4197 Glenbrook Drive, Hailey, Idaho 83333

The undersigned, as Bidder, declares that we have received and examined the Project Manual for the **Woodside WRF Equipment Procurement – Screens** that we are well-qualified to supply the Goods and Special Services, that we are familiar with the Goods and Special Services, applicable federal, state, and local laws, ordinances, rules, and regulations, and conditions affecting cost, progress, or performance of the Goods and Special Services, and have made such independent investigations as Bidder deems necessary.

We acknowledge that the Project Manual provides the contract requirements, the general conditions of the contract, the technical specifications, as well as the referenced federal, state, and local laws, ordinances, rules, and regulations.

We acknowledge that addenda numbers ____ through ____ have been received and have been examined as part of the Project Manual.

We acknowledge that this price includes the following completed documents: Bid Proposal, and Procurement Bid Form.

The undersigned, as Bidder, proposes and agrees that if this bid is accepted we will contract with the City of Hailey, hereinafter referred to as Buyer, on the form of Agreement Between Buyer and Seller provided herewith to furnish the Goods and Special Services according to the Contract Documents with all terms and conditions contained therein. We agree to sign the Agreement Between Buyer and Seller without qualification and to furnish the performance and payment bonds and the required evidence of insurance within fifteen (15) calendar days after receiving written Notice to Proceed for the contract.

We further propose and agree, if our bid is accepted and a contract for furnishing the Goods and Special Services is entered into with the Buyer, to plan the furnishing and to prosecute it with such diligence that the Goods and Special Services shall be completely furnished within the time stipulated, and to accept as full payment the bid price(s) written in the following Procurement Bid Form.

We agree that this Bid Proposal constitutes an offer, which shall be binding on the undersigned for sixty (60) days from the date of this Bid Proposal.

The party by whom this proposal is submitted and by whom the contract will be entered into in case the award is made to him:

Bidder (State whether business is a Corporation, a Partnership, or an Individual)

_____, a _____

Bidder's Address: State of Incorporation:

_____ _____

_____

Corporate Address:

Bidder's Phone Number:_____

Bidder's Fax Number: _____

Bidder's E-mail Address: _____

Dated:_____ (SEAL)

Signature:

_____

Name of Authorizing Official, City of Hailey:

_____

Title:_____

Attested By:

_____

Title:_____

END OF SECTION

SECTION 00 50 13
AGREEMENT BETWEEN BUYER AND SELLER

This Agreement is between the CITY OF HAILEY (Buyer) and

_____ (Seller).

Buyer and Seller, in consideration of the mutual covenants set forth herein, agree as follows:

ARTICLE 1 - GOODS AND SPECIAL SERVICES

1.01 Seller shall furnish to Buyer the Goods and Special Services as specified or indicated in the Contract Documents.

ARTICLE 2 - THE PROJECT

2.01 The Project for which the Goods and Special Services to be provided under the Contract Documents may be the whole or only a part is generally described as follows:

Woodside WRF Equipment Procurement – Screens

ARTICLE 3 - ENGINEER

3.01 The Contract Documents for the Goods and Special Services have been prepared by HDR Engineering, Inc., who is hereinafter called Engineer and who is to assume all duties and responsibilities, and have the rights and authority assigned to Engineer in the Contract Documents in connection with the furnishing of Goods and Special Services.

ARTICLE 4 - POINTS OF DESTINATION

4.01 The places where the Goods are to be delivered are defined in the STANDARD GENERAL CONDITIONS FOR PROCUREMENT CONTRACTS as the Points of Destination and designated as: Woodside Water Reclamation Facility.

ARTICLE 5 - CONTRACT TIMES

5.01 *Time of the Essence*

A. All time limits for Milestones, the delivery of Goods and the furnishing of Special Services as stated in the Contract Documents are of the essence. The statement herein that time is of the essence shall not be construed to limit the Seller's cure rights as set forth in the Contract Documents upon default, or any other provision of the Contract Documents or under applicable law that would afford Seller a time certain or a reasonable time to perform its contractual obligations.

5.02 Dates for Goods and Special Services

A. Special Services required by the Contract Documents will be performed pursuant to the schedule set forth:

ITEM NO.	MILESTONE EVENT	CONTRACT TIMES	CALENDAR DAYS
1	Shop Drawing Submittals		
a	Process & Instrumentation Drawings, Equipment Data/Cut Sheets, Electrical Drawings, Instrumentation and Control Wiring Diagrams (I/O), Electrical Equipment Cut Sheets.	After date of Agreement	70
2	Review of Shop Drawing Submittals (by Engineer)	After Shop Drawing Submittal (item 1.a.)	14
3	Fabrication & Delivery of Goods	After Approval of Shop Drawings by Engineer (item 2)	160
4	Spare Parts	With Delivery of Goods	
5	Installation Manuals	After Approval of Shop Drawings by Engineer (item 2)	70
6	Final O&M Manual	After Approval of Shop Drawing by Engineer (item 2)	90
7	Completion of Installation Certification	Time Period after Installation Contractor states equipment is ready for commencement of manufacturer's field services	28
8	Operator Training	Time Period after Installation Contractor states equipment is ready for commencement of manufacturer's field services	28
9	Successful Completion of Performance Demonstration Period (14 days uninterrupted operation)	Time Period after Installation Contractor states equipment is ready for commencement of manufacturer's field services	42

5.03 *Liquidated Damages*

A. Buyer and Seller recognize that time is of the essence of this Agreement and that Buyer will suffer financial loss if the Goods are not delivered at the Point of Destination and ready for receipt of delivery by Buyer within the times specified for delivery of Goods and Special Services, plus any extensions thereof allowed in accordance with Article 7 of the GENERAL CONDITIONS FOR PROCUREMENT CONTRACTS. The parties also recognize that the timely performance of services by others involved in the Project are materially dependent upon Seller's specific compliance with the requirements for delivery of Goods and Special Services. Further, they recognize the delays, expense and difficulties involved in proving the actual loss suffered by Buyer if complete acceptable Goods are not delivered on time. Accordingly, instead

of requiring such proof, Buyer and Seller agree that as liquidated damages for delay (but not as a penalty) Seller shall pay Buyer $500.00 for each calendar day that expires after the time specified for delivery of each item. Liquidated damages shall also be applicable to the times specified for each item of Special Services ($500.00/calendar day). The maximum total amount for liquidated damages shall be limited to ten (10) percent of the Total Contract Price in Article 6.

B. The liquidated damages provided in this Specification Section shall be Buyer's sole and exclusive remedy for Seller's late delivery of Goods and Special Services. Seller shall have no liability to Buyer under this Article if Seller's delay causes no damages or losses to Buyer.

C. If Seller is prevented from achieving the delivery times, milestone submittal dates or response times, as defined in Article 5.02A. and 5.02.B., for any reason beyond Seller's reasonable control and not attributable to its actions or inactions, Seller shall not be assessed liquidated damages and shall be entitled to an adjustment of the Contract Times and the Contract Price in an amount equal to the duration of the reason or event causing the delay in delivery to the extent that the delay is caused by Buyer.

D. Upon receipt of Buyer's Notification to Proceed with Fabrication of Equipment that satisfies Seller's requirements for meeting the delivery schedule, Seller shall commence fabrication of equipment. The place of delivery specified therein shall be firm and fixed, provided that Buyer may notify Seller no later than 45 days prior to the scheduled shipment date of the products of an alternate point of delivery (the "Alternate Delivery Site"). Provided the parties agree to a Variation to take into account any additional cost or delay incurred by Seller in implementing this change, the Alternate Delivery Site shall become the agreed place of delivery for all purposes under this Agreement. In such event the following conditions shall apply: (i) title and risk of loss shall pass to the Buyer upon delivery of the products to the Alternate Delivery Site; (ii) any amounts payable to the Seller upon delivery or shipment shall become payable upon delivery of the products to the Alternate Delivery Site; (iii) any additional expenses incurred by the Seller in connection with such shipment to storage shall become payable by the Buyer upon submission of the Seller's invoice(s) (including but not limited to costs of any additional transportation, preparation for and placement into storage, handling, inspection, preservation, insurance, storage, removal charges and any applicable taxes); (iv) transportation of the products from the storage facility to their place of installation shall be the Buyer's responsibility; and, (v) if the Contract includes Services, subject to the terms and conditions in the Contract the Seller shall resume provision of Services to Buyer when instructed to do so by Buyer provided that all amounts due hereunder plus any cost incurred by Seller in delaying such Services have been paid.

ARTICLE 6 - CONTRACT PRICE

6.01 Buyer shall pay Seller for furnishing the Goods and Special Services in accordance with the Contract Documents in current funds pursuant to the schedule below:

MILESTONE EVENT	PERCENT PAYMENT AT EACH EVENT	PRICE
Notice to Proceed	10	$
Approval of Shop Drawing Submittals	20	
Delivery of Installation Manuals	10	$
Delivery of Goods	40	$
Final O&M Manual	10	$
Satisfactory Install Certification/Performance Testing/Operator Training	10	$
Total Price	100	$

ARTICLE 7 - PAYMENT PROCEDURES

7.01 *Submittal and Processing of Payments*

A. Seller shall submit Applications for Payment to Buyer in accordance with the Contract Documents. Applications for Payment will be processed by Engineer as provided in the Contract Documents.

7.02 *Progress Payments*

A. Buyer shall make payments on account of the Contract Price on the basis of Seller's Applications for Payment as recommended by Engineer for items listed in Article 6.

7.03 *Final Payment*

A. Upon receipt of the final Application for Payment accompanied by Engineer's recommendation of payment in accordance with Paragraph 10.06 of the GENERAL CONDITIONS FOR PROCUREMENT CONTRACTS, Buyer shall make final payment thirty (30) days after acceptance by the City Council.

ARTICLE 8 - INTEREST

8.01 All moneys not paid when due hereunder shall bear interest at the maximum statutory rate allowed by law at the place of BUYER'S project in accordance with State of Idaho.

ARTICLE 9 - SELLER'S REPRESENTATIONS

9.01 In order to induce Buyer to enter into this Agreement, Seller makes the following representations:

A. Seller has examined and carefully studied the Contract Documents and the other related data identified in the Bidding Documents.

B. If specified or if, in Seller's judgment, any local condition may affect cost, progress or the furnishing of the Goods and Special Services, Seller has visited the Point of Destination and become familiar with and is satisfied as to the local conditions that may affect cost, progress or the furnishing of the Goods and Special Services.

C. Seller is familiar with and is satisfied as to all local federal, state and local Laws and Regulations that may affect cost, progress and the furnishing of the Goods and Special Services.

D. Seller has carefully studied and correlated the information known to Seller, and information and observations obtained from Seller's visits, if any, to the Point of Destination, with the Contract Documents.

E. Seller has given Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Seller has discovered in the Contract Documents, and the written resolution thereof by Engineer is acceptable to Seller.

F. The Contract Documents are generally sufficient to indicate and convey understanding of all terms and conditions for furnishing Goods and Special Services.

G. Seller's relationship to the Buyer in performance of this Agreement is that of an Independent Contractor. The personnel performing services under this Agreement shall at all times be under the Seller's exclusive direction and control and not employees of the Buyer. Seller shall pay all wages, salaries and other amounts due to its employees in connection with this agreement and shall be responsible for all applicable state, federal, and local reports and obligations respecting

them such as labor wages, social security, income tax withholding, unemployment compensation and similar matters.

ARTICLE 10 - CONTRACT DOCUMENTS

10.01 *Contents*

A. The Contract Documents consist of the following:

1. This Agreement for Procurement Contracts.

2. Performance Bond for Procurement Contracts.

3. Payment Bond for Procurement Contracts.

4. General Conditions for Procurement Contracts.

5. Supplementary Conditions for Procurement Contracts.

6. Specifications as listed in table of contents.

7. Drawings as listed in table of contents.

8. Addenda (Numbers _____ to _____, inclusive).

9. Exhibits to this Agreement (enumerated as follows):

    a. Documentation submitted by Seller prior to Notice of Award;

10. The following which may be delivered or issued on or after the Effective Date of the Agreement and are not attached hereto:

    a. Notice to Proceed.

    b. Written Amendment(s).

    c. Change Order(s).

    d. Field Order(s).

    e. Engineer's Written Interpretation(s).

B. The documents listed in Paragraph 10.01.A are attached to this Agreement (except as expressly noted otherwise above).

C. There are no Contract Documents other than those listed above in this Article 10.

D. The Contract Documents may only be amended, or supplemented as provided in Paragraph 3.04 of the GENERAL CONDITIONS FOR PROCUREMENT CONTRACTS.

ARTICLE 11 - MISCELLANEOUS

11.01 *Defined Terms*

A. Terms used in this Agreement will have the meanings indicated in the GENERAL CONDITIONS FOR PROCUREMENT CONTRACTS and the SUPPLEMENTARY CONDITIONS FOR PROCUREMENT CONTRACTS.

11.02 *Successors and Assigns*

A. Buyer and Seller each binds itself, its partners, successors, assigns and legal representatives to the other party hereto, its partners, successors, assigns and legal representatives in respect to all covenants, agreements and obligations contained in the Contract Documents.

11.03 *Severability*

A. Any provision or part of the Contract Documents held to be void or unenforceable under any Law or Regulation shall be deemed stricken, and all remaining provisions shall continue to be valid and binding upon Buyer and Seller. The Contract Documents shall be reformed to replace such stricken provision or part thereof with a valid and enforceable provision that comes as close as possible to expressing the intention of the stricken provision.

11.04 *Limitations of Liability*

A. Notwithstanding any other provisions of the Contract Documents, the Supplier's total liability for direct, indirect, incidental, special, punitive or other damages arising at any time under any of the Contract Documents or otherwise in connection with completing the Contract (whether arising under breach of contract, tort, strict liability, or any other theory of law) shall not exceed the amount of the Contract Price.

11.05 *Performance and Payment Bond*

A. For the faithful performance of this Agreement Between Buyer and Seller in accordance with the Contract Documents and payment for all labor and materials as specified in Section 00 41 13 – Procurement Bid Form, the Seller shall execute good and sufficient performance bond and payment bond each in the amount of one hundred percent (100%) of the total amount of the price stated, said bonds to be executed by a surety company authorized to do business in the State of Idaho.

11.06 *Sales Tax*

A. The Buyer will provide to the Seller a copy of Idaho State Tax Commission Sales Tax Resale or Exemption Certificate (ST-101) for the Seller's records. The Equipment is Sales Tax Exempt by both item 3. Exempt Buyer (Federal/Idaho Government Entity) and item 5. Other Exempt Goods and Buyers (Pollution Control items). If the State of Idaho determines the equipment is not Tax Exempt, Buyer will reimburse Seller by Change Order for the Sales Tax paid to the State (actual paid amount only, receipt required).

11.07 *Certification Regarding Boycotting Certain Sectors*

A. Pursuant to Idaho Code § 67-2347A, Bidder certifies that it is not currently engaged in, and will not for the duration of the contract engage in, a boycott of any individual or company because the individual or company:

1. Engages in or supports the exploration, production, utilization, transportation, sale, or manufacture of fossil fuel-base energy, timber, minerals, hydroelectric power, nuclear energy, or agriculture; or

2. Engages in or supports the manufacture, distribution, sale, or use of firearms, as defined in Idaho Code § 18-3302(2)(d).

11.08 *Certification Regarding Anti-Boycott of Israel*

A. Pursuant to Idaho Code § 67-2346, Bidder certifies that it is not currently engaged in, and will not for the duration of the contract engage in, a boycott of goods or services from Israel or territories under its control.

11.09 *Certification Regarding Ownership and Operation*

A. Pursuant to Idaho Code § 67-2359, Bidder certifies that it is not currently owned or operated by the government of China, and will not, for the duration of this contract, be owned or operated by the government of China.

IN WITNESS WHEREOF, Buyer and Seller have signed this Agreement in duplicate. One counterpart each has been delivered to Buyer and Seller. All portions of the Contract Documents have been signed or identified by Buyer and Seller or on their behalf.

_____.

Buyer: City of Hailey, Idaho

By: Martha Burke

Title: City of Hailey, Idaho Mayor

Executed on _____/_____, 2025

Attest
By:

_____

Title:

_____

Approved to as Form:

_____

Seller: _____

By: _____

Attest: _____

Address for giving notice:

_____

_____

_____

Agent for service of process:

_____

_____

_____

(If Seller is a corporation or a partnership, attach evidence of authority to sign.)

END OF SECTION

This page intentionally left blank.

SECTION 00 51 16

NOTICE OF AWARD FOR PROCUREMENT CONTRACTS

For

Woodside WRF Equipment Procurement – Screens

For

City of Hailey, Idaho

Dated:

TO:

(Successful BIDDER - SELLER)

ADDRESS:

CONTRACT FOR: **Woodside WRF Equipment Procurement – Screens**
City of Hailey, Idaho

You are notified that the Contract Time under the above contract will commence to run on as of the date of the Notice of Proceed for Procurement Contracts. By that date, you are to start performing your obligations under the Contract Documents.

Within fifteen (15) days of this Notice of Award for Procurement Contracts, you must deliver to the Buyer:

- Certificates of insurance are required to be purchased and maintained in accordance with the Contract Documents.
- Signed Copy of the Agreement Between Buyer and Seller.
- Bonds are required to be purchased and maintained in accordance with the Contract Documents.
- All applicable licenses required by the contract documents.

City of Hailey, Idaho
(Buyer)

By: _____
(Buyer's Authorized Signatory)

_____
(printed name and title)

(Use Certified Mail,
Return Receipt Requested)

END OF SECTION

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SECTION 00 55 19

NOTICE TO PROCEED WITH FABRICATION FOR PROCUREMENT CONTRACTS

Dated _____, 20__

TO: _____
(SELLER)

ADDRESS: _____

_____

PROJECT NO.: 10381996

CONTRACT FOR: **Woodside WRF Equipment Procurement - Screens**

You are notified to proceed with Fabrication of Equipment that satisfies Seller's requirements for meeting the delivery schedule listed in the Agreement. Seller shall commence fabrication of equipment so as to meet these dates. The place of delivery and conditions shall be as specified in the Agreement. You are to continue performing your obligations under the Contract Documents.

City of Hailey, Idaho
(Buyer)

By: _____
(Buyers's Authorized Signatory)

_____
(printed name and title)

END OF SECTION

This page intentionally left blank.

SECTION 00 61 13

PERFORMANCE BOND

Any singular reference to Seller, Surety, Buyer, or other party shall be considered plural where applicable.

SELLER (Name and Address):

SURETY (Name and Address of Principal Place of Business):

BUYER:

Woodside Water Reclamation Facility
4197 Glenbrook Drive
Hailey, Idaho 83333

CONTRACT

Date:
Amount:
Description (Name and Location):

BOND

Date (Not earlier than Contract Date):
Bond Number:
Amount:
Modifications to this Bond Form:

Surety and Seller, intending to be legally bound hereby, subject to the terms set forth below, do each cause this Performance Bond to be duly executed on its behalf by its authorized officer, agent, or representative.

Seller as Principal		**Surety**	
Company:	(Corp. Seal)	Company:	(Corp. Seal)
Signature:		Signature:	
Name and Title:		Name and Title: (Attach Power of Attorney)	
		Address:	
		Telephone Number:	

(Space is provided below for signatures of additional parties, if required.)

Seller as Principal		**Surety**	
Company:	(Corp. Seal)	Company:	(Corp. Seal)
Signature:		Signature:	
Name and Title:		Name and Title:	
		Address:	
		Telephone Number:	

1. Seller and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors and assigns to Buyer for the performance of the Contract, which is incorporated herein by reference. For purposes of this bond, Buyer means Buyer's assigns, if and when Buyer has assigned the Contract.

2. If Seller performs the Contract, Surety and Seller have no obligation under this Bond, except to participate in conferences as provided in Paragraph 3.1.

3. If there is no Buyer Default, Surety's obligation under this Bond shall arise after:

   3.1. Buyer has notified Seller and Surety pursuant to Paragraph 10 that Buyer is considering declaring a Seller Default and has requested and attempted to arrange a conference with Seller and Surety to be held not later than 15 days after receipt of such notice to discuss methods of performing the Contract. (If Buyer, Seller, and Surety agree, Seller shall be allowed a reasonable time to perform the Contract, but such an agreement shall not waive Buyer's right, if any, subsequently to declare a Seller Default); and

   3.2. Buyer has declared a Seller Default and formally terminated Seller's right to complete the Contract. Such Seller Default shall not be declared earlier than 20 days after Seller and Surety have received notice as provided in Paragraph 3.1; and

   3.3. Buyer has agreed to pay the Balance of the Contract Price to:

      a. Surety in accordance with the terms of the Contract;

      b. Another seller selected pursuant to Paragraph 4.3 to perform the Contract.

4. When Buyer has satisfied the conditions of Paragraph 3, Surety shall promptly and at Surety's expense take one of the following actions:

   4.1. Arrange for Seller, with consent of Buyer, to perform and complete the Contract; or

   4.2. Undertake to perform and complete the Contract itself, through its agents or through independent contractors; or

   4.3. Obtain bids or negotiated proposals from qualified sellers acceptable to Buyer for a contract for performance and completion of the Contract, arrange for a contract to be prepared for execution by Buyer and a seller selected with Buyer's concurrence, to be secured with performance and payment bonds executed by a qualified surety equivalent to the Bonds issued on the Contract, and pay to Buyer the amount of damages as described in Paragraph 6 in excess of the Balance of the Contract Price incurred by Buyer resulting from Seller Default; or

   4.4. Waive its right to perform and complete, arrange for completion, or obtain a new seller, and with reasonable promptness under the circumstances, either:

      a. determine the amount for which it may be liable to Buyer and, as soon as practicable after the amount is determined, tender payment therefor to Buyer; or

      b. deny liability in whole or in part and notify Buyer citing reasons therefor.

5. If Surety does not proceed as provided in Paragraph 4 with reasonable promptness, Surety shall be deemed to be in default on this Bond 15 days after receipt of an additional written notice from Buyer to Surety demanding that Surety perform its obligations under this Bond, and Buyer shall be entitled to enforce any remedy available to Buyer. If Surety proceeds as provided in paragraph 4.4, and Buyer refuses the payment tendered or Surety has denied liability, in whole or in part, without further notice Buyer shall be entitled to enforce any remedy available to Buyer.

6. After Buyer has terminated Seller's right to complete the Contract, and if Surety elects to act under Paragraph 4.1, 4.2, or 4.3, then the responsibilities of Surety to Buyer shall not be greater than those of Seller under the Contract, and the responsibilities of Buyer to Surety shall not be greater than those of Buyer under the Contract. To a limit of the amount of this Bond, but subject to commitment by Buyer of the Balance of the Contract Price to mitigation of costs and damages on the Contract, Surety is obligated without duplication for:

   6.1. The responsibilities of Seller for correction or replacement of defective Goods and Special Services and completion of the Contract;

6.2. Additional legal, design professional, and delay costs resulting from Seller's Default, and resulting from the actions of or failure to act of Surety under Paragraph 4; and

6.3. Liquidated damages, or if no liquidated damages are specified in the Contract, actual damages caused by delayed performance or non-performance of Seller.

7. Surety shall not be liable to Buyer or others for obligations of Seller that are unrelated to the Contract, and the Balance of the Contract Price shall not be reduced or set off on account of any such unrelated obligations. No right of action shall accrue on this Bond to any person or entity other than Buyer or its heirs, executors, administrators, successors, or assigns.

8. Surety hereby waives notice of any change, including changes of time, to the Contract or to related subcontracts, purchase orders and other obligations.

9. Any proceeding, legal or equitable, under this Bond may be instituted in any court of competent jurisdiction in the location of the Point of Destination and shall be instituted within two years after Seller Default or within two years after Seller ceased working or within two years after Surety refuses or fails to perform its obligations under this Bond, whichever occurs first. If the provisions of this paragraph are void or prohibited by law, the minimum period of limitation available to sureties as a defense in the jurisdiction of the suit shall be applicable.

10. Notice to Surety, Buyer or Seller shall be mailed or delivered to the address shown on the signature page.

11. When this Bond has been furnished to comply with a statutory or other legal requirement in the location of the Point of Destination, any provision in this Bond conflicting with said statutory or legal requirement shall be deemed deleted herefrom and provisions conforming to such statutory or other legal requirement shall be deemed incorporated herein. The intent is that this Bond shall be construed as a statutory bond and not as a common law bond.

12. Definitions.

12.1. *Balance of the Contract Price:* The total amount payable by Buyer to Seller under the Contract after all proper adjustments have been made, including allowance to Seller of any amounts received or to be received by Buyer in settlement of insurance or other Claims for damages to which Seller is entitled, reduced by all valid and proper payments made to or on behalf of Seller under the Contract.

12.2. *Contract:* The agreement between Buyer and Seller identified on the signature page, including all Contract Documents and changes thereto.

12.3. *Seller Default*: Failure of Seller, which has neither been remedied nor waived, to perform or otherwise to comply with the terms of the Contract.

12.4. *Buyer Default:* Failure of Buyer, which has neither been remedied nor waived, to pay Seller as required by the Contract or to perform and complete or comply with the other terms thereof.

END OF SECTION

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SECTION 00 72 09

STANDARD GENERAL CONDITIONS FOR PROCUREMENT CONTRACTS

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This document has important legal consequences; consultation with an attorney is encouraged with respect to its use or modification. This document should be adapted to the particular circumstances of the contemplated Project and the controlling Laws and Regulations.

STANDARD GENERAL CONDITIONS FOR PROCUREMENT CONTRACTS

Prepared by

EJCDC
ENGINEERS JOINT CONTRACT DOCUMENTS COMMITTEE

and

Issued and Published Jointly by

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American Council of Engineering Companies

AGC of America
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Quality People. Quality Projects.

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These Standard General Conditions for Procurement Contracts have been prepared for use with the Suggested Instructions to Bidders for Procurement Contracts (EJCDC P-200, 2010 Edition), the Agreement Between Buyer and Seller for Procurement Contracts (EJCDC P-520, 2010 Edition), and the Guide to Preparation of Supplementary Conditions for Procurement Contracts (EJCDC P-800, 2010 Edition). Their provisions are interrelated and a change in one may necessitate a change in the others. Additional information concerning the use of the EJCDC Procurement Documents may be found in the Commentary on Procurement Documents (EJCDC P-001, 2010 Edition).

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STANDARD GENERAL CONDITIONS FOR PROCUREMENT CONTRACTS

ARTICLE 1 - DEFINITIONS AND TERMINOLOGY

1.01 *Defined Terms*

A. Whenever 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 the singular or 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 signed by both Buyer and Seller covering the Goods and Special Services and which lists the Contract Documents in existence on the Effective Date of the Agreement.

3. *Application for Payment*—The form acceptable to Buyer which is used by Seller in requesting progress and final payments and which is accompanied by such supporting documentation as is required by the Contract Documents.

4. *Bid*— The offer or proposal of a Seller submitted on the prescribed form setting forth the prices for the Goods and Special Services to be provided.

5. *Bidder*—The individual or entity that submits a Bid directly to Buyer.

6. *Bidding Documents*—The Bidding Requirements and the proposed Contract Documents (including all Addenda).

7. *Bidding Requirements*—The advertisement or invitation to bid, Instructions to Bidders, Bid security of acceptable form, if any, and Bid Form with any supplements.

8. *Buyer*—The individual or entity purchasing the Goods and Special Services.

9. *Change Order*—A document which is signed by Seller and Buyer and authorizes an addition, deletion, or revision to the Contract Documents or an adjustment in the Contract Price or the Contract Times, issued on or after the Effective Date of the Agreement. Change Orders may be the result of mutual agreement by Buyer and Seller, or of resolution of a Claim.

10. *Claim*—A demand or assertion by Buyer or Seller 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.

11. *Contract*—The entire and integrated written agreement between Buyer and Seller concerning the Goods and Special Services. The Contract supersedes prior negotiations, representations, or agreements, whether written or oral.

12. *Contract Documents*—Those items so designated in the Agreement. Shop Drawings and other Seller submittals are not Contract Documents, even if accepted, reviewed, or approved by Engineer or Buyer.

13. *Contract Price*—The moneys payable by Buyer to Seller for furnishing the Goods and Special Services in accordance with the Contract Documents as stated in the Agreement.

14. *Contract Times*—The times stated in the Agreement by which the Goods must be delivered and Special Services must be furnished.

15. *Drawings*—That part of the Contract Documents prepared or approved by Engineer which graphically shows the scope, extent, and character of the Goods and Special Services to be furnished by Seller. Shop Drawings and other Seller submittals are not Drawings as so defined.

16. *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.

17. *Engineer*—The individual or entity designated as such in the Agreement.

18. *Field Order*—A written order issued by Engineer which requires minor changes in the Goods or Special Services but which does not involve a change in the Contract Price or Contract Times.

19. *General Requirements*—Sections of Division 1 of the Specifications. The General Requirements pertain to all sections of the Specifications.

20. *Goods*—The tangible and movable personal property that is described in the Contract Documents, regardless of whether the property is to be later attached to realty.

21. *Goods and Special Services*—The full scope of materials, equipment, other items, and services to be furnished by Seller, including Goods, as defined herein, and Special Services, if any, as defined herein. This term refers to both the Goods and the Special Services, or to either the Goods or the Special Services, and to any portion of the Goods or the Special Services, as the context requires.

22. *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.

23. *Milestone*—A principal event specified in the Contract Documents relating to an intermediate completion date or time prior to the Contract Times.

24. *Notice of Award*—The written notice by Buyer to the Successful Bidder stating that upon timely compliance by the Successful Bidder with the conditions precedent listed therein, Buyer will sign and deliver the Agreement.

25. *Notice to Proceed*—A written notice given by Buyer to Seller fixing the date on which the Contract Times commence to run and on which Seller shall start to perform under the Contract.

26. *Point of Destination*—The specific address of the location where delivery of the Goods shall be made, as stated in the Agreement.

27. *Project*—The total undertaking of which the Goods and Special Services may be the whole, or only a part.

28. *Project Manual*—The documentary information prepared for bidding and furnishing the Goods and Special Services. A listing of the contents of the Project Manual is contained in its table of contents.

29. *Samples*—Physical examples of materials, equipment, or workmanship that are representative of some portion of the Goods and Special Services and which establish the standards by which such portion of the Goods and Special Services will be judged.

30. *Seller*—The individual or entity furnishing the Goods and Special Services.

31. *Shop Drawings*—All drawings, diagrams, illustrations, schedules, and other data or information which are specifically prepared or assembled by or for Seller and submitted by Seller to illustrate some portion of the Goods and Special Services.

32. *Special Services*—Services associated with the Goods to be furnished by Seller as required by the Contract Documents.

33. *Specifications*—That part of the Contract Documents consisting of written requirements for materials, equipment, systems, standards and workmanship as applied to the furnishing of the Goods and Special Services, and certain administrative requirements and procedural matters applicable thereto.

34. *Successful Bidder*—The Bidder submitting a responsive Bid, to whom Buyer makes an award.

35. *Supplementary Conditions*—That part of the Contract Documents which amends or supplements these General Conditions.

36. *Work Change Directive*—A written statement to Seller issued on or after the Effective Date of the Agreement and signed by Buyer ordering an addition, deletion, or other revision in the Contract Documents with respect to the Goods and Special Services. A Work Change Directive 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 in a subsequently issued Change Order following negotiations by the parties as to its effect, if any, on the Contract Price or Contract Times.

1.02 *Terminology*

A. The words and terms discussed in Paragraphs 1.02.B and 1.02.C are not defined, but have the indicated meanings when used in the Bidding Requirements or Contract Documents.

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 Goods and Special Services. It is intended that such exercise of professional judgment, action, or determination will be commercially reasonable and will be solely to evaluate, in general, the Goods and Special Services for compliance with the requirements of and information in the Contract Documents and conformance with the design concept of the completed 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 shall not be effective to assign to Engineer any duty or authority to supervise or direct the furnishing of Goods or Special Services or any duty or authority to undertake responsibility contrary to any other provision of the Contract Documents.

2. The word "non-conforming" when modifying the words "Goods and Special Services," "Goods," or "Special Services," refers to Goods and Special Services that fail to conform to the Contract Documents.

3. The word "receipt" when referring to the Goods, shall mean the physical taking and possession by the Buyer under the conditions specified in Paragraph 8.01.B.3.

4. The word "day" means a calendar day of 24 hours measured from midnight to the next midnight.

5. The word "furnish," when used in connection with the Goods and Special Services shall mean to supply and deliver said Goods to the Point of Destination (or some other

specified location) and to perform said Special Services fully, all in accordance with the Contract Documents.

C. 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*

A. When Seller delivers the executed counterparts of the Agreement to Buyer, Seller also shall deliver such bonds as Seller may be required to furnish.

2.02 *Evidence of Insurance*

A. When Seller delivers the executed counterparts of the Agreement to Buyer, Seller shall deliver to Buyer, with copies to each additional insured identified by name in the Supplementary Conditions, certificates of insurance (and other evidence of insurance which either of them or any additional insured may reasonably request) which Seller is required to purchase and maintain in accordance with Article 4.

2.03 *Copies of Documents*

A. Buyer shall furnish Seller up to five printed or hard copies of the Contract Documents. Additional copies will be furnished upon request at the cost of reproduction.

2.04 *Commencement of Contract Times; Notice to Proceed*

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

2.05 *Designated Representatives*

A. Buyer and Seller shall each designate its representative at the time the Agreement is signed. Each representative shall have full authority to act on behalf of and make binding decisions in any matter arising out of or relating to the Contract.

2.06 *Progress Schedule*

A. Within 15 days after the Contract Times start to run, Seller shall submit to Buyer and Engineer an acceptable progress schedule of activities, including at a minimum, Shop Drawing and Sample submittals, tests, and deliveries as required by the Contract Documents. No progress payment will be made to Seller until an acceptable schedule is submitted to Buyer and Engineer.

B. The progress schedule will be acceptable to Buyer and Engineer if it provides an orderly progression of the submittals, tests, and deliveries to completion within the specified Milestones and the Contract Times. Such acceptance will not impose on Buyer or Engineer responsibility for the progress schedule, for sequencing, scheduling, or progress of the work nor interfere with or relieve Seller from Seller's full responsibility therefor. Such acceptance shall not be deemed to acknowledge the reasonableness and attainability of the schedule.

2.07 *Preliminary Conference*

A. Within 20 days after the Contract Times start to run, a conference attended by Seller, Buyer, Engineer and others as appropriate will be held to establish a working understanding among the parties as to the Goods and Special Services and to discuss the schedule referred to in Paragraph 2.06.A, procedures for handling Shop Drawings and other submittals, processing Applications for Payment, and maintaining required records.

2.08 *Safety*

A. Buyer and Seller 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. When Seller's personnel, or the personnel of any subcontractor to Seller, are present at the Point of Destination or any work area or site controlled by Buyer, the Seller shall be responsible for the compliance by such personnel with any applicable requirements of Buyer's safety programs that are made known to Seller.

ARTICLE 3 - CONTRACT DOCUMENTS: INTENT AND AMENDING

3.01 *Intent*

A. The Contract Documents are complementary; what is called for by one is as binding as if called for by all.

B. Any labor, documentation, services, materials, or equipment that may reasonably be inferred from the Contract Documents or from prevailing custom or trade usage as being required to produce or furnish the indicated Goods and Special Services will be provided, whether or not specifically called for, at no additional cost to Buyer.

C. Clarifications and interpretations of, or notifications of minor variations and deviations in, the Contract Documents, will be issued by Engineer as provided in Article 9.

3.02 *Standards, Specifications, Codes, Laws and Regulations*

A. Reference to standards, specifications, manuals, or codes of any technical society, organization, or association, or to Laws and Regulations, whether such reference be specific or by implication, shall mean the standard, specification, manual, code, or Laws and Regulations in effect at the time of opening of Bids (or on the Effective Date of the Agreement if there were no Bids), except as may be otherwise specifically stated in the Contract Documents.

B. 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 Buyer or Engineer, or any of their subcontractors, consultants, agents, or employees from those set forth in the Contract Documents, nor shall any such provision or instruction be effective to assign to Buyer or Engineer, or any of their consultants, agents, or employees any duty or authority to supervise or direct the performance of Seller's obligations 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. *Seller's Review of Contract Documents Before the Performance of the Contract*: Before performance of the Contract, Seller shall carefully study and compare the Contract Documents and check and verify pertinent figures therein and all applicable field measurements. Seller shall promptly report in writing to Engineer any conflict, error, ambiguity, or discrepancy which Seller discovers or has actual knowledge of and shall obtain a written interpretation or clarification from Engineer before proceeding with the furnishing of any Goods and Special Services affected thereby.

2. *Seller's Review of Contract Documents During the Performance of the Contract:* If, during the performance of the Contract, Seller discovers any conflict, error, ambiguity, or discrepancy within the Contract Documents or between the Contract Documents and any provision of any Law or Regulation applicable to the performance of the Contract, any standard, specification, manual or code, or of any instruction of any Supplier, Seller shall promptly report it to Engineer in writing. Seller shall not proceed with the furnishing of the Goods and Special Services affected thereby until an amendment to or clarification of the Contract Documents has been issued.

3. Seller shall not be liable to Buyer or Engineer for failure to report any conflict, error, ambiguity, or discrepancy in the Contract Documents unless Seller had actual knowledge thereof.

B. *Resolving Discrepancies:* 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:

1. the provisions of any standard, specification, manual, code, or instruction (whether or not specifically incorporated by reference in the Contract Documents); or

2. the provisions of any Laws or Regulations applicable to the furnishing of the Goods and Special Services (unless such an interpretation of the provisions of the Contract Documents would result in violation of such Law or Regulation).

3.04 *Amending and Clarifying Contract Documents*

A. The Contract Documents may be amended to provide for additions, deletions, and revisions to the Goods and Special Services or to modify contractual terms and conditions by a Change Order.

B. Buyer may issue a Work Change Directive providing for additions, deletions, or revisions to the Goods and Special Services, in which case (1) the Contract Price shall be equitably adjusted to account for any reasonable and necessary credits to Buyer for any such deletion, or for costs (including reasonable overhead and profit) incurred by Seller to accommodate such an addition or revision and (2) the Contract Times shall be equitably adjusted to account for any impact on progress and completion of performance. Such adjustments subsequently shall be duly set forth in a Change Order.

C. The requirements of the Contract Documents may be supplemented, and minor variations and deviations in the Goods and Special Services may be authorized, by one or more of the following ways:

1. A Field Order;

2. Engineer's approval of a Shop Drawing or Sample (subject to the provisions of Paragraph 5.06.D.3); or

3. Engineer's written interpretation or clarification.

ARTICLE 4 - BONDS AND INSURANCE

4.01 *Bonds*

A. Seller shall furnish to Buyer 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 Seller's obligations under the Contract Documents. These bonds shall remain in effect until 1) one year after the date when final payment becomes due or 2) completion of the correction period specified in Paragraph 8.03, whichever is later, except as provided otherwise by Laws or Regulations or by the Contract Documents. Seller 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 current list of "Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies" as published in Circular 570 (amended) by the 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 Seller 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 4.01.B, Seller shall promptly notify Buyer 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 4.01.B and 4.02.

4.02 *Insurance*

A. Seller shall provide insurance of the types and coverages and in the amounts stipulated in the Supplementary Conditions.

B. Failure of Buyer to demand certificates of insurance or other evidence of Seller's full compliance with these insurance requirements or failure of Buyer to identify a deficiency in compliance from the evidence provided shall not be construed as a waiver of Seller's obligation to maintain such insurance.

C. Upon assignment of this Contract, Seller shall comply with the written request of assignee to provide certificates of insurance to assignee.

D. Buyer does not represent that insurance coverage and limits established in this Contract necessarily will be adequate to protect Seller.

E. The insurance and insurance limits required herein shall not be deemed as a limitation on Seller's liability under the indemnities granted to Buyer in the Contract Documents.

4.03 *Licensed Sureties and Insurers*

A. All bonds and insurance required by the Contract Documents to be purchased and maintained by Buyer or Seller 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. Such surety and insurance companies shall also meet such additional requirements and qualifications as may be provided in the Supplementary Conditions.

ARTICLE 5 - SELLER'S RESPONSIBILITIES

5.01 *Supervision and Superintendence*

A. Seller shall supervise, inspect, and direct the furnishing of the Goods and Special Services competently and efficiently, devoting such attention thereto and applying such skills and expertise as may be necessary to perform its obligations in accordance with the Contract Documents. Seller shall be solely responsible for the means, methods, techniques, sequences, and procedures necessary to perform its obligations in accordance with the Contract Documents. Seller shall not be responsible for the negligence of Buyer or Engineer in the design or specification of a specific means, method, technique, sequence, or procedure that is shown or indicated in and expressly required by the Contract Documents.

5.02 *Labor, Materials and Equipment*

A. Seller shall provide competent, qualified and trained personnel in all aspects of its performance of the Contract.

B. All Goods, and all equipment and material incorporated into the Goods, shall be as specified, and unless specified otherwise in the Contract Documents, shall be:

1. new, and of good quality;

2. protected, assembled, connected, cleaned, and conditioned in accordance with the original manufacturer's instructions; and

3. shop assembled to the greatest extent practicable.

5.03 *Laws and Regulations*

A. Seller shall give all notices required by and shall comply with all Laws and Regulations applicable to the performance of its obligations in accordance with the Contract Documents. Except where otherwise expressly required by such Laws and Regulations, neither Buyer nor Engineer shall be responsible for monitoring Seller's compliance with any Laws or Regulations.

B. If Seller furnishes Goods and Special Services knowing or having reason to know that such furnishing is contrary to Laws or Regulations, Seller 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 performance. It shall not be Seller's responsibility to make certain that the Specifications and Drawings are in accordance with Laws and Regulations, but this provision shall not relieve Seller of Seller's obligations under Paragraph 3.03.

C. Changes in Laws or Regulations not known at the time of opening of Bids (or, on the Effective Date of the Agreement if there were no Bids) having an effect on the cost or time of performance shall be the subject of an adjustment in Contract Price or Contract Times. If Buyer and Seller 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 9.06.

5.04 *Or Equals*

A. Whenever the Goods, or an item of material or equipment to be incorporated into the Goods, are specified or described in the Contract Documents by using the name of a proprietary item or the name of a particular supplier or manufacturer, 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 is permitted, other items of material or equipment or material or equipment of other suppliers or manufacturers may be submitted to Buyer for Engineer's review.

1. If in Engineer's sole discretion, such an item of material or equipment proposed by Seller is functionally equal to that named and sufficiently similar so that no change in related work will be required, it may be considered by Engineer as an "or-equal" item.

2. For the purposes of this paragraph, a proposed item of material or equipment may be considered functionally equal to an item so named only if:

a. in the exercise of reasonable judgment, Engineer determines that: 1) it is at least equal in quality, durability, appearance, strength, and design characteristics; 2) it will reliably perform at least equally well the function imposed by the design concept of the completed Project as a functioning whole; 3) it has an acceptable record of performance and availability of responsive service; and

b. Seller certifies that if approved: 1) there will be no increase in any cost, including capital, installation or operating costs, to Buyer; and 2) the proposed item will conform substantially to the detailed requirements of the item named in the Contract Documents.

B. *Engineer's Evaluation:* Engineer will be allowed a reasonable time within which to evaluate each proposal or submittal made pursuant to Paragraph 5.04.A. Engineer will be the sole judge of whether to accept or reject such a proposal or submittal. No "or-equal" will be ordered, manufactured or utilized until Engineer's review is complete, which will be evidenced by an approved Shop Drawing. Engineer will advise Buyer and Seller in writing of any negative determination. Notwithstanding Engineer's approval of an "or-equal" item, Seller shall remain obligated to comply with the requirements of the Contract Documents.

C. *Special Guarantee:* Buyer may require Seller to furnish at Seller's expense a special performance guarantee or other surety with respect to any such proposed "or-equal."

D. *Data:* Seller shall provide all data in support of any such proposed "or-equal" at Seller's expense.

5.05 *Taxes*

A. Seller shall be responsible for all taxes and duties arising out of the sale of the Goods and the furnishing of Special Services. All taxes are included in the Contract Price, except as noted in the Supplementary Conditions.

5.06 *Shop Drawings and Samples*

A. Seller shall submit Shop Drawings and Samples to Buyer for Engineer's review and approval in accordance with the schedule required in Paragraph 2.06.A. All submittals will be identified as required and furnished in the number of copies specified in the Contract Documents. The 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 Seller proposes to provide.

B. Where a Shop Drawing or Sample is required by the Contract Documents, any related work performed prior to Engineer's approval of the pertinent submittal will be at the sole expense and responsibility of Seller.

C. *Submittal Procedures:*

1. Before submitting each Shop Drawing or Sample, Seller shall have determined and verified:

   a. all field measurements (if required), quantities, dimensions, specified performance criteria, installation requirements, materials, catalog numbers, and similar information with respect thereto; and

   b. that all materials are suitable with respect to the indicated application, fabrication, shipping, handling, storage, assembly, and installation pertaining to the furnishing of Goods and Special Services.

2. Seller shall also have reviewed and coordinated each Shop Drawing or Sample with the Contract Documents.

3. Each submittal shall bear a stamp or include a written certification from Seller that Seller has reviewed the subject submittal and confirmed that it is in compliance with the requirements of the Contract Documents. Both Buyer and Engineer shall be entitled to rely on such certification from Seller.

4. With each submittal, Seller shall give Buyer and Engineer specific written notice of any variations that the Shop Drawing or Sample may have from the requirements of the Contract Documents. This notice shall be both in a written communication separate from the submittal and by specific notation on each Shop Drawing or Sample.

D. *Engineer's Review:*

1. Engineer will provide timely review of Shop Drawings and Samples.

2. Engineer's review and approval will be only to determine if the Goods and Special Services covered by the submittals will, after installation or incorporation in the Project, conform to the information given in the Contract Documents and be compatible with the design concept of the completed Project as a functioning whole.

3. Engineer's review and approval shall not relieve Seller from responsibility for any variation from the requirements of the Contract Documents unless Seller has complied with the requirements of Paragraph 5.06.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 Seller from responsibility for complying with the requirements of Paragraph 5.06.C.1.

E. *Resubmittal Procedures:*

1. Seller shall make corrections required by Engineer and shall return the required number of corrected copies of Shop Drawings and submit, as required, new Samples for review and approval. Seller shall direct specific attention in writing to any revisions other than the corrections called for by Engineer on previous submittals.

5.07 *Continuing Performance*

A. Seller shall adhere to the progress schedule established in accordance with Paragraph 2.06.A., and the Goods shall be delivered and the Special Services furnished within the Contract Times specified in the Agreement.

B. Seller shall carry on furnishing of the Goods and Special Services and adhere to the progress schedule during all disputes or disagreements with Buyer. No furnishing of Goods and Special Services shall be delayed or postponed pending resolution of any disputes or disagreements, except as permitted by Paragraphs 11.03 or 11.04, or as Buyer and Seller may otherwise agree in writing.

5.08 *Seller's Warranties and Guarantees*

A. Seller warrants and guarantees to Buyer that the title to the Goods conveyed shall be proper, its transfer rightful, and free from any security interest, lien, or other encumbrance. Seller shall defend, indemnify, and hold Buyer harmless against any liens, claims, or demands contesting or affecting title of the Goods conveyed.

B. Seller warrants and guarantees to Buyer that all Goods and Special Services will conform with the Contract Documents, and with the standards established by any Samples approved by Engineer. Engineer shall be entitled to rely on Seller's warranty and guarantee. If the Contract Documents do not otherwise specify the characteristics or the quality of the Goods, the Goods shall comply with the requirements of Paragraph 5.02.B.

C. Seller's warranty and guarantee hereunder excludes defects or damage caused by:

1. abuse, improper modification, improper maintenance, or improper operation by persons other than Seller; or

2. corrosion or chemical attack, unless corrosive or chemically-damaging conditions were disclosed by Buyer in the Contract Documents and the Contract Documents required the Goods to withstand such conditions;

3. use in a manner contrary to Seller's written instructions for installation, operation, and maintenance; or

4. normal wear and tear under normal usage.

D. Seller's obligation to furnish the Goods and Special Services in accordance with the Contract Documents shall be absolute. None of the following will constitute an acceptance of Goods and Special Services that are non-conforming, or a release of Seller's obligation to furnish the Goods and Special Services in accordance with the Contract Documents:

1. observations by Buyer or Engineer;

2. recommendation by Engineer or payment by Buyer of any progress or final payment;

3. use of the Goods by Buyer;

4. any acceptance by Buyer (subject to the provisions of Paragraph 8.02.D.1) or any failure to do so;

5. the issuance of a notice of acceptance by Buyer pursuant to the provisions of Article 8;

6. any inspection, test or approval by others; or

7. any correction of non-conforming Goods and Special Services by Buyer.

E. Buyer shall promptly notify Seller of any breach of Seller's warranties or guarantees.

F. Seller makes no implied warranties under this Contract.

5.09 *Indemnification*

A. To the fullest extent permitted by Laws and Regulations, Seller shall indemnify and hold harmless Buyer and Engineer, and the officers, directors, members, partners, employees, agents, consultants, contractors, and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to the performance of Seller's obligations under the Contract Documents, provided that any such claim, cost, loss, or damages attributable to bodily injury, sickness, disease, or death, or to injury to or destruction of tangible property (other than the Goods themselves), including the loss of use resulting therefrom, but only to the extent cause by any negligent act or omission of Seller, or any individual or entity directly or indirectly employed by Seller or anyone for whose acts Seller may be liable.

B. In any and all claims against Buyer or Engineer or any of their respective assignees, consultants, agents, officers, directors, members, partners, employees, agents, consultants, contractors, or subcontractors, by any employee (or the survivor or personal representative of such employee) of Seller, any subcontractor, any supplier, or any individual or entity directly or indirectly employed by any of them to furnish any of the Goods and Special Services, or anyone for whose acts any of them may be liable, the indemnification obligation under Paragraph 5.09.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 seller 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 Seller under Paragraph 5.09.A shall not extend to the liability of Engineer and Engineer's officers, directors, partners, employees, agents, and consultants 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.

5.10 *Delegation of Professional Design Services*

A. Seller will not be required to provide professional design services unless such services are specifically required by the Contract Documents or unless such services are required to carry out Seller's responsibilities for furnishing the Goods and Special Services. Seller 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 the Goods and Special Services are specifically required of Seller by the Contract Documents, Buyer and Engineer will specify all performance and design criteria that such services must satisfy. Seller 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 Goods and Special Services designed or certified by such professional, if prepared by others, shall bear such professional's written approval when submitted to Engineer.

C. Buyer 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 Buyer and Engineer have specified to Seller all performance and design criteria that such services must satisfy.

D. Pursuant to this Paragraph 5.10, 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 5.06.D.2.

E. Seller shall not be responsible for the adequacy of the performance or design criteria required by the Contract Documents.

ARTICLE 6 - SHIPPING AND DELIVERY

6.01 *Shipping*

A. Seller shall select the carrier and bear all costs of packaging, transportation, insurance, special handling and any other costs associated with shipment and delivery.

6.02 *Delivery*

A. Seller shall deliver the Goods F.O.B. the Point of Destination in accordance with the Contract Times set forth in the Agreement, or other date agreed to by Buyer and Seller.

B. Seller shall provide written notice to Buyer at least 10 days before shipment of the manner of shipment and the anticipated delivery date. The notice shall also include any instructions concerning special equipment or services required at the Point of Destination to unload and care

for the Goods. Seller shall also require the carrier to give Buyer at least 24 hours notice by telephone prior to the anticipated time of delivery.

C. Buyer will be responsible and bear all costs for unloading the Goods from carrier.

D. Buyer will assure that adequate facilities are available to receive delivery of the Goods during the Contract Times for delivery set forth in the Agreement, or another date agreed by Buyer and Seller.

E. No partial deliveries shall be allowed, unless permitted or required by the Contract Documents or agreed to in writing by Buyer.

6.03 *Risk of Loss*

A. Risk of loss and insurable interests transfer from Seller to Buyer upon Buyer's receipt of the Goods.

B. Notwithstanding the provisions of Paragraph 6.03.A, if Buyer rejects the Goods as non-conforming, the risk of loss on such Goods shall remain with Seller until Seller corrects the non-conformity or Buyer accepts the Goods. If rejected Goods remain at the Point of Destination pending modification and acceptance, then Seller shall be responsible for arranging adequate protection and maintenance of the Goods at Seller's expense.

6.04 *Progress Schedule*

A. Seller shall adhere to the progress schedule established in accordance with Paragraph 2.06 as it may be adjusted from time to time as provided below.

1. Seller shall submit to Engineer for acceptance (to the extent indicated in Paragraph 2.06) proposed adjustments in the progress schedule that will not result in changing the Contract Times. Such adjustments will comply with any provisions of the General Requirements applicable thereto.

2. Proposed adjustments in the progress schedule that will change the Contract Times shall be submitted in accordance with the requirements of Article 7. Adjustments in Contract Times may only be made by a Change Order.

ARTICLE 7 - CHANGES: SCHEDULE AND DELAY

7.01 *Changes in the Goods and Special Services*

A. Buyer may at any time, without notice to any surety, make an addition, deletion, or other revision to the Contract Documents with respect to the Goods and Services, within the general scope of the Contract, by a Change Order or Work Change Directive. Upon receipt of any such document, Seller shall promptly proceed with performance pursuant to the revised Contract Documents (except as otherwise specifically provided).

B. If Seller concludes that a Work Change Directive issued by Buyer affects the Contract Price or Contract Times, then Seller shall notify Buyer within 15 days after Seller has received the Work

Change Directive, and submit written supporting data to Buyer within 45 days after such receipt. If Seller fails to notify Buyer within 15 days, Seller waives any Claim for such adjustment. If Buyer and Seller 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, a Claim may be made therefor as provided in Paragraph 9.06.

C. Seller shall not suspend performance while Buyer and Seller are in the process of making such changes and any related adjustments to Contract Price or Contract Times.

7.02 *Changing Contract Price or Contract Times*

A. The Contract Price or Contract Times may only be changed by a Change Order.

B. Any Claim for an adjustment in the Contract Price or Contract Times shall be based on written notice submitted by the party making the Claim to the Engineer and the other party to the Contract in accordance with the provisions of Paragraph 9.06.

C. If Seller is prevented from delivering the Goods or performing the Special Services within the Contract Times for any unforeseen reason beyond its control and not attributable to its actions or inactions, then Seller shall be entitled to an adjustment of the Contract Times to the extent attributable to such reason. Such reasons include but are not limited to acts or neglect by Buyer, inspection delays, fires, floods, epidemics, abnormal weather conditions, acts of God, and other like matters. If such an event occurs and delays Seller's performance, Seller shall notify Buyer in writing within 15 days of knowing or having reason to know of the beginning of the event causing the delay, stating the reason therefor.

D. Seller shall not be entitled to an adjustment in Contract Price or Contract Times for delays within the control of Seller. Delays attributable to and within the control of Seller's subcontractors or suppliers shall be deemed to be delays within the control of Seller.

E. If Seller is prevented from delivering the Goods or furnishing the Special Services within the Contract Times due to the actions or inactions of Buyer, Seller shall be entitled to any reasonable and necessary additional costs arising out of such delay to the extent directly attributable to Buyer.

F. Neither Buyer nor Seller shall be entitled to any damages arising from delays which are beyond the control of both Buyer and Seller, including but not limited to fires, floods, epidemics, abnormal weather conditions, acts of God, and other like matters.

ARTICLE 8 - BUYER'S RIGHTS

8.01 *Inspections and Testing*

A. *General:*

1. The Contract Documents specify required inspections and tests. Buyer shall have the right to perform, or cause to be performed, reasonable inspections and require reasonable

tests of the Goods at Seller's facility, and at the Point of Destination. Seller shall allow Buyer a reasonable time to perform such inspections or tests.

2. Seller shall reimburse Buyer for all expenses, except for travel, lodging, and subsistence expenses of Buyer's and Engineer's representatives, for inspections and tests specified in the Contract Documents. If as the result of any such specified testing the Goods are determined to be non-conforming, then Seller shall also bear the travel, lodging, and subsistence expenses of Buyer's and Engineer's representatives, and all expenses of re-inspection or retesting.

3. Buyer shall bear all expenses of inspections and tests that are not specified in the Contract Documents (other than any re-inspection or retesting resulting from a determination of non-conformity, as set forth in Paragraph 8.01.A.2 immediately above); provided, however, that if as the result of any such non-specified inspections or testing the Goods are determined to be non-conforming, then Seller shall bear all expenses of such inspections and testing, and of any necessary re-inspection and retesting.

4. Seller shall provide Buyer timely written notice of the readiness of the Goods for all inspections, tests, or approvals which the Contract Documents specify are to be observed by Buyer prior to shipment.

5. Buyer will give Seller timely notice of all specified tests, inspections, and approvals of the Goods which are to be conducted at the Point of Destination.

6. If, on the basis of any inspections or testing, the Goods appear to be conforming, Buyer will give Seller prompt notice thereof. If on the basis of said inspections or testing, the Goods appear to be non-conforming, Buyer will give Seller prompt notice thereof and will advise Seller of the remedy Buyer elects under the provisions of Paragraph 8.02.

7. Neither payments made by Buyer to Seller prior to any tests or inspections, nor any tests or inspections shall constitute acceptance of non-conforming Goods, or prejudice Buyer's rights under the Contract.

B. Inspection on Delivery:

1. Buyer or Engineer will visually inspect the Goods upon delivery solely for purposes of identifying the Goods and general verification of quantities and observation of apparent condition in order to provide a basis for a progress payment. Such visual inspection will not be construed as final or as receipt of any Goods and Special Services that, as a result of subsequent inspections and tests, are determined to be non-conforming.

2. Within ten days of such visual inspection, Buyer shall provide Seller with written notice of Buyer's determination regarding conformity of the Goods. In the event Buyer does not provide such notice, it will be presumed that the Goods appear to be conforming and that Buyer has acknowledged their receipt upon delivery.

3. If, on the basis of the visual inspection specified in Paragraph 8.01.B.1, the Goods appear to be conforming, Buyer's notice thereof to Seller will acknowledge receipt of the Goods.

C. Final Inspection:

1. After all of the Goods have been incorporated into the Project, tested in accordance with such testing requirements as are specified, and are functioning as indicated, Buyer or Engineer will make a final inspection.

2. If, on the basis of the final inspection, the Goods are conforming, Buyer's notice thereof will constitute Buyer's acceptance of the Goods.

3. If, on the basis of the final inspection, the Goods are non-conforming, Buyer will identify the non-conformity in writing.

8.02 *Non-Conforming Goods and Special Services*

A. If, on the basis of inspections and testing prior to delivery, the Goods and Special Services are found to be non-conforming, or if at any time after Buyer has acknowledged receipt of delivery and before the expiration of the correction period described in Paragraph 8.03, Buyer determines that the Goods and Special Services are non-conforming, then Seller shall promptly, without cost to Buyer and in response to written instructions from Buyer, either correct such non-conforming Goods and Special Services, or, if Goods are rejected by Buyer, remove and replace the non-conforming Goods with conforming Goods, including all work required for reinstallation.

B. Buyer's Rejection of Non-Conforming Goods:

1. If Buyer elects to reject the Goods in whole or in part, Buyer's notice to Seller will describe in sufficient detail the non-conforming aspect of the Goods. If Goods have been delivered to Buyer, Seller shall promptly, and within the Contract Times, remove and replace the rejected Goods.

2. Seller shall bear all costs, losses and damages attributable to the removal and replacement of the non-conforming Goods as provided in Paragraph 8.02.E.

3. Upon rejection of the Goods, Buyer retains a security interest in the Goods to the extent of any payments made and expenses incurred in their testing and inspection.

C. Remedying Non-Conforming Goods and Special Services:

1. If Buyer elects to permit the Seller to modify the Goods to correct the non-comformance, then Seller shall promptly provide a schedule for such modifications and shall make the Goods conforming within a reasonable time.

2. If Buyer notifies Seller in writing that any of the Special Services are non-conforming, Seller shall promptly provide conforming services acceptable to Buyer. If Seller fails to do so, Buyer may delete the Special Services and reduce the Contract Price a commensurate amount.

D. Buyer's Acceptance of Non-Conforming Goods:

Instead of requiring correction or removal and replacement of non-conforming Goods discovered either before or after final payment, Buyer may accept the non-conforming Goods. Seller shall bear all reasonable costs, losses, and damages attributable to Buyer's evaluation of and determination to accept such non-conforming Goods as provided in Paragraph 8.02.E.

E. Seller shall pay all claims, costs, losses, and damages, including but not limited to all fees and charges for re-inspection, retesting and for any engineers, architects, attorneys and other professionals, and all court or arbitration or other dispute resolution costs arising out of or relating to the non-conforming Goods and Special Services. Seller's obligations shall include the costs of the correction or removal and replacement of the non-conforming Goods and the replacement of property of Buyer and others destroyed by the correction or removal and replacement of the non-conforming Goods, and obtaining conforming Special Services from others.

F. *Buyer's Rejection of Conforming Goods:*

If Buyer asserts that Goods and Special Services are non-conforming and such Goods and Special Services are determined to be conforming, or if Buyer rejects as non-conforming Goods and Special Services that are later determined to be conforming, then Seller shall be entitled to reimbursement from Buyer of costs incurred by Seller in inspecting, testing, correcting, removing, or replacing the conforming Goods and Special Services, including but not limited to fees and charges of engineers, architects, attorneys and other professionals, and all court or arbitration or other dispute resolution costs associated with the incorrect assertion of non-conformance or rejection of conforming Goods and Special Services.

8.03 *Correction Period*

A. Seller's responsibility for correcting all non-conformities in the Goods and Special Services will extend for a period of one year after the earlier of the date on which Buyer has placed the Goods in continuous service or the date of final payment, or for such longer period of time as may be prescribed by Laws or Regulations or by the terms of any specific provisions of the Contract Documents.

ARTICLE 9 - ROLE OF ENGINEER

9.01 *Duties and Responsibilities*

A. The duties and responsibilities and the limitations of authority of Engineer are set forth in the Contract Documents.

9.02 *Clarifications and Interpretations*

A. Engineer will issue with reasonable promptness such written clarifications or interpretations of the Contract Documents as Engineer may determine necessary, which shall be consistent with or reasonably inferable from the overall intent of the Contract Documents. Such written

clarifications and interpretations will be binding on Buyer and Seller. If either Buyer or Seller believes that a written clarification or interpretation justifies an adjustment in the Contract Price or Contract Times, either may make a Claim therefor.

9.03 *Authorized Variations*

A. Engineer may authorize minor deviations or variations in the Contract Documents by: 1) written approval of specific variations set forth in Shop Drawings when Seller has duly noted such variations as required in Paragraph 5.06.C.4, or 2) a Field Order.

9.04 *Rejecting Non-Conforming Goods and Special Services*

A. Engineer will have the authority to disapprove or reject Goods and Special Services that Engineer believes to be non-conforming. Engineer will also have authority to require special inspection or testing of the Goods or Special Services as provided in Paragraph 8.01 whether or not the Goods are fabricated or installed, or the Special Services are completed.

9.05 *Decisions on Requirements of Contract Documents*

A. Engineer will be the initial interpreter of the Contract Documents and judge of the acceptability of the Goods and Special Services. Claims, disputes and other matters relating to the acceptability of the Goods and Special Services or the interpretation of the requirements of the Contract Documents pertaining to Seller's performance will be referred initially to Engineer in writing with a request for a formal decision in accordance with this paragraph.

B. When functioning as interpreter and judge under this Paragraph 9.05, Engineer will not show partiality to Buyer or Seller and will not be liable in connection with any interpretation or decision rendered in good faith in such capacity. The rendering of a decision by Engineer pursuant to this Paragraph 9.05 with respect to any such Claim, dispute, or other matter (except any which have been waived by the making or acceptance of final payment as provided in Paragraph 10.07) will be a condition precedent to any exercise by Buyer or Seller of such rights or remedies as either may otherwise have under the Contract Documents or by Laws or Regulations in respect of any such Claim, dispute, or other matter.

9.06 *Claims and Disputes*

A. *Notice*: Written notice of each Claim relating to the acceptability of the Goods and Special Services or the interpretation of the requirements of the Contract Documents pertaining to either party's performance shall be delivered by the claimant to Engineer and the other party to the Agreement within 15 days after the occurrence of the event giving rise thereto, and written supporting data shall be submitted to Engineer and the other party within 45 days after such occurrence unless Engineer allows an additional period of time to ascertain more accurate data.

B. *Engineer's Decision*: Engineer will review each such Claim and render a decision in writing within 30 days after receipt of the last submittal of the claimant or the last submittal of the opposing party, if any.

C. If Engineer does not render a formal written decision on a Claim within the time stated in Paragraph 9.06.B., Engineer shall be deemed to have issued a decision denying the Claim in its entirety 31 days after receipt of the last submittal of the claimant or the last submittal of the opposing party, if any.

D. Engineer's written decision on such Claim or a decision denying the Claim in its entirety that is deemed to have been issued pursuant to Paragraph 9.06.C, will be final and binding upon Buyer and Seller 30 days after it is issued unless within 30 days of issuance Buyer or Seller appeals Engineer's decision by initiating the mediation of such Claim in accordance with the dispute resolution procedures set forth in Article 13.

E. If Article 13 has been amended to delete the mediation requirement, then Buyer or Seller may appeal Engineer's decision within 30 days of issuance by following the alternative dispute resolution process set forth in Article 13, as amended; or if no such alternative dispute resolution process has been set forth, Buyer or Seller may appeal Engineer's decision by 1) delivering to the other party within 30 days of the date of such decision a written notice of intent to submit the Claim to a court of competent jurisdiction, and 2) within 60 days after the date of such decision instituting a formal proceeding in a court of competent jurisdiction.

F. No Claim for an adjustment in Contract Price or Contract Times will be valid if not submitted in accordance with this Paragraph 9.06.

G. The parties agree to endeavor to avoid or resolve Claims through direct, good faith discussions and negotiations whenever practicable. Such discussions and negotiations should at the outset address whether the parties mutually agree to suspend the time periods established in this Paragraph 9.06; if so, a written record of such mutual agreement should be made and jointly executed.

ARTICLE 10 - PAYMENT

10.01 *Applications for Progress Payments*

A. Seller shall submit to Buyer for Engineer's review Applications for Payment filled out and signed by Seller and accompanied by such supporting documentation as is required by the Contract Documents and also as Buyer or Engineer may reasonably require. The timing and amounts of progress payments shall be as stipulated in the Agreement.

1. The first application for Payment will be submitted after review and approval by Engineer of all Shop Drawings and of all Samples required by the Contract Documents.

2. The second Application for Payment will be submitted after receipt of the Goods has been acknowledged in accordance with Paragraph 8.01.B and will be accompanied by a bill of sale, invoice, or other documentation reasonably satisfactory to Buyer warranting that Buyer has rightfully received good title to the Goods from Seller and that, upon payment, the Goods will be free and clear of all liens. Such documentation will include releases and waivers from all parties with viable lien rights. In the case of multiple deliveries of Goods, additional Applications for Payment accompanied by the required

documentation will be submitted as Buyer acknowledges receipt of additional items of the Goods.

10.02 *Review of Applications for Progress Payments*

A. Engineer will, within ten days after receipt of each Application for Payment, either indicate in writing a recommendation of payment and present the Application to Buyer, or return the Application to Seller indicating in writing Engineer's reasons for refusing to recommend payment. In the latter case, Seller may make the necessary corrections and resubmit the Application.

1. Engineer's recommendation of payment requested in the first Application for Payment will constitute a representation by Engineer, based on Engineer's review of the Application for Payment and the accompanying data, that the Shop Drawings and Samples have been reviewed and approved as required by the Contract Documents and Seller is entitled to payment of the amount recommended.

2. Engineer's recommendation of payment requested in the Application for Payment submitted upon Buyer's acknowledgment of receipt of the Goods will constitute a representation by Engineer, based on Engineer's review of the Application for Payment and the accompanying data Seller is entitled to payment of the amount recommended. Such recommendation will not constitute a representation that Engineer has made a final inspection of the Goods, that the Goods are free from non-conformities, acceptable or in conformance with the Contract Documents, that Engineer has made any investigation as to Buyer's title to the Goods, that exhaustive or continuous inspections have been made to check the quality or the quantity of the Goods beyond the responsibilities specifically assigned to Engineer in the Contract Documents or that there may not be other matters or issues between the parties that might entitle Seller to additional payments by Buyer or Buyer to withhold payment to Seller.

3. Engineer may refuse to recommend that all or any part of a progress payment be made, or Engineer may nullify all or any part of any payment previously recommended if, in Engineer's opinion, such recommendation would be incorrect or if on the basis of subsequently discovered evidence or subsequent inspections or tests Engineer considers such refusal or nullification necessary to protect Buyer from loss because the Contract Price has been reduced, Goods are found to be non-conforming, or Seller has failed to furnish acceptable Special Services.

10.03 *Amount and Timing of Progress Payments*

A. Subject to Paragraph 10.02.A., the amounts of the progress payments will be as provided in the Agreement. Buyer shall within 30 days after receipt of each Application for Payment with Engineer's recommendation pay Seller the amount recommended; but, in the case of the Application for Payment upon Buyer's acknowledgment of receipt of the Goods, said 30-day period may be extended for so long as is necessary (but in no event more than 60 days) for Buyer to examine the bill of sale and other documentation submitted therewith. Buyer shall notify Seller promptly of any deficiency in the documentation and shall not unreasonably withhold payment.

10.04 *Suspension of or Reduction in Payment*

A. Buyer may suspend or reduce the amount of progress payments, even though recommended for payment by Engineer, under the following circumstances:

1. Buyer has reasonable grounds to conclude that Seller will not furnish the Goods or the Special Services in accordance with the Contract Documents, and

2. Buyer has requested in writing assurances from Seller that the Goods and Special Services will be delivered or furnished in accordance with the Contract Documents, and Seller has failed to provide adequate assurances within ten days of Buyer's written request.

B. If Buyer refuses to make payment of the full amount recommended by Engineer, Buyer will provide Seller and Engineer immediate written notice stating the reason for such action and promptly pay Seller any amount remaining after deduction of the amount withheld. Buyer shall promptly pay Seller the amount withheld when Seller corrects the reason for such action to Buyer's satisfaction.

10.05 *Final Application for Payment*

A. After Seller has corrected all non-conformities to the reasonable satisfaction of Buyer and Engineer, furnished all Special Services, and delivered all documents required by the Contract Documents, Engineer will issue to Buyer and Seller a notice of acceptance. Seller may then make application for final payment following the procedure for progress payments. The final Application for Payment will be accompanied by all documentation called for in the Contract Documents, a list of all unsettled Claims, and such other data and information as Buyer or Engineer may reasonably require.

10.06 *Final Payment*

A. If, on the basis of final inspection and the review of the final Application for Payment and accompanying documentation, Engineer is reasonably satisfied that Seller has furnished the Goods and Special Services in accordance with the Contract Documents, and that Seller's has fulfilled all other obligations under the Contract Documents, then Engineer will, within ten days after receipt of the final Application for Payment, recommend in writing final payment subject to the provisions of Paragraph 10.07 and present the Application to Buyer. Otherwise, Engineer will return the Application to Seller, indicating the reasons for refusing to recommend final payment, in which case Seller shall make the necessary corrections and resubmit the Application for payment. If the Application and accompanying documentation are appropriate as to form and substance, Buyer shall, within 30 days after receipt thereof, pay Seller the amount recommended by Engineer, less any sum Buyer is entitled to set off against Engineer's recommendation, including but not limited to liquidated damages to which Buyer is entitled.

10.07 *Waiver of Claims*

A. The making and acceptance of final payment will constitute:

1. a waiver of all Claims by Buyer against Seller, except Claims arising from unsettled liens from non-conformities in the Goods or Special Services appearing after final payment, from Seller's failure to comply with the Contract Documents or the terms of any special guarantees specified therein, or from Seller's continuing obligations under the Contract Documents; and

2. a waiver of all Claims by Seller against Buyer (other than those previously made in accordance with the requirements herein and listed by Seller as unsettled as required in Paragraph 10.05.A, and not resolved in writing).

ARTICLE 11 - CANCELLATION, SUSPENSION, AND TERMINATION

11.01 *Cancellation*

A. Buyer has the right to cancel the Contract, without cause, at any time prior to delivery of the Goods by written notice. Cancellation pursuant to the terms of this paragraph shall not constitute a breach of contract by Buyer. Upon cancellation:

1. Buyer shall pay Seller for the direct costs incurred in producing any Goods that Seller has specially manufactured for the Project, plus a fair and reasonable amount for overhead and profit.

2. For Goods that are not specially manufactured for the Project, Seller shall be entitled to a restocking charge of 10 percent of the unpaid Contract Price of such Goods.

11.02 *Suspension of Performance by Buyer*

A. Buyer has the right to suspend performance of the Contract for up to a maximum of ninety days, without cause, by written notice. Upon suspension under this paragraph, Seller shall be entitled to an increase in the Contract Times and Contract Price caused by the suspension, provided that performance would not have been suspended or delayed for causes attributable to Seller.

11.03 *Suspension of Performance by Seller*

A. Subject to the provisions of Paragraph 5.07.B, Seller may suspend the furnishing of the Goods and Special Services only under the following circumstance:

1. Seller has reasonable grounds to conclude that Buyer will not perform its future payment obligations under the Contract; and,

2. Seller has requested in writing assurances from Buyer that future payments will be made in accordance with the Contract, and Buyer has failed to provide such assurances within ten days of Seller's written request.

11.04 *Breach and Termination*

A. Buyer's Breach:

1. Buyer shall be deemed in breach of the Contract if it fails to comply with any material provision of the Contract Documents, including but not limited to:

a. wrongful rejection or revocation of Buyer's acceptance of the Goods,

b. failure to make payments in accordance with the Contract Documents, or

c. wrongful repudiation of the Contract.

2. Seller shall have the right to terminate the Contract for cause by declaring a breach should Buyer fail to comply with any material provisions of the Contract. Upon termination, Seller shall be entitled to all remedies provided by Laws and Regulations.

a. In the event Seller believes Buyer is in breach of its obligations under the Contract, Seller shall provide Buyer with reasonably prompt written notice setting forth in sufficient detail the reasons for declaring that it believes a breach has occurred. Buyer shall have seven days from receipt of the written notice declaring the breach (or such longer period of time as Seller may grant in writing) within which to cure or to proceed diligently to cure such alleged breach.

B. Seller's Breach:

1. Seller shall be deemed in breach of the Contract if it fails to comply with any material provision of the Contract Documents, including, but not limited to:

a. failure to deliver the Goods or perform the Special Services in accordance with the Contract Documents,

b. wrongful repudiation of the Contract, or

c. delivery or furnishing of non-conforming Goods and Special Services.

2. Buyer may terminate Seller's right to perform the Contract for cause by declaring a breach should Seller fail to comply with any material provision of the Contract Documents. Upon termination, Buyer shall be entitled to all remedies provided by Laws and Regulations.

a. In the event Buyer believes Seller is in breach of its obligations under the Contract, and except as provided in Paragraph 11.04.B.2.b, Buyer shall provide Seller with reasonably prompt written notice setting forth in sufficient detail the reasons for declaring that it believes a breach has occurred. Seller shall have seven days from receipt of the written notice declaring the breach (or such longer period of time as Buyer may grant in writing) within which to cure or to proceed diligently to cure such alleged breach.

b. If and to the extent that Seller has provided a performance bond under the provisions of Paragraph 4.01, the notice and cure procedures of that bond, if any, shall supersede the notice and cure procedures of Paragraph 11.04.B.2.a.

ARTICLE 12 - LICENSES AND FEES

12.01 *Intellectual Property and License Fees*

A. Unless specifically stated elsewhere in the Contract Documents, Seller is not transferring any intellectual property rights, patent rights, or licenses for the Goods delivered. However, in the event the Seller is manufacturing to Buyer's design, Buyer retains all intellectual property rights in such design.

B. Seller shall pay all license fees and royalties and assume all costs incident to the use or the furnishing of the Goods, unless specified otherwise by the Contract Documents.

12.02 *Seller's Infringement*

A. Subject to Paragraph 12.01.A, Seller shall indemnify and hold harmless Buyer, Engineer and their officers, directors, members, partners, employees, agents, consultants, contractors, and subcontractors from and against all claims, costs, losses, damages, and judgments (including but not limited to all reasonable 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 or alleged infringement of any United States or foreign patent or copyright by any of the Goods as delivered hereunder.

B. In the event of suit or threat of suit for intellectual property infringement, Buyer will promptly notify Seller of receiving notice thereof.

C. Seller shall promptly defend the claim or suit, including negotiating a settlement. Seller shall have control over such claim or suit, provided that Seller agrees to bear all expenses and to satisfy any adverse judgment thereof.

1. If Seller fails to defend such suit or claim after written notice by Buyer, Seller will be bound in any subsequent suit or claim against Seller by Buyer by any factual determination in the prior suit or claim.

2. If Buyer fails to provide Seller the opportunity to defend such suit or claim after written notice by Seller, Buyer shall be barred from any remedy against Seller for such suit or claim.

D. If a determination is made that Seller has infringed upon intellectual property rights of another, Seller may obtain the necessary licenses for Buyer's benefit, or replace the Goods and provide related design and construction as necessary to avoid the infringement at Seller's own expense.

12.03 *Buyer's Infringement*

A. Buyer shall indemnify and hold harmless Seller, and its officers, directors, partners, employees, agents, consultants, contractors, and subcontractors from and against all claims, costs, losses, damages, and judgments (including but not limited to all reasonable 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 or alleged infringement of any United States or foreign patent or copyright caused by Seller's compliance with Buyer's design of the Goods or Buyer's use of the Goods in combination with other materials or equipment in any process (unless intent of such use was known to Seller and Seller had reason to know such infringement would result).

B. In the event of suit or threat of suit for intellectual property infringement, Seller must after receiving notice thereof promptly notify Buyer.

C. Upon written notice from Seller, Buyer shall be given the opportunity to defend the claim or suit, including negotiating a settlement. Buyer shall have control over such claim or suit, provided that Buyer agrees to bear all expenses and to satisfy any adverse judgment thereof.

    1. If Buyer fails to defend such suit or claim after written notice by Seller, Buyer will be bound in any subsequent suit or claim against Buyer by Seller by any factual determination in the prior suit or claim.

    2. If Seller fails to provide Buyer the opportunity to defend such suit or claim after written notice by Buyer, Seller shall be barred from any remedy against Buyer for such suit or claim.

12.04 *Reuse of Documents*

A. Neither Seller nor any other person furnishing any of the Goods and Special Services under a direct or indirect contract with Seller shall: (1) 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 versions; or ~~(~~2) reuse any of such Drawings, Specifications, other documents, or copies thereof on any other project without written consent of Buyer and Engineer and specific written verification or adaptation by Engineer. This prohibition will survive termination or completion of the Contract. Nothing herein shall preclude Seller from retaining copies of the Contract Documents for record purposes.

12.05 *Electronic Data*

A. Unless otherwise stated in the Supplementary Conditions, copies of data furnished by Buyer or Engineer to Seller, or by Seller to Buyer 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 days, after which the receiving party shall be deemed to have accepted the data thus transferred. The transferring party will correct any errors detected within the 60-day acceptance period.

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.

ARTICLE 13 - DISPUTE RESOLUTION

13.01 *Dispute Resolution Method*

A. Either Buyer or Seller may initiate the mediation of any Claim decided in writing by Engineer under Paragraph 9.06.B or 9.06.C before such decision becomes final and binding. The mediation will be governed by the Construction Industry Mediation Rules of the American Arbitration Association in effect as of the Effective Date of the Agreement. The request for mediation shall be submitted in writing to the American Arbitration Association and the other party to the Contract. Timely submission of the request shall stay the Engineer's decision from becoming final and binding.

B. Buyer and Seller shall participate in the mediation process in good faith. The process shall be concluded within 60 days of filing of the request. The date of termination of the mediation shall be determined by application of the mediation rules referenced above.

C. If the mediation process does not result in resolution of the Claim, then Engineer's written decision under Paragraph 9.06.B or a denial pursuant to Paragraph 9.06.C shall become final and binding 30 days after termination of the mediation unless, within that time period, Buyer or Seller:

1. elects in writing to invoke any dispute resolution process provided for in the Supplementary Conditions, or

2. agrees with the other party to submit the Claim to another dispute resolution process, or

3. if no dispute resolution process has been provided for in the Supplementary Conditions, delivers to the other party written notice of the intent to submit the Claim to a court of competent jurisdiction, and within 60 days of the termination of the mediation institutes such formal proceeding.

ARTICLE 14 - MISCELLANEOUS

14.01 *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 or to a member

of the firm or to an officer of the corporation for whom it is intended, or 2) if delivered at or sent by registered or certified mail, postage prepaid, to the last business address known to the giver of the notice.

14.02 *Controlling Law*

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

B. In the case of any conflict between the express terms of this Contract and the Uniform Commercial Code, as adopted in the state whose law governs, it is the intent of the parties that the express terms of this Contract shall apply.

14.03 *Computation of Time*

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

14.04 *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, and 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.

14.05 *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 Goods and Special Services and termination or completion of the Agreement.

14.06 *Entire Agreement*

A. Buyer and Seller agree that this Agreement is the complete and final agreement between them, and supersedes all prior negotiations, representations, or agreements, either written or oral. This Agreement may not be altered, modified, or amended except in writing signed by an authorized representative of both parties.

DIVISION 01

GENERAL REQUIREMENTS

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SECTION 01 11 00
SUMMARY OF GOODS AND SPECIAL SERVICES

PART 1 - GENERAL

1.1 SUMMARY

A. Project Summary

1. This project provides two (2) 6-mm in-channel drum screens and associated components for wastewater applications at the Woodside Water Reclamation Facility (WRF). Installation by others.

B. Related sections include but are not necessarily limited to:

1. Division 00 – Bidding Requirements, Contract Forms, and Conditions of the Contract.
2. Division 01 – General Requirements.
3. Division 40 – Process Interconnections.
4. Division 46 – Water and Wastewater Equipment.

1.2 GOODS AND SPECIAL SERVICES COVERED BY CONTRACT

A. The Procurement Bid Form, Section 00 41 13, includes the Bid Items for the project. The Goods and Special Services to be furnished include:

1. Bid Item No. A: In-Channel Drum Screens.

a. All labor, equipment, materials, and appurtenances for furnishing the system as specified in these Contract Documents.

b. The equipment shall be delivered to the Woodside Water Reclamation Facility.

c. Special Services shall include, but are not limited to:

1) Shop Drawings.

2) Operations and Maintenance Manuals

3) Manufacturer's Field Services such as all the necessary installation certification, startup, testing, and training of Buyer's operations and maintenance personnel as quality control and quality assurance of the delivered equipment.

d. Conduct performance testing of equipment to show compliance with performance requirements.

e. The completion of all the furnishing of Goods and Special Services shall be on or before the dates or within the number of calendar days indicated in the Agreement.

1.3 WORK BY OTHERS

A. Buyer or Buyer's Installation Contractor will unload equipment in accordance with Section 01 65 50, Product Delivery, Storage, and Handling.

B. Buyer's Installation Contractor under separate contract will install the screens in the new Headworks Building.

1.4 FABRICATION SCHEDULE

A. Within ten (10) days of Notice to Proceed, the Seller shall submit their fabrication schedule to meet the scheduled sequence, milestones, and limitations. The schedule shall be a bar chart showing, as a minimum, the schedule for the following activities:

1. Shop Drawings Submittals.
2. Final Shop Drawings
3. Fabrication of equipment.
4. Equipment delivery.

1.5 OTHERS WORKING AT PROJECT SITE

A. The Seller shall coordinate the delivery of the equipment and appurtenances with the Buyer and the Buyer's Installation Contractor.

1.6 FINAL COMPLETION

A. For the purposes of establishing when the Project is complete and suitable for its intended purpose, the following functional components and work elements shall be completed:

1. Final shop drawings submitted and approved.
2. Goods delivered to the site.
3. Final operations and maintenance manuals submitted and approved.
4. Manufacturer's Field Services are complete.
5. Satisfactory completion of performance testing.

1.7 REGULATORY REQUIREMENTS

A. Comply with all Federal, State, and local laws, regulations, codes, and ordinance applicable to furnishing the Goods and Special Services.

B. References in the Contract Documents to local codes shall mean City of Hailey, Idaho.

C. Other standards and codes that apply to furnishing the Goods and Special Services are designated in the Specifications.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01 33 00
SUBMITTALS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Mechanics and administration of the submittal process for:
   a. Shop Drawings.
   b. Informational submittals.
2. General content requirements for Shop Drawings.

B. Related Specification Sections include but are not necessarily limited to:

1. Division 00 - Bidding Requirements, Contract Forms, and Conditions of the Contract.
2. Division 01 - General Requirements.
3. Operations and Maintenance Manual submittal requirements are specified in Specification Section 01 33 04.
4. Specification Sections in Division 02 through Division 46 identifying required submittals.

1.2 DEFINITIONS

A. Shop Drawings:

1. See STANDARD GENERAL CONDITIONS FOR PROCUREMENT CONTRACTS.
2. Product data is Shop Drawing information.

B. Informational Submittals:

1. Submittals other than Shop Drawings and samples required by the Contract Documents that do not require approval.
2. Representative types of informational submittal items include but are not limited to:
   a. Equipment delivery schedule.
   b. Installed equipment and systems performance test reports.
   c. Manufacturer's installation certification letters.
   d. Instrumentation and control commissioning reports.
   e. Warranties.
3. For-Information-Only submittals upon which the Engineer is not expected to conduct review or take responsive action may be so identified in the Contract Documents.

1.3 TRANSMITTAL OF SUBMITTALS

A. Shop Drawings and Product Data:

1. Transmit paper copy submittals to:
   HDR Engineering, Inc.
   412 East Parkcenter Boulevard, Suite 100
   Boise, ID 83706
   Attn: Brad Bjerke, PE

2. Electronic Transmission of Submittals:
    a. Via email:
        brad.bjerke@hdrinc.com
3. Utilize one (1) copy of attached Exhibit "A" to transmit all Shop Drawings and samples.
    a. An electronic version (Microsoft Word .doc format) of Exhibit “A” will be given to Seller upon request.
4. All submittals must be from Seller and bear his approval stamp.
    a. Shop Drawing submittal stamp shall read "(Seller's Name) has satisfied Seller's obligations under the Contract Documents with respect to Seller's review and approval as stipulated under STANDARD GENERAL CONDITIONS FOR PROCUREMENT CONTRACTS Paragraph 5.06C".
5. Provide submittal information defining specific equipment or materials utilized on the project.
    a. Generalized product information, not clearly defining specific equipment or materials to be provided, will be rejected.
6. Calculations required in individual Specification Sections will be received for information purposes only, as evidence calculations have been performed by individuals meeting specified qualifications and will be returned stamped "E. Engineer's Review Not Required" to acknowledge receipt.
7. Submittal schedule:
    a. Schedule of Shop Drawings:
        1) Submitted and approved in accordance with timeframes listed in Contract.
        2) Account for multiple transmittals under any Specification Section where partial submittals will be transmitted.

B. Informational Submittals:

1. Transmit under Seller's standard letter of transmittal or letterhead.
2. Submit in triplicate or as specified in individual Specification Section.
3. Transmit paper copy submittals to:

    HDR Engineering, Inc.
    412 East Parkcenter Boulevard, Suite 100
    Boise, ID 83706
    Attn: Brad Bjerke, PE

4. Electronic Transmission of Submittals:
    a. Via email:
        brad.bjerke@hdrinc.com

1.4 PREPARATION OF SUBMITTALS

A. Legibility:

1. All submittals and all pages of all copies of a submittal shall be completely legible.
2. Submittals which, in the Engineer’s sole opinion, are illegible will be returned without review.

B. Shop Drawings:

1. Scope of any submittal and letter of transmittal:
    a. Limited to one (1) Specification Section.
    b. Do not submit under any Specification Section entitled (in part) "Basic Requirements" unless the product or material submitted is specified, in total, in a "Basic Requirements" Specification Section.
2. Numbering letter of transmittal:
    a. Use the Specification Section number followed by a series number ("-xx" and beginning with "01"); increase the series number sequentially with each additional transmittal for that Specification Section.
3. Describing transmittal contents:
    a. Provide listing of each component or item in submittal capable of receiving an independent review action.
    b. Identify for each item:
        1) Manufacturer and Manufacturer's Drawing or data number.
        2) Contract Document tag number(s).
        3) Specification Article/Paragraph number if appropriate.
        4) Unique page numbers for each page of each separate item.
    c. When submitting "or-equal" items that are not the products of named manufacturers, include the words "or-equal" in the item description.
4. Seller stamping:
    a. General:
        1) Seller's review and approval stamp shall be applied either to the letter of transmittal or a separate sheet preceding each independent item in the submittal.
            a) Seller's signature and date shall be original ink signature.
        2) Letters of transmittal may be stamped only when the scope of the submittal is one (1) item.
        3) Submittals containing multiple independent items shall be prepared with an index sheet for each item listing the discrete page numbers for each page of that item, which shall be stamped with the Seller's review and approval stamp.
            a) Individual pages or sheets of independent items shall be numbered in a manner that permits Seller's review and approval stamp to be associated with the entire contents of a particular item and vice-versa.
        4) In the event submittals are transmitted as a single item and found to include multiple independent items, the Buyer and Engineer reserve the right to limit review to the single item listed, remove the other items from the submittal and return them not reviewed to the Seller for coordination, stamping and submittal under a new transmittal number that is not a re-submittal number.
            a) The items not listed in the transmittal letter will not be logged as received, or in any other manner acknowledged as submitted.
    b. Electronic stamps:
        1) Seller may electronically embed Seller's review and approval stamp to either the letter of transmittal or a separate index sheet preceding each independent item in the submittal.

2) Seller's signature and date on electronically applied stamps shall be original ink signature.

5. Resubmittals:
   a. Number with original Specification Section and series number with a suffix letter starting with "A" on a (new) duplicate transmittal form.
   b. Do not increase the scope of any prior transmittal.
   c. Account for all components of prior transmittal.
      1) If items in prior transmittal received "A" or "B" Action code, list them and indicate "A" or "B" as appropriate.
         a) Do not include submittal information for items listed with prior "A" or "B" Action in resubmittal.
      2) Indicate "Outstanding-To Be Resubmitted At a Later Date" for any prior "C" or "D" Action item not included in resubmittal.
         a) Obtain Engineer's approval to exclude items.
6. Seller shall not use red color for marks on transmittals.
   a. Duplicate all marks on all copies transmitted, and ensure marks are photocopy reproducible.
   b. Engineer will use red marks or enclose marks in a cloud.
7. Transmittal contents:
   a. Coordinate and identify Shop Drawing contents so that all items can be easily verified by the Engineer.
   b. Provide submittal information or marks defining specific equipment or materials utilized on the Project.
      1) Generalized product information, not clearly defining specific equipment or materials to be provided, will be rejected.
   c. Identify equipment or material project application, tag number, Drawing detail reference, weight, and other Project specific information.
   d. Provide sufficient information together with technical cuts and technical data to allow an evaluation to be made to determine that the item submitted is in compliance with the Contract Documents.
   e. Do not modify the manufacturer's documentation or data except as specified herein.
   f. Submit items such as equipment brochures, cuts of fixtures, product data sheets or catalog sheets on 8-1/2 x 11 IN pages.
      1) Indicate exact item or model and all options proposed.
   g. When a Shop Drawing submittal is called for in any Specification Section, include as appropriate, scaled details, sizes, dimensions, performance characteristics, capacities, test data, anchoring details, installation instructions, storage and handling instructions, color charts, layout Drawings, rough-in diagrams, wiring diagrams, controls, weights and other pertinent data in addition to information specifically stipulated in the Specification Section.
      1) Arrange data and performance information in format similar to that provided in Contract Documents.
      2) Provide, at minimum, the detail specified in the Contract Documents.
   h. If proposed equipment or materials deviate from the Contract Drawings or Specifications in any way, clearly note the deviation and justify the said deviation in detail in a separate letter immediately following transmittal sheet.

8. Provide one (1) electronic copy of each submittal until submittal has received either an “A” or “B” action.
    a. Submittal may be transmitted via e-mail or on a CD-ROM disc.
    b. The Engineer will mark comments directly on the electronic copy of each submittal or provide review comment in an electronic comment sheet attached to the Shop Drawing Transmittal sheet included in Exhibit A.
    c. Engineer will return the submittals with the review comments via e-mail.
9. If “B” action, incorporate response addressing the “Furnish as Noted” items and then provide one (1) electronic copy via e-mail or on compact disc (CD-ROM) of each submittal.

C. Informational Submittals:

1. Prepare in the format and detail specified in Specification requiring the informational submittal.

D. Paper copy submittals:

1. Provide 8-1/2 x 11 IN, 8-1/2 x 14 IN, and 11 x 17 IN size sheets on heavy first quality paper with standard three-hole punching and bound in appropriately sized three-ring (or post) binders with clear overlays front, spine and back.
2. Reduce Drawings or diagrams bound in manuals to an 8-1/2 x 11 IN or 11 x 17 IN size.
    a. Where reduction is not practical to ensure readability, fold larger Drawings separately and place in vinyl envelopes which are bound into the binder.
    b. Identify vinyl envelopes with Drawing numbers.
3. Provide a Cover Page for each binders with the following information:
    a. Seller’s Name.
    b. Date.
    c. Buyer’s Name.
    d. Project Name.
    e. Specification Section.
    f. Project Equipment Tag Numbers, if applicable.
    g. Model Numbers, if applicable.
    h. Engineer.
4. Provide a Table of Contents or Index for each binder.
    a. Use plastic-coated dividers to tab each section per the Table of Contents/Index for easy reference.

E. Electronic copy submittals:

1. Electronic copies are to be produced in Adobe Acrobat's Portable Document Format (PDF) Version 5.0 or higher.
2. Do not password protect and/or lock the PDF document.
3. Create one (1) PDF document (PDF file) for each submittal.
4. Drawings shall be provided in AutoCAD 2020.dwg and PDF formats. The equipment shall also be provided in a 3D model.
5. Rotate pages that must be viewed in landscape to the appropriate position for easy reading.
6. Images only shall be scanned at a resolution of 300 dpi or greater.
    a. Perform Optical Character Recognition (OCR) capture on all images.

b. Word searches of the PDF document must operate successfully to demonstrate OCR compliance.

7. Create bookmarks in the navigation frame, for each entry in the Table of Contents/Index.
8. File naming conventions:
   a. File names shall use a "ten dot three" convention (XX XX XX-YY-Z.PDF) where XX XX XX is the Specification Section number, YY is the Shop Drawing Root number and Z is an ID number used to designate the associated volume.
      1) Example 1:
         a) Two (2) pumps submitted as separate Shop Drawings under the same Specification Section:
            (1) Pump 1 = 43 23 50-01-1.pdf.
            (2) Pump 2 = 43 23 50-02-1.pdf.
      2) Example 2:
         a) Control system submitted as one (1) Shop Drawing but separated into two (2) O&M volumes:
            (1) Volume 1 = 40 90 00-01-1.pdf.
            (2) Volume 2 = 40 90 00-01-2.pdf.
9. Label CD-ROM discs and jewel cases with same information required for Cover Pages.
   a. Include labeled CD(s) in labeled jewel case(s).

1.5 ENGINEER'S REVIEW ACTION

A. Shop Drawings and Samples:

1. Items within transmittals will be reviewed for overall design intent and will receive one (1) of the following actions:
   a. A - FURNISH AS SUBMITTED.
   b. B - FURNISH AS NOTED (BY ENGINEER).
   c. C - REVISE AND RESUBMIT.
   d. D - REJECTED.
   e. E - ENGINEER'S REVIEW NOT REQUIRED.
2. Submittals received will be initially reviewed to ascertain inclusion of Seller's approval stamp.
   a. Drawings not stamped by the Seller or stamped with a stamp containing language other than that specified in Paragraph 1.3A.4.a., will not be reviewed for technical content and will be returned without any action.
3. Submittals returned with Action "A" or "B" are considered ready for fabrication and installation.
   a. If for any reason a submittal that has an "A" or "B" Action is resubmitted, it must be accompanied by a letter defining the changes that have been made and the reason for the resubmittal.
   b. Destroy or conspicuously mark "SUPERSEDED" all documents having previously received "A" or "B" Action that are superseded by a resubmittal.
4. Submittals with Action "A" or "B" combined with Action "C" (Revise and Resubmit) or "D" (Rejected) will be individually analyzed giving consideration as follows:
   a. The portion of the submittal given "C" or "D" will not be distributed.
      1) Correct and resubmit items so marked.

b. Items marked "A" or "B" will be fully distributed.

c. If a portion of the items or system proposed are incomplete or require revision, the entire submittal may be given "C" or "D" Action.

1) This is at the sole discretion of the Engineer. In this case, some Drawings may contain relatively few or no comments or the statement, "Resubmit to maintain a complete package."

2) Distribution to the Buyer and field will not be made (unless previously agreed to otherwise).

5. Failure to include any specific information specified under the submittal paragraphs of the Specifications will result in the submittal being returned to the Seller with "C" or "D" Action.

6. Calculations required in individual Specification Sections will be received for information purposes only, as evidence calculations have been performed by individuals meeting specified qualifications and will be returned stamped "E. Engineer's Review Not Required" to acknowledge receipt.

7. Transmittals of submittals which the Engineer considers as "Not Required" submittal information, which is supplemental to but not essential to prior submitted information, or items of information in a transmittal which have been reviewed and received "A" or "B" Action in a prior submittal, will be returned with Action "E. Engineer's Review Not Required."

B. Engineer will review two versions, initial submittal and one resubmittal, of each Shop Drawing, Installation Manual, and Operations and Maintenance Manual at no cost to the Seller.

1. Should additional reviews beyond the root and one resubmittal be required due to no fault of the Buyer or Engineer, Engineer will tack the review hours and expenses associated with these extra reviews.

2. Buyer will issue a deductive change order to the Seller for the extra review expenses of the Engineer and/or Buyer.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

EXHIBIT A

Shop Drawing Transmittal No. _____-_____

(Spec Section) (Series)

Project Name: Woodside WRF Equipment Procurement – Screens		Date Received:	
Project Owner: Woodside WRF		Checked By:	
Contractor:	HDR Engineering, Inc.	Log Page:	
Address:	Address: 412 East Parkcenter Boulevard, Suite 100 Boise, Idaho 83706	HDR No.: Spec Section: Drawing/Detail No.:	
Attn:	Attn: Brad Bjerke	1st. Sub	ReSub.
Date Transmitted:	Previous Transmittal Date:		

Item No.	No. Copies	Description	Manufacturer	Mfr/Vendor Dwg or Data No.	Action Taken*

Remarks:

* The Action designated above is in accordance with the following legend:

A - Furnish as Submitted

B - Furnish as Noted

C - Revise and Submit
1. Not enough information for review.
2. No reproducibles submitted.
3. Copies illegible.
4. Not enough copies submitted.
5. Wrong sequence number.
6. Wrong resubmittal number.
7. Wrong spec. section.
8. Wrong form used.
9. See comments.

D - Rejected

E - Engineer's review not required
1. Submittal not required.
2. Supplemental Information. Submittal retained for informational purposes only.
3. Information reviewed and approved on prior submittal.
4. See comments.
5. Delegated Design - Submittal received as requested by the Contract Documents. The Engineer did not review the engineering or technical content of the submittal.

Engineer's review and approval is limited to determine whether items covered by this submittal will, after installation or incorporation in the Work, conform in general to the information given in the Contract Documents and be compatible with the design concept of the completed Project as a functioning whole. Any deviation from plans or specifications not depicted in the submittal or included but not clearly noted by the Contractor may not have been reviewed. Review by the Engineer shall not serve to relieve the Contractor of the contractual responsibility for any error or deviation from contract requirements.

Comments:

By Date

Distribution: Contractor | File | Field | Owner | Other |

SECTION 01 33 04
OPERATION AND MAINTENANCE MANUALS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Administration of the submittal process for Operation and Maintenance Manuals.
2. Content requirements for Operation and Maintenance Manuals.

B. Related Specification Sections include but are not necessarily limited to:

1. Division 00 - Bidding Requirements, Contract Forms, and Conditions of the Contract.
2. Division 01 - General Requirements.
3. General submittal requirements are specified in Specification Section 01 33 00 - Submittals.
4. Sections in Division 02 through Division 46 identifying required Operation and Maintenance Manual submittals.

1.2 DEFINITIONS

A. Equipment Operation and Maintenance Manuals:

1. Contain the technical information required for proper installation, operation and maintenance of process, electrical and mechanical equipment and systems.

B. Building Materials and Finishes Operation and Maintenance Manuals:

1. Contain the information required for proper installation and maintenance of building materials and finishes.

1.3 SUBMITTALS

A. List of all the Operation and Maintenance Manuals required by the Contract as identified in Division 02 through Division 46.

B. Operation and Maintenance Manuals:

1. Draft and final electronic copies.
2. Final paper copies: One (1).

1.4 SUBMITTAL SCHEDULE

A. List of Required Operation and Maintenance Manuals:

1. Submit list with Specification Section number and title within 21 days after Notice to Proceed.

B. Draft Operation and Maintenance Manuals:

1. Submit approvable draft manuals in electronic format (PDF) within 90 days after Notice to Proceed.
    a. Include placeholders or fly sheet pages where information is not final or is missing from the draft manual.

C. Final Operation and Maintenance Manuals:

1. Final approval of Operation and Maintenance Manuals in electronic format (PDF) must be obtained 45 days prior to equipment start-up.
2. Provide paper copies and CD-ROMs of approved final Operation and Maintenance Manuals in electronic format (PDF), a minimum of 30 days prior to equipment start-up.
3. Issue addenda to Final Approved Operation and Maintenance Manual to include:
    a. Equipment data that requires collection after start-up, for example but not limited to electrical switchgear, automatic transfer switch, and circuit breaker settings.
    b. Equipment field testing data.
    c. Equipment start-up reports.
    d. Revisions made to the drawings that are included in the manual during the field testing.

1.5 PREPARATION OF SUBMITTALS

A. General:

1. All pages of the Operation and Maintenance Manual submittal shall be legible.
    a. Submittals which, in the Engineer's sole opinion, are illegible will be rejected without review.
2. Identify each equipment item in a manner consistent with names and identification numbers used in the Contract Documents, not the manufacturer's catalog numbers.
3. Neatly type any data not furnished in printed form.
4. Operation and Maintenance Manuals are provided for Owner's use, to be reproduced and distributed as training and reference materials within Owner's organization.
    a. This requirement is:
        1) Applicable to both paper copy and electronic files.
        2) Applicable to materials containing copyright notice as well as those with no copyright notice.
5. Notify supplier and/or manufacturer of the intended use of Operations and Maintenance Manuals provided under the Contract.

B. Operation and Maintenance Manual Format and Delivery:

1. Draft electronic submittals:
    a. Provide manual in Adobe Acrobat Portable Document Format (PDF), latest version.
    b. Create one (1) PDF file for each equipment Operation and Maintenance Manual.
    c. Do not password protect or lock the PDF document.
    d. Drawings or other graphics must be converted to PDF file format from the original drawing file format and made part of the PDF document.
    e. Scanning of drawings is to be used only where actual file conversion is not possible and drawings must be scanned at a resolution of 300 dpi or greater.
    f. Rotate sheets that are normally viewed in landscape mode so that when the PDF file is opened the sheet is in the appropriate position for viewing.
    g. Create bookmarks in the bookmarks panel for the Operation and Maintenance Manual cover, the Table of Contents and each major section of the Table of Contents.

h. Using Adobe Acrobat Standard or Adobe Acrobat Professional, set the PDF document properties, initial view as follows:
    1) Select File →Properties→Initial View.
    2) Select the Navigation tab: Bookmarks Panel and Page.
    3) Select the Page layout: Single Page.
    4) Select the Magnification: Fit Page.
    5) Select Open to page: 1.
    6) Set the file to open to the cover page of the manual with bookmarks to the left, and the first bookmark linked to the cover page.
i. Set the PDF file "Fast Web View" option to open the first several pages of the document while the rest of the document continues to load.
    1) To do this:
        a) Select Edit→Preferences→ Documents→Save Settings.
        b) Check the Save As optimizes for Fast Web View box.
j. PDF file naming convention:
    1) Use the Specification Section number, the manufacturer's name and the equipment description, separated by underscores.
    2) Example: 46 51 21_Sanitaire_Coarse_Bubble_Diffusers.pdf.
    3) Do not put spaces in the file name.

2. Final electronic submittals:
    a. Submit two (2) copies in PDF file format on two (2) CD-ROM discs (one (1) copy per CD-ROM), each secured in a jewel case.
    b. CD-ROM Labeling:
        1) Provide the following printed labeling on all CD-ROM discs:
            a) Project name.
            b) Specification Section.
            c) Equipment names and summary of tag(s) covered.
            d) Manufacturer name.
            e) Date (month, year).
    c. CD-ROM Jewel Case Holder:
        1) Insert jewel cases containing labeled CD-ROM discs in three-ring binder holder (C-Line Products, www.c-lineproducts.com stock number CLI-61968 or equivalent) at the front of each final paper copy.
3. Final paper copy submittals:
    a. Quantity: Provide one (1) copies.
    b. Paper: 8.5 x 11 IN or 11 x 17 IN bright white, 20 pound paper with standard three-hole punching.
    c. 3-Ring Binder:
        1) Provide D-ring binder with clear vinyl sleeves (i.e. view binder) on front and spine.
        2) Insert binder title sheet with the following information under the front and spine sleeves:
            a) Project name.
            b) Specification Section.
            c) Equipment names and summary of tag(s) covered.

d) Manufacturer name.
e) Date (month, year).
3) Provide plastic sheet lifters prior to first page and following last page.

d. Drawings:
1) Provide all drawings at 11 x 17 IN size, triple folded and three-hole punched for insertion into manual.
2) Where reduction is not practical to ensure readability, fold larger drawings separately and place in three-hole punched vinyl envelopes inserted into the binder.
3) Identify vinyl envelopes with drawing numbers.

e. Use plastic coated dividers to tab each section of each manual in accordance with the Table of Contents.

C. Equipment Operation and Maintenance Manual Content:

1. Provide a cover page as the first page of each manual with the following information:
a. Manufacturer(s) Name and Contact Information.
b. Vendor's Name and Contact Information.
c. Date (month, year).
d. Project Owner and Project Name.
e. Specification Section.
f. Project Equipment Tag Numbers.
g. Model Numbers.
h. Engineer's Name.
i. Seller's Name.
2. Provide a Table of Contents for each manual.
3. Provide Equipment Record sheets as follows:
a. Printed copies of the Equipment Record (Exhibits B1, B2 and B3), as the first tab following the Table of Contents.
b. Exhibits B1-B3 are available as Fillable PDF Form documents from the Engineer.
c. Each section of the Equipment Record must be completed in detail; simply referencing the related equipment Operation and Maintenance Manual sections for nameplate, maintenance, spare parts or lubricant information is not acceptable.
d. For equipment involving separate components (for example, a motor and gearbox), a fully completed Equipment Record is required for each component.
e. Submittals that do not include the Equipment Record(s) will be rejected without further content review.
4. Provide a printed copy of the Manufacturer's Field Services report as required by Specification Section 01 75 00 following the Equipment Record sheets.
5. Provide the following detailed information, as applicable:
a. Use equipment tag numbers from the Contract Documents to identify equipment and system components.
b. Equipment function, normal and limiting operating characteristics.
c. Instructions for assembly, disassembly, installation, alignment, adjustment, and inspection.

d. Operating instructions for start-up, normal operation, control, shutdown, and emergency conditions.
e. Lubrication and maintenance instructions.
f. Troubleshooting guide.
g. Mark each sheet to clearly identify specific products and component parts and data applicable to the installation for the Project; delete or cross out information that does not specifically apply to the Project.
h. Parts lists:
    1) A parts list and identification number of each component part of the equipment.
    2) Exploded view or plan and section views of the equipment with a detailed parts callout matching the parts list.
    3) A list of recommended spare parts.
    4) List of spare parts provided as specified in the associated Specification Section.
    5) A list of any special storage precautions which may be required for all spare parts.
i. General arrangement, cross-section, and assembly drawings.
j. Electrical diagrams, including elementary diagrams, wiring diagrams, connection diagrams, and interconnection diagrams.
k. Test data and performance curves.
l. As-constructed fabrication or layout drawings and wiring diagrams.
m. Copy of the equipment manufacturer’s warranty meeting the requirements of the Contract.
n. Copy of any service contracts provided for the specific piece of equipment as part of the Contract.

6. Additional information as required in the associated equipment or system Specification Section.

D. Building Materials and Finishes Operation and Maintenance Manual Content:

1. Building products, applied materials and finishes:
    a. Include product data, with catalog number, size, composition and color and texture designations.
    b. Provide information for ordering custom manufactured products.
2. Necessary precautions:
    a. Include product MSDS for each approved product.
    b. Include any precautionary application and storage guidelines.
3. Instructions for care and maintenance:
    a. Include manufacturer's recommendations for cleaning agents and methods, precautions against detrimental agents and methods and recommended schedule for cleaning and maintenance.
4. Moisture protection and weather exposed products:
    a. Include product data listing, applicable reference standards, chemical composition, and details of installation.
    b. Provide recommendations for inspections, maintenance and repair.
5. Additional requirements as specified in individual product specifications.

1.6 TRANSMITTAL OF SUBMITTALS

A. Operation and Maintenance Manuals.

1. Transmit paper copy submittals to:

   HDR Engineering, Inc.
   412 East Parkcenter Boulevard, Suite 100
   Boise, ID 83706
   Attn: Brad Bjerke, PE

2. Utilize one (1) copy of attached Exhibit "A" to transmit all Operation and Maintenance Manuals.
   a. An electronic version (Microsoft Word .doc format) of Exhibit “A” will be given to Seller upon request.
3. Transmittal numbering:
   a. Number each submittal with the Specification Section number followed by a series number beginning with "-01" and increasing sequentially with each additional transmittal, followed by "-OM" (for example: 11061-01-OM).
4. Submit draft and final Operation and Maintenance Manual in electronic format (PDF) to Engineer, until manual is approved.
5. All submittals must be from Seller and bear his approval stamp.
   a. Operation and Maintenance Manual submittal stamp may be Seller's standard approval stamp.

B. Expedited Return Delivery:

1. Include prepaid express envelope or air bill in submittal transmittal package for any submittals Seller expects or requires express return mail.
2. Inclusion of prepaid express envelope or air bill does not obligate Engineer to conduct expedited review of submittal.

1.7 ENGINEER'S REVIEW ACTION

A. Draft Electronic (PDF) Submittals:

1. Engineer will review and indicate one of the following review actions:
   a. A – FURNISH AS SUBMITTED
   b. B - FURNISH AS NOTED
   c. C - REVISE AND RESUBMIT
   d. D - REJECTED
2. Submittals marked as Acceptable or Furnish As Noted will be retained; however, the transmittal form will be returned with a request for the final paper and electronic documents to be submitted.
3. Copies of submittals marked as Revise and Resubmit or Rejected will be returned with the transmittal form marked to indicate deficient areas.
4. Resubmit until approved.

B. Final Paper Copy Submittals:

1. Engineer will review and indicate one (1) of the following review actions:
   a. A - ACCEPTABLE
   b. D - REJECTED

2. Submittals marked as Acceptable will be retained with the transmittal form returned as noted.
3. Submittals marked as Rejected will be returned with the transmittal form marked to indicate deficient areas.
4. Resubmit until approved.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

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EXHIBIT A

Operation and Maintenance Manual Transmittal _____-_____ - OM

(Spec Section) (Series)

Project Name: Woodside WRF Equipment Procurement – Screens | Date Received:

Project Owner: City of Hailey, ID | Checked By:

Contractor: | Owner: City of Hailey, ID | Log Page:

Address: | Address: 4197 Glenbrook Drive, Hailey, ID 83333 | HDR No.:

Attn: | Attn: | 1st. Sub. ReSub.

Date Transmitted: | Previous Transmittal Date:

No. Copies	Description of Item	Manufacturer	Dwg. or Data No.	Action Taken*

Remarks:

To: | From: *HDR Engineering, Inc.*

Date:

* The Action designated above is in accordance with the following legend:

A - Acceptable

B - Furnish as Noted

C - Revise and Resubmit

D - Rejected

Comments:

By | Date

Distribution: Contractor | File | Field | Owner | Other

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EXHIBIT B1

Equipment Record

Equipment Data and Spare Parts Summary

Project Name Woodside WRF Equipment Procurement - Screens				Specification Section:
Equipment Name				Year Installed:
Project Equipment Tag No(s).				
Equipment Manufacturer				Project/ Order No.
Address				Phone
Fax	Web Site		E-mail	
Local Vendor/Service Center				
Address				Phone
Fax	Web Site		E-mail	

MECHANICAL NAMEPLATE DATA

Equip.			Serial No.	
Make			Model No.	
ID No.	Frame No.	HP	RPM	Cap.
Size	TDH	Imp. Sz.	CFM	PSI
Other:				

ELECTRICAL NAMEPLATE DATA

Equip.				Serial No.				
Make				Model No.				
ID No.	Frame No.	HP	V.	Amp.	HZ	PH	RPM	SF
Duty	Code	Ins. Cl.	Type	NEMA	C Amb.	Temp. Rise	Rating	
Other:								

SPARE PARTS PROVIDED PER CONTRACT

Part No.	Part Name	Quantity

RECOMMENDED SPARE PARTS

Part No.	Part Name	Quantity

(Jun 1990; Revised Oct 2001, Revised Nov 2007)

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EXHIBIT B2

Equipment Record

Recommended Maintenance Summary

Equipment Description	Project Equip. Tag No(s).	

RECOMMENDED BREAK-IN MAINTENANCE (FIRST OIL CHANGES, ETC.)	INITIAL COMPLETION * FOLLOWING START-UP							
	D	W	M	Q	S	A	RT	Hours

RECOMMENDED PREVENTIVE MAINTENANCE	PM TASK INTERVAL *							
	D	W	M	Q	S	A	RT	Hours

***** **D = Daily** **W = Weekly** **M = Monthly** **Q = Quarterly** **S = Semiannual** **A = Annual** **Hours = Run Time I**

(Jun 1990; Revised Oct 2001, Revised Nov 2007)

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EXHIBIT B3

Equipment Record

Lubrication Summary

Equipment Description	Project Equip. Tag No(s).

Lubricant Point						
		Manufacturer	Product	AGMA #	SAE #	ISO
Lubricant Type	1					
	2					
	3					
	4					
	5					
Lubricant Point						
		Manufacturer	Product	AGMA #	SAE #	ISO
Lubricant Type	1					
	2					
	3					
	4					
	5					
Lubricant Point						
		Manufacturer	Product	AGMA #	SAE #	ISO
Lubricant Type	1					
	2					
	3					
	4					
	5					
Lubricant Point						
		Manufacturer	Product	AGMA #	SAE #	ISO
Lubricant Type	1					
	2					
	3					
	4					
	5					
Lubricant Point						
		Manufacturer	Product	AGMA #	SAE #	ISO
Lubricant Type	1					
	2					
	3					
	4					
	5					
Lubricant Point						
		Manufacturer	Product	AGMA #	SAE #	ISO
Lubricant Type	1					
	2					
	3					
	4					
	5					

(Feb 1991; Revised Oct 2001, Revised Nov 2007)

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SECTION 01 61 03
EQUIPMENT - BASIC REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Requirements of this Specification Section apply to all equipment provided on the Project including those found in other Divisions even if not specifically referenced in individual "Equipment" Articles of those Specification Sections.

B. Related Sections include but are not necessarily limited to:

1. Section 05 50 00 - Metal Fabrications.
2. Section 40 90 00 - Instrumentation for Process Control - Basic Requirements.
3. Section 46 21 76 – In-Channel Drum Screens.

1.2 QUALITY ASSURANCE

A. Referenced Standards:

1. American Bearing Manufacturers Association (ABMA).
2. American Gear Manufacturers Association (AGMA).
3. American Petroleum Institute
   a. API 686 - Recommended Practice for Machinery Installation and Installation Design
4. ASTM International (ASTM):
   a. E1934, Standard Guide for Examining Electrical and Mechanical Equipment with Infrared Thermography.
   b. F593, Standard Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs.
5. Hydraulic Institute (HI):
   a. 9.6.4, Rotodynamic Pumps for Vibration Measurements and Allowable Values.
6. International Electrotechnical Commission (IEC).
7. Institute of Electrical and Electronics Engineers, Inc. (IEEE).
8. International Organization for Standardization (ISO):
   a. 1940, Mechanical Vibration - Balance Quality Requirements for Rotors in a Constant (Rigid) State - Part 1: Specification and Verification of Balance Tolerances.
   b. 21940-11, Mechanical Vibration - Rotor Balancing - Part 11: Procedures and Tolerances for Rotors with Rigid Behavior.
9. National Electrical Manufacturers Association (NEMA):
   a. 250, Enclosures for Electrical Equipment (1000 Volts Maximum).
   b. ICS 6, Enclosures for Industrial Control and System.
   c. MG 1, Motors and Generators.
10. InterNational Electrical Testing Association (NETA):
    a. ATS, Acceptance Testing Specification for Electrical Power Distribution Equipment and Systems.
11. National Fire Protection Association (NFPA):

a. 70, National Electrical Code (NEC):

12. National Institute for Certification in Engineering Technologies (NICET).
13. National Institute of Standards and Technology (NIST).
14. Occupational Safety and Health Administration (OSHA):
    a. 29 CFR 1910, Occupational Safety and Health Standards, referred to herein as OSHA Standards.
15. Underwriters Laboratories, Inc. (UL).
    a. 508, Standard for Safety Industrial Control Equipment.
    b. 508A, Standard for Safety Industrial Control Panels.
    c. 698A, Standard for Industrial Control Panels Relating to Hazardous (Classified) Locations.
16. Vibration Institute.

B. Supplier's Vibration Analyst:

1. Supplier's vibration analyst shall prepare pre-Shop Drawing vibration analysis of equipment.
2. Where required, Supplier's vibration analyst shall be either equipment manufacturer's qualified employee or independent business entity whose sole business, or principal part of its business, is evaluating and determining natural frequencies of rotating equipment.
3. Shall possess not less than 10 years' relevant experience.
4. Supplier's Vibration Analyst's Professional Engineer:
    a. Vibration analysis shall be performed by, or under the direct, personal supervision of, professional engineer licensed and registered in the same jurisdiction as the Site experienced in preparing finite element analyses, rotodynamic analyses, and experimental modal analysis similar to that required for the Work.
    b. Professional engineer shall possess not less than five years' combined experience in field testing and data analysis for vibration analysis.
    c. Vibration analysis professional engineer's seal and signature, with indication of date seal and signature were applied to the subject document, shall clearly appear on all results and reports furnished as Submittals.

C. Field Vibration Testing Subcontractor:

1. Field vibration testing Subcontractor shall, where required by the Contract Documents, perform vibration testing of equipment installed at the Site and perform associated vibration analyses.
2. Vibration testing Subcontractor shall be an independent entity that has performed as its sole business, or principal part of its business, for not less than 10 years, inspection, testing, calibrating, adjusting equipment and systems, and performing vibration testing of equipment.
3. Entities whose principal business is one or more of the following are not considered independent vibration testing entities and, therefore, shall not be field vibration testing Subcontractor:
    a. Motor sales, service, or repairs.
    b. Process equipment sales, service, or repairs.
4. Acceptable entities include, but are not necessarily limited to::
    a. AVS Engineering: https://www.avsengineering.net/

b. Engineering Testing Services: https://etestinc.com/
c. Maritech, LLC: http://www.maritech-llc.com/contact.html

5. Field vibration testing Subcontractor must have an established program for monitoring and testing equipment calibration, with accuracy traceable in an unbroken chain, in accordance with NIST requirements.
6. Field Personnel: Each person employed for field vibration testing on the Work shall possess not less than the following qualifications:
   a. Three years' field experience covering all phases of field vibration testing and data gathering.
   b. Current, valid Vibration Category II certification from Vibration Institute or a licensed, registered professional engineer.
7. Analysis Personnel: Personnel performing analysis for field vibration testing Subcontractor shall possess not less than the following qualifications:
   a. Five years' combined field testing and data analysis experience.
   b. Current, valid Vibration Category III certification from the Vibration Institute or a professional engineer licensed and registered in in the same jurisdiction as the Site. Where required by Laws and Regulations, field vibration analysis report shall be sealed, signed, and dated by professional engineer who personally prepared, or exercised personal, supervisory control over subordinates in preparing, the field vibration analysis report.
8. Analysis Equipment: Field vibration testing Subcontractor shall have access to and use, where appropriate, the following testing equipment, properly maintained and calibrated:
   a. Impact Hammer:
      1) Frequency Range: 1 kHz.
      2) Range (5v output) 5,000 pounds-force (22,200 newtons).
      3) Hammer sensitivity (approx.) 1mV/lbf (0.23 mV/N)
   b. Analyzer:
      1) Frequency Range: 1 Hz to 10,000Hz.
      2) Frequency Accuracy: 0.02 percent.
      3) Non-Integrated Spectral Amplitude Accuracy: 5 percent, 3 Hz to 65 Hz.
      4) Single Integrated Spectral Amplitude Accuracy: 5 percent, 10 Hz to 20 Hz.
      5) Supports measurements of acceleration, velocity, and displacement.
   c. Vibration Sensor:
      1) Sensitivity: ±5 percent = 100 mV/g
      2) Acceleration Range: ±5 g.
      3) Amplitude Nonlinearity: ±1 percent
      4) Frequency Response: ±10Hz to 7kHz (±3 dB)
   d. Data logging equipment for simultaneous recording of the following data points:
      1) Vibration in the X, Y, and axial planes (for all pumps pursuant to ANSI/HI Standard).
      2) Digital tachometer recording RPM.
      3) Discharge Pressure Transmitter
         a) Accuracy: 0.3 percent of range
         b) Fluid Temperature Range: 32 to 100 DegF

4) Suction Pressure Transmitter (when other than submersible pump or vertical turbine (suspended) pump.
    a) Accuracy 0.35 percent of range.
    b) Fluid Temperature Range: 32 to 100 DegF.
    c) For submersible pumps and vertical turbine (suspended) type pumps, suction liquid surface level signal from Site's monitoring and control system (e.g., plant PLC/SCADA system).
5) For pumps, pumping rate (flow) signal from Site's monitoring and control system (e.g., plant PLC/SCADA system)
6) Equipment/motor bearing temperature signal from Site's monitoring and control system (e.g., plant PLC/SCADA system)).
7) Pump/motor vibration signal from Site's monitoring and control system (e.g., plant PLC/SCADA system).

D. Infrared Thermography Testing Program:

1. Testing firm:
    a. An independent firm performing, as the sole or principal part of its business for a minimum of 10 years, the inspection, testing, calibration, and adjusting of systems.
    b. Must have an established monitoring and testing equipment calibration program with accuracy traceable in an unbroken chain, according to NIST.
2. Field personnel:
    a. Minimum of one year field experience covering all phases of field thermography testing and data gathering.
    b. Supervisor certified by NETA or NICET.
3. Analysis personnel:
    a. Minimum three years combined field testing and data analysis experience.
    b. Supervisor certified by NETA or NICET.

E. Electrical Equipment and Connections Testing Program:

1. Qualification requirements as specified in section 26 08 00 – Commissioning of Electrical Systems.

F. Miscellaneous:

1. A single manufacturer of a "product" shall be selected and utilized uniformly throughout Project even if:
    a. More than one manufacturer is listed for a given "product" in Specifications.
    b. No manufacturer is listed.
2. Equipment, electrical assemblies, related electrical wiring, instrumentation, controls, and system components shall fully comply with specific NEC requirements related to area classification and to NEMA 250 and NEMA ICS 6 designations shown on Electrical Power Drawings and defined in the Electrical specifications.
3. Variable speed equipment applications: The driven equipment manufacturer shall have single source responsibility for coordination of the equipment and VFD system and verify their compatibility.

1.3 DEFINITIONS

A. Product: Manufactured materials and equipment.

B. Major Equipment Supports - Supports for Equipment:

1. Located on or suspended from elevated slabs with supported equipment weighing 2000 pounds or greater, or;
2. Located on or suspended from roofs with supported equipment weighing 500 pounds or greater, or;
3. Located on slab-on-grade or earth with supported equipment weighing 5000 pounds or more.

C. Equipment:

1. One or more assemblies capable of performing a complete function.
2. Mechanical, electrical, instrumentation or other devices requiring an electrical, pneumatic, electronic or hydraulic connection.
3. Not limited to items specifically referenced in "Equipment" articles within individual Specifications.

D. Installer or Applicator:

1. Installer or applicator is the person actually installing or applying the product in the field at the Project site.
2. Installer and applicator are synonymous.

E. Baseplate or equipment base plate or machine base

1. Are fabricated frames of structural shapes and plates with enough strength and sturdiness to serve as the surface to which other equipment is attached to and supported by. Baseplates can be directly mounted and grouted to concrete equipment support bases or machined and bolted to a sole plate.

F. Sole plate

1. A thick steel machined plate that is attached to and grouted to a concrete equipment support base.
2. Base plates are bolted to a sole plate when a sole plate is specified and/or provide.

1.4 SUBMITTALS

A. Shop Drawings:

1. General for all equipment:
   a. Data sheets that include manufacturer's name and complete product model number.
      1) Clearly identify all optional accessories that are included.
   b. Acknowledgement that products submitted comply with the requirements of the standards referenced.
   c. Manufacturer's delivery, storage, handling, and installation instructions.
   d. Equipment identification utilizing numbering system and name utilized in Drawings.
   e. Equipment installation details:
      1) Location of anchorage.
      2) Anchorage setting templates.
      3) Manufacturer's installation instructions.
   f. Equipment area classification rating.
   g. Shipping and operating weight.
   h. Equipment physical characteristics:

1) Dimensions (both horizontal and vertical).
2) Materials of construction and construction details.

i. Equipment factory primer and paint data.
j. Manufacturer's recommended spare parts list.
k. Equipment lining and coatings.
l. Equipment utility requirements include air, natural gas, electricity, and water.
m. Ladders and platforms provided with equipment:
1) Certification that all components comply fully with OSHA requirements.
2) Full details of construction/fabrication.
3) Scaled plan and sections showing relationship to equipment.

2. Mechanical and process equipment:
a. Operating characteristics:
1) Technical information including applicable performance curves showing specified equipment capacity, rangeability, and efficiencies.
2) Brake horsepower requirements.
3) Copies of equipment data plates.
b. Piping and duct connection size, type and location.
c. Equipment bearing life certification.
d. Equipment foundation data:
1) Equipment center of gravity.
2) Criteria for designing vibration, special or unbalanced forces resulting from equipment operation.
3) Type, size, and materials of construction of anchorage.
4) Data required for anchor rod design.
e. Equipment electrical and control elements:
1) Manufacturer’s descriptive information.
2) Outline diagrams.
3) Conduit entrance locations.
4) One-line diagrams.
5) Interconnection wiring diagrams including all field devices.
6) Control schematics showing wiring, remote control devices, remote indication and pilot lights, interconnections and interlocking circuits between equipment elements, and tag numbers associated with all control devices and equipment.

3. Electric motor:
a. Motor manufacturer and model number.
b. Complete motor nameplate data.
c. Weight.
d. NEMA design type.
e. Enclosure type.
f. Frame size.
g. Winding insulation class and temperature rise.
h. Starts per hour.
i. Performance data:

1) Motor speed-torque curve superimposed over driven machine speed-torque curve during start-up acceleration and at rated terminal voltage a minimum permissible or specified terminal voltage for all motors over 5 HP.
2) Time-current plots with acceleration versus current and thermal damage curves at the operating and ambient temperatures and at rated terminal voltage and minimum permissible or specified terminal voltage for all motors over 5 HP.
3) Guaranteed minimum efficiencies at 100 percent, 75 percent, and 50 percent of full load.
4) Guaranteed minimum power factor at 100 percent, 75 percent, and 50 percent of full load.
5) Locked rotor and full load current at rated terminal voltage and minimum permissible or specified terminal voltage.
6) Starting, full load, and breakdown torque at rated terminal voltage and minimum permissible or specified terminal voltage.

j. Bearing data and lubrication system.
k. Natural frequency calculations for:
   1) Completed assembly including but not limited to the equipment base, rotating piece of equipment, and the rotating piece of equipment driver.
   2) Individual piece of rotating equipment.
   3) Equipment driver and connected gear reducer, if applicable.
l. Thermal protection system including recommended alarm and trip settings for winding and bearing RTD's.
m. Fabrication and/or layout drawings:
   1) Dimensioned outlined drawing.
   2) Connection diagrams including accessories (strip heaters, thermal protection, etc.).
n. Certifications:
   1) When utilized with a reduced voltage starter, certify that motor and driven equipment are compatible.
   2) When utilized with a variable frequency controller, certify motor is inverter duty and the controller and motor are compatible.
      a) Include minimum speed at which the motor may be operated for the driven machinery.
o. Electrical gear:
   1) Unless specified in a narrow-scope Specification Section, provide the following:
      a) Equipment ratings: Voltage, continuous current, kVa, watts, short circuit with stand, etc., as applicable.
   2) Control panels:
      a) Panel construction.
      b) Point-to-point ladder diagrams.
      c) Scaled panel face and subpanel layout.
      d) Manufacturer's descriptive literature and technical product data for all panel components.
      e) Panel and subpanel dimensions and weights.
      f) Panel access openings.

g) Nameplate schedule.
h) Panel anchorage.
i) Short Circuit Current Rating (SCCR) nameplate marking per NFPA 70. Include any required calculations.

4. Systems schematics and data:
   a. Provide system schematics where required in system specifications.
      1) Acknowledge all system components being supplied as part of the system.
      2) Utilize equipment, instrument and valving tag numbers defined in the Contract Documents for all components.
      3) Provide technical data for each system component showing compliance with the Contract Document requirements.
      4) For piping components, identify all utility connections, vents and drains which will be included as part of the system.
5. For factory painted equipment, provide paint submittals per Manufacturer standard.
6. Qualifications for:
   a. Natural frequency analysis firm and personnel.
   b. Vibration testing firm and personnel.
   c. Infrared thermography testing firm and personnel.
   d. Electrical equipment and connections testing firm and personnel.
7. Equipment Monitoring and Testing plans, in accordance with PART 3 of this Specification Section:
   a. Natural frequency analysis and calculations.
   b. Vibration testing.
   c. Thermography testing.
   d. Electrical equipment and connection testing.

B. Factory Test Reports:
   1. Natural frequency bump test reports where required for rotating equipment.
      a. Minimum characteristics of impact hammer.
         1) Frequency Range 1 kHz.
         2) Range (5v output) 5,000 pounds-force (22,200 N).
         3) Hammer Sensitivity (7pprox.) 1 mV/lbf (0.23 mV/N).
         4) Resonant Frequency 12 kHz
   2. Motor, equipment and final assembled equipment including motor.
      a. Determine natural frequency of assembled motor prior to shipping to equipment manufacturer or job site.
         1) Individual motor fastened to an “infinitely rigid” mass at the same bolt circle as the final assembled equipment.
      b. Determine natural frequency of the pump.
         1) Pump fastened to an “infinitely rigid” mass at the same bolt circle as the final assembled equipment.
      c. Determine natural frequency of the pump/motor assembly.
         1) Pump/motor assembly fastened to an “infinitely rigid” mass at the same bolt circle as the final field assembled equipment.
      d. For this use, the "infinitely rigid" mass shall be at least 10 times the weight of the equipment being tested.

3. Submit natural frequency report(s) for approval prior to shipment.
4. Equipment performance tests.
    a. As listed in individual equipment specifications.

C. Contract Closeout Information:

1. Operation and Maintenance Data:
    a. See Section 01 33 00 for requirements for the mechanics, administration, and the content of Operation and Maintenance Manual submittals.

D. Informational Submittals:

1. Notification, at least one week in advance, that testing will be conducted at factory.
2. Certification from equipment manufacturer that all manufacturer-supplied control panels that interface in any way with other controls or panels have been submitted to and coordinated with the supplier/installer of those interfacing systems.
3. Submit sample Manufacturer's Field Service Report (MFSR). Report shall use manufacturer's standard report or use the form in the Exhibits and have at least the following information:
    a. Certification that equipment has been installed properly, has been initially started up, has been calibrated and/or adjusted as required, and is ready for operation.
    b. Certification for major equipment supports that equipment foundation design loads shown on the Drawings or specified have been compared to actual loads exhibited by equipment provided for this Project and that said design loadings are equal to or greater than the loads produced by the equipment provided.
    c. Motor test reports.
    d. Field noise testing reports if such testing is specified.
    e. Preliminary field quality control testing format to be used as a basis for final field quality control reporting.
    f. Provide three bound final written reports documenting natural frequency testing, vibration monitoring and testing for specified equipment.
        1) Include the acceptance criteria of all equipment tested.
        2) Provide individual tabbed sections for information associated with each piece of tested equipment.
    g. Certification prior to Project closeout that electrical panel drawings for manufacturer-supplied control panels truly represent panel wiring including any field-made modifications.
    h. Testing and monitoring reports in accordance with PART 3 of this Specification Section.
    i. Certification that driven equipment and VFD are compatible.
4. Submit completed Manufacturer's Field Service Report (MFSR) for each piece of equipment supplied.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:

1. Motors:
    a. ABB Baldor-Reliance.

b. General Electric.
c. Hyundai Heavy Industries.
d. Marathon Electric.
e. Siemens.
f. TECO-Westinghouse.
g. Toshiba U.S.
h. U.S. Motors, Nidec Motor Corporation.
i. WEG.

2. Mechanical variable speed drives:
   a. Reeves.
   b. U.S. Motors (VariDrive).

2.2 MANUFACTURED UNITS

A. Electric Motors:

1. Where used in conjunction with adjustable speed AC or DC drives, provide motors that are fully compatible with the speed controllers.
2. Design for frequent starting duty equivalent to duty service required by driven equipment.
3. Design for full voltage starting.
4. Design bearing life based upon actual operating load conditions imposed by driven equipment.
5. Size for altitude of Project.
6. Furnish with stainless steel nameplates which include all data required by NEC Article 430.
7. Use of manufacturer's standard motor will be permitted on integrally constructed motor driven equipment specified by model number in which a redesign of the complete unit would be required in order to provide a motor with features specified.
8. AC electric motors less than 1/3 hp:
   a. Single phase, 60 Hz, designed for the supply voltage shown on the Drawings.
   b. Permanently lubricated sealed bearings conforming to ABMA standards.
   c. Built-in manual reset thermal protector or integrally mounted manual motor starter with thermal overload element with stainless steel enclosure.
9. AC electric motors 1/3 to 1 hp:
   a. Single or 3 PH, 60 Hz, designed for the supply voltage shown on the Drawings.
   b. Permanently lubricated sealed bearings conforming to ABMA standards.
      1) For single phase motors, provide built-in manual reset thermal protector or integrally mounted manual motor starter with thermal overload element.
10. AC electric motors 1-1/2 to 10 hp:
    a. Single or 3 PH, 60 Hz, designed for the supply voltage shown on the Drawings.
    b. Permanently lubricated sealed bearings conforming to ABMA standards.
    c. For vertical motors provide 15 year, average-life thrust bearings conforming to ABMA standards.
    d. Provide inverter duty motors with integral thermal detectors (thermostat) per phase with normally closed contacts wired in series that will open on overtemperature.
11. AC electric motors greater than 10 hp:

a. Single or 3 PH, 60 Hz, designed for the supply voltage shown on the Drawings.
b. Oil or grease lubricated antifriction bearings conforming to ABMA standards.
    1) Design bearing life for 90 percent survival rating at 50,000 hours of operation for motors up to and including 100 hp.
    2) For motors greater than 100 hp, design bearing life for 90 percent survival rating at 100,000 HRS of operation.
c. For vertical motors provide 15 year, average-life thrust bearings conforming to ABMA standards.
d. Thermal protection:
    1) For motors controlled from a variable frequency drive and for all other motors 100 hp and above, provide one of the following:
        a) Integral thermal detectors (thermostat) per phase with normally closed contacts wired in series that will open on overtemperature.
        b) Resistance type temperature detector (RTD) complete with monitor and alarm panel having a normally closed contact that will open on overtemperature.
            (1) Two thermal sensing devices per phase in each phase hot-spot location.
            (2) Monitor and alarm panel:
                (a) For constant speed motors, install panel in and energize from the motor starter equipment.
                (b) For variable speed motors, install panel in and energize from the variable speed drive equipment.

12. Severe duty motor to have the following minimum features:
    a. All cast iron construction.
    b. Gasketed conduit box.
    c. Epoxy finish for corrosion protection.
    d. Hydroscopic varnish on windings for corrosion protection.
    e. Drain plug and breather.

B. NEMA Design Squirrel Cage Induction Motors:
    1. Provide motors designed and applied in compliance with NEMA and IEEE for the specific duty imposed by the driven equipment.
    2. Motors to meet NEMA MG 1 NEMA Premium efficiencies.
    3. Do not provide motors having a locked rotor kVA per HP exceeding the NEMA standard for the assigned NEMA code letter.
    4. For use on variable frequency type adjustable speed drives, provide:
        a. Induction motors that comply with NEMA MG 1, Part 31.
        b. Nameplate identification meeting NEMA MG 1 Part 31 requirements.
        c. Insulated drive end bearing on all motors.
        d. Insulated non-drive end bearings, at a minimum, on all motors with horizontal shaft 100 hp and larger.
        e. An insulated bearing carrier on the non-drive end for vertical shaft motors 100 hp and larger.
        f. Shaft grounding ring on all motors:
            1) Factory installed, maintenance free, circumferential, bearing protection ring with conductive microfiber shaft contacting material.

2) Electro Static Technology AEGIS SGR Bearing Protection Ring or approved equal.

g. Have the following minimum turndown ratio without the use of additional cooling, such as a blower, to provide continuous supply of cooling air over the motor.

1) Variable torque: 10:1.

2) Constant torque: 6:1.

5. Design motor insulation in accordance with NEMA standards for Class F insulation with Class B temperature rise above a 40 degrees C ambient.
6. Design motors for continuous duty.
7. Size motors having a 1.0 service factor so that nameplate HP is a minimum of 15 percent greater than the maximum HP requirements of the driven equipment over its entire operating range.

a. As an alternative, furnish motors with a 1.15 service factor and size so that nameplate HP is at least equal to the maximum HP requirements of the driven equipment over its entire operating range.

8. Motor enclosure and winding insulation application:

a. The following shall apply unless modified by specific Specification Sections:

MOTOR LOCATION	MOTOR ENCLOSURE / WINDING INSULATION
Unclassified Indoor Areas	DPFG (for horizontal motors), WP-I (for vertical motors)
Wet indoor Areas	WP-II (for vertical motors)]
Wet outdoor Areas	WP-II (for vertical motors)
Corrosive Areas	TEFC, Severe/ Chemical Duty
Class I, Division 1 Areas	Explosion Proof, Approved for Class I Division 1 Locations
Class II, Division 1 Areas	Explosion Proof, Approved for Class II Division 1 Locations
Class I or Class II, Division 2 Areas	Explosion Proof, Approved for Division 1 Locations or TEFC with maximum external frame temperature compatible with the gas or dust in the area, Extra Dip and Bake for moisture

NOTE: Provide TENV motors in the smaller horsepower ratings where TEFC is not available.

9. Provide oversize conduit box complete with clamp type grounding terminals inside the conduit box.
10. Balance motors to ISO G2.5 level.

a. Submit prior to shipping to equipment manufacturer or job site.

C. Submersible Motors: Refer to individual narrow-scope Specification Sections for submersible motor requirements.

D. V-Belt Drive:

1. Provide each V-belt drive with sliding base or other suitable tension adjustment.
2. Provide V-belt drives with a service factor of at least 1.6 at maximum speed.
3. Provide static proof belts.

E. Mechanical Variable Speed Drives:

1. Oil-lubricated shaft-mounted reduction gear drive capable of 300 percent shock load and providing a 1.5 service factor in accordance with AGMA.

2. Assure infinite speed adjustment over a 4:1 range.
3. Secure drive to equipment base.
4. Flexible coupling between drive shaft and equipment shaft.

F. Vibration Isolators:

1. Provide all equipment subject to vibration with restrained spring type vibration isolators or pads according to the manufacturer's written recommendation.

G. Space Heaters:

1. Silicone rubber strip type, 120 V rated.
2. Provided on:
   a. All motors 10 hp and larger mounted outdoors.
   b. Indoor motors in humid environments as indicated.

2.3 COMPONENTS

A. Gear Drives and Drive Components:

1. Size drive equipment capable of supporting full load including losses in speed reducers and power transmission.
2. Provide nominal input horsepower rating of each gear or speed reducer at least equal to nameplate horsepower of drive motor.
3. Design drive units for 24-hour continuous service, constructed so oil leakage around shafts is precluded.
4. Utilize gears, gear lubrication systems, gear drives, speed reducers, speed increasers and flexible couplings meeting applicable standards of AGMA.
5. Gear reducers:
   a. Provide gear reducer totally enclosed and oil lubricated.
   b. Utilize antifriction bearings throughout.
   c. Provide worm gear reducers having a service factor of at least 1.20.
   d. Furnish other helical, spiral bevel, and combination bevel-helical gear reducers with a service factor of at least 1.50.

2.4 ACCESSORIES

A. Guards:

1. Provide each piece of equipment having exposed moving parts with full length, easily removable guards, meeting OSHA requirements.
2. Interior applications:
   a. Construct from expanded galvanized steel rolled to conform to shaft or coupling surface.
   b. Utilize non-flattened type 16 GA galvanized steel with nominal 1/2 inches spacing.
   c. Connect to equipment frame with hot-dip galvanized bolts and wing nuts.
3. Exterior applications:
   a. Construct from 16 GA stainless steel or aluminum.
   b. Construct to preclude entrance of rain, snow, or moisture.
   c. Roll to conform to shaft or coupling surface.
   d. Connect to equipment frame with stainless steel bolts and wing nuts.

B. Anchorage:

1. Cast-in-place anchorage:
    a. Provide ASTM F593, Type 316 stainless steel anchorage for all equipment.
    b. Configuration and number of anchor bolts shall be per manufacturer's recommendations.
    c. Provide two nuts for each bolt.
2. Drilled anchorage:
    a. Adhesive anchors.
    b. Epoxy grout.
    c. Threaded rods same as cast-in-place.

C. Data Plate:

1. Attach a stainless steel data plate to each piece of rotary or reciprocating equipment.
2. Permanently stamp information on data plate including manufacturer's name, equipment operating parameters, serial number and speed.

D. Lifting Eye Bolts or Lugs:

1. Provide on all equipment 50 pounds or greater.
2. Provide on other equipment or products as specified in the narrow-scope Specification Sections.

E. Platforms and Ladders:

1. Design and fabricate in accordance with OSHA Standards.
2. Fabricate components from fiberglass-reinforced plastic.
3. Provide platform surface: Non-skid checkered plate, unless specified in narrow-scope Specification Sections.

2.5 FABRICATION

A. Design, fabricate, and assemble equipment in accordance with modern engineering and shop practices.

B. Manufacture individual parts to standard sizes and gages so that repair parts, furnished at any time, can be installed in field.

C. Furnish like parts of duplicate units to be interchangeable.

D. Ensure that equipment has not been in service at any time prior to delivery, except as required by tests.

E. Furnish equipment which requires periodic internal inspection or adjustment with access panels which will not require disassembly of guards, dismantling of piping or equipment or similar major efforts.

1. Quick opening but sound, securable access ports or windows shall be provided for inspection of chains, belts, or similar items.

F. Provide common, lipped base plate mounting for equipment and equipment motor where said mounting is a manufacturer's standard option.

1. Provide drain connection for 3/4 inches PVC tubing.

G. Machine the mounting feet of rotating equipment.

H. Fabricate equipment which will be subject to Corrosive Environment in such a way as to avoid back to back placement of surfaces that cannot be properly prepared and painted.

1. When such back to back fabrication cannot be avoided, provide continuous welds to seal such surfaces from contact with corrosive environment.
2. Where continuous welds are not practical, after painting seal the back to back surfaces from the environment.

I. Natural frequency/critical Speed:

1. All rotating parts accurately machined and in as near perfect rotational balance as practicable.
2. Excessive vibration is sufficient cause for equipment rejection.
3. Ratio of all rotative speeds to natural frequency/critical speed of a unit or components: Greater than 1.2.

J. Equipment Base

1. Adequate grout and vent openings to allow grout to flow under entire base.

K. Control Panels Engineered and Provided with the Equipment by the Manufacturer:

1. General:
   a. Provide single source electrical and control coordination responsibility for the Screens system.
   b. The manufacturer shall not condition or void any warranty for the performance of the products of this specification due to incompatibility of any components covered in other specification sections.
2. Control Panel Digital Control Systems:
   a. The basis of design for the Owner's plant Process Instrumentation and Control System (PICS) is based on Rockwell Automation's digital control system and associated Ethernet/IP network protocol. Control panels that include digital control system elements such as variable frequency drives, programmable logic controllers (PLC), and programmable overload relays shall be as follows:
      1) All controllers shall have a Rockwell Automation Studio 5000 based controller interface, and the data shall be compatible with produce and consume tag formatting to interface with the plant PICS.
      2) All digital control system elements connected to the PICS via Ethernet shall utilize native Ethernet/IP protocol. The term "native" used in this context means that the protocol is integral to the equipment such that a converter, gateway, or card used to convert from one protocol to another is not required. The use of these devices is not acceptable.
      3) Provide digital control system application passwords to the Owner prior to project completion.
      4) Programs shall be provided to the owner's programmer to allow the programmer to access information for developing monitoring screens for the overall plant SCADA system.
3. Manufacturer's standard design for components and control logic unless specific requirements are specified in the specific equipment Specification Section.
4. NEMA or IEC rated components are acceptable, whichever is used in the manufacturer's standard engineered design, unless specific requirements are required in the specific equipment Specification Section.

5. Affix entire assembly with a UL 508A or UL 698A label "Listed Enclosed Industrial Control Panel" prior to delivery.
    a. Control panels without an affixed UL 508A or UL 698A label shall be rejected.
6. Provide equipment or control panels with Short Circuit Current Rating (SCCR) labeling as required by NFPA 70 and other applicable codes.
    a. Minimum Short Circuit Current Rating at 480Y/277/V: 22,000 amps rms symmetrical.
    b. Minimum Short Circuit Current Rating at 208Y/120V or 120/240V: 10,000 amps rms symmetrical.

2.6 SHOP OR FACTORY PAINT FINISHES

A. Electrical Equipment:

1. Provide factory-applied paint coating system(s) for all electrical equipment components.
    a. Field painted equipment: Manufacturer shall provide direction for factory applied primer/field paint compatibility requirements.

B. Field paint other equipment in accordance with Manufacturer's requirements.

1. Manufacturer shall provide direction for factory applied primer/field paint compatibility requirements.

2.7 SOURCE QUALITY CONTROL

A. Motor Tests:

1. Test motors in accordance with NEMA and IEEE standards.
2. Provide routine test for all motors.
3. The Owner reserves the right to select and have tested, either routine or complete, any motor included in the project.
    a. The Owner will pay all costs, including shipping and handling, for all motors successfully passing the tests.
    b. Pay all costs, including shipping and handling, for all motors failing the tests.
    c. If two successive motors of the same manufacturer fail testing, the Owner has the right to reject all motors from that manufacturer.

B. Balance:

1. Unless specified otherwise, for all equipment 10 hp or greater, all rotating elements in motors, pumps, blowers, and centrifugal compressors shall be fully assembled, including coupling hubs, before being statically and dynamically balanced. Balance all rotating elements to the following criteria, per ISO 21940-11:

$$Uper = \frac{G\ x\ 6.015\ x\ W/2}{N}$$

Where:

Uper = Permissible residual unbalance for each correction plane in ounce-inches (OZ-IN). See ISO 21940-11 for acceptable values.

G = ISO Balance Quality Grade Number, per ISO 21940-11

W = Rotor weight in pounds

N = Maximum continuous operating RPM

a. Where specified, balancing reports, demonstrating compliance with this requirement, shall be submitted as product data.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install equipment as shown on the Drawings and other Contract Documents, in accordance with manufacturer's written instructions, and in accordance with Laws and Regulations. Where the Contract Documents, manufacturer's written instructions, or Laws and Regulations conflict, obtain interpretation or clarification from Engineer before proceeding.

B. Utilize appropriate templates for anchorage placement for equipment installed on concrete.

C. Equipment Drainage Discharges:

1. For equipment having drainage requirements, such as seal water, provide 3/4-inch copper, PVC, or clear plastic tubing from drainage discharge at equipment base to nearest floor drain or equipment drain. Do not discharge liquid across floors.
2. Furnish and install bell up at each equipment base.
3. Route equipment drainage piping clear of major traffic areas, to discharge to locations approved by Engineer. To extent practical, avoid creating tripping hazards.

D. Coordination of Equipment Supports and Bases with Structures:

1. Do not construct foundations until major equipment supports are approved by Engineer.

E. Equipment Lubrication Points:

1. Extend all non-accessible or difficult-to-access lubrication fittings to reasonably accessible locations to facility operation and maintenance personnel without use of ladders or elevating devices, by providing stainless steel tubing (of appropriate wall thickness for the service and application) to a location which allows easy access of fittings from closest operating floor level.

F. Concrete Equipment Support Bases:

1. Install level in both directions, with acceptable vertical tolerance of 1/4-inch±.
2. At anchorage locations, install bases flat and level.

G. Machine Bases / Sole Plates:

1. Grease or tape anchorages and jack screws to inhibit grout from adhering to bolts and other anchors.
    a. Jack screws number and size by equipment manufacturer.
        1) Jack screw
            a) 304 Stainless Steel minimum
            b) 0.5 inches diameter minimum
        2) Jack Screw Pad
            a) 2 inch diameter minimum
            b) Anchored in place with a structural epoxy adhesive.
2. Install machine base of rotating equipment on equipment base.

3. Level in both directions using jack screws, with a machinist level, according to machined surfaces on base. Base shall be level within vertical tolerance of the lesser of (a) 0.005 inch per foot with no more than 0.0005 inches difference between any two points, or (b) equipment manufacturer's written instructions.
4. Level machine base on equipment base and align couplings between driver and driven equipment.

H. Couplings for Rotating Equipment:

1. Align in annular and parallel positions.
    a. For equipment rotating at 1200 rpm or less, align both annular and parallel within 0.001 inch tolerance for couplings four-inch size and smaller.
    b. Couplings larger than four-inch size: Increase tolerance 0.0005 inch per inch of coupling diameter above four-inch; for example: for six-inch coupling, tolerance is 0.002 inch. For 10 inch coupling, required tolerance is 0.004 inch.
    c. For equipment rotating at speeds greater than 1200 rpm, tolerance for both annular and parallel positions shall be rate of 0.00025 inch (or less) per inch of coupling diameter.
2. If equipment is furnished by manufacturer as mounted unit , verify factory alignment after installation at the Site. Realign if as necessary, in accordance with equipment manufacturers' written instructions, to provide required factory tolerance.
3. Inspect surfaces for runout before attempting to trim or align units.

I. Grouting:

1. Level onto equipment base with jack screws in accordance with the Contract Documents, provide a dam or formwork around base to contain grout between equipment base and equipment support pad.
2. Preparation:
    a. Extend dam or formwork to cover leveling shims and blocks.
    b. Anchor sleeves:
        1) Required for equipment (Pumps, Mixers, Blowers) greater than 50 hp
        2) If anchor sleeves were used, fill voids in anchor sleeves with foam or room temperature vulcanizing (RTV) silicone to keep grout from filling sleeves.
    c. Do not use nuts below the machine base to level the unit.
    d. Saturate top of roughened concrete surface with water before grouting.
3. Grout Installation:
    a. Install grout until entire space under machine base is completely filled to underside of base. Voids are unacceptable.
    b. Puddle grout by working a stiff wire through the grout and vent holes, to ensure grout is installed properly and to release air entrained in grout or base cavity.
4. After Grout Installation:
    a. When grout is sufficiently hardened, remove dam or formwork and finish exposed grout surface to fine, smooth surface.
    b. Completely cover exposed grout surfaces with wet burlap and keep covering sufficiently wet to prevent too-rapid evaporation of water from grout.
    c. Check for voids by tapping along the top deck of the mounting plate. A solid thud indicates grout-filled areas while a drum-like hollow sound indicates a void requiring filling.

1) Void areas are to be filled by drilling 1/8 inches NPT holes in opposite corners of each void area. Grout to be pumped into one void with a grout gun until grout emerges from the other vent hole.

d. When grout is fully hardened (after not less than seven days), remove jack screws, and tighten nuts on anchor bolts and similar anchors to required torque.

e. Inspect and verify levelness of machine base and, if not in accordance with requirements, remedy by removing base and reinstalling in accordance with the Contract Documents.

f. Inspect driver-driven equipment for proper alignment. When not in accordance with requirements, remedy so that the Work is not defective.

3.2 INSTALLATION CHECKS

A. For all equipment specifically required in detailed specifications, secure services of experienced, competent, and authorized representative(s) of equipment manufacturer to visit site of work and inspect, check, adjust and approve equipment installation.

1. In each case, representative(s) shall be present during placement and start-up of equipment and as often as necessary to resolve any operational issues which may arise.

B. Secure from equipment manufacturer's representative(s) a written report certifying that equipment:

1. Has been properly installed and lubricated.
2. Is in accurate alignment.
3. Is free from any undue stress imposed by connecting piping or anchor bolts.
4. Has been operated under full load conditions and that it operated satisfactorily.
    a. Secure and deliver a field written report to Owner immediately prior to leaving jobsite.

C. No separate payment shall be made for installation checks.

1. All or any time expended during installation check does not qualify as Operation and Maintenance training or instruction time when specified.

3.3 IDENTIFICATION OF EQUIPMENT AND HAZARD WARNING SIGNS

A. Identify equipment and install hazard warning signs.

3.4 FIELD PAINTING AND PROTECTIVE COATINGS

A. For required field painting and protective coatings, comply with Manufacturer’s standard requirements.

3.5 WIRING CONNECTIONS AND TERMINATION

A. Clean wires before installing lugs and connectors.

B. Coat connection with oxidation eliminating compound for aluminum wire.

C. Terminate motor circuit conductors with copper lugs bolted to motor leads.

D. Tape stripped ends of conductors and associated connectors with electrical tape.

1. Wrapping thickness shall be 150 percent of the conductor insulation thickness.

E. Connections to carry full ampacity of conductors without temperature rise.

F. Terminate spare conductors with electrical tape.

3.6 FIELD QUALITY CONTROL

A. General:

1. Furnish equipment manufacturer's field quality control services and testing as specified in the individual equipment Specification Sections.
2. Execute pre-demonstration requirements in accordance with Section 01 75 00.
3. Perform and report on all tests required by the equipment manufacturer's Operation and Maintenance Manual.
4. Provide testing for all equipment furnished or installed as part of the Work.
5. Repair or replace equipment shown to be out of range of the acceptable tolerance until the equipment meets or exceeds acceptable standards.
6. Equip testing and analysis personnel with all appropriate project related reference material required to perform tests, analyze results, and provide documentation including, but not limited to:
    a. Contract Drawings and Specifications.
    b. Related construction change documentation.
    c. Approved Shop Drawings.
    d. Approved Operation and Maintenance Manuals.
    e. Other pertinent information as required.

B. Equipment Monitoring and Testing Plans:

1. Approved in accordance with Shop Drawing submittal schedule.
2. Included as a minimum:
    a. Qualifications of firm, field personnel, and analysis personnel doing the Work.
    b. List and description of testing and analysis equipment to be utilized.
    c. List of all equipment to be testing, including:
        1) Name and tag numbers identified in the Contract Documents.
        2) Manufacturer's serial numbers.
        3) Other pertinent manufacturer identification,

C. Instruments Used in Equipment and Connections Quality Control Testing:

1. Minimum calibration frequency:
    a. Field analog instruments: Not more than 6 months.
    b. Field digital instruments: Not more than 12 months.
    c. Laboratory instruments: Not more than 12 months.
    d. If instrument manufacturer's calibration requirements are more stringent, those requirements shall govern.
2. Carry current calibration status and labels on all testing instruments.
3. See individual testing programs for additional instrumentation compliance requirements.

D. Testing and Monitoring Program Documentation:

1. Provide reports with tabbed sections for each piece of equipment tested.
2. Include all testing results associated with each piece of equipment under that equipment's tabbed section.
    a. Include legible copies of all forms used to record field test information.

3. Prior to start of testing, submit one copy of preliminary report format for Engineer review and comment.
    a. Include data gathering and sample test report forms that will be utilized.
4. In the final report, include as a minimum, the following information for all equipment tested:
    a. Equipment identification, including:
        1) Name and tag numbers identified in the Contract Documents.
        2) Manufacturer's serial numbers.
        3) Other pertinent manufacturer identification,
    b. Date and time of each test.
    c. Ambient conditions including temperature, humidity, and precipitation.
    d. Visual inspection report.
    e. Description of test and referenced standards, if any, followed while conducting tests.
    f. Results of initial and all retesting.
    g. Acceptance criteria.
    h. "As found" and "as left" conditions.
    i. Corrective action, if required, taken to meet acceptance.
    j. Verification of corrective action signed by the Contractor, equipment supplier, and Owner's representative.
    k. Instrument calibration dates of all instruments used in testing.
5. Provide three (3) bound final reports prior to Project final completion.

E. Electrical Equipment and Connections Testing Program:

1. Perform testing on Electrical equipment, connections, and motors.

F. Other Testing:

1. Perform tests and inspections not specifically listed but required to assure equipment is safe to energize and operate.
2. Subbase that supports the equipment base and that is made in the form of a cast iron or steel structure that has supporting beams, legs, and cross members that are cast, welded, or bolted shall be tested for a natural frequency of vibration after equipment is mounted.
    a. The ratio of the natural frequency of the structure to the frequency of the disturbing force shall not be between 0.5 and 1.5.

G. Infrared Thermography Testing Program:

1. Perform infrared thermography testing for equipment specified in other Divisions during the Equipment Demonstration Period.
    a. Perform on all rotating and reciprocating equipment having drivers 25 hp or greater.
2. Additional requirements for infrared thermography monitoring and testing equipment:
    a. Temperature range: -10 to 350 degrees C.
    b. Accuracy: ±2 percent or 2 degrees C, whichever is greater.
    c. Repeatability: ±1 percent or 1 degree C, whichever is greater.
    d. Temperature indication resolution: 0.1 degrees C.

e. Minimum focus distance: 0.3 meters.

f. Output in color palettes: JPEG, BMP, or other digital format compatible with Windows.

3. Perform inspection per ASTM E1934.

a. Operate VFD driven equipment at 100 percent speed during thermographic inspection.

4. Acceptability of electrical connections and components based on temperature comparison between components and ambient air temperatures not greater than 10 degrees C per ASTM E1934.

5. Acceptability of motors and equipment bearings based on temperature rise not greater than 5 DEGC above the equipment and/or bearing manufacturers published criteria.

H. Equipment Field Vibration Monitoring and Testing Program:

1. Perform vibration monitoring and testing for equipment specified in other Divisions during the Equipment Demonstration Period.

2. Perform field vibration testing on each item of rotating and reciprocating equipment having driver 50 HP and greater

3. Acceptability of equipment conditions, except pumps, based on ISO 1940-1 Balance Quality Grade G6.3 criteria.

4. Acceptability of pumping equipment to be based on current ANSI/HI criteria:

a. ANSI/HI 11.6-2012 for Submersible Pumps in a Wet-pit or Dry-pit configuration.

b. ANSI/HI 9.6.4-2016 for all other centrifugal pumps.

5. Utilize an Engineer approved 3rd party testing agency to perform vibration monitoring and testing on equipment.

6. For variable speed equipment provide vibration testing at no more than 3 percent increments of maximum speed throughout entire operating range.

7. Provide machinery condition diagnosis based on an acceptable machinery vibration severity guide or machinery fault guide analysis provided by the testing agency.

8. Tolerances for pumping equipment shall be per HI published standards.

9. Repair or replace equipment shown to be out of range of the specified tolerance until the equipment meets the specified normal operation range required in the machinery fault guide analysis.

10. Document testing with written report.

a. Report to include initial testing results, acceptance criteria, corrective action taken to meet acceptance, verification of corrective action and acceptance report and baseline.

b. Natural frequency of installed equipment utilizing an impact hammer.

c. Report to include graphical plots of vibration signature for each test point at a scale which illustrates all vibration levels greater than 0.025 ips RMS.

3.7 DEMONSTRATION

A. Demonstrate equipment in accordance with Section 01 75 00.

3.8 ABBREVIATION TABLE

A. As indicated on the Drawings.

END OF SECTION

EXHIBIT A

MANUFACTURER FIELD SERVICE REPORT

This field service report is generic in nature. An electronic copy of this form will be furnished upon request from the Engineer. This report is to reflect that all requirements of the Operations and Maintenance Manual and the individual equipment specification requirements have been performed for the installation and operation and also to provide a baseline for amperage draw for each phase, vibration readings, rotation, alignment and all other applicable tests required to ensure that the equipment has been installed properly. A MFSR will be required for each individual piece of equipment requiring a MFSR.

Definitions of Reports:

Initial service report: Required for construction preparations. Equipment delivered to site is in good condition and conforms to specification requirements. Anchor bolts, hardware and ancillary items (piping, flanges, conduits, fuel/power supply) are compatible with equipment.

Interim service report: Required for equipment installation onto base or foundation. Piping connections, electrical and control connections or structural attachment are complete. For equipment stored on site over four weeks, interim service report will document that manufacturer's long-term storage procedures have been incorporated and equipment has not been damaged, nor coatings deteriorated.

Final service report is to be completed when equipment can be started, electrical amperage and voltage draw measured, cold and hot alignments performed, vibration testing and monitoring performed and the equipment is found to be in compliance with Manufacturer's operating parameters and the requirements of the individual equipment specifications.

PROJECT: Woodside WRF Equipment Procurement - Screens

Report Status:

Initial Service Report completed and submitted on _____

Interim Service Report completed and submitted on _____

Final Service Report completed and submitted on _____

Commencement of Warranty _____

I Description

A. Equipment Name and Identification: _____

_____

B. Serial Number: _____

C. Specification Section Number: _____

D. Manufacturer: _____

E. Representative: _____

F. Type of Service: Initial [_____] Interim [_____] Final [_____]

II General Review

A. The above referenced equipment/material/supplies have been inspected, checked, and adjusted. Yes [_____] No [_____]

Summary: _____

_____

B. The above referenced equipment/material/supplies were placed upon properly prepared or suitable substrate. N/A [_____] Yes [_____] No [_____]

Summary: _____

_____

C. The above referenced equipment/material/supplies are free from any undue stress imposed by any connected piping, anchor bolts or any other load. N/A [_____] Yes [_____] No [_____]

Summary: _____

_____

D. The above referenced equipment/material/supplies have operated under design conditions. N/A [_____] Yes [_____] No [_____]

Summary: _____

_____

E. The above referenced equipment/material/supplies have been installed in accordance with the manufacturer's recommendations and the Procurement Documents, require no corrective work, and are hereby approved. Yes [_____] No [_____]

Summary: _____

_____

F. The above referenced equipment/material/supplies are acceptable to the manufacturer as installed providing the following corrective action(s) are performed:

1. _____
2. _____
3. _____
4. _____
5. _____

III Inspection Checklist

Item	Acceptable (Yes/No)	Readings/Comments
Bearings (1)		
Belts (tension reading)		
Lubrication Levels		
Vibration (1) (2) (MILS/SEC)		
Infrared Thermography (1) (2)		
Starting AMPS		
Full Load AMPS		
Volts		
Rotation		
Jacket Temperature (DEGF)		
Seal Water Flow Rate (GPH or GPM)		
Seal Water Pressure (PSI)		
O-rings/Packing		
Alignment (1)		
Anchor Bolts		
Anchor Bolt Torque		
Grout		

Item	Acceptable (Yes/No)	Readings/Comments
Substrate Approval		
Sound level (4 feet from unit) (1) (dB)		
Other		

(1) Inspection or testing reports must be attached.
(2) Provide vibration testing and monitoring procedures for Engineer's review and approval prior to testing.

IV O&M Manuals

A. The O&M manual as presented contains all information required for proper operation, maintenance, and instruction of this system. N/A [_____] Yes [_____] No [_____]

Summary: _____

_____

V Preventive Maintenance

A. The preventive maintenance summary outlined in the O&M manual is acceptable for operation of the system throughout the warranty period. N/A [_____] Yes [_____] No [_____]

Summary: _____

_____

VI Operator Training/Classroom Instruction

A. Training and instruction have been performed in accordance with the requirements of the Procurement Documents. N/A [_____] Yes [_____] No [_____]

B. Final Training/Classroom Instruction Completed on: _____

Summary: _____

_____

VII Remarks

_____

_____

_____

VIII Certification

I hereby certify, that I, [_____], am a duly authorized representative of the manufacturer, that I am empowered by the manufacturer to inspect, approve, and operate his equipment, and that I am authorized to make recommendations required to assure that the equipment furnished by the manufacturer is complete and operational, except as modified herein. I also certify that all information contained herein is true and accurate.

By: _____
(Authorized Representative)

For: _____

Date: _____

IX Acknowledgments

By: _____

For: _____
(Contractor)

Date: _____

By: _____

For: _____
(Engineer)

Date: _____

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SECTION 01 65 50
PRODUCT DELIVERY, STORAGE, AND HANDLING

PART 1 - GENERAL

1.1 SUMMARY

A. General work included in this section:

1. Scheduling of product delivery.
2. Packaging of products for delivery.
3. Protection of products against damage from:
    a. Handling.
    b. Exposure to elements or harsh environments.

B. Related sections include but are not necessarily limited to:

1. Division 00 – Bidding Requirements, Contract Forms, and Conditions of the Contract.
2. Division 01 – General Requirements.
3. Division 46 – Water and Wastewater Equipment

1.2 DELIVERY

A. Scheduling:

1. Arrange deliveries of products in accordance with the schedule in the Agreement.
2. Immediately on delivery, Seller or Seller's duly authorized representative, and Buyer or Buyer's duly authorized representative shall inspect shipments to assure compliance with the Contract Documents and accepted submittals, and that products are properly protected and undamaged.
3. Seller or their representative and Buyer or their representative shall agree in writing to conditions of delivery.
4. Equipment shall be packaged for outdoor all-weather storage at the Buyer's facility, except electrical control panels which are not rated NEMA 3, 4, 7, or 9.

B. Location:

Woodside Water Reclamation Facility
4197 Glenbrook Drive
Hailey, Idaho 83333

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 PROTECTION, STORAGE, AND HANDLING

A. Preparation for shipment:

1. Package materials and equipment to facilitate handling and protect against damage during transit, handling or storage.
2. Box, crate, or otherwise completely enclose and protect all equipment.

3. Protect equipment from exposure to the elements and keep thoroughly dry and dust free at all times.
4. Protect painted surfaces against impact, abrasion, discoloration, or other damage.
5. Grease or oil all bearings and similar items.
6. Tag or mark each item per the delivery schedule or shop drawings.
7. Include complete packing lists and bills of materials with each shipment.
8. Provide permanent, labeled packing of spare parts.

B. Delivery and unloading:

1. Seller shall deliver all parts and equipment to the Woodside Water Reclamation Facility.
2. Seller or their representative shall supervise unloading of equipment and Buyer or Buyer's duly authorized representative will unload equipment.
3. Seller shall give Buyer a minimum of 48 hours notice prior to shipping the goods.
4. Seller shall give Buyer a minimum of 24 hours written notice as to the time and date of delivery.
5. Seller shall inform Buyer of the type of equipment required to unload the goods 30 days prior to shipping.
6. Goods must be delivered between 8:00 am and 3:00 pm, Mondays through Friday:
    a. No deliveries on weekends accepted.
    b. No deliveries on holidays accepted.
    c. Buyer has no obligation to accept products before or after specified times of day.
7. Buyer or Buyer's duly authorized representative shall unload equipment within 24 hours of time of delivery:
    a. Seller shall pay for all delivery truck and driver's time except that due to Buyer's failing to unload equipment within 24 hours of time of delivery.
    b. Buyer shall pay for additional delivery truck and driver's time resulting from Buyer's failure to unload equipment within 24 hours of time of delivery.
8. Seller or their representative shall insure equipment is properly stored after off-loading.
9. If equipment is not delivered within 2 hours of the specified time and date in Seller's written notice, Seller shall reimburse Buyer for standby charges for unloading equipment and personnel.

C. Storage:

1. Buyer shall store equipment after delivery.
2. Buyer shall store and protect equipment in accordance with the following requirements:
    a. Store immediately upon delivery.
    b. Store products in accordance with Seller's instruction.
    c. Store electrical equipment in weathertight structures.
    d. Protect electrical equipment, controls and insulation against moisture, water, and dust damage.
    e. Store fabricated products above the ground on blocking or skids.
    f. Arrange storage in a manner to provide easy access for inspecting. Make periodic inspections of stored products to assure that products are maintained under specific conditions, and free from damage or deterioration.

3.2 FIELD QUALITY CONTROL

A. Inspect all Deliveries:

1. Seller or their representative and Buyer or Buyer's duly authorized representative shall inspect all goods upon delivery.
2. All products that are damaged, used, or in any other way unsatisfactory for use on the project shall be rejected.

END OF SECTION

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SECTION 01 75 00
SYSTEM START-UP

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Procedures and actions, required of the Seller, which are necessary to achieve and demonstrate Substantial Completion.
2. Requirements for Substantial Completion Submittals.

B. Related Sections include but are not necessarily limited to:

1. Division 00 - Bidding Requirements, Contract Forms, and Conditions of the Contract.
2. Division 01 - General Requirements.
3. Section 46 21 76 – In-Channel Drum Screens

1.2 DEFINITIONS

A. Pre-Demonstration Period: The period of time, of unspecified duration after initial construction and installation activities during which Seller, with assistance from Construction Contractor, performs in the following sequence:

1. Supervise commissioning of headwork equipment and systems furnished by Seller.
2. Assist Construction Contractor with commissioning of the work that directly interfaces with the in-channel drum screens furnished by Seller.
3. Assist Buyer and Contractor initiates process flow through the headwork equipment and systems and starts up and operates the headwork equipment and systems, without exceeding specified downtime limitations, to prove the functional integrity of the mechanical and electrical equipment and components and the control interfaces of the respective equipment and components comprising the in-channel drum screens as evidence of Substantial Completion.
4. Train Buyer's personnel on the operation and maintenance of the in-channel drum screens furnished by Seller.

B. Performance Demonstration Period: A period of time, of specified duration, following the Pre-Demonstration Period, during which the Seller, with assistance from Construction Contractor, performs:

1. Seller performs field demonstration testing to demonstrate the system meets the design criteria as defined in the Contract Documents and all regulatory requirements have been achieved.
2. Coordinate with other screen-associated equipment Seller(s) to demonstrate the functional integrity of all the systems.
3. Documentation of demonstration testing.

C. Substantial Completion: See the General Conditions.

1.3 SUBMITTALS

A. See Specification Section 01 33 00 for requirements for the mechanics and administration of the submittal process.

B. Submit in the chronological order listed below prior to the completion of the Pre-Demonstration Period.

1. Within five (5) days following the completion of any required on-site service, including but not limited to reports field logs, electronic data files etc., the Seller shall submit to the Buyer five (5) copies of all field notes and test data collected during the service visit.
    a. The data and notes collected shall include but not be limited to:
        1) Production logs of the in-channel drum screens.
        2) Component instrument calibration certificates.
        3) Motor amperage readings to verify electrical is properly sized.
        4) Tolerance and alignment measurements, where applicable.
        5) And all other information collected that demonstrate that the equipment has been properly installed.
2. Master operation and maintenance training schedule:
    a. Submit 30 days (minimum) prior to first training session for Buyer's personnel.
    b. Schedule to include:
        1) Target date and time for Buyer witnessing of each system initial start-up.
        2) Target date and time for Operation and Maintenance training for each system, both field and classroom.
        3) Target date for initiation of Demonstration Period.
    c. Submit for review and approval by Buyer.
    d. Include holidays observed by Buyer.
    e. Attend a schedule planning and coordination meeting 90 calendar days prior to first anticipated training session.
        1) Provide a status report and schedule-to-complete for requirements prerequisite to manufacturer's training.
        2) Identify initial target dates for individual manufacturer's training sessions.
    f. Buyer reserves the right to insist on a minimum seven (7) days' notice of rescheduled training session not conducted on master schedule target date for any reason.
    g. Schedule to be resubmitted until approved.
3. Completion Submittal:
    a. File Seller’s Notice of Completion & Request for Inspection.
    b. Approved Operation and Maintenance manuals (paper and electronic) received by Engineer minimum 1 week prior to scheduled training.
    c. Written request for Buyer to witness each system start-up.
        1) Request to be received by Buyer minimum one (1) week before scheduled training of Buyer’s personnel on that system.
    d. Equipment installation certifications.

e. Letter verifying completion of all Commissioning start-up activities including receipt of all specified items from manufacturers or suppliers as final item prior to initiation of Performance Demonstration Period.

f. Written report detailing the results of the field demonstration testing, including a copy of all field notes and test data.

1) Buyer and Engineer will review the written report.

g. The start of the equipment warranty will commence on the date of the successful field demonstration testing is completed.

1.4 COST OF START-UP

A. Seller to pay all costs associated with:

1. Seller's labor, travel and other labor-related expenses.

a. Seller shall also pay for the services of any manufacturer's representatives required for equipment and systems furnished by Seller.

2. The costs for work specified elsewhere as the Seller's responsibility.

B. Buyer and Buyer's Installation Contractor will pay costs associated with:

1. Construction trades labor for commissioning and testing.

2. Utilities from the time field demonstration testing begins until completion of the Performance Demonstration Period.

3. Supervision of commissioning of the overall project and of the equipment and systems not furnished by Seller.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 GENERAL

A. The in-channel drum screens equipment and systems start-up is divided into two periods:

1. Pre-Demonstration Period including:

a. Completion of construction work to bring Project to a state of readiness for performance demonstration.

b. Installation certification.

c. Start-up of Equipment.

d. Training of Personnel.

e. Completion of the filing of all required submittals.

2. Demonstration Period including:

a. Demonstration of in-channel drum screens equipment and systems meets the design criteria as defined in the contract documents and all regulatory requirements.

b. Demonstration of functional integrity of the in-channel drum screens equipment for continuous operation for stated period.

c. Filing of Seller's Notice of Completion.

3.2 PRE-DEMONSTRATION PERIOD

A. Completion of Construction Work:

1. Complete the work to bring the in-channel drum screen equipment and systems to a state of readiness for performance Demonstration.
2. The Seller shall instruct the Construction Contractor in the proper installation procedures for the in-channel drum screen equipment.
    a. The training shall be conducted on-site by an authorized, experienced, and competent representative of the Seller, and shall include both verbal and written instructions, as specified herein.
3. The Seller shall place the Goods into operation and perform tests to determine if equipment is operating properly.
    a. The purpose of these tests is to verify that both the System and each Unit are:
        1) Properly installed.
        2) Operational.
        3) Capable of completing operating cycles free of problems.
        4) Free from overheating, overloading, vibration, or other operating problems.
4. The Construction Contractor will be responsible for making any adjustments and/or modifications to the installation process that may become necessary to ensure that all equipment is properly installed in accordance with the Seller's written instructions.
5. After the installation is complete, the Seller, Construction Contractor, and Engineer shall jointly inspect the system and list any equipment that has not been properly installed, detailing the problems and noting the party who shall be responsible for each correction.

B. Equipment Start-up:

1. Requirements for individual items of equipment are included in Division 02 through Division 16 Specification Sections.
2. Prepare the equipment so it will operate properly and safely and be ready to demonstrate functional integrity during the Demonstration Period.
3. Procedures include but are not necessarily limited to the following:
    a. Test or check and correct deficiencies of:
        1) Power, control, and monitoring circuits for continuity prior to connection to power source.
        2) Voltage of all circuits.
        3) Phase sequence.
        4) Cleanliness of connecting piping systems.
        5) Alignment of connected machinery.
        6) Vacuum and pressure of all closed systems.
        7) Lubrication.
        8) Valve orientation and position status for manual operating mode.
        9) Instrumentation and control signal generation, transmission, reception, and response.
        10) Tagging and identification systems.
        11) All equipment: Proper connections, alignment, calibration and adjustment.

b. Calibrate all components, instruments, and safety equipment.

c. Manually rotate or move moving parts to assure freedom of movement.

d. "Bump" start electric motors to verify proper rotation.

e. Perform other tests, checks, and activities required to make the equipment ready for Demonstration Period.

f. Documentation:

1) Prepare a log showing each equipment item subject to this paragraph and listing what is to be accomplished during Equipment Start-up.

2) Provide a place for the Seller to record date and person accomplishing required work.

3) Submit completed document before requesting inspection for Substantial Completion certification.

4. Obtain certifications, without restrictions or qualifications, and deliver to Engineer:

a. Manufacturer's equipment installation check letters (sometimes referred to as Manufacturer’s Field Services report).

b. Instrumentation Supplier's Instrumentation Installation Certificate.

5. Perform Equipment Start-up to extent possible without introducing process flow including but not limited to:

a. Submittal of check list with verification of equipment functions with manual activation of PLC inputs and outputs.

b. Submittal of check list of manual activation of equipment functions from SCADA/HMI Control Panel(s).

c. Submittal of check list demonstrating manual SCADA/HMI system activation of equipment functions from SCADA/HMI including demonstration of field faults and instrument readings to SCADA.

d. Calibration of all primary elements and transmitters.

e. Check list confirming PLC input of all primary elements and transmitters.

1) Transmitter process variable water elevations shall be simulated by using a small bucket of water to simulate different water level elevations.

f. Check list confirming equipment and control system restart upon opening of main service entrance breaker.

g. Check list describing the system status when power is lost to individual components demonstrated by opening disconnect, circuit breaker and fuses:

1) Main control panel.

2) PLC.

3) SCADA Computer, if included in Contract.

4) Each individual instrument.

5) Each VFD, if included in Contract.

6) Each reduced voltage starter, if included in Contract.

7) UPS system, if included in Contract.

8) Confirm loss of signal response and out of range response for each analog instrument.

9) Checklist will be developed after P&ID Drawings and Control Loop Descriptions are provided by Seller.

h. Document and verify point to point as-built drawings.

6. As part of the commissioning, the Seller shall start up and operate all support systems provided by or required by the Seller for operation of the system, including but not limited to water supply system, instrumentation, air compression equipment, and electrical controls.

   a. This testing shall demonstrate that there are no water or air leaks in the System, that the piping has been installed and connected properly, the electrical system is operating correctly, and that the instrumentation has been properly calibrated.

7. The Seller shall furnish materials (excluding water and power), instruments, and incidental and expendable equipment required for commissioning/placing the equipment into operation.

   a. The Seller shall retain the services of any manufacturer's representatives as required in the Contract Documents to assist with the commissioning/placing into operation of the Goods.

8. When requested by the Seller, the Engineer shall review the operation of the equipment to verify that the commissioning is complete.

   a. The Engineer shall perform random tests to determine if the equipment is operating properly and witness various operational sequences.

   b. The Engineer may initiate alarm conditions to determine if the control system is functioning properly.

   c. The Engineer's review shall include a review of the HMI interface and PLC SCADA system commissioning requirements to determine conformance with Contract Documents.

   d. The Engineer's review shall identify any equipment that has not been properly installed, or operating, detailing the outstanding installation issues on a punch list and noting the party who shall be responsible for each correction and identify the items that require that correction.

9. Upon satisfactory completion of the review, the Engineer shall submit to the Seller a written Notice of Completed Commissioning.

   a. Once the: Notice of Completed Commissioning is issued, Training of Operation and Maintenance Personnel may commence.

C. Personnel Training:

1. See individual equipment specification sections.

2. Conduct all personnel training after completion of Equipment Start-up for the equipment for which training is being conducted.

   a. Personnel training on individual equipment or systems will not be considered completed unless:

      1) All pretraining deliverables are received and approved before commencement of training on the individual equipment or system.

      2) No system malfunctions occur during training.

      3) All provisions of field and classroom training specifications are met.

   b. Training not in compliance with the above will be performed again in its entirety by the manufacturer at no additional cost to Buyer.

3. Field and classroom training requirements:

   a. Hold classroom training on-site.

b. Notify each manufacturer specified for on-site training that the Buyer reserves the right to video record any or all training sessions.

   1) Organize each training session in a format compatible with video recording.

c. Training instructor qualification: Factory trained and familiar with giving both classroom and "hands-on" instructions.

d. Training instructors:

   1) Be at classes on time.

   2) Session beginning and ending times to be coordinated with the Owner and indicated on the master schedule.

   3) Normal time lengths for class periods can vary, but brief rest breaks should be scheduled and taken.

e. Organize training sessions into maintenance verses operation topics and identify on schedule.

f. Plan for minimum class attendance of 5 people at each session and provide sufficient classroom materials, samples, and handouts for those in attendance.

g. Instructors to have a typed agenda and well-prepared instructional material.

   1) The use of visual aids, e.g., films, pictures, and slides is recommended for use during the classroom training programs.

   2) Deliver agendas to the Engineer a minimum of seven (7) days prior to the classroom training.

   3) Provide equipment required for presentation of films, slides, and other visual aids.

   4) Provide copies in electronic format to Buyer for Buyer’s subsequent use.

h. In the on-site training sessions, cover the information required in the Operation and Maintenance Manuals submitted according to Specification Section 01 33 04 and the following areas as applicable to the in-channel drum screen equipment.

   1) Operation of equipment.

   2) Lubrication of equipment.

   3) Maintenance and repair of equipment.

   4) Troubleshooting of equipment.

   5) Preventive maintenance procedures.

   6) Adjustments to equipment.

   7) Inventory of spare parts.

   8) Optimizing equipment performance.

   9) Capabilities.

   10) Operational safety.

   11) Emergency situation response.

   12) Takedown procedures (disassembly and assembly).

i. Address above Paragraphs 1), 2), 8), 9), 10), and 11) in the operation sessions. Address above Paragraphs 3), 4), 5), 6), 7), and 12) in the maintenance sessions.

j. Maintain a log of classroom training provided including: Instructors, topics, dates, time, and attendance.

D. Complete the filing of all required submittals:

1. Shop Drawings.
2. Operation and Maintenance Manuals (paper copies and electronic copy).
3. Training material (including electronic presentation materials).

E. Filing of Seller's Notice of Completion of the Equipment Start-up and Request for Inspection:

1. File the notice when the following Commissioning items have been completed:
    a. Construction work (brought to state of readiness for demonstration testing).
        1) Coordinate with Construction Contractor.
    b. Equipment Start-up.
    c. Personnel Training.
    d. Submittal of required documents.
2. Upon notification of completion of the Pre-Demonstration testing by the Seller, the Engineer shall review the operation of the equipment to verify that the testing is complete.
    a. The Engineer shall perform random tests to determine if the equipment is operating properly and witness various operational sequences.
    b. The Engineer may initiate alarm conditions to determine if the control system is functioning properly.
3. Engineer will inform Seller in writing of the status of the Work reviewed.
    a. Work determined not meeting state of readiness:
        1) Seller: Correct deficiencies noted or submit plan of action for correction.
        2) Engineer: Re-inspect work after Seller's notice of correction of deficiencies.
        3) Second reinspection costs incurred by Engineer will be billed to Buyer who will deduct them from final payment due Seller.

3.3 DEMONSTRATION PERIOD

A. General:

1. Demonstrate the functional integrity of the mechanical, electrical, and control interfaces of the respective equipment and components comprising the in-channel drum screens as evidence of Completion.
    a. During this demonstration period Seller shall perform the following tests and simulations and submit verification checklists:
        1) Equipment functions with manual activation of PLC outputs.
        2) Manual activation of equipment functions from HMI/SCADA system.
        3) Manual HMI/SCADA system activation of equipment functions from HMI/SCADA including demonstration of field faults and instrument readings to HMI/SCADA.
2. Buyer and Engineer may test system and confirm status when power is lost to individual components demonstrated by opening disconnect, circuit breaker and fuses:
    a. Main control panel(s).
    b. PLC if provided.
    c. SCADA Computer if provided.
    d. Each individual instrument.
    e. Each VFD.

f. Each reduced voltage starter if provided.

g. UPS system if provided.

h. Confirm loss of signal response and out of range response for each analog instrument

i. Loss of Utility Power to system.

3. If, during the Demonstration Period, the aggregate amount of time used for repair, alteration, or unscheduled adjustments to any equipment or system that renders the affected equipment or system inoperative exceed 10 percent of the Demonstration Period, the demonstration of functional integrity will be deemed to have failed.

   a. In the event of failure not caused by Buyer/Engineer's testing of power failure described above, a new Demonstration Period will recommence after correction of the cause of failure.

   b. The new Demonstration Period shall have the same requirements and duration as the Demonstration Period previously conducted.

4. Conduct the demonstration of functional integrity under full operational conditions.

5. Buyer will provide operational personnel to provide process decisions affecting facility performance.

   a. Buyer's assistance will be available only for process decisions.

   b. Contractor will perform all other functions including but not limited to equipment operation and maintenance until successful completion of the Demonstration Period.

6. Buyer reserves the right to simulate operational variables, equipment failures, routine maintenance scenarios, etc., to verify the functional integrity of automatic and manual backup systems and alternate operating modes.

7. Time of beginning and ending any Demonstration Period shall be agreed upon by Seller, Buyer and Engineer in advance of initiating Demonstration Period.

8. Throughout the Demonstration Period, provide knowledgeable personnel to answer Buyer's questions; provide final field instruction on all mechanical, pumping, electrical and control systems; and respond to any system problems or failures which may occur.

9. Seller to provide all of his labor, supervision, utilities, maintenance, equipment, vehicles or any other item necessary for Seller to operate and demonstrate all systems being demonstrated.

10. The length of time to demonstrate compliance with the contract requirement in no case shall be less than 120 consecutive hours.

11. Upon successful completion of the Performance Demonstration period, Engineer will endorse certificate attesting to the successful demonstration, and citing the hour and date on which Buyer has placed the Goods in continuous service as the effective date of Substantial Completion and the beginning of the warranty period on the equipment.

    1) Issued subject to completion or correction of items cited in the certificate (punch list).

    2) Issued with responsibilities of Buyer and Seller cited.

    3) Executed by Engineer.

    4) Accepted by Buyer.

    5) Accepted by Seller.

END OF SECTION

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DIVISION 05

METALS

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SECTION 05 50 00
METAL FABRICATIONS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Anchor bolts, washers, and nuts.

B. Related Specification Sections include but are not necessarily limited to:

1. Division 00 - Bidding Requirements, Contract Forms, and Conditions of the Contract.
2. Division 01 - General Requirements.
3. Division 46 – Water and Wastewater Equipment.

1.2 QUALITY ASSURANCE

A. Referenced Standards:

1. ASTM International (ASTM):
   a. A325, Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength.
   b. F467, Standard Specification for Nonferrous Nuts for General Use.
   c. F468, Standard Specification for Nonferrous Bolts, Hex Cap Screws, and Studs for General Use.
   d. F593, Standard Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs.
   e. F835, Standard Specification for Alloy Steel Socket Button and Flat Countersunk Head Cap Screws.
   f. F879, Standard Specification for Stainless Steel Socket Button and Flat Countersunk Head Cap Screws.
   g. F1554, Standard Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength.
   h. F1789, Standard Terminology for F16 Mechanical Fasteners.
2. Occupational Safety and Health Administration (OSHA):
   a. 29 CFR 1910, Occupational Safety and Health Standards, referred to herein as OSHA Standards.

1.3 DEFINITIONS

A. Fasteners: As defined in ASTM F1789.

B. Hardware: As defined in ASTM A153/A153M.

1.4 SUBMITTALS

A. Shop Drawings:

1. See Specification Section 01 33 00 for requirements for the mechanics and administration of the submittal process.
2. Product technical data including:
   a. Acknowledgement that products submitted meet requirements of standards referenced.
   b. Manufacturer's installation instructions.
   c. Provide manufacturer's standard allowable load tables for the following:
      1) Expansion anchor bolts.
      2) Adhesive anchor bolts.
   d. Certification that manufactured units meet all design loads specified.

e. Shop Drawings and engineering design calculations:
   1) Indicate design live loads.
   2) Sealed by a professional structural engineer.
   3) Engineer will review for general compliance with Contract Documents.

B. Informational Submittals:

1. See Specification Section 01 33 00 for requirements for the mechanics and administration of the submittal process.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:

1. Headed studs and deformed bar anchors:
   a. Nelson Stud Welding Div., TRW Inc.
   b. Stud Welding Products, Inc.
2. Expansion anchor bolts:
   a. Hilti Inc.
   b. ITW Ramset/Red Head.
   c. Simpson Strong-Tie.
3. Epoxy adhesive anchor bolts:
   a. Hilti Inc.
   b. ITW Ramset/Red Head.
   c. Simpson Strong-Tie.
4. Self-tapping concrete anchors:
   a. ITW Buildex.
   b. Powers Fasteners.

B. No like, equivalent or "or-equal" item or substitution is permitted.

2.2 MATERIALS

A. Steel:

1. Bolts, nuts and washers, high strength:
   a. ASTM A325.
   b. Provide two (2) washers with all bolts.
2. Bolts and nuts:
   a. ASTM A307, Grade A.

B. Stainless Steel:

1. Minimum yield strength of 30,000 psi and minimum tensile strength of 75,000 psi.
   a. Bolts and nuts: ASTM F593, Type 303, 304 or 316.

C. Aluminum:

1. ASTM F468, alloy 2024 T4 for bolts.
2. ASTM F467, alloy 2024 T4 for nuts.

D. Washers: Same material and alloy as found in accompanying bolts and nuts.

E. Embedded Anchor Bolts:

1. Building anchor bolts:

a. ASTM F1554, Grade 55 with weldability supplement S1 or ASTM A36 for threaded rods galvanized.
b. ASTM A307, Grade A for headed bolts galvanized.

2. All other anchor bolts: Type 304 or 316 stainless steel with matching nut and washer.

F. Expansion Anchor Bolts and Adhesive Anchor Bolts:

1. Stainless steel, Type 304, 314 or 316.
2. Provide minimum edge distance cover and spacing as recommended by manufacturer, or as indicated on Drawings whichever is larger.
   a. Minimum embedment as recommended by manufacturer or eight (8) diameters of bolt, whichever is larger.
   b. Notify Engineer if required depth of embedment cannot be achieved at a particular anchor bolt location.
   c. Follow manufacturer's recommendations for installation and torque.
3. Submit manufacturer's load test data to verify at least the anchor bolt capacities at the following embedment depths:
   a. Data must be based on actual tests performed in unreinforced mass of concrete of not more than 4000 psi compressive strength.
   b. Capacity must be at a concrete temperature of at least 130 DEGF.

ANCHOR BOLT DIAMETER (IN)	EMBEDMENT (IN)	MINIMUM ULTIMATE TENSION CAPACITY (KIP)*, **
3/8	3	4.8
1/2	4	8.1
5/8	5	11.4
3/4	6	15.4
7/8	7	20.0
1	8	24.7
1-1/4	10	34.3

* Data must be based on actual tests performed in unreinforced mass concrete of not more than 4000 psi compressive strength.

** Capacity must be at a concrete temperature of at least 130 DEGF.

4. Expansion anchor bolts:
   a. Kwik Bolt by Hilti, Inc.
   b. Trubolt by ITW Ramset/Red Head.
   c. Wedge-All by Simpson Strong-Tie.
5. Adhesive anchor bolts:
   a. HVA Adhesive Anchor System by Hilti.
   b. HIT HY 150 Adhesive Anchor by Hilti.
   c. HSE 2411 Epoxy Adhesive Anchor by Hilti.
   d. EPCON Ceramic 6 Epoxy by ITW Ramset/Red Head.
   e. Acrylic-Tie by Simpson Strong-Tie.
6. Self-tapping concrete anchors:
   a. Tapcon by ITW Buildex.
   b. 410 stainless steel.
   c. 1/4 IN DIA with 5/16 IN hex head.
      1) Minimum embedment as recommended by manufacturer.
   d. #3 Phillips flat head.

G. Headed Studs: ASTM A108 with a minimum yield strength of 50,000 psi and a minimum tensile strength of 60,000 psi.

H. Deformed Bar Anchors: ASTM A496 or ASTM A1064 with a minimum yield strength of 70,000 psi and a minimum tensile strength of 80,000 psi.

I. Iron and Steel Hardware: Galvanized in accordance with ASTM A153/A153M when required to be galvanized.

PART 3 - EXECUTION (NOT USED)

END OF SECTION

DIVISION 40

PROCESS INTERCONNECTIONS

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SECTION 40 63 43
PROGRAMMABLE LOGIC CONTROLLERS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Programmable logic controller (PLC) control system(s), including hardware, software, programming, documentation, and training.

B. Related Sections include but are not necessarily limited to:

1. Section 01 75 00 - Checkout and Start-Up Procedures
2. Section 26 05 19 - Wire and Cable - 600 Volt and Below.
3. Section 40 67 00 - Control System Equipment Panels and Racks.
4. Section 40 61 96 - Process Control Descriptions.

1.2 QUALITY ASSURANCE

A. Referenced Standards:

1. The Institute of Electrical and Electronics Engineers, Inc. (IEEE):
   a. C37.90.2, Withstand Capability of Relay Systems to Radiated Electromagnetic Interference from Transceivers.
   b. C62.41.2, Recommended Practice on Characterization of Surges in Low-Voltage (1000 V and Less) AC Power Circuits.
2. International Electrotechnical Commission (IEC)
   a. IEC 61131-3 Programmable logic controllers
3. National Electrical Manufacturers Association (NEMA):
   a. ICS 1, Industrial Control and Systems General Requirements.

B. Qualifications:

1. Installation supervisor shall have had experience in overseeing installation and startup of at least three similar installations within the last five years.
2. Programmer(s) shall have had experience in programming PLCs for at least two projects of similar size and complexity.

1.3 SUBMITTALS

A. Shop Drawings:

1. See Specification Section 46 21 76 and in accordance with Division 01.
2. Product technical data including:
   a. Submit annotated copies of complete PLC software programs:
      1) In native-format file including all applicable formats (ladder logic, function block diagram, sequential function chart, instruction list, structured text).
      2) In PDF-format file with fully annotated PLC code that can be read without the native configuration and programming environment on electronic media (DVD or USB drive).
      3) Provide text description completely defining each unique function block used in the program if FBDs are used.
      4) Provide list of all addresses referenced in logic diagram with description of data associated with each address (Tag database).
   b. Results of factory testing or simulation procedures.
   c. Bill of material

d. Drawings containing the following information to be submitted as part of Specification Section 40 67 00 (control panels) submittals:
    1) Arrangement drawings for PLC system components.
    2) Panel and enclosure plans, sections and details.
    3) Access opening locations and required clearances for each panel and enclosure.
    4) Enclosure internal wiring and terminal blocks.
e. DIP Switch and Jumper Settings, if applicable.
f. I/O Rack and I/O Module Layout.
g. Wiring and Interconnection diagrams.
    1) Power Supplies.
    2) I/O Points.
    3) Communications.
h. Catalog cut sheets containing information on PLC components to be submitted as part of these Specification Section submittals.

3. Certifications:
    a. Qualifications of installation supervisor.
    b. Qualifications of programmer(s).
4. Software Licenses:
    a. Documentation of all software package licenses being assigned to Owner.
5. Manufacturer support proposal [agreement].

B. Operation and Maintenance Data:

1. See Specification Section 01 78 23 for requirements for:
    a. The mechanics and administration of the submittal process.
    b. The content of Operation and Maintenance Manuals.
2. Program Documentation.
    a. Program Overview.
    b. Program Listing.
    c. I/O Listing.
    d. Memory Map.
    e. I/O Cross Reference.
3. Maintenance procedures.
    a. Include the location and phone numbers of service centers (including 24 hour "hot lines").
    b. Provide specific information including operation and maintenance requirements, programming assistance, troubleshooting guide, parts ordering, field service personnel requests, and service contracts.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:

1. Rockwell Automation: Allen-Bradley.

2.2 PERFORMANCE AND DESIGN REQUIREMENTS

A. See Specification Section 40 61 13.

B. The PLC system shall meet the control requirements of the Section 46 21 76 - Process Control Descriptions, Drawings, and Specifications.

C. PLC programming shall be documented and factory tested.

D. The PLC system be capable of operating in ambient conditions of 32 to 140 degrees F temperatures and 5 to 95% relative humidity without the need for purging or air conditioning.

E. Environmental Controls:

1. Furnish circulation fans in solid state control system enclosures.
2. Over-temperature switches shall be utilized to provide special cooling if required to maintain operating temperatures within the manufacturer's specified range.
3. Air conditioning applications shall include means of preventing moisture condensation.

F. Where the PLC is utilized to control multiple trains of equipment and where the equipment in each train operates as a unit relatively independent of other equipment trains (e.g., facility with multiple boiler units or filter trains), the PLC components (I/O modules, power supplies, etc.) shall be designed so that the failure of any one component does not affect equipment on all trains. The following shall also apply.

1. I/O modules shall be segregated on a train basis unless required for safety reasons.
2. Where several equipment units operate in parallel, but are not considered assigned to a particular equipment train (e.g., multiple raw water pumps or chemical feed pumps all discharging into a common header), the PLC I/O modules associated with each equipment unit shall be assigned so that the failure of any one I/O module will not affect the other parallel unit/s.

2.3 HARDWARE

A. Processor shall include diagnostic indicators for power, mode, low battery, communications ports, and memory and I/O errors.

B. Redundant processors, if specified, shall have seamless fail-over capability.

C. I/O modules shall be capable of being replaced while the PLC is on-line and operating.

D. All I/O modules shall have terminal block failure or removal monitoring.

E. Analog output modules shall have a resolution of at least 12 bits.

F. Electrical isolation shall be provided between logical and field device.

G. I/O Module field wiring shall remain undisturbed when removing or replacing an I/O module.

H. Fail-safe state for each I/O channel shall be capable of being defined as on, off or fail-in-place.

I. Power Supply Units:

a. Electrical service to PLC system shall be 120 VAC, 60 Hz.

J. All PLC control system components shall be capable of meeting or exceeding electromagnetic interference tests per IEEE C37.90.2.

K. Incorporate the following minimum safety measures:

1. Watchdog function to monitor:
   a. Internal processor clock failure.
   b. Processor memory failure.
   c. Loss of communication between processor and I/O modules.
   d. Processor ceases to execute logic program.
2. Safety function wiring: Emergency safety switches shall not be wired into the controller.
3. Safe wiring:
   a. Unless otherwise specified, activation of alarms and stopping of equipment shall be based on de-energization of rather than the energization of control circuits.
4. Initial safety conditions:

a. Utilize program module to dictate output states in a known and safe manner prior to running of control program.
b. Utilize program each time PLC is initialized/re-initiated and the control program activated.

5. Monitoring of internal faults and display:
   a. Internal PLC system status and faults shall be monitored and displayed.
      1) Monitored items shall include:
         a) Memory ok/loss of memory.
         b) Processor ok/fault.
         c) Scan time overrun.
6. Control of programs: Protect access to PLC program loading with password protection or with locked, key operated selector switches.
   a. Provide login, passwords, and/or keys to Owner at Substantial Completion.
7. Design PLC system with high noise immunity to prevent occurrence of false logic signals resulting from switching transients, relay and circuit breaker noise or conducted and radiated radio frequency interference.
8. Operator intervention:
   a. Logic system failure shall not preclude proper operator intervention.
   b. Safety shutdown of equipment or a system shall require manual operator intervention before the equipment or system operation may be reestablished.

2.4 SOFTWARE

A. All software will be furnished and licensed to Owner.

1. At Substantial Completion, transfer all licenses and media to Owner.
2. At Substantial Completion, all software must be latest edition and licensed to the Owner.
3. Software shall be lifetime licensed and be OEM supported for at least 10 years from the date of license transfer.

B. Programming.

1. Languages supported: All application programming in IEC 61131-3 compliant language.
2. Program PLC utilizing ladder diagram, function block, or structured text format.
3. Protect program via removable key switch or password to prevent unauthorized changes. Provide password and/or programming keys to Owner.
4. Capable of on-line and off-line programming.

C. PLC program Structure.

1. Clear, concise, well-annotated logic.
2. Implement a modular design to allow specific functions to be replicated to ensure consistency.
3. Program shall align with the control strategies. Include comments reflecting alignment with control strategies.
4. Include named variables that reflect the actual use of the variable.
5. Annotate program listing to include the following (using the features of the appropriate PLC programming software):
   a. Clearly identified variables, I/O points, contacts, and analog values.
   b. Written description of each functional area.
   c. Written description of each rung's function.
   d. Reference to control loop number for each rung where applicable.
   e. Reference to instrumentation tag number of I/O devices for each rung where applicable.

D. Manufacturer support

1. Submit a written proposal for a manufacturer support agreement for all products specified herein for a minimum of 12 months starting at final completion of the project. The cost of this manufacturer support agreement shall not be included in the Contract Price. The support agreement shall be executed in the name of, and for the benefit of, the Owner. At a minimum, this agreement shall provide the Owner with:
   a. 8 AM to 5 PM, 5 day per week manufacturer telephone support.
   b. Access to the manufacturer's technical support website.
   c. Software updates and patches.

2.5 COMPONENTS

A. PLC System Central Processor Unit (CPU):

1. The PLC shall have the capability of communicating with other commonly specified PLC and control system protocols such as Modbus/RTU, Modbus/TCP, Profibus, Ethernet/TCP and OPC.
2. CPU shall include capability to modify logic via an Ethernet port without taking processor off line.
3. Memory:
   a. Battery-backed RAM.
   b. Non-volatile program storage via flash EEPROM:
      1) Automatically download to RAM in the event RAM is corrupted.
4. Memory battery backup shall be capable of 180 days memory retention with fresh battery.
   a. Provide visual indication of battery status and alarm low battery voltage.
   b. Memory battery backup shall be capable of 28 days memory retention after the "Battery Low" indicating LED is on.
5. Plug-in card designed to allow quick field replacement of faulty devices.
   a. Provide unit designed for field replacement and expansion of memory without requiring rewiring or use of special tools.
6. 20% minimum spare useable memory capacity after all required programming is in place and operating.
7. Capable of executing all control functions required by the Specifications and Drawings.
8. Built-in three-mode (proportional-integral-derivative) control capabilities.
   a. As directly selectable algorithms requiring no user knowledge of programming languages.
9. Lighted status indicators for "RUN" and "FAILURE".
10. Capable of manual or automatic control mode transfer from the operating console stations or from within the control strategy.
    a. Transfer shall be bumpless and balanceless.

B. Input/output (I/O) Modules:

1. Provide plug-in modular-type I/O racks with cables to connect to all other required PLC system components.
2. Provide I/O system with:
   a. I/O solid state boards with status lights indicating I/O status.
   b. Electric isolation between logic and field device.
   c. Capability of withstanding low energy common mode transient to 1000 V without failure.
   d. Incorporate noise suppression design.
   e. Capable of meeting or exceeding electrical noise tests, NEMA ICS 1-109.60-109.66.
   f. Capable of being removed and inserted into the I/O rack under power, without affecting any other I/O modules in the rack.

g. Install 20% spare I/O points for each type.

3. Input/output connection requirements:
   a. Make connections to I/O subsystem by terminating all field wiring on terminal blocks within the I/O enclosure.
   b. Prewire I/O modules to terminal blocks.
   c. Provide terminal blocks with continuous marking strip.
   d. Size terminals to accommodate all active data base points and spares.
   e. Provide terminals for individual termination of each signal shield.
   f. Field wiring shall not be disturbed when removing or replacing an I/O module.
4. Discrete I/O modules:
   a. Interface to ON/OFF devices.
   b. I/O status indicator on module front.
   c. Voltage rating to match circuit voltage.
   d. Output module current rating:
      1) Match maximum circuit current draw.
      2) Minimum 1.0 continuous A/point for 120 VAC applications.
   e. Isolated modules for applications where one module interfaces with devices utilizing different sources of power.
5. Discrete outputs shall be fused:
   a. Provide one fuse per common or per isolated output.
   b. Provide blown fuse indication.
   c. External fusing shall be provided if output module does not possess internal fusing.
   d. Fuses provided external to output model shall:
      1) Be in accordance with module manufacturer's specifications.
      2) Be installed at terminal block.
6. Analog I/O modules:
   a. Input modules to accept signals indicated on Drawings or Specifications.
   b. Minimum 12 bit resolution.
   c. I/O chassis supplied power for powering connected field devices.
   d. Differential inputs and outputs.
   e. User configurable for desired fault-response state.
   f. Provide output signals as indicated on Drawings and Specifications.
   g. Individual D/A converter for each output module.
   h. Individual A/D converter for each input module.
7. Communications Modules:
   a. Provide communications modules as required..
   b. Provide communications modules for each protocol required for a complete communications system.
   c. Multi-port Ethernet modules may not be utilized as a network switch or to bridge networks.
   d. Separate communications modules and networks are required for I/O devices and PLC to HMI communications.

C. Power Supply Units:

1. Provide regulated power units:
   a. Designed to operate with PLC system and shall provide power to:
      1) All components of PLC system.
      2) All two-wire field instruments.

3) Other devices as indicated on Drawings or Specifications.

b. Capable of supplying PLC system when all of the specified spare capacity is utilized.

c. Each power supply shall be sized such that it will carry no more than 75% of capacity under normal loads.

2. Electrical service to PLC system is 120 VAC, 60 Hz.

3. Separate AC circuit breakers shall be provided for each power supply.

4. If the PLC system is field expandable beyond the specified spare capacity, and if such expansion requires power supply modification, note such requirements in the submittals and allow room for power supply modification in the PLC system enclosure.

5. Capable of meeting or exceeding electrical noise tests, NEMA ICS 1-109.60-109.66.

6. Power distribution:

a. Immune to transients and surges resultant from noisy environment.

b. Shall provide constant voltage level DC distribution to all devices.

7. Provide uninterruptible power supply (UPS) to sustain full power to UPS powered loads listed below for a minimum of 15minutes following loss of primary power and to ensure that the transient power surges and dips do not affect the operation of the PLC system.

a. UPS powered loads:

1) All rack mounted PLC components.

2) Local operator consoles.

3) All power supplies furnished with the PLC and associated loads.

b. Input:

1) 108 to 132 VAC.

2) 57 to 63 Hz.

3) Line fuse protection.

c. Output:

1) 120 VAC nominal.

2) 60 Hz.

3) Short circuit protected.

4) Instantaneous transfer time.

d. IEEE C62.41 Class A voltage surges of 6000 V attenuated to less than 50 V on the output.

e. Battery: Maintenance free lead acid.

D. PLC System Enclosure:

1. In accordance with Specification Section 40 67 00 - Control Panels.

2. Component placement:

a. Mount all controller components vertically within the enclosure to allow maximum convection cooling.

b. Either install power supplies above all other equipment with at least 10 inches of clearance between the power supply and the enclosure top, or adjacent to other components, but with sufficient spacing for circulation of cooling air.

c. Do not place I/O racks directly above the CPU or power supply.

d. Locate incoming line devices (isolation or constant voltage transformers, local power disconnects, surge suppressors, etc.) so as to keep power wire runs within an enclosure as short as possible.

e. If items such as magnetic starters, contactors, relays, and other electromagnetic devices must be located within the same enclosure as the PLC system components, place a barrier with at least 6 inches of separation between the magnetic area and the control area.

f. Place circulating fans close to major heat generating devices.

g. Segregate input/output modules into groups of identical type.

3. Wiring and grounding to be in accordance with Specification Section 40 67 00.
4. Termination requirements:
    a. In accordance with Specification Section 40 67 00.
    b. Make connections to I/O subsystem by terminating all field wiring on terminal blocks within the enclosure.
    c. Prewire I/O modules to terminal blocks.
    d. Size terminals to accommodate all active database points and spares.
    e. Provide terminals for individual termination of each signal shield.
    f. Field wiring shall not be disturbed when removing or replacing an I/O module.

E. PLC System Software and Programming:

1. Provide all hardware and programming required to provide communication between the PLC and the human-machine interface.
2. Coordinate with HMI programmer to allow modification of all setpoint through the HMI utilizing appropriate security considerations. Configure scaling and setpoint validation within PLC logic.
3. All communications logic shall include a watch-dog timer and alarm for loss of communications. Coordinate communications failure response with Owner.
4. Provide programming to accomplish all control and monitoring requirements of the Drawings and Specifications.
5. Full documentation capability.
6. Online and offline programming.
7. Offline simulation prior to download.
8. Program over network capability.
9. Two-step commands requiring PLC programmer verification prior to modification of any programming.

2.6 ACCESSORIES

A. Provide all accessories required to install and test a complete PLC control system to accomplish the requirements of the Drawings and Specifications.

B. Provide all programming cables required to configure the PLC logic.

2.7 SOURCE QUALITY CONTROL

A. Perform Factory Acceptance Testing in accordance with Specification Section 40 61 21 - Process Control System Testing.

2.8 MAINTENANCE MATERIALS

A. Furnish Owner with the following extra spares:

1. One spare CPU for every four field CPUs or fraction thereof installed.
2. One spare communication module by type installed in the Plant.
3. One spare I/O card of each card type for every 10 cards or fraction thereof installed.
4. One spare power supply for every 10 power supplies or fraction thereof installed.
5. A set of spare fuses for all installed types.

B. Include a complete bill of materials itemizing each line item with make and model (part) number.

C. Include a complete set of all special tools required to install, maintain and test the PLCs.

PART 3 - EXECUTION

3.1 FUNCTIONALITY

A. Complete System.

1. Provide all graphics and logic programming, configuration, coordination, integration, and testing required for furnishing a fully functioning system.
2. Provide interface support with all foreign device interfaces (FDI) communicating with the PLC system.

3.2 INSTALLATION

A. Install PLC control system in accordance with manufacturer's written instructions.

3.3 FIELD QUALITY CONTROL

A. Test system in accordance with Specification Section 40 61 21 - Process Control System Testing.

B. Demonstrate system in accordance with Specification Section 01 75 00 - Checkout and Start-Up Procedures.

3.4 TRAINING

A. Employee of the manufacturer or certified representative to provide [one week] [_____] of operation and maintenance training at the Project site after the system has successfully undergone all field testing and acceptance procedures.

B. As a minimum, training shall cover:

1. Hardware overview.
2. Software overview.
3. Documentation.
4. Maintenance.
5. Trouble shooting.
6. Operation, e.g., changing set points, passwords, etc.

3.5 DOCUMENTATION

A. Update O&M manuals to reflect as-built conditions.

3.6 SUPPORT

A. Provide on-call technical support for a period of one year after substantial completion. Include a minimum of two site visits to work with Owner on any final modifications to the logic.

END OF SECTION

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SECTION 40 67 00

CONTROL SYSTEM EQUIPMENT PANELS AND RACKS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Requirements for control panels and enclosures utilized as follows:
    a. Unless noted otherwise, all control panels and enclosures housing control components that are specified in Section 46 21 76.
    b. This Section is only applicable to panels furnished with equipment specified in other specification divisions when so stated in the applicable equipment specification section.

B. Related Sections include but are not necessarily limited to:

1. Section 40 63 43 - Programmable Logic Controllers.
2. Section 40 90 00 – Instrumentation for Process Control Basic Requirements.
3. 40 90 05 – Control Loop Descriptions

1.2 QUALITY ASSURANCE

A. Referenced Standards:

1. American National Standards Institute (ANSI).
2. ASTM International (ASTM):
    a. B75, Standard Specification for Seamless Copper Tube.
3. National Electrical Manufacturers Association (NEMA):
    a. 250, Enclosures for Electrical Equipment (1000 Volts Maximum).
    b. ICS 4, Industrial Control and Systems: Terminal Blocks.
4. National Fire Protection Association (NFPA):
    a. 70, National Electrical Code (NEC):
        1) Article 409, Industrial Control Panels.
        2) Article 504, Intrinsically Safe Systems.
5. Underwriters Laboratories, Inc. (UL):
    a. 508A, Standard for Safety Industrial Control Panels.
    b. 698A, Standard for Industrial Control Panels Relating to Hazardous (Classified) Locations.
    c. 913, Standard for Safety Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II, and III, Division 1, Hazardous (Classified) Locations.

B. Qualifications:

1. See Section 40 61 13 - Process Control Systems General Requirements.

C. Miscellaneous:

1. Approved supplier of Industrial Control Panels under provisions of UL 508A or UL 698A.
    a. Entire assembly shall be affixed with a UL 508A or UL 698A label "Listed Enclosed Industrial Control Panel" prior to shipment to the jobsite.
    b. Control panel(s) without an affixed UL 508A or UL 698A label shall be rejected and sent back to the Contractor’s factory.

1.3 DEFINITIONS

A. Panel: Control panels or enclosures listed in the schedule included in this Specification Section.

B. Foreign Voltages: Voltages that may be present in circuits when the panel main power is disconnected.

C. Intrinsically Safe:

1. A device, instrument or component that will not produce sparks or thermal effects under normal or abnormal conditions that will ignite a specified gas mixture.
2. Designed such that electrical and thermal energy limits inherently are at levels incapable of causing ignition.

D. Intrinsically Safe Circuit: A circuit in which any spark or thermal effect is incapable of causing ignition of a mixture of flammable or combustible material in air under test conditions as prescribed in UL 913.

E. Cable: Multi-conductor, insulated, with outer sheath containing either building wire or instrumentation wire.

F. Instrumentation Cable:

1. Multiple conductor, insulated, twisted or untwisted, with outer sheath.
2. Instrumentation cable is typically either TSP (twisted-shielded pair) or TST (twisted-shielded triad) and is used for the transmission of low current or low voltage signals.

G. Ground Fault Circuit Interrupter (GFCI): A type of device (e.g., circuit breaker or receptacle) which detects an abnormal current flow to ground and opens the circuit preventing a hazardous situation.

H. Programmable Logic Controller (PLC): A specialized industrial computer using programmed, custom instructions to provide automated monitoring and control functions by interfacing software control strategies to input/output devices.

I. Remote Terminal Unit (RTU): An industrial data collection device designed for location at a remote site, that communicates data to a host system by using telemetry such as radio, dial-up telephone, or leased lines.

J. Input/Output (I/O): Hardware for the moving of control signals into and/or out of a PLC or RTU.

K. Supervisory Control and Data Acquisition (SCADA): Used in process control applications, where programmable logic controllers (PLCs) perform control functions but are monitored and supervised by computer workstations.

L. Highway Addressable Remote Transducer (HART): a bi-directional communication protocol that provides data access between intelligent field instruments and host systems.

M. Digital Signal Cable: Used for the transmission of digital communication signals between computers, PLCs, RTUs, etc.

N. Uninterruptible Power Supply (UPS): A backup power unit that provides continuous power when the normal power supply is interrupted.

O. Loop Calibrator: Portable testing and measurement tool capable of accurately generating and measuring 4-20mA DC analog signals.

1.4 SUBMITTALS

A. See Section 40 21 76.

B. Shop Drawings:

1. Table of contents sheet(s).
2. Legend and abbreviation sheets.
3. Panel exterior layout drawings.
4. Panel interior layout drawings.
5. Wiring diagrams.
6. Communication network drawing(s).

7. Bill of Material for each panel.
8. Panel door weight calculation.
9. Electrical load calculations for each panel.
10. Climate control calculations for each panel.

C. Product Data:

1. Manufacturer catalog cut sheets for enclosure, finish, panel devices, control auxiliaries, and accessories.

D. Contract Closeout Information:

1. Operation and Maintenance Data:
   a. See Section 01 33 04 for requirements for the mechanics, administration, and the content of Operation and Maintenance Manual submittals.

E. Informational Submittals:

1. Unwitnessed Factory Testing confirmation of completion.
2. Record Drawings:
   a. Updated panel drawings delivered with the panel(s) from the Contractor's factory.
   b. Drawings shall be enclosed in transparent plastic and firmly secured within each panel.

1.5 SUBMITTAL DOCUMENTATION REQUIREMENTS

A. Shop Drawings:

1. Prepared with computer aided design (CAD) software.
2. Printed on 11 by 17 inches sheets.
3. Drawings shall include a title block containing the following:
   a. Plant or facility name where panel(s) are to be installed.
   b. Drawing title.
   c. Drawing number.
   d. Revision list with revision number and date
   e. Drawing date.
   f. Drawing scale.
   g. Manufacturer name, address, and telephone number.
4. Cover sheet for each drawing set shall indicate the following:
   a. Plant or facility name.
   b. Project name.
   c. Submittal description.
   d. Revision number.
   e. Issue date.
5. Table of contents sheet(s) shall indicate the following for each drawing in the set:
   a. Drawing number.
   b. Drawing title.
   c. Sheet number.
6. Legend and abbreviation sheets shall indicate the following:
   a. Description of symbols and abbreviations used.
   b. Panel construction notes including enclosure NEMA rating, finish type and color, wire type, wire color strategy, conductor sizes, and wire labeling strategy.
   c. Confirmation that the panel(s) are to be affixed with a UL 508A or UL 698A label prior to shipment from the factory.
7. Bill of Material for each panel shall include the following component information:

a. Instrument tag number.
b. Quantity.
c. Functional name or description.
d. Manufacturer.
e. Complete model number.
f. Size or rating.

8. Panel exterior layout drawings to scale and shall indicate the following:
   a. Panel materials of construction, dimensions, and total assembled weight.
      1) All dimensions shall be in inches.
   b. Panel access openings.
   c. Conduit access locations.
      1) Ensure conduit entry locations allow for sufficient bend radius of field cables entering enclosure.
      2) Control panel exterior layout shall identify conduit and cable entry locations.
   d. Front view, side views and top view of enclosure.
   e. Front panel device layout.
   f. Nameplate schedule:
      1) Nameplate location.
      2) Nameplate dimensions.
      3) Legend which indicates text, letter height and color, background color and nameplate material.
      4) Include exterior legends as per UL requirements.
      5) Short Circuit Current Rating (SCCR) marking per NFPA 70 or statement of exception. Include any required calculations.
   g. Alarm annunciator window engraving schedule.
   h. Layouts of graphic panels or mosaic displays.
   i. Include a statement on the drawings that indicates that the panel has been built as per UL508A or UL698A standards.
9. Panel interior layout drawings shall be drawn to scale and shall indicate the following:
   a. Sub-panel or mounting pan dimensions.
      1) All dimensions shall be in inches.
   b. Interior device layouts indicating dimensioned location of devices.
   c. PLC/RTU general arrangement layouts.
   d. Wire-way locations, purpose, and dimensions. Include center line dimensions for all DIN rail and wire-way.
   e. Terminal strip designations.
   f. Location of external wiring and/or piping connections.
   g. Location of lighting fixtures, switches and receptacles.
   h. Include interior legends as per UL requirements.
10. Wiring diagrams shall consist of the following:
   a. Panel power distribution diagrams.
   b. Control and instrumentation wiring diagrams.
   c. PLC/RTU I/O information:
      1) Model number of I/O module.
      2) Description of I/O module type and function.
      3) Rack and slot number.
      4) Terminal number on module.

5) Point or channel number.
6) Programmed point addresses.
7) Signal function and type.

d. Internal network connections diagram
e. Wiring diagrams shall identify each wire as it is to be labeled.
f. Wiring diagrams shall include line/ rung references.
g. Relay coils and their associated contacts shall be cross referenced to each other and clearly identified on the drawings.
h. Wires leaving the sheet shall clearly indicate the continuation sheet and line/ rung references.
i. Point to point loop diagrams clearly indicating interconnects between Vendor provided equipment from source to destination.

11. Communication network drawing(s) shall include:
    a. Network equipment
    b. Interconnections between all network equipment within the panel.
    c. Connection to the plant network.
    d. IP addressing of individual equipment.

B. Verify that panel door mounted equipment will not exceed the maximum allowed weight as per manufacturer's specification.

1. Submit panel door weight calculation. Include weight of computer if using a laptop shelf.

C. Electrical load calculations for each panel:

1. Panel current draw based on connected load.
2. SSCR Calculations.
3. UPS Run time calculations.
4. DC power supply load calculations.
5. Climate control calculations for each panel.
6. Verify that sufficient dissipation and/or generation of heat is provided to maintain interior panel temperatures within the rated operating temperatures of panel components.
7. Submit control panel heat release calculations (Watts or BTU/HR). Verify results with cooling/heating software. Submit heating and/or cooling equipment as required. Refer to Section 2.1.
8. Provide temperature monitoring switch when an air conditioner is required by heat release calculations. High Temperature switch shall be wired to a PLC discrete input for temperature monitoring.
9. Provide temperature monitoring switch when heater is required by heat release calculations. Low temperature switch shall be wired to a PLC discrete input for temperature monitoring.
10. Air conditioners shall have built-in temperature display.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:

1. Enclosures:
    a. Hoffman Engineering Co.
    b. Hammond Manufacturing.
    c. Saginaw Control and Engineering.

d. Rittal

2. Panel heaters:
   a. Hoffman Enclosures, Inc.
   b. Hammond Manufacturing.
   c. Rittal
3. Heat exchangers and air conditioners:
   a. Hoffman Engineering Co.
   b. Hammond Manufacturing.
   c. Saginaw Control and Engineering.
   d. Rittal
   e. Pfannenberg.
   f. Kooltronic
4. Cooling fans and exhaust packages:
   a. Hoffman Enclosures, Inc.
   b. Hammond Manufacturing.
   c. Saginaw Control and Engineering.
   d. Rittal
5. Internal corrosion inhibitors:
   a. Hoffman Enclosures, Inc.; Model A-HCI10E
   b. Northern Technologies International Corporation (NTIC); Model Zerust VC.
   c. Cortec Corporation; Model VpCl Emitting Systems.

2.2 ACCESSORIES

A. Panel Nameplates and Identification:

1. See Section 10 14 00.

B. Free standing enclosures containing a PLC shall be provided with an interior swing out shelf for laptop computers.

C. Enclosures shall be provided with print pocket mounted on the interior of the door. Free standing enclosures shall have a minimum size print pocket of 12 inches.

D. Enclosures containing a PLC shall include door contacts to monitor enclosure door status. Door contacts shall be wired to a PLC input for monitoring status.

E. All field instrument enclosure penetrations shall be plugged using threaded conduit plugs to prevent water or contaminant entry into the enclosure during installation.

1. Instruments shall maintain manufacturer's rating for the appropriate area designation.
2. Tape and/or plastic plugs shall not be an acceptable means of preventing water/contaminate intrusion.

2.3 FABRICATION

A. General:

1. Fabricate panels with instrument arrangements and dimensions identified in the Contract Documents.
2. Provide panel(s) with the required enclosure rating per NEMA 250 to meet classifications identified in the Contract Documents.
3. Devices installed in panel openings shall have a NEMA enclosure rating at least equal to the panel enclosure rating.
   a. Devices that cannot be obtained with an adequate NEMA rating shall be installed behind a transparent viewing window.
   b. The window shall maintain the required NEMA rating of the enclosure.

4. Externally mounted components including but not limited to air conditioners, enclosed transformers, external disconnect switches and external surge protector boxes shall match the NEMA rating and be constructed of the same material as the control panel. As an illustrative example, a NEMA 3/3R external enclosed transformer shall not be mounted on a NEMA 4X stainless steel panel.
5. Panel(s) shall be completely assembled at the Contractor's factory.
    a. No fabrication other than correction of minor defects or minor transit damage shall be performed on panels at the jobsite.
6. Painting:
    a. Panels fabricated from steel shall have their internal and external surfaces prepared, cleaned, primed, and painted.
        1) Mechanically abrade all surfaces to remove rust, scale, and surface imperfections.
        2) Provide final surface treatment with 120 grit abrasives or finer, followed by spot putty to fill all voids.
        3) Utilize solvent or chemical methods to clean panel surfaces.
        4) Apply surface conversion of zinc phosphate prior to painting to improve paint adhesion and to increase corrosion resistance.
        5) Electrostatically apply polyester urethane powder coating to all inside and outside surfaces.
        6) Bake powder coating at high temperatures to bond coating to enclosure surface.
            a) Panel interior shall be white with semi-gloss finish.
            b) Panel exterior shall be ANSI #61 gray with flat finish.
        7) Application of alkyd liquid enamel coating shall be allowed in lieu of polyester urethane powder for wall mounted NEMA 1 or NEMA 12 rated panels.
    b. Panels fabricated from stainless steel, aluminum, or fiberglass shall not be painted.
7. Finish opening edges of panel cutouts to smooth and true surface conditions.
    a. Panels fabricated from steel shall have the opening edges finished with the panel exterior paint.
8. Panels shall meet all requirements of UL 508A or UL 698A.
    a. If more than one disconnect switch is required to disconnect all power within a panel or enclosure, provide a cautionary marking with the word "CAUTION" and the following or equivalent, "Risk of Electric Shock-More than one disconnect switch required to de-energize the equipment before servicing."
9. Provide control panel in accordance with NFPA 70, Article 409.
    a. In the event of any conflict between NFPA 70, Article 409 and UL 508A or UL 698A, the more stringent requirement shall apply.
10. Provide equipment or control panels with Short Circuit Current Rating (SCCR) labeling as required by NFPA 70 and other applicable codes.
    a. Determine the SCCR rating by one of the following methods:
        1) Method 1: SCCR rating meets or exceeds the available fault current of the source equipment when indicated on the Drawings.
        2) Method 2: SCCR rating meets or exceeds the source equipment's Amp Interrupting Current (AIC) rating as indicated on the Drawings.
        3) Method 3: SCCR rating meets or exceeds the calculated available short circuit current at the control panel.
    b. The source equipment is the switchboard, panelboard, motor control center or similar equipment where the control panel circuit originates.
    c. For Method 3, provide calculations justifying the SCCR rating. Utilize source equipment available fault current or AIC rating as indicated on the Drawings.

B. Free-Standing Panels:

1. Welded construction.
2. Completely enclosed, self-supporting, and gasketed, dust-tight.
3. Rolled lip around all sides of enclosure door opening.
4. Seams and corners welded and ground smooth to touch and smooth in visual appearance.
5. Full height, fully gasketed flush pan doors.
6. Full length piano hinges rated for 1.5 times door plus instrument weight.
7. Doors with keyed alike locking handles and three-point catch.
8. Appropriate conduit, wiring, and instrument openings shall be provided.
9. Lifting eyebolts to allow simple, safe rigging and lifting of panel during installation.

C. Wall Mounted Panels:

1. Seams continuously welded and ground smooth.
2. Rolled lip around all sides of enclosure door opening.
3. Gasketed dust tight.
4. [Door clamps and hasp/staple for padlocking] [Three-point latching mechanism operated by oil tight key-locking handle].
5. Key doors alike.
6. Continuous heavy GA hinge pin on doors.
    a. Hinges rated for 1.5 times door plus instrument weight.
7. Front full opening door.
8. Brackets for wall mounting.

D. Internal Panel Wiring:

1. Panel wire duct shall be installed between each row of components, and adjacent to each terminal strip.
    a. Route wiring within the panel in wire-duct neatly tied and bundled with tie wraps.
    b. Size wire ducts to include a minimum of 20% spare fill capacity.
    c. Wire-duct shall have removable snap-on covers and perforated walls for easy wire entrance.
    d. Wire-duct shall be constructed of nonmetallic materials with rating in excess of the maximum voltage carried therein.
2. Lay out panel wire-duct on both sides of each terminal strip. Leave one wire-duct empty, so the field wiring has sufficient room for entry into the panel through this wire-way. Designate the other wire-duct for panel wiring.
3. Utilize fiber optic and Ethernet cable management accessories within the panel.
    a. Terminate Ethernet cables from the field to RJ45 punch down blocks. Connect Ethernet patch cords from the RJ45 punch down block to the Ethernet switch.
    b. Terminate Fiber optic cable from field in fiber optic patch panel. Terminate all fibers within the cable. Connect Fiber optic patch cords from the fiber optic patch panel to the fiber optic Ethernet switch.
4. Wiring shall be installed such that if wires are removed from one device, source of power will not be disrupted to other devices.
5. “Daisy-chaining” of ground cables or power neutrals between equipment is not permitted.
6. Terminate all internal wiring with no more than two (2) conductors per terminal block point. For terminal strips designated for field wiring, only one side of the terminal strip shall be used for panel wiring.
7. Splicing and tapping of wires permitted only at terminal blocks.
8. Wire bundles to doors shall be secured at each end so that bending or twisting will be around longitudinal axis of wire.
    a. Protect bend area with sleeve.

9. Arrange wiring neatly, cut to proper length, with surplus wire removed.
    a. Arrange wiring with sufficient clearance.
    b. Provide abrasion protection for wire bundles that pass through openings or across edges of sheet metal.
10. To eliminate noise coupling or interference, AC power and control circuits shall be routed separate from analog signal cables, low voltage control circuits, and communications cables and digital signal cables.
    a. Separate by at least 6 inches, except at unavoidable crossover points and at device terminations.
    b. All wiring shall be bundled and supported by straps.
11. Separation of intrinsically safe circuit conductors and non-intrinsically safe circuit conductors:
    a. Secure conductors so that any intrinsically safe circuit conductor that might come loose from a terminal is unlikely to come into contact with another terminal.
    b. Separate non-intrinsically safe circuit conductors from intrinsically safe circuit conductors by one of the following methods:
        1) Separation of non-intrinsically safe circuit conductors from intrinsically safe circuit conductors by at least 2 inches (50 mm).
        2) Separation of non-intrinsically safe circuit conductors from intrinsically safe circuit conductors by use of a grounded metal partition 0.0359 inches (0.91 mm) or thicker.
        3) Separation of non-intrinsically safe circuit conductors from intrinsically safe circuit conductors by use of an approved insulating partition that extends to within 0.0625 inches (1.5 mm) of the enclosure walls.
        4) Where either (1) all of the intrinsically safe circuit conductors or (2) all of the non-intrinsically safe circuit conductors are in grounded metal-sheathed or metal-clad cables where the sheathing or cladding is capable of carrying fault current to ground.
    c. Blue wire-duct shall be used for wires carrying intrinsically safe circuit conductors.
12. Separate different intrinsically safe circuit conductors from each other by one of the following means:
    a. The conductors of each circuit are within a grounded metal shield.
    b. The conductors of each circuit have insulation with a minimum thickness of 0.01 inches (0.25 mm).
13. Provide minimum clearance of 0.125 inches (3 mm) between uninsulated parts of intrinsically safe field wiring conductors connected to terminals and grounded metal or other conducting parts.
14. Wiring to pilot devices or rotary switches shall be individually bundled and installed with a "flexible loop" of sufficient length to permit the component to be removed from panel for maintenance without removing terminations.
15. Conductors for AC and DC circuits shall be type MTW stranded copper listed for operation with 600 V at 90 degrees C.
    a. Conductor size shall be as required for load and 16 AWG minimum.
    b. Internal panel wiring color code:
        1) AC circuits:
            a) Power wiring: Black.
            b) Control interconnections: Red.
            c) Neutral: White.
            d) Ground: Green.
        2) Low voltage DC circuits:
            a) Power wiring: Dark Blue(+) and White with Blue stripe.

b) Control interconnections: Dark Blue.

3) Foreign voltage circuits: Yellow.

4) Annunciator circuits: Red.

5) Intrinsically safe circuits: Light Blue.

16. Analog signal cables shall be of 600 V insulation, stranded copper, twisted-shielded pairs.
    a. Conductor size: 18 AWG minimum.
    b. Terminate shield drain conductors to ground only at one end of the cable.
17. High precision 250 ohm resistors with 0.25 % accuracy shall be used where 4 - 20 mA DC analog signals are converted to 1 - 5 VDC signals.
    a. Resistors located at terminal strips.
    b. Resistors terminated using individual terminal blocks and with no other conductors.
    c. Resistor leads shall be un-insulated and of sufficient length to allow test or calibration equipment (e.g., HART communicator, loop calibrator) to be properly attached to the circuit with clamped test leads.
18. Analog signals for devices in separate enclosures shall not be wired in series.
    a. Loop isolators shall be used where analog signals are transmitted between control enclosures.
19. Wire and cable identification:
    a. Wire and cables numbered and tagged at each termination.

E. Grounding Requirements:

1. Equipment grounding conductors shall be separated from incoming power conductors at the point of entry.
2. Minimize grounding conductor length within the enclosure by locating the ground reference point as close as practical to the incoming power point of entry.
3. Bond electrical racks, chassis and machine elements to a central ground bus.
    a. Nonconductive materials, such as paint, shall be removed from the area where the equipment contacts the enclosure.
4. Bond the enclosure to the ground bus. Bonded connections shall be free of paint and debris.
5. It is imperative that good electrical connections are made at the point between the ground bus and enclosure.
6. Panel-mounted devices shall be bonded to the panel enclosure or the panel grounding system by means of locknuts or pressure mounting methods.
7. Sub-panels and doors shall be bonded to ground.
8. Associated apparatus (connected to intrinsically safe circuits) and associated cable shields:
    a. Ground in accordance with the associated control drawing (drawing provided for the intrinsically safe circuit and which contains manufacturer’s entity parameters).

F. Termination Requirements:

1. Wiring to circuits external to the panel connected to interposing terminal blocks.
2. Terminal blocks rigidly mounted on DIN rail mounting channels.
3. Electrical connections to terminal blocks shall be terminated with a proper torque tool as per manufacturer terminal block instructions. Terminating conductors without a torque tool can result in improper and unsafe installation.
4. Terminal strips located to provide adequate space for entrance and termination of the field conductors.
5. One side of each strip of terminal blocks reserved exclusively for the termination of field conductors.
6. Terminal block markings:

a. Marking shall be the same as associated wire marking.
b. Legible, machine-printed markings.
c. Markings as identified in the shop drawings.
d. Terminal block markings shall follow a consecutive numbering sequence. Terminal block numbers with a random numbering sequence are not acceptable.

7. Terminal block mechanical characteristics, and electrical characteristics shall be in accordance with NEMA ICS 4.
8. Terminal blocks with continuous marking strips.
   a. Each terminal block shall be identified with machine printed labels.
9. Terminals shall facilitate wire sizes as follows:
   a. 120 VAC applications: Conductor size 12 AWG minimum.
   b. Other: Conductor size 14 AWG minimum.
10. Analog signal cable shield drain conductors shall be individually terminated.
11. Install minimum of 20 % spare terminals.
12. Fused terminal blocks shall be used in the following circuits:
    a. Control voltage is used to energize a solenoid valve.
    b. DC power is connected to 2-wire, loop-powered instruments.
13. Fused terminal blocks shall be provided with blown fuse indicators.
14. When control circuits require more than one field conductor connected to a single wiring point, a sufficient number of terminal points shall be connected internally to allow termination of only one field conductor per terminal block.
15. DIN rail mounting channels shall be installed along full length of the terminal strip areas to facilitate future expansion.
16. Connections to devices with screw type terminals shall be made using spade-tongue, insulated, compression terminators.
17. Intrinsically safe circuit termination:
    a. Provide at least 0.25 inches (6 mm) clearance between two terminals for connection of field wiring of different intrinsically safe circuits, unless this clearance is permitted to be reduced by the control drawing this is provided for the intrinsically safe circuit and which contains manufacturer's entity parameters.
    b. Identify intrinsically safe circuits at terminal and junction locations in a manner that is intended to prevent unintentional interference with the circuits during testing and servicing as required by NEC, Article 504.
    c. Terminal blocks used for intrinsically safe wires shall be blue.

G. Component Mounting and Placement:

1. Components shall be installed per manufacturer instructions.
2. Mount and wire so removal or replacement may be accomplished without interruption of service to adjacent devices.
3. Locate all devices mounted inside enclosures so terminals and adjustment devices are readily accessible without use of special tools and with terminal markings clearly visible.
4. Control relays and other control auxiliaries shall be mounted on DIN rail mounting channels where practical.
5. Front panel devices shall be mounted within a range of 40 to 70 inches above the finished floor, unless otherwise shown in the Contract Documents.
6. PLC/RTU and I/O rack installation:
   a. Located such that the LED indicators and switches are readily visible with the panel door open.
   b. Located such that repair and/or replacement of component can be accomplished without the need to remove wire terminations or other installed components.

7. Locate power supplies with sufficient spacing for circulation of air.
8. Where components such as magnetic starters, contactors, relays, and other electromagnetic devices are installed within the same enclosure as the PLC/RTU system components, provide a barrier of at least 6 inches of separation between the “power area containing the electromagnetic devices” and the “control area”.
9. Components mounted in the panel interior shall be fastened to an interior sub-panel using machine screws.
    a. Fastening devices shall not project through the outer surface of the panel enclosure.
10. Excess mounting space of at least 20 % for component types listed below to facilitate future expansion:
    a. Fuse holders.
    b. Circuit breakers.
    c. Control relays.
    d. Time delay relays.
    e. Intrinsically safe barriers and relays.
11. Components installed on sub-panels shall be provides with a minimum spacing between component and wire duct of 1 inch.
    a. Minimum of 2 inches separation between terminal strips and wire ducts.
12. Pneumatic tubes and appurtenances:
    a. Connect panel air piping and tubing penetrations with bulkhead fittings.
    b. Pneumatic control tubing shall be 1/4 inches OD.
        1) Tubing material: Either soft annealed ASTM B75 copper or flame-resistant polyethylene.
    c. Main headers within panels shall be minimum 1 inch.
    d. Compression-type pressure fittings.
    e. Equip panel instrument leads with ball type isolation valve.
    f. Route tubing neatly and mount securely.
    g. Do not route tubing in front of or in wire ducting.
    h. Code terminal plates.
    i. Pneumatic devices shall be served by a dual function filter regulator.

H. Power Distribution:

1. Control panels powered by voltage greater than 120 VAC (nominal) main incoming power shall be provided with a disconnect switch mounted within the enclosure.
    a. Disconnect switch shall be interlocked with the enclosure door(s).
    b. Disconnect switches that supply motor loads shall comply with NEC Code part IX of article 430.
2. Main incoming power circuits shall be protected with a thermal magnetic circuit breaker.
    a. Limit load to maximum of 80 % of circuit breaker rating.
3. Component types listed below shall be individually fused so that they may be individually de-energized for maintenance:
    a. PLC/RTU power supply modules.
    b. Single-loop controllers.
    c. Operator interface terminals/HMI.
    d. DC power supplies.
    e. Alarm annunciators.
4. Each control panel with PLC/RTU components shall be furnished with power protection in the form of a double conversion UPS.

5. Equip each panel with necessary power supplies with ratings required for installed equipment and with minimum 25 % spare capacity.
6. Constant voltage transformers, balancing potentiometers, and rectifiers as necessary for specific instrument requirements.
7. Circuit breakers and fuses shall be used to protect equipment powered inside and outside enclosure
    a. Circuit breakers shall be UL489.
    b. UL489 circuit breaker shall be finger safe.
    c. Fuses shall be 1/4 x 1-1/4 inches size.

I. Internal Panel Lighting and Service Receptacles:

1. Panels less than or equal to 4 feet wide:
    a. One electrical GFCI duplex receptacle.
    b. One LED light fixture with manual switch(es).
2. Panels or panel faces greater than 4 feet wide:
    a. One duplex electrical GFCI receptacle per 6 feet of length.
    b. Continuous LED lighting strip with manual switches.

J. Security Controls:

1. Provide all control panels and enclosures with door switch monitored by discrete input utilizing normally closed contacts.
2. Configure door switch as an alarm at the HMI.

K. Environmental Controls:

1. Indoor panels located in a designated electrical room or control room:
    a. Thermostat controlled cooling fans with exhaust louvers if required to maintain temperature inside panel(s) below the maximum operating temperature rating of the internal components.
    b. Internal corrosion inhibitors.
2. Indoor panels not located within a designated electrical room or control room:
    a. Thermostat controlled heaters to maintain temperature approximately 10 degrees F above ambient for condensation prevention inside the panels.
    b. Automatically controlled, closed-loop heat exchangers or closed-loop air conditioners where required to maintain temperature inside each enclosure below the maximum operating temperature rating of the components inside the panel(s).
    c. Internal corrosion inhibitors.
3. Outdoor panels:
    a. Outdoor temperature range of 0 degrees F through 120 degrees F.
    b. Thermostat controlled heaters to maintain temperature approximately 10 degrees F above ambient dew point for condensation prevention inside the panels.
    c. Thermostat controlled closed-loop heat exchangers or closed-loop air conditioners if required to maintain temperature inside each enclosure below the maximum operating temperature rating of the components inside the panel.
    d. Internal corrosion inhibitors.
4. Environmental control components:
    a. Panel heaters:
        1) Thermostat controlled.
        2) Fan driven.
        3) Components mounted in an anodized aluminum housing.
        4) Designed for sub-panel mounting.

5) Powered from 120 VAC and protected with a dedicated circuit breaker.

b. Cooling fans and exhaust packages:
   1) Cooling fan with louver or grill and replaceable filter.
   2) Designed to be mounted within a panel cutout to provide positive airflow through the panel.
   3) Cooling fan and exhaust louvers shall be designed and listed to maintain a NEMA 12 enclosure rating.
   4) Fitted with replaceable, high-density foam or synthetic fiber.
   5) Cooling fan controlled with a separately mounted thermostat with bi-metal sensor and adjustable dial for temperature setting.
   6) Powered from 120 VAC and protected with a dedicated circuit breaker.

c. Heat exchangers and air conditioners:
   1) Dual-loop design to isolate panel interior air from exterior air.
   2) Thermostat controlled.
   3) Operate from 120 VAC and protected with a dedicated circuit breaker.

d. Internal corrosion inhibitors:
   1) Contains chemical which vaporizes and condenses on surfaces in the enclosure.
   2) Inhibitor shall be applied in accordance with manufacturer instructions for the enclosure volume.
   3) Inhibitor shall be applied in the panel(s) prior to shipment from the Contractor's factory.

2.4 UNWITNESSED FACTORY TESTING

A. Inspect and test entire panel assembly to verify readiness for shipment and installation..

B. Location: Panel fabricator's factory.

C. Tests shall be fully documented and signed by the panel fabricator's factory supervisor.

D. The panel shop shall fully test the control panel for correct wiring.

   1. Each I/O point shall be checked by measuring or connecting circuits at the field terminal blocks.

E. Burn-in test: Panel(s) shall be fully energized for a minimum period of 48 hours.

F. A PLC Central Processing Unit (CPU) shall be obtained and connected to the panel(s) if necessary for testing purposes.

G. Testing equipment (such as digital multi-meters, analog loop calibrators, and laptop computers with PLC programming software) shall be used as required for testing.

H. The following functions shall be tested as a minimum:

   1. Verify functions of the panel(s) required by the Contract Documents.
   2. Correctness of wiring from all panel field terminals to all I/O points and to all panel components.
   3. Simulate and test each discrete signal at the field terminal strips.
   4. Simulate and test each analog signal using loop calibrators.
   5. Correct operation of communications between PLC system Central Processing Units (CPUs) and Remote I/O bases.
   6. Correct operation of single-loop controllers (including digital communication to microprocessor based devices).
   7. Correct operation of all digital communication devices.
   8. Verify online and offline diagnostic tests and procedures.

I. Deficiencies shall be corrected prior to requesting the Engineer and/or Owner to attend factory testing if specified, or prior to shipment from the Contractor's factory.

2.5 MAINTENANCE MATERIALS

A. Extra Materials:

1. Quantity of 25 % replacement lamps for each type installed (minimum of 12 of each type).
2. Minimum 12 replacement filters for each type installed.
3. 1 QT of exterior finish touch-up paint.
4. One complete set of replacement corrosion inhibitors in sealed packages for each panel.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install freestanding panels on 4 inches high concrete housekeeping pads.

B. Anchor panels in a manner to prevent the enclosure from racking, which may cause the access doors to become misaligned.

C. Obtain approved panel layouts prior to installation of conduits.

D. Install products in accordance with manufacturer's instructions.

END OF SECTION

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SECTION 40 90 00
PROCESS CONTROL SYSTEM: BASIC REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Basic requirements for complete instrumentation system for process control.

B. Related Specification Sections include but are not necessarily limited to:

1. Division 00 - Procurement and Contracting Requirements.
2. Division 01 - General Requirements.
3. Section 40 67 00 - Control System Equipment Panels and Racks.
4. Section 46 21 76 – In-Channel Drum Screens

1.2 QUALITY ASSURANCE

A. Referenced Standards:

1. The International Society of Automation (ISA):
   a. 7.0.01, Quality Standard for Instrument Air.
   b. S5.1, Instrumentation Symbols and Identification.
   c. S5.3, Graphic Symbols for Distributed Control/Shared Display Instrumentation, Logic and Computer Systems.
   d. S5.4, Standard Instrument Loop Diagrams.
   e. S20, Standard Specification Forms for Process Measurement and Control Instruments, Primary Elements and Control Valves.
   f. 101 Human Machine Interfaces
   g. 95 Enterprise-Control System Integration
2. National Electrical Manufacturers Association (NEMA):
   a. 250, Enclosures for Electrical Equipment (1000 Volts Maximum).
3. National Fire Protection Association (NFPA):
   a. 70, National Electrical Code (NEC).
4. Underwriters Laboratories, Inc. (UL):
   a. 913, Standard for Safety, Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II, and III, Division 1, Hazardous (Classified) Locations.

B. Qualifications:

1. Instrumentation subcontractor:
   a. Experience:
      1) Have satisfactorily provided a control system for a minimum of five (5) projects of similar magnitude and function.

C. Miscellaneous:

1. Comply with electrical classifications and NEMA enclosure types shown on Drawings.

1.3 DEFINITIONS

A. Architecturally finished area: Offices, laboratories, conference rooms, restrooms, corridors and other similar occupied spaces.

B. Non-architecturally Finished Area: Pump, chemical, mechanical, electrical rooms and other similar process type rooms.

C. Hazardous Areas: Class I, II or III areas as defined in NFPA 70.

D. Highly Corrosive and Corrosive Areas: Rooms or areas identified on the Drawings where there is a varying degree of spillage or splashing of corrosive materials such as water, wastewater or chemical solutions; or chronic exposure to corrosive, caustic or acidic agents, chemicals, chemical fumes or chemical mixtures.

E. Outdoor Area: Exterior locations where the equipment is normally exposed to the weather and including below grade structures, such as vaults, manholes, handholes and in-ground pump stations.

F. Instrument Air Header: The segment of air supply piping and tubing which transports air from the compressed instrument air source through the branch isolation valve of any takeoff (branch) line.

G. Branch Line: The segment of air supply piping and tubing which transports air from the outlet of the air header branch isolation valve through an air user's isolation valve.

H. Intrinsically Safe Circuit: A circuit in which any spark or thermal effect is incapable of causing ignition of a mixture of flammable or combustible material in air under test conditions as prescribed in UL 913.

I. Calibrate: To standardize a device so that it provides a specified response to known inputs.

1.4 CONTROL SYSTEM REQUIREMENTS:

1. This Specification Section provides the general requirements for the instrument and control system.
2. The instrument and control system consist of all primary elements, transmitters, switches, controllers, computers, recorders, indicators, panels, signal converters, signal boosters, amplifiers, special power supplies, special or shielded cable, special grounding or isolation, auxiliaries, software, wiring, and other devices required to provide complete control of the plant as specified in the Contract Documents.
3. The existing Process Instrumentation and Control Systems (PICS) design and associated native Ethernet IP network protocol is based on the existing plant Rockwell Automation platform. Network standardization is required to maximize operational efficiency and effectiveness, and minimize network operational costs.
    a. All new equipment connected to PICS via Ethernet shall utilize native Ethernet IP protocol. The term “native” used in this context means that the protocol is integral to the equipment—a converter or gateway to convert from one protocol to another (e.g., Modbus Plus to Ethernet IP) is not required. *The use of protocol converters and gateways for substitute equipment is not acceptable.*
    b. All proposals for substitute products shall demonstrate equipment compatibility with existing software and hardware systems, replacement parts requirements, and training requirements. The bid price of the proposed substitute products shall include:
        1) 8 hours of training (in addition to that specified herein) for Owner operations personnel
        2) Spare parts (for each type/size) including control and power boards or modules, operator interface units, and communication and input/output modules

        PICS modification design, programming, and integration costs required to accommodate the proposed substitute.

B. All signals shall be directly linearly proportional to measured variable unless specifically noted otherwise.

C. Single Instrumentation Subcontractor:

1. Furnish and coordinate instrumentation system through a single instrumentation subcontractor.
    a. The instrumentation subcontractor shall be responsible for functional operations of all systems, performance of control system engineering, supervision of installation, final

connections, calibrations, preparation of Drawings and Operation and Maintenance Manuals, start-up, training, demonstration of substantial completion and all other aspects of the control system.

2. Ensure coordination of instrumentation with other work to ensure that necessary wiring, conduits, contacts, relays, converters, and incidentals are provided in order to transmit, receive, and control necessary signals to other control elements, to control panels, and to receiving stations.
3. Prior to Shop Drawing preparation, the Instrumentation Subcontractor shall inspect the Owner's existing equipment and as-constructed electrical documentation so as to be able to fully coordinate the interface of new and existing instrumentation and controls. All costs associated with this Work shall be incorporated into the original bid. Although such Work is not specifically indicated, furnish and install all supplementary or miscellaneous items, appurtenances and devices incidental to or necessary for a sound, secure, complete and compatible installation.

1.5 BASIS OF DESIGN

A. Basis of design includes the following:

1. Equipment and motors as shown in the PID's, network diagram, electrical one-line drawing(s) and load/panel schedules.
2. Digital control systems and associated network protocols and software based on a specific technology platform. Such digital control systems are often proprietary in nature and include, but are not limited to, lighting control systems, generator control systems, fire alarm systems, Process Instrumentation and Control System PICS (i.e., SCADA) systems, and motor control systems.
3. Unless otherwise noted, all new control equipment components connected to the PICS via Ethernet shall utilize native Ethernet/IP protocol. The term "native" used in this context means that the protocol is integral to the equipment—a converter, gateway or card used to convert from one protocol to another (e.g., Modbus Plus to Ethernet IP) is not required. The use of these devices is not acceptable.

B. If different equipment or sizes are provided in order for the vendor's equipment to meet mechanical performance requirements, the contractor shall coordinate various suppliers, vendors, and subcontractors to change the required electrical conduit, circuits, breakers, motor control center sections, motor controllers, and accessories, etc. as necessary to meet the vendor's equipment installation requirements. The traits and characteristics of all provided materials, equipment, and devices shall meet the specifications. These changes to materials, equipment, and devices shall be at no cost to the Owner. Electrical submittal information shall be coordinated with the equipment and motors provided.

C. The contract for the work will be based on materials and equipment included in the Contract Documents, and those "or-equal" and substitute products subsequently approved as outlined in Bidding Requirements, Conditions of the Contract, and Division 1. The burden of proof regarding proposed product merit and the associated cost by the Engineer/Owner to evaluate the product merit is upon the Bidder. Any assumptions regarding the possibility of post-bid approvals of or-equal or substitution requests are made at Bidder's sole risk.

D. "Or-Equal" or Substitute Digital Control System Materials and Software:

1. Technology platform standardization is required to maximize performance, efficiency, and effectiveness and to minimize technology platform total cost of ownership (TCO). Therefore, the determination of associated "or-equal" or substitute materials and equipment will be based on these elements in addition to those specified in the Contract Documents.
2. TCO includes initial engineering/design costs, construction administration costs, equipment acquisition and installation costs, and ongoing operating costs and personnel/resource costs associated with management and support after construction is completed.
    a. Design costs include digital control system design documents including, but not limited to, network diagrams, riser diagrams, I/O matrixes, schematics, wiring diagrams, equipment layouts, and bill of materials based on the specified product.

b. Construction administration costs include anticipated submittal reviews, RFI's, construction changes, and record drawing development based on the specified product.

c. Acquisition and installation costs include software, hardware, implementation, customization, user licenses, data migration, user training, integrating third-party systems, and physical equipment installation.

d. Operating costs include replacement parts, additional user licenses, ongoing personnel training, software and firmware maintenance and support, additional integrations, downtime, associated third party service contracts, and electronic security.

e. Personnel/resource costs include personnel required to manage the system, keeping the system secure, and keeping up with technology obsolescence and maintenance.

3. All associated written requests for approval shall include as a minimum:

a. Assurance that the proposed system is compatible with any existing digital control system software and hardware system elements proposed to remain in place. Depending on the Owner's familiarity, a workshop with the Engineer and Owner may also be required to demonstrate compatibility.

b. TCO breakdown comparison for both the substitute product and that specified. Include actual and verifiable data from similar recent projects to validate.

c. Net present value (NPV) analysis for both the substitute product TCO and that specified to present to the Owner for evaluation. If elements of the existing digital control systems are proposed to remain in place, the NPV analysis shall also include ongoing operating costs and personnel/resource costs associated with managing both technology types. All Owner related ongoing operating costs and personnel/resource costs forecasted after construction shall be validated and agreed upon by the Owner.

d. Modified design documents showing updated network diagrams, schematics, wiring diagrams, bill of materials, and any other design related changes to accommodate the substitute equipment.

4. Contractor represents the proposals for "or-equal" and substitute products also include:

a. 8 hours of training (in addition to that specified herein) for Owner operations personnel.

b. Spare parts (one for each type/size) including control and power boards or modules, operator interface units, and communication and input/output modules.

c. Engineering design and construction administration costs that may result or are required to accommodate the proposed substitute. Engineer will define these costs during evaluation of substitute.

1.6 SUBMITTALS

A. Shop Drawings:

1. See Specification Section 01 33 00 for requirements for the mechanics and administration of the submittal process.
2. Submittals shall be original printed material or clear unblemished photocopies of original printed material.
   a. Facsimile information is not acceptable.
3. Limit the scope of each submittal to one (1) Specification Section.
   a. Each submittal must be submitted under the Specification Section containing requirements of submittal contents.
   b. Do not provide any submittals for Specification Section 40 90 00.
4. Product technical data including:
   a. Equipment catalog cut sheets.
   b. Instrument data sheets:
      1) ISA S20 or approved equal.
      2) Separate data sheet for each instrument.

c. Materials of construction.
d. Minimum and maximum flow ranges.
e. Pressure loss curves.
f. Physical limits of components including temperature and pressure limits.
g. Size and weight.
h. Electrical power requirements and wiring diagrams.
i. NEMA rating of housings.

5. Submittals shall be marked with arrows to show exact features to be provided. Comprehensive set of wiring diagrams as specified in Specification Section 40 98 00.
6. Panel fabrication drawings as specified in Specification Section 40 98 00.
7. PLC/DCS equipment drawings.
8. HMI graphics.
9. Nameplate layout drawings.
10. Drawings, systems, and other elements are represented schematically in accordance with plant standards.
    a. The nomenclature, tag numbers, equipment numbers, panel numbers, and related series identification contained in the Contract Documents shall be employed exclusively throughout submittals.
11. All Shop Drawings shall be modified with as-built information/corrections.
12. All panel and wiring drawings shall be provided in both hardcopy and softcopy.
    a. Furnish electronic files on thumb drive.
    b. Drawings in AUTO CAD format.
13. Provide a parameter setting summary sheet for each field configurable device.
14. Certifications:
    a. Documentation verifying that calibration equipment is certified with NIST traceability.
    b. Approvals from independent testing laboratories or approval agencies, such as UL..
        1) Certification documentation is required for all equipment for which the specifications require independent agency approval.
15. Testing reports: Source quality control reports.

B. Contract Closeout Information:

1. Operation and Maintenance Data:
    a. See Specification Section 01 33 00 for requirements for the mechanics, administration, and the content of Operation and Maintenance Manual submittals.
2. Warranties: Provide copies of warranties and list of factory authorized service agents.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Do not remove shipping blocks, plugs, caps, and desiccant dryers installed to protect the instrumentation during shipment until the instruments are installed and permanent connections are made.

1.8 SITE CONDITIONS

A. Unless designated otherwise on the Drawings, area designations are as follows:

1. Outdoor area:
    a. Wet.
    b. Corrosive and/or hazardous when specifically designated on the Drawings or in the Specifications.
    c. Below grade vaults and manholes:
        1) Subject to temporary submergence when specifically designated on the Drawings or Specifications.

2. Architecturally finished area:
    a. Dry.
    b. Noncorrosive unless designated otherwise on the Drawings or in the Specifications.
    c. Nonhazardous unless designated otherwise on the Drawings or in the Specifications.
3. Non-architecturally finished area: As designated elsewhere on the Drawings or in the Specifications.

PART 2 - PRODUCTS

2.1 NEMA TYPE REQUIREMENTS

A. Provide enclosures/housing for control system components in accordance with the following:

1. Areas designated as wet: NEMA Type 4.
2. Areas designated as wet and/or corrosive: NEMA Type 4X.
3. Areas designated as Class I hazardous, Groups A, B, C, or D as defined in NFPA 70:
    a. NEMA Type 7 unless all electrical components within enclosure utilize intrinsically safe circuitry.
        1) Utilize intrinsically safe circuits to the maximum extent practical and as depicted in the Contract Documents.
4. Areas designated as Class II hazardous, Groups E, F, or G as defined in NFPA 70:
    a. NEMA Type 9 unless all electrical components within enclosure utilize intrinsically safe circuitry.
        1) Utilize intrinsically safe circuits to the maximum extent practical and as depicted in the Contract Documents.
5. Either architecturally or non-architecturally finished areas designated as dry, noncorrosive, and nonhazardous: NEMA Type 12.
6. Areas designated to be subject to temporary submersion: NEMA 6P.

2.2 PERFORMANCE AND DESIGN REQUIREMENTS

A. System Operating Criteria:

1. Stability: After controls have taken corrective action, as result of a change in the controlled variable or a change in setpoint, oscillation of final control element shall not exceed two (2) cycles per minute or a magnitude of movement of 0.5 percent full travel.
2. Response: Any change in setpoint or change in controlled variable shall produce a corresponding corrective change in position of final control element and become stabilized within 30 seconds.
3. Agreement: Setpoint indication of controlled variable and measured indication of controlled variable shall agree within 3 percent of full scale over a 6:1 operating range.
4. Repeatability: For any repeated magnitude of control signal, from either an increasing or decreasing direction, the final control element shall take a repeated position within 0.5 percent of full travel regardless of force required to position final element.
5. Sensitivity: Controls shall respond to setpoint deviations and measured variable deviations within 1.0 percent of full scale.
6. Performance: All instruments and control devices shall perform in accordance with manufacturer's specifications.

2.3 ACCESSORIES

A. Provide identification devices for instrumentation system components in accordance with Specification Section 10 14 00.

B. Provide corrosion resistant spacers to maintain 1/4 IN separation between equipment and mounting surface in wet areas, on below grade walls and on walls of liquid containment or processing areas such as Clarifiers, Digesters, Reservoirs, etc.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Wherever feasible, use bottom entry for all conduit entry to control panels, instruments and junction boxes.

B. Install electrical components per the requirements of the Electrical design and specifications.

C. Panel-Mounted Instruments:

1. Mount and wire so removal or replacement may be accomplished without interruption of service to adjacent devices.
2. Locate all devices mounted inside enclosures so terminals and adjustment devices are readily accessible without use of special tools and with terminal markings clearly visible.

D. See Specification Section 26 05 19.

3.2 FIELD QUALITY CONTROL

A. See Specification Section 01 45 16.13.

B. Maintain accurate daily log of all startup activities, calibration functions, and final setpoint adjustments.

1. Documentation requirements include the utilization of the forms located at the end of this Specification Section.
    a. Loop Check-out Sheet.
    b. Instrument Certification Sheet.
    c. Final Control Element Certification Sheet.

C. In the event that instrument air is not available during calibration and testing, supply either filtered, dry, instrument quality air from a portable compressor or bottled, dry, instrument quality air.

1. Do not, under any circumstances, apply hydrostatic test to any part of the air supply system or pneumatic control system.

D. Pneumatic Signal Tubing Testing:

1. Before the leak test is begun, blow clean with dry air.
2. Test signal tubing per ISA 7.0.01, except for tubing runs of less than 10 FT where simple soap bubble testing will suffice.
3. If a leak is detected, repair the leak and repeat the leak test.
4. After completion of the leak test, check each signal line for obstructions.
    a. If any are indicated, remove and retest.

E. Instrumentation Calibration:

1. Verify that all instruments and control devices are calibrated to provide the performance required by the Contract Documents.
2. Calibrate all field-mounted instruments, other than local pressure and temperature gages, after the device is mounted in place to assure proper installed operation.
3. Calibrate in accordance with the manufacturer's specifications.
4. Bench calibrate pressure and temperature gages.
    a. Field mount gage within seven (7) days of calibration.
5. Check the calibration of each transmitter and gage across its specified range at 0, 25, 50, 75, and 100 percent.

a. Check for both increasing and decreasing input signals to detect hysteresis.

6. Replace any instrument which cannot be properly adjusted.
7. Stroke control valves with clean dry air to verify control action, positioner settings, and solenoid functions.
8. Calibration equipment shall be certified by an independent agency with traceability to NIST.
   a. Certification shall be up-to-date.
   b. Use of equipment with expired certifications shall not be permitted.
9. Calibration equipment shall be at least three (3) times more accurate as the device being calibrated.

F. I/O Loop Testing

1. General Testing Procedures: The System Integrator and electrical contractor shall provide all necessary labor, tools, and equipment to field test, inspect and adjust each instrument installed under this contract to its specified performance requirement in accordance with manufacturer's specifications and instructions.
2. The System Integrator in coordination with the electrical contractor shall test all wiring and primary control devices. The system integrator shall provide documentation to the Owner of the testing procedures and results of the following:
   a. All Process Control Panels are installed, connected to power, and fully wired for all I/O points shown on the Process Control Panel Shop drawings.
   b. All field instruments are installed, wired, powered and produce the appropriate signal at the Process Control Panel.
   c. All panels and devices capable of being powered on and off have had power cycled for verification and have been documented as functional.
3. When possible the Contractor shall simulate events of actual processes during testing.
   a. All I/O points shall be tested. The results of the test shall be documented.
   b. Any I/O point that is not tested shall be documented as well as the reason for not being tested.
4. If system malfunctions are found during I/O testing, efforts to correct malfunctions must be made. Any malfunction not capable of being corrected prior to submitting I/O testing documentation shall be documented including the procedures and actions taken attempting to correct the malfunction.
5. Point to point testing shall be performed on all digital inputs, digital outputs, analog inputs, and analog outputs. Testing shall be performed without unwiring and rewiring when possible.
   a. Digital input testing shall be performed and completed by exercising the field instrument or device. Continuity between the field side of the disconnect terminal block and input field wiring terminal block shall be verified. Results of the tests shall be documented with field device name and input number.
   b. Analog inputs shall be verified and documented for proper current /voltage range received at the PLC panel from the powered field instrument. Document the results of the tests. If the field instrument is unavailable, verify wiring is correct and proper current/voltage range is received at the panel using a signal generating device such as a process meter or other loop calibrator.
   c. Digital output circuits shall be tested by jumping the digital output relay contacts in the process control panel. The proper response should be observed and verified at the field instrument or device. Document the results of the tests.
   d. Analog outputs should be tested using a process style test meter that can provide a 4-20mA simulated source. An appropriate response should be observed and verified at the field device. Document the results of the tests.
6. All motors and valves with automated controls and a Hand-Off-Auto switch shall be operated in Hand to verify functionality. Results of the test shall be documented.

G. Functional check-out requirements are as follows:

1. Functional testing shall prove out the control system operates as outlined in the contract documents and the Process Control Description.
2. All alarm conditions shall be simulated and verified that alarms are generated and properly notified through the SCADA system.
3. The Operator shall be capable of system navigation and adjustment of all Operator adjustable set points from SCADA and at local HMI's.
4. Provide documentation of all conditions and alarms tested and provided with project closeout material.
5. Testing shall be completed when the system is capable of being automatically operated (without manual Operator intervention) for a period of approximately one week. At the end of this time period, the Owner shall sign-off as testing complete and system operational. Alternatively, the Owner may sign-off before the one week time period if completely satisfied and willing to sign off early.

Loop Check-out Sheet

Project Name:		Owner's Project No. (if applicable):	Page of
Project Owner:		Regulatory Agency Project No. (if applicable):	
HDR Project No.:		Date:	

LEAK AND TERMINATION/CONTINUITY CHECKS

DESCRIPTION	FIELD					CONTROL CAB	
	LEAK CHECK(1)			TERM/CONT CHECK(2)		TERM/CONT CHECK(2)	
	Device Tag No.	Process Conn.	Signal Tube	Device Tag No.	Termination Ident.	Device Tag No.	Termination Ident.

.. Leak check for pneumatic signal tubing to be per ISA-PR7.1.

:. Termination/continuity check includes check at terminated equipment for: (a) correct polarity, (b) appropriate signal generation, transmission and reception, and (c) correct shield & ground terminations.

OPERATOR INTERFACE CHECK-OUT

MONITORING POINTS OBSERVED

PARAMETER TYPE	TAG NO.	TAG NO.	TAG NO.	TAG NO.	TAG NO.	TAG NO.
PROCESS VAR						
EQUIP STATUS						
ALARM POINT						

OPERATOR CONTROL FUNCTIONS CHECKED

FUNCTION TYPE	TAG NO.	LOCATION	TAG NO.	LOCATION	TAG NO.	LOCATION

FINAL CONFIGURED SETTINGS

TAG NO.	SWITCH & ALARM SP	CONTROLLERS			
		Gain	Reset, rpm	Deriv. (rate), min	PV Set Point

Describe all interlocks checked, equipment started/stopped, valves/operators stroked. Describe modes of operation checked, and location of operator interface (local/remote).

I certify that the control loop referenced on this page has been completely checked and functions in accordance with applicable drawings and specifications.

Certified by:_____ Date:_____

(Work Performed By)

Instrument Certification Sheet

Project Name:	Owner's Project No. (if applicable):
Project Owner:	Regulatory Agency Project No. (if applicable):
HDR Project No.	Date:
Control Loop No.:	
Instrument Tag No.	Transmitter/gauge span:
Manufacturer:	Switch set-point:
Model No.	Switch dead band:
Serial No.	Switch range:

TRANSMITTERS AND INDICATORS

	INCREASING INPUT			DECREASING INPUT		
% OF SPAN	**INPUT**	**OUTPUT**	**ERROR (% of span)**	**INPUT**	**OUTPUT**	**ERROR (% of span)**
0%						
25%						
50%						
75%						
100%						
Other (if applicable)						
Other (if applicable)						

SWITCHES

	INCREASING INPUT			DECREASING INPUT		
ACTUATION POINT	**INPUT**	**OUTPUT**	**ERROR (% of range)**	**INPUT**	**OUTPUT**	**ERROR (% of range)**
High (Increasing input)						
Low (Decreasing input)						

Maximum allowable error (per Contract Documents): _____

Remarks: _____

_____

_____

CALIBRATION EQUIPMENT UTILIZED

DEVICE TYPE	MFR/MODEL NO.	ACCURACY	NIST TRACEABILITY?

Certified by: _____ Date Certified: _____

Final Control Element Certification Sheet

Project Name:	Owner's Project No. (if applicable):
Project Owner:	Regulatory Agency Project No. (if applicable):
HDR Project No.	Date:
Control Loop No.:	

Tag No.	
Description:	
Manufacturer:	
Model No.	
Serial No.	

Actuator:	Pneumatic: _____ Electric: _____
Positioner:	Direct: _____ Reverse: _____
Positioner:	Input: _____ Output: _____
I/P Converter:	Input: _____ Output: _____
Valve to	_____ on air failure
Valve to	_____ on power failure

I/P CONVERTER

	INCREASING INPUT			DECREASING INPUT		
% OF SPAN	**INPUT**	**OUTPUT**	**ERROR (% of span)**	**INPUT**	**OUTPUT**	**ERROR (% of span)**
0%						
25%						
50%						
75%						
100%						

Specified I/P converter accuracy: _____ % of span.

FINAL CONTROL ELEMENT

	INCREASING INPUT			DECREASING INPUT		
% OF SPAN	**INPUT**	**TRAVEL**	**ERROR (% of full travel)**	**INPUT**	**TRAVEL**	**ERROR (% of full travel)**
0%						
25%						
50%						
75%						
100%						

Remarks: _____

CALIBRATION EQUIPMENT UTILIZED

DEVICE TYPE	MFR/MODEL NO.	ACCURACY	NIST TRACEABILITY?

Certified by: _____ Date Certified: _____

SECTION 40 90 05
CONTROL LOOP DESCRIPTIONS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Equipment and instrumentation control loops.

B. Influent screens controls and panels shall be configured and integrated by screen vendors in accordance with Section 46 21 76 - In-Channel Drum Screens. Control requirements indicated for screens include project-specific requirements for screen control system.

C. SCADA configuration and integration services will be provided by others.

D. Related Specification Sections include but are not necessarily limited to:

1. Division 00 - Bidding Requirements, Contract Forms, and Conditions of the Contract.
2. Division 01 - General Requirements.
3. Section 40 90 00 - Instrumentation for Process Control: Basic Requirements.

1.2 QUALITY ASSURANCE

A. See Specification Section 40 90 00.

1.1 DEFINITIONS

A. PLC - Programmable Logic Controller.

B. SCADA - Supervisory Control and Data Acquisition system.

C. OIS - Operator Interface Station.

D. HIM - Human Interface Module - Used for local control of Variable frequency drives.

E. REMOTE (AUTO) - Control is directed automatically from the PLC and Monitored by the SCADA system.

F. REMOTE (MANUAL) - Allows the operator to manually override remote (auto) controls and operate equipment manually from the SCADA or OIS stations [A1]

G. LOCAL (MANUAL) - Local manual control at the MCC or Local control station from physical switches.

1.2 SYSTEM DESCRIPTION

A. The control loop descriptions provide the functional requirements of the control loops represented in the Contract Documents.

1. Descriptions are provided as follows:
   a. Control system overview and general description.
   b. Major equipment to be controlled.
   c. Major field mounted instruments (does not include local gauges).
   d. Manual control functions.
   e. Automatic control functions/interlocks.
   f. Major indications provided at local control panels and motor starters/VFD's.
   g. Remote indications and alarms.

B. The control loop descriptions are not intended to be an inclusive listing of all elements and appurtenances required to execute loop functions, but are rather intended to supplement and complement the Drawings and other Specification Sections.

1. The control loop descriptions shall not be considered equal to a bill of materials.
2. The control loop descriptions for existing equipment shall not be altered unless otherwise noted in Part 3 - Execution.

C. Provide instrumentation hardware and software as necessary to perform control functions specified herein and shown on Drawings.

D. Ensure coordination of instrumentation manufacturer with other work to ensure that necessary wiring, conduits, contacts, interposing relays, loop-isolators, converters, and incidentals are provided in order to transmit, receive, and control necessary signals to other control elements, to control panels, and to receiving stations.

PART 2 - PRODUCTS - (NOT APPLICABLE TO THIS SPECIFICATION SECTION)

PART 3 - EXECUTION

3.1 AREA 2 – HEADWORKS

A. Influent Screening (Control Strategy 02-01):

1. P&ID Sheets: Y-002 & Y-003.
2. Description:
   a. Influent screens in series remove inorganic solids from the wastewater stream.
   b. Influent screenings control shall be controlled by the screen control panels.
3. Equipment Schedule:

Description	Location	Equipment Tag No.
Influent Screen 01	Screen Channel 1	SCRN-02-01
Influent Screen 02	Screen Channel 2	SCRN-02-02
Screen 01 Upstream Level Sensor	Screen Channel 1	LE/LIT-02-01
Screen 02 Upstream Level Sensor	Screen Channel 2	LE/LIT-02-02
Screen 01 Downstream Level Sensor	Screen Channel 1	LE/LIT-02-03
Screen 02 Downstream Level Sensor	Screen Channel 2	LE/LIT-02-04
Screen 01 Spray Wash Solenoid 01	Influent Screen 01	SV-02-01
Screen 01 Spray Wash Solenoid 02	Influent Screen 01	SV-02-02
Screen 01 Spray Wash Solenoid 03	Influent Screen 01	SV-02-03
Screen 01 Spray Wash Solenoid 04	Influent Screen 01	SV-02-04
Screen 01 Spray Wash Solenoid 05	Influent Screen 01	SV-02-05
Screen 02 Spray Wash Solenoid 01	Influent Screen 02	SV-02-06
Screen 02 Spray Wash Solenoid 02	Influent Screen 02	SV-02-07
Screen 02 Spray Wash Solenoid 03	Influent Screen 02	SV-02-08
Screen 02 Spray Wash Solenoid 04	Influent Screen 02	SV-02-09
Screen 02 Spray Wash Solenoid 05	Influent Screen 02	SV-02-10

4. Equipment Protection:

a. N/A.

5. Local Control:
   a. A local control switch LOCAL/OFF/REMOTE (LOR) selector switch is installed at the screen control panel. When in the LOCAL position, the screens and the solenoid valves on the wash water system will operate based on screen vendor logic and operator set timing. In REMOTE the screens and press will operate based on the headworks control panel.
      1) Influent Screen channels shall be controlled in redundant configuration. Screen control panel shall allow operators to manually select active screens to switch service channel.
      2) Screen start shall rotate drum and commence screen spray cleaning sequence based on either a high upstream water level or high differential level with an operator adjustable timer override.
6. Plant PLC Control:
   a. With the local LOR selector switch in the REMOTE position, the screens and solenoid valves are controlled by the Headworks PLC.
7. SCADA HMI Configuration
   a. Status Display:
      1) Screen remote (2; future additional 2)
      2) Screen running (2; future additional 2)
      3) Screen channel level (4; future additional 4)
      4) Screen wash solenoid position (10; future additional 10)
   b. Operator Entries:
      1) High upstream level (2; future additional 2)
      2) High differential level (2; future additional 2)
      3) Timer override start (2; future additional 2)
      4) Manual/Auto Mode selection (2; future additional 2)
      5) Manual Start/Stop control (2; future additional 2)
   c. Alarms:
      1) Screen fault (2; future additional 2)
      2) Solenoid fail to open (10; future additional 10)
      3) High upstream level alarm (2; future additional 2)
      4) High differential level alarm (2; future additional 2)

END OF SECTION

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DIVISION 46

WATER AND WASTEWATER EQUIPMENT

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SECTION 46 21 76

IN-CHANNEL DRUM SCREENS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Two (2), 6-mm perforated plate, fully automatic self-cleaning in-channel mounted rotating drum screens for wastewater applications with integral washer/compactors and all appurtenances to make a complete and operable system. Equipment shall be installed as shown on the Contract Drawings by others, as specified herein, and as recommended by the manufacturer.
2. Screens shall be installed in series with the 6-mm screens upstream of the future 2-mm screens for protection of a future membrane bioreactor (MBR) system.
3. Each channel is designed to be fully redundant. Each screen shall be designed to pass full peak hour design flow of 3.20 MGD.
4. The screens will be installed in a classified area indoors and provided with an enclosure to enclose the portion of the screen above the operating floor. An adequately sized air duct will be provided on the enclosure and to the screen channel system to mitigate odor generation. All appurtenances provided with screens in the classified area shall be electrically rated for a Class 1, Division 1 environment.
5. Two (2) control panels with PLCs with 10.5” HMIs shall be provided to serve two (2) new screens plus two (2) future screens. Each control panel shall serve one complete channel (one 6-mm screen and one future 2-mm screen per control panel). The control panels will be located in an unclassified electrical room and fabricated from painted carbon steel with a NEMA 12 rating. The local control panels with physical operators and indicators shall be located inside the Headworks Building and fabricated from 316 stainless steel with a NEMA 7 rating.

B. Related Sections include but are not necessarily limited to:

1. Division 00 - Bidding Requirements, Contract Forms, and Conditions of the Contract.
2. Division 01 - General Requirements.
3. Section 01 61 03 - Equipment: Basic Requirements.
4. Section 05 50 00 - Metal Fabrications.
5. Section 40 67 00 - Control System Equipment Panels and Racks.
6. Section 40 90 05 - Control Loop Descriptions.
7. Section 40 63 43 - Programmable Logic Controller (PLC) Control System.

1.2 QUALITY ASSURANCE

A. Referenced Standards:

1. American Bearing Manufacturers Association (ABMA).
   a. ABMA 9: Load Ratings and Fatigue Life for Ball Bearings
   b. ABMA 11: Load Ratings and Fatigue Life for Roller Bearings
2. Anti-Friction Bearing Manufacturers Association (AFBMA Publications:
   a. Standard 9-90 Load Ratings and Fatigue Life for Ball Bearings
   b. Standard 11-90 Load Ratings and Fatigue Life for Roller Bearings
3. American Gear Manufacturer Association (AGMA).
4. American Institute of Steel Construction (AISC) Publications
5. American National Standards Institute (ANSI)
6. American Welding Society (AWS) Publications.

7. American Society of Mechanical Engineers (ASME):
    a. B1.20.1, Pipe Threads, General Purpose (Inch).
    b. B16.1, Gray Iron Pipe Flanges and Flanged Fittings Classes 25, 125 and 250.
8. ASTM International (ASTM):
    a. ASTM A193/A193M: Standard Specification for Alloy-Steel and Stainless Steel Bolting for High Temperature or High Pressure Service and Other Special Purpose Applications.
    b. ASTM A194/A194M: Standard Specification for Carbon Steel, Alloy Steel, and Stainless Steel Nuts for Bolts for High-Pressure and High Temperature Service, or Both.
    c. ASTM A320/A320M REV A: Standard Specification for Alloy Steel and Stainless Steel Bolting for Low Temperature Service.
    d. ASTM A322: Carbon and Alloy Steel Bar Publications:
    e. ASTM A380/A380M, Standard Practice for Cleaning, Descaling, and Passivation of Stainless Steel Parts, Equipment, and Systems.
    f. ASTM A480/A480M: Standard Specification for General Requirements for Flat-
    g. Rolled Stainless and Heat Resisting Steel Plate, Sheet, and Strip
    h. ASTM A507-10: Standard Specification for Drawing Alloy Steel, Sheet and Strip, Hot-Rolled and Cold Rolled.
9. National Electrical Manufacturers Association (NEMA).
    a. NEMA 250: Enclosures for Electrical Equipment (1000 Volts Maximum).
    b. NEMA ICS 6: Industrial Control and Systems: Enclosures.
    c. NEMA MG1: Motors and Generators.
10. National Fire Protection Association (NFPA):
    a. 70, National Electric Code (NEC).
    b. 820, Standard for Fire Protection in Wastewater Treatment and Collection Facilities.
11. Occupational Safety and Health Administration (OSHA).
12. UL (UL):
    a. 508: Standard for Industrial Control Equipment.
    b. 508A: Standard for Industrial Control Panels

B. Stainless Steel:

1. The entire unit shall be manufactured from AISI 316L stainless steel shapes. All components made of stainless steel shall be passivated by full submergence in a pickling bath for perfect surface finishing. No stainless steel components may be fabricated or assembled in a factory where carbon steel products are also fabricated, in order to prevent contamination by foreign debris which can cause corrosion of stainless steel.
2. The equipment after its fabrication, shall undergo a passivation (pickling) process to ensure maximum resistance to corrosion. All stainless steel components and structures shall be submersed in a chemical bath of nitric acid and hydrofluoric acid to remove any residues that may be present on the material as a result of forming, manufacture, or handling. After removal from the pickling bath, the equipment must be washed with a high-pressure wash of cold water to remove any remaining surface debris and promote the formation of an oxidized passive layer. Submergence ensures complete coverage. Spray on chemical treatments, electropolishing and glass bead blasting are specifically not acceptable.
3. All welding in the factory shall use shielded arc, inert gas, MIG or TIC method. Filler wire shall be added to all welds to provide for a cross section equal to or greater than the parent metal. Butt welds shall fully penetrate to the interior surface and gas shielding to interior and exterior of the joint shall be provided.
4. Bolts, nuts and washers shall be selected from AISI 316L stainless steel such that they are anti-seizing.

5. All welding is performed in accordance with American Welding Society (AWS) ED1.1 Structural Welding Code, or equivalent.

C. Responsibilities and Qualifications:

1. All equipment provided under this Specification Section shall be obtained from a single manufacturer who, with the Contractor, shall assume full responsibility for designing, furnishing and installing a complete and operational influent screening system.
   a. The manufacturer shall be the source of information on all equipment furnished regardless of the manufacturing source of that equipment.
2. Manufacturer's qualifications:
   a. For a manufacturer to be determined acceptable for providing the 6-mm (and future 2-mm) screening system on this Project, they must show evidence of a minimum of 5 installations of the same size screen as proposed for this project with 3 of these 5 screens being in operation a minimum of 3 years.
      1) All manufacturers must provide documentation from MBR manufacturers to verify the screening will not void future membrane equipment warranties.
      2) All manufacturers must provide an installation list with contact names and valid phone numbers to verify in-channel perforated plate drum screen installations meet the above requirements.

1.1 SUBMITTALS

D. Shop Drawings:

1. See Specification Section 01 33 00 for requirements for the mechanics and administration of the submittal process.
2. Product technical data including:
   a. Acknowledgement that products submitted meet requirements of standards referenced.
   b. Manufacturer's installation instructions.
   c. Manufacturer's catalog information, descriptive literature, specifications, and identification of materials for construction.
   d. Materials of construction of all components.
3. Detailed Structural, Mechanical, and Electrical Drawings showing equipment fabrications and interface with other items including:
   a. Dimensions, size, and locations of connections to other work.
   b. Details of attachment and support in channel.
   c. Scaled floor plan and sections showing dimensions, weights, structural supports, embedments, clearances, and screen discharge interface.
   d. Any structural calculations shall be stamped by a registered Idaho structural engineer.
4. Hydraulic calculations and flow curves for the proposed screen verifying that the screen is capable of processing the peak flow.
5. Head loss calculations for the Screens at peak influent flow assuming a zero percent blinded condition and 30 and 50 PCT blinded conditions.
6. Provide safety factors for the following conditions:

Flow (MGD)	TSS (mg/L)
3.20	360

7. Provide calculations of submerged surface area at maximum upstream water depth screen open area and screen velocities.
8. Gear output torque.
9. Complete motor nameplate data, as defined by NEMA, motor manufacturer, and motor modifications.

10. Functional description of internal and external instrumentation and controls including list of parameters monitored, controlled, or alarmed.
    a. See Specification Section 40 90 05 for additional details.
11. Control panel elevation drawings showing fabrication and placement of operator interface devices and associated elements.
    a. Panel layout drawings shall contain a complete Bill of Material (BOM) showing the manufacturer, quantity and complete part number of each component.
    b. Panel layout drawings shall show dimensions, clearly marked conduit entry areas and panel installation details.
    c. Control panel cooling calculations (heat load calculations) justifying if additional cooling is required within the panel. Calculations shall assume a high temperature of 85 DEGF.
12. Power and control schematics, interconnection diagrams, and wiring diagrams, including terminals and numbers.
13. The Contractor shall provide interconnection shop drawings as part of this package that show all wiring, terminations, and conduits and pull boxes. The interconnection shop drawings shall be submitted and approved prior to installation of the conduits and wire.
14. Short Circuit Current Rating (SCCR) nameplate marking per NFPA 70 as required per Specification Section 01 61 03.
15. Shop painting systems, including manufacturer's descriptive technical catalog literature and specifications.
16. External utility requirements for air, water, power, drain, etc., for each component.
17. Recommended spare parts list.
18. Detailed installation instructions, with clear step-by-step points on the correct mechanical and electrical installation procedure.
19. Equipment weights and lifting points.
20. Recommendation for short- and long-term storage.
21. A copy of the manufacturer's warranty.
22. A copy of documents proving certification of the Manufacturer's Quality Management System according to ISO 9001 and Environmental Protection Management System according to ISO 1400.1.
23. Training course outlines.
24. Certifications:
    a. Manufacturer's Certificate of Compliance of factory-applied coating system.
    b. Manufacturer's Certificate of Proper Installation.
25. Test reports:
    a. Written factory test report of inspection.
    b. Field functional test reports.
26. Annotated copies of complete PLC software programs.
    a. Provide one PDF-format file with fully annotated PLC code that can be read without the native configuration and programming environment on electronic media (USB drive).
    b. Provide one native-format file including all supporting files so that the complete project can be opened in the native configuration and programming environment on electronic media (USB drive).
    c. Provide written descriptions completely defining all function blocks used in program.
    d. Provide list of all addresses referenced in logic diagram with description of data associated with each address (Tag database).
27. HMI graphic screen displays; provide in actual colors utilized.
28. Network diagram showing screen control system network architecture of all networked equipment with IP addressing to be coordinated with the Owner.

29. Submit detailed testing plans and proposed testing documentation after review of the Quality Assurance submittal showing conformance with requirements herein. Obtain approved submittal a minimum of 30 working days prior to testing:
    a. Factory Acceptance Testing (FAT) plan:
        1) FAT schedule and location.
        2) FAT procedures and test forms.
        3) As a minimum, the following information shall be included in the Factory Acceptance Test Plan for each test:
            a) Test identification number
            b) Test name and description
            c) List of all equipment to be tested including any special test equipment required. Test displays are to be developed by the subsystem provider for FAT testing.
            d) FAT application program testing:
                (1) For PLC Testing: If the PLC application programs are completed prior to the FAT, they will be tested as part of the FAT.
            e) Description of test procedure in logical steps for testing:
                (1) Subsystem PLC control panel functionality and performance testing including PLC Networks and equipment, PLC regulatory control logic, Ethernet Network and equipment, and PLC I/O subsystems.
            f) Description of expected response verifying the completion of each logical step.
            g) Space for recording results of the test, time, date, and signature lines for approval by Owner's witness and subsystem supplier.
        4) The final draft of the software and hardware documentation shall be used during these tests to ascertain the accuracy and completeness of the documentation.

E. Operation and Maintenance Manuals:

1. See Specification Section 01 33 04 for requirements for:
    a. The mechanics and administration of the submittal process.
    b. The content of Operation and Maintenance Manuals.

F. Informational Submittals:

1. Provide structural design calculations by a Professional structural engineer registered in the State of Idaho to support the structural design of the screen and anchors to withstand the worst-case load on the screen at maximum upstream water level in the channel with no water in the downstream channel.
2. Special shipping, storage and protection, and handling instructions.

1.3 ENVIRONMENTAL CONDITIONS

A. Unless otherwise specified, equipment and materials shall be sized and de-rated for the ambient conditions at an elevation of 5,400 feet without exceeding the manufacturer's stated tolerances.

B. The screens will be installed indoors in the Headworks Building as shown on the Drawings.

C. Hydrogen sulfide will be present due to the nature of an enclosed headworks. Use of corrosion resistant materials for equipment provided under this specification section is a requirement.

D. Equipment Environment Application Rating: Class 1 Division 1 Groups C & D.

1.4 DELIVERY, STORAGE, AND HANDLING

A. The system shall be delivered to the site in fully assembled units to the extent possible.

B. Refer to Specification Section 01 65 50 for additional requirements.

1.5 SEQUENCING AND SCHEDULING

A. Owner shall attain services of a Contractor under a separate contract to coordinate sequencing and scheduling of Work associated with this Section.

1.6 PROJECT/SITE CONDITIONS

A. The product will be located indoors.

1. Temperatures: Between 45 DEGF and 85 DEGF.

1.7 WARRANTY

A. The manufacturer will warrant against any defects in material or workmanship for the equipment included under this specification section. This warranty will commence upon delivery of the products and will expire two (2) years from substantial completion of the installation of the product.

1.8 PERFORMANCE BOND

A. Refer to Section 00 61 13 for requirements..

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Subject to compliance with the Contract Documents, the following manufacturers and noted screen models are acceptable:

1. Huber Technology, Inc. – Rotamat® RPPS 1400/6.
2. Saveco – SAVI Flo-Drum In-Channel Rotating Drum Screen Model VSA 1400/6.
3. Or equal.

2.2 PERFORMANCE AND DESIGN REQUIREMENTS

A. Influent Screen 01 (SCRN-02-01), Influent Screen 02 (SCRN-02-02):

1. Performance:
    a. Influent type: municipal raw sewage.
    b. Perforation Size: 6 mm.
    c. Average Annual Design Conditions:
        1) Flow: 1.19 MGD.
        2) TSS Concentration: 300 mg/L.
    d. Peak Month Design Conditions:
        1) Flow: 1.46 MGD.
        2) TSS Concentration: 320 mg/L.
    e. Peak Day Design Conditions:
        1) Flow: 1.83 MGD.
        2) TSS Concentration: 360 mg/L.
    f. Peak Hour Design Conditions:
        1) Flow: 3.20 MGD.
        2) TSS Concentration: same as Peak Day conditions.
    g. Hydraulic Conditions:
        1) Screen manufacturer shall verify upstream and downstream water level requirements for the screens.
        2) Maximum Head Loss at Peak Hour Conditions: 1.56 inches at 50 PCT blinding.
        3) Maximum Upstream Water Level: 33.12 inches (elevation 5253.76).
            a) Maximum upstream water level refers to the maximum water level the screen can accept before overflowing and bypassing occurs.

b) Design Upstream Water Level: 24.12 inches (elevation 5253.01).

4) Maximum Downstream Water Level: 31.62 inches (elevation 5253.63).

a) Design Downstream Water Level: 22.44 inches (elevation 5252.87).

h. Wet Screenings Capacity: 1.07 cubic feet per hour at peak hour flow of 3.20 MGD.

i. Maximum Drum Diameter: 1,400 mm.

1) 6-mm screen drum diameter shall be sized to match the drum diameter of the future 2-mm screens.

j. Channel Depth: 4.5 feet.

k. Screenings Discharge Height (above finished floor): 5.0 feet.

l. Length from discharge chute to screen bearing: 16 feet 7 inches.

m. Minimum Screenings Capture Rate (SCR): 86 PCT.

1) Provide validation certified by National Screen Evaluation Facility, Northumbrian Water.

n. Installation Angle: 35 DEG.

o. Spray Wash Water: 46 GPM at 75 PSI.

p. Power Supply: 460V, 3 phase, 60 Hz.

q. Maximum Motor Size: 2 HP.

r. System shall be suitable for installation in Class 1, Division 1, Group D environment.

B. The screens shall be designed to handle the maximum flow with the maximum upstream and downstream liquid levels as specified above.

C. The nominal perforation sizes specified above shall be the width of the circular perforated plate opening. Screen designs which define the bar spacing as the distance between a fixed bar element and a moving adjacent bar element are not acceptable. Screens using rotating rakes, screw flight mounted brushes, wedge wire, or traveling filter media are also not acceptable.

D. The average perforation flow through velocity shall not exceed 3.3 ft/sec (1.0 m/sec) under any flow condition up to the maximum clean water flow specified above. The screen design shall minimize solids deposits in the channel.

E. The screen shall be capable of processing spherical objects with a diameter of 3-1/8 IN. Such objects shall be conveyed through the auger and shall be discharged with the screenings. The unit shall be capable of processing the screenings load specified above.

F. The perforated plate screen shall consist of a rotating cylindrical screen with an integral screw conveyor and screenings press. The fine screen shall use a single drive for screening, conveying, dewatering and compressing the screening material. The screen shall have an inclination as recommended by the manufacturer.

G. Operation of the rotating screen shall be automatically initiated at a preset water differential between upstream and downstream water level. Screens which operate continuously or via timer only will not be acceptable. The rotating basket shall remove solids from the flow and deposit them into the concentric screw conveyor hopper using dual alternating spray bars providing positive cleaning of the screen basket surface. The screenings shall be transported up the screw conveyor, through an integrated screening washing system, a compaction and dewatering zone and then shall be discharged into a trash bin provided by Owner.

H. All open spaces of the screen shall be positively cleaned via a spray bar. Screens using a rotating rake or only screw flights with brushes will not be acceptable.

I. The screening equipment shall produce dewatered screenings capable of passing the EPA Paint Filter Test as described in method 9095 of EPA Publication SW-486.

J. To minimize odors and nuisance, the conveyance, dewatering and compaction zones shall be completely enclosed.

K. The spray wash systems shall be enclosed such that spray water, aerosols or leakage do not contaminate the operating floor.

L. The control system shall be designed such that the cleaning characteristics of the screen and wash system can be changed via the programmable controller. Systems which do not offer this feature will not be acceptable for this project.

M. The screens shall be designed so that there are no metal on metal wearing surfaces in the screening, transport and compaction/dewatering zones of the screen. The spiral shall be supported between the gearbox and the bottom bearing and shall not rely on the anti-rotation bars for support. Units requiring wear liners or wear bars shall not be accepted.

N. The rotating drum screen shall be capable of presenting a clean filtration surface to the oncoming liquid stream at all times during operation.

O. Each screen shall be supplied with an endless bagging system attached to the discharge chute.

P. Materials (Huber and Saveco):

1. Unless otherwise specified in these specifications, the entire equipment shall be manufactured from AISI 316L austenitic stainless steel shapes (rods, angles, and channels), pipes, and sheets. All mechanical parts shall be designed to handle the forces that may be exerted on the unit during fabrication, shipping, erection, and proper operation according to the O&M manual.
2. The entire equipment shall be manufactured in a stainless steel only factory to prevent contamination of the stainless steel with foreign contaminants.

Q. Production design specifications (Huber only):

1. Screen:
    a. The perforated plate screen shall be designed and built to withstand the maximum possible static and hydraulic forces exerted on the screen by the liquid force. All structural and functional parts shall be sized for the loads encountered during the screening, conveying and pressing operations to prevent deflections or vibrations that may impair screening, conveying, washing and compacting operations. All submerged components and all components of the rotary screen in contact with the screened solids shall be of stainless-steel construction.
    b. The screen basket shall be of a cylindrical shape. The perforated plate spacing shall be as specified in 2.2.A.1.b. Bars or wedge wire will not be acceptable screen media.
    c. The basket diameter shall have a width as noted in 2.2.A.1.i.
    d. The upper end of the basket shall incorporate a support ring which shall be machined and supported by one (1) double guide roller and two (2) single guide rollers made of polyamide. The guide rollers shall be attached to an upper support plate. This plate shall match a flange that is attached to the auger tube to ensure proper alignment of the basket. A brush shall be clamped to the upper support plate sealing the gap between the rotating screen basket and the fixed upper support plate.
    e. The lower support ring of the basket shall be connected to the shaft of the auger and be driven by a common drive with the auger. The basket shall be connected with a solid support arm at the lower end of the basket which is bolted to the auger shaft.
    f. A seal plate shall be provided between the circular screen and the channel. The seal plate shall be one-piece fabricated of stainless-steel plate. The sealing plate shall be of sufficient height to prevent bypassing of flow around the screen at the maximum screen hydraulic capacity. A polyurethane seal shall be provided to ensure proper sealing of the rotating screen basket against the fixed sealing plate. This polyurethane seal ensures that there will be no bypass of unwanted solids through the screen. Screens using a brush for sealing the gap between the fixed seal plate and the rotating screen basket shall not be allowed.
    g. The screen shall be provided with a support stand. The support stand shall be fabricated from stainless steel Double-C-Channels having the minimum dimensions of 11.8 IN by 4.4 IN with a thickness of 0.15 IN.
    h. The screen shall be provided with a stainless-steel housing of four wall plates and a cover. The housing shall be made of 5/64 IN thick 316 stainless steel plate. The cover

shall be made of 0.06 IN thick plate. The cover shall be removable and shall be secured with turn-locks.

2. Screen and trough cleaning:
    a. The screen basket shall rotate in one direction and pass through the topmost position where it is cleaned with dual alternating stainless steel high-pressure spray bars.
    b. The brush shall be designed to ensure cleaning of the spaces to the full depth of the perforated plate. The cleaning brush shall be mounted upon a stainless-steel holding device which keeps the brush in constant contact with the basket and shall be adjustable to allow for brush wear.
    c. Another stainless steel backed nylon brush shall be attached to the rotating basket and positioned to make contact with the screening trough to sweep material caught on the edges of the trough.
    d. If necessary, the screen will be provided with a pump to assist with screenings removal during high flows.
3. Screenings conveyor and screenings wash-press:
    a. The auger tube shall have a diameter of 10-3/4 IN. The auger tube shall incorporate four (4) anti-rotation bars which shall be welded or bolted to the inside of the transport tube along the longitudinal axis. The screw shall not be in contact with the anti-rotation bars during normal operation, the screw shaft shall be supported by a Teflon® lined bronze slide bearing at the bottom and the gear box at the top.
    b. A support flange with a minimum thickness of 0.8 IN shall be welded to the screenings transport tube.
    c. A gear box support flange with a minimum thickness of 0.78 IN shall be welded to the upper end of the screenings transport tube for attachment of the drive assembly.
    d. A shafted auger screw that is entirely made of stainless steel shall be provided to transport and dewater the screened material. A shaft-less screw shall not be acceptable. Screw flights shall be of decreasing pitch approaching the compaction zone to provide a mechanical compressing action on the screenings material. The shaft shall have a diameter of 8.6 IN and shall have flights with a minimum thickness of 0.3 IN in the transport zone and 0.4 IN in the compaction zone. A replaceable flight section with an angle of about 120 degrees that is bolted to the shaft shall be provided at the bottom of the shaft where the wear is highest.
    e. A compaction zone shall be an integral part of the screenings screw conveyor and transport tube design. The compaction zone shall be designed to form a screenings plug of material and to return water released from the screened material back to the wastewater channel/pump sump through circular holes that are machined into the screenings transport tube.
    f. The auger shaft shall be fitted with an upper and a lower solid stub. Stubs and screw shaft shall be accurately machined and shrink-fitted.
    g. The lower bearing shaft and arm shall be designed to minimize material wrapping around the shaft. A seal plate shall be furnished to mate between the stationary lower bearing support and the rotating arm to prevent material intrusion into the bearing seals.
    h. A compaction zone shall be provided as an integral part of the screw conveyor and tube. The compaction zone shall be designed to form a plug of screenings material and to return water released from the screened material back to the channel through 0.2 IN (5 mm) diameter perforations that are machined into the screenings transport tube in a square configuration.
    i. The compaction zone shall be provided with split glass fiber reinforced housing, furnished with gaskets and bolts, and easily removable for access. Designs requiring removal of the drive assembly, discharge head, or screw conveyor to gain access to the compaction zone will not be acceptable. The housing shall be provided with a drain connection at its lowest point and a clamped flexible PVC hose for drain water whose other end is connected to a connection through the screen basket's upper support

flange to return the drain water into the screen basket. The plastic housing shall also be provided with a 1 IN flush connection.

4. Drive:
    a. The basket mechanism and transport screw shall be driven by a shaft mounted geared motor. The geared motor shall have a minimum service factor of 1.15. The motor shall be provided with thermostats to provide thermal overload protection in addition to current overload protection.
    b. The gear reducer shall be bolted to a machined flange welded to the upper end of the transport tube.
    c. The gear reducer shall be driven by a 3 phase, 60 Hz, 230/460 volt, Class 1, Division 1, Group D inverter-duty, totally-enclosed, fan-cooled motor which leads to a conduit box for outdoor operation. The motor rating shall be a maximum of 2.0 HP.
    d. Chain drives, belt drives, hydraulic driver or designs incorporating a separate upper bearing for the transport screw will not be accepted.
5. Spray wash systems:
    a. The screen shall be designed for a water supply of 46 GPM per screen and shall be provided with wash water distribution manifold with a single 1 IN point for connecting to the treatment plant's final effluent water (utility water) and/or potable water supply.
    b. An automatic spray wash system shall be provided for cleaning of the screen basket and shall be constructed of minimum 1 IN diameter piping and minimum 1 IN diameter flexible reinforced PVC hose. The spray wash systems shall be operated only while the screen basket is rotating. The spray wash system shall include 1 IN solenoid valves for flow control to the various zones as required. Minimum pressure to the spray wash shall be 75 PSI.
    c. The screen shall incorporate a screenings washing system (IRGA) distributed from one connection point. The washing system shall include five (5) washing points. Two points shall be located within the screenings wash zone, one point shall be located at the screen compaction zone, and two points shall be located at the screen drum. Each washing point shall include one (1) 1 IN solenoids valve for flow control.
        1) The screenings wash zone in the conveyor tube shall be provided with three nozzles located equidistant around the circumference to maximize the washing performance.
        2) A lower wash system shall be located above the open top of the hopper and shall utilize a spray bar with a minimum of 2 spray nozzles.
        3) The screen compaction zone shall be provided with a wash nozzle designed to flush the entire interior surface of compaction zone housing to ensure no debris buildup can occur.
    d. The solenoid valves shall be operated by the programmable logical controller. Individual manual operation of each solenoid shall also be possible from the control panel.
    e. The solenoid valves shall be minimum 1 IN diameter, 316 stainless steel body, 2-way, and designed for 110 VAC with an explosion-proof rating. Solenoid valves shall be normally closed and rated for up to 140 PSI.
        1) A 2 IN 316 stainless steel body Y-strainer shall be provided for the incoming plant service water for each screen.
6. Screen framework:
    a. Cross section with a minimum thickness 1/4 IN.
    b. Various parts fastened by welding, riveting, or bolting shall be braced as necessary to ensure a rigid structure.
    c. No braces, gussets, or stiffeners inside the screen frame that will allow for screenings to collect.
    d. Supplied in one piece requiring no field assembly.
    e. Suitably reinforced to support the required loads.

7. Perforated plate screen assembly enclosure:
    a. Main enclosure:
        1) Material: Type 316 stainless steel, 3/16 IN.
    b. Access doors: A minimum of two (2) access panels shall be provided. Each access panel shall be provided with quarter turn latches with a handles.
    c. Provide lifting eyes at the four corners of the cover to allow for complete removal of the channel cover.
    d. Enclosures shall include a 6-inch diameter connection for foul air exhausting on the outlet side.
        1)
8. Anchor Bolts:
    a. Equipment manufacturer shall furnish all anchor bolts of ample size and strength required to securely anchor each item of equipment. Anchor bolts, hex nuts, and washers shall be stainless steel. Anchor bolts shall be wedge or epoxy type.
    b. Anchor bolts shall be set by the contractor. Equipment shall be placed on the foundations, leveled, shimmed, bolted down, and grouted with a non-shrinking grout.

R. Production design specifications (Saveco only):

1. Drum screen basket:
    a. The Drum Screen Basket shall be designed and built to withstand the maximum possible static hydraulic forces exerted on the screen by the liquid flow. Structural and functional parts shall be sized to prevent deflections or vibrations that may impair the screening, conveying, washing and compacting operations.
    b. The drum screen basket shall be of a cylindrical shape with perforations around the entire basket. The drum screen basket shall be perforated plate with opening sizes as specified in 2.2.A.1.b. Bar screens, wire mesh or wedge wire will not be acceptable screen media.
    c. The top end ring and the bottom drive ring inclusive of support arm(s) shall each be made from a single plate from stainless steel. Units which use multiple pieces for each end and that are welded or otherwise affixed shall not be accepted.
    d. Units with a drum screen basket diameter of 1,400 mm and above shall be provided with dual lower support arms.
    e. A support arm hub shall be welded directly to the support arm(s). The hub shall be machined complete with keyway from a single piece of stainless steel. The hub shall be sized to support the drum screen basket without deflection or distortion.
    f. The drum screen basket shall have shaped lifting vanes to retain loose solids during rotation and lift them up and into the screw auger trough. Helical shaped vanes which can tumble screenings rather than lift screenings shall not be accepted.
    g. A one-piece stainless steel seal plate shall be provided to direct water flow into the circular drum screen basket in the channel. The seal plate shall be sufficient to prevent bypassing of flow around the screen basket at the maximum screen hydraulic capacity.
    h. The drum screen basket shall be provided with a triple face seal system, incorporating an internal brush in order to minimize bypassing of hair and other fine particles, one polyurethane seal creating a labyrinth through a ring welded on the drum screen, and an external rubber seal pressing on the external part of the drum ring preventing laminar bypass. Any unit which does not incorporate this design will not be accepted.
    i. The upper portion of the drum screen basket shall have a brush seal to prevent screenings from being carried into the channel from splashing inside the drum.
    j. The drum screen basket and screw conveyor shall be fixed to the same shaft and driven by a common drive.
    k. The drum screen basket shall be supported by the drive end with a reinforced support arm and by nylon rollers at the opposite end. Each of the rollers shall use two ball bearing assemblies mounted to the stainless-steel shaft. The rollers and bearings shall

require no lubrication. A preload adjustment system shall be included for the rollers. Screens using wear shoes or glides to guide or support the basket shall not be accepted.

2. Drum screen basket cleaning brush and spray bar:
    a. The rotating drum screen basket assembly shall be cleaned by a stainless-steel spray bar with stainless steel spray nozzles and a stainless steel backed polypropylene brush. The drum screen basket shall continuously rotate in one direction during the cleaning cycle and pass through the topmost portion where it is cleaned by the spray bar and brush.
    b. The drum screen basket shall incorporate a brush and spay wash located above the basket to remove solids from the screening basket and direct them into the concentric screw conveyor trough as the basket rotates.
    c. The cleaning brush shall be mounted on a holding device which keeps the brush in constant contact with the screen basket and can be adjusted to compensate for brush wear.
    d. The drum screen basket shall have a stainless steel backed brush attached to sweep materials from the edge of the screw conveyor trough.
3. Screenings conveyor and dewatering zone:
    a. The transport tube shall be provided with anti-rotation bars bolted from the outside along the longitudinal axis. The screenings screw conveyor shall not be dependent on the anti-rotation bars for support during normal operation.
    b. The screenings shafted transport/dewatering screw shall be constructed from type 316L stainless steel.
    c. The screen basket rollers and screenings collection hopper shall be attached to the screenings transport tube by a basket support flange. The drive assembly shall be attached via a drive support flange welded to the upper end of the screenings transport tube. The basket shall be mounted to the unit with a solid support arm hub at the lower end of the basket. The support arm hub shall be bolted directly to the concentric screw shaft.
    d. The screenings shafted transport screw shall have a brush mounted on it for the length of the screenings inlet/drainage hopper.
    e. The concentric transport/dewatering screw shall be designed to transport and dewater the screened material. The unit shall be provided with screw flights of constant pitch approaching the compaction zone in order to prevent clogging in the compaction zone. Designs incorporating a decreasing pitch screw will not be accepted.
    f. The screenings screw conveyor shall be supported by a sealed, self-lubricating lower bronze bushing. The shaft in contact with the bushing shall be protected by chrome a plated sleeve. The lower bushing shall be designed such that it does not take any thrust load from the screw conveyor. Designs requiring bearings of any type or externally lubricated bushing(s) or water injection into the housing shall not be accepted.
    g. The lower bearing shall have a 10-year or 55,000 HRS of bearing life. Bearings unable to meet this service life will not be accepted.
    h. The stainless steel lower bearing shaft and arm(s) shall be designed to minimize material wrapping around the shaft. A stainless steel seal plate shall be provided to mate between the stationary lower bearing support and the rotating arms(s) to prevent material intrusion into the bearing seals.
    i. The compaction zone shall be integral to the screenings screw conveyor and compaction tube. The compaction zone shall be designed to form a screenings plug and return water released from the screened material back to the channel through circular holes that are machined into the screenings compaction tube.
    j. The screw conveyor shall transport the screenings to the compaction/dewatering chamber. After compaction and dewatering, the screenings shall be discharged with the aid of a serrated blade.

k. The compaction zone housing shall be fabricated entirely of 316L stainless steel. The lower body shall be a welded construction with a minimum of 10 mm end plates for maximum torsion resistance. The bottom of the compaction zone shall be curved to promote maximum cleaning and minimum depositing of materials. Units utilizing a fiber glass reinforced compaction zone housing will not be accepted.

l. The compaction zone shall be furnished with a latched, hinged access cover with a gasket. The access cover shall incorporate a safety interlock switch in order to prevent operation of the unit with the access cover open. Units which require the use of any tools to gain access to the compaction zone will not be accepted.

4. Spray wash system:
   a. The spray wash system shall include one 1 IN connection point per screen. Provide 2 IN strainer as required for each screen.
   b. The automatic spray wash systems for the screen shall be furnished with automatic controlled valve(s).
   c. Spray wash systems shall be constructed of 316 stainless steel piping and fittings, flexible rubber reinforced hoses and stainless steel or PVDF spray nozzles. Spray wash system shall operate only when the screen basket is rotating.
   d. The screen wash system shall be located over the rotating basket which utilizes spray bars with adequate spray nozzles to ensure a consistent spray pattern over the entire length of the basket. For maximum wash water flow rate and pressure the spray bar will be controlled with an electric actuated full port stainless steel ball valve. Full port ball valve shall have a maximum Cv rating of 60.
   e. A screenings spray wash system shall be located in the lower section of the transport tube to break up and return organic materials to the flow stream and to ensure maximum screenings washing.
   f. A compaction zone wash system shall be provided which periodically cleans the compaction and dewatering zone via a stainless steel wash header located in the uppermost end of the compaction/dewatering chamber. The header shall be designed to completely wash the full surface of the transport tube drainage area. Wash water to the compaction zone will be controlled with a stainless steel body solenoid valve.
   g. The electric actuated full port stainless steel ball valve shall be 120V AC rated and operated via the programmable controller and/or manually.
   h. The solenoid valves shall be minimum 1 IN diameter, 316 stainless steel body, 2-way, and designed for 110 VAC with an explosion-proof rating. Solenoid valves shall be normally closed and rated for up to 140 PSI. The solenoid valve shall be operated via the programmable controller and/or manually.
5. Drive unit:
   a. Drive unit shall be rigidly supported so that there is no visible "wobble" movement under any operating condition.
   b. Basket and transport screw shall be driven by a shaft mounted geared motor.
   c. The gear reducer shall be bolted to a machined flange welded to the upper end of the transport tube.
   d. Gear reducer shall be a helical gear type as manufactured by NORD or approved equal. Provide a cast iron frame; design in accordance with AGMA 1 recommendations for wastewater service.
   e. Gear reducer shall be driven by a maximum 2.0 HP, TEFC, 480V, 3 PH, 60 Hz motor suitable for the area classification.
   f. Chain drives, belt drives, hydraulic drives or designs incorporating a separate upper bearing for the transport screw will not be accepted.
6. Perforated plate screen assembly enclosure:
   a. Main enclosure:
      1) Material: Type 316 stainless steel or aluminum, 3/16 IN thick.

b. Access doors: A minimum of two (2) access panels shall be provided. Each access panel shall be provided with quarter turn latches with a handles.

c. Provide lifting eyes at the four corners of the cover to allow for complete removal of the channel cover.

d. Enclosures shall include a 6-inch diameter connection for foul air exhausting on the outlet side.

7. Anchor bolts:

a. Equipment manufacturer shall furnish all anchor bolts of ample size and strength required to securely anchor each item of equipment. Anchor bolts, hex nuts, and washers shall be stainless steel. Anchor bolts shall be epoxy type.

b. Anchor bolts shall be set by the Contractor. Equipment shall be placed on the foundations, leveled, shimmed, bolted down, and grouted with a non-shrinking grout.

S. Electrical controls and devices (Huber and Saveco):

1. All controls necessary for the fully automatic operation of the screens shall be provided, including a NEMA 12 main control panel for each screen, and a NEMA 7 local control station. Each main control panel shall be wall mounted, and the local control station shall be pedestal mount. The pedestals shall be corrosion resistant and provided by the screen manufacturer.

2. Screen manufacturer shall provide radar level sensors as indicated in Drawings and specified in Specification Section 40 90 00 for continuously monitoring of the upstream and downstream water levels for control of screen operation. The transducers shall be rated for Class 1 Division 1 hazardous locations and shall be intrinsically safe without the use of additional barriers. The transmitter shall be mounted next to the main control panel. Contractor shall install the transducers and provide wiring to the control.

3. Each main control panel shall be suitable for indoor unclassified electrical room installation. Enclosure shall be NEMA 12 with continuous hinge and lockable door latch, and shall include the following:

a. Door-interlocked and fused disconnect.

b. 600 VAC terminal block.

c. VFD and Circuit Breaker Branch Circuit Protection for screen motor. VFD's shall be Allen Bradley Powerflex series: Less than 5HP may be PowerFlex 525; 5HP or greater shall be PowerFlex 753 with 20-750-ENETR Ethernet card and 20-HIM-A6 HIM. Each VFD shall be provided with its own programming and display modules (HIM).

d. Control power transformer with 120 VAC transient voltage surge compressor (TVSC) and fused primary and secondary.

e. Programmable logic controller (PLC), Allen Bradley 5069 CompactLogix..

f. Panel mounted Human Machine Interface (HMI), Allen Bradley Panel View Plus 7, 10-IN display.

g. Pilot lights for:

1) Control power on (white).

2) Screen running (green).

3) Screen high level (amber).

h. Screen fault (red).

i. E-stop push button (red).

j. Screen reset push button (black).

k. Flashing alarm light and alarm horn with silencer-reset button.

l. Plastic Nameplates.

m. Panels shall be provided with provision for Ethernet/IP communication with the Plant SCADA system as indicated on the Drawings. Provide an Allen-Bradley Stratix 5800 un-managed Ethernet switch in each screen control panel for connection to Vendor

provided Ethernet/IP capable devices and connection to plant SCADA over copper ethernet.

n. The plant systems integrator under the Owner for this project is responsible for overall plant SCADA system and as such will integrate the Fine Screen Control Panel PLC into the plant SCADA.

o. Fine Screen Control Panel Supplier shall integrate the PLC and the PLC program so all I/O and internal data needed for the SCADA system is available in addressable PLC registers. Fine Screen Control Panel Supplier shall provide a listing of those registers and addresses in a PLC database for use by the plant systems integrator.

4. A local operator station shall be provided. Enclosure shall be NEMA 7 cast aluminum, and shall include the following:
   a. Hand-Off-Auto selector switches for the following:
      1) Screen drive.
   b. Screen forward-off-reverse (spring return of off from reverse) for the following:
      1) Screen drive.
   c. Spray wash HOA selector switches for the following:
      1) Drum Spray bar.
      2) Compaction zone flushing.
   d. E-stop pushbutton (red).
5. Safety microswitch: 120 volt safety interlock switch shall be factory mounted to the compaction/discharge zone access door. Interlock switch shall prevent operation of the screen while the doors is open. Switch housing shall be rated for NEMA 7.

T. Operation, monitoring, and control:
1. Screen hand operation: Screen to run continuously.
2. Screen automatic Operation: Operation of the rotating drum screen basket and spray bar(s) shall be automatically initiated at a preset high liquid level or at high differential level. Screen to cycle based on the level sensor.
3. Basket zone spray wash/screening wash system hand operation: Spray wash shall run continuously.
4. Basket zone spray wash/screening wash system automatic operation: Spray wash shall run when the spiral assembly is rotating in forward operation and also have the capability to sequence on and off if conditions warrant.
5. Compaction zone spray wash hand operation: Spray wash shall run continuously.
6. Compaction zone spray wash automatic operation: An intermittent cleaning cycle of the drum screen basket shall be initiated by the upstream water level as required. All open spaces of the drum screen basket shall be positively cleaned via brush bristles and spray wash system.
7. Fault conditions:
   a. Momentary motor over current shall trip the current monitor, stop the drive motor, and illuminate the alarm indicating light. Reset shall be manual on the outside of the control panel.

2.3 SPARE PARTS

A. The following spare parts shall be included and supplied together with the equipment:
1. 3 sets complete bottom bearing assemblies.
2. 3 solenoid valve rebuild kits.
3. 6 Polyamide rollers.
4. 3 sets basket cleaning brushes.
5. 3 high pressure rated solenoid valve rebuild kits.

2.4 FINISHES

A. For non-stainless steel and non-aluminum metal surfaces, prepare, and prime, and finish coat.

B. Equipment identification plates.

C. Anchor bolts: Type 316 stainless steel, sized by equipment manufacturer, and as specified in Specification Section 05 50 00.

PART 3 - EXECUTION (HUBER AND SAVECO)

3.1 INSTALLATION

A. Prior to submittal of shop drawings, verification of all existing and new structures and equipment dimensions and locations that are key to installing equipment specified under this section.

B. Install as indicated on the Drawings and in conformance with the manufacturer's installation instructions, and shop drawings.

C. Provide Manufacturer Field Certification.

D. Interconnecting Piping and Wiring:

1. Routed by Contractor as indicated on the Drawings.
2. Coordinated with the perforated plate screen manufacturer to ensure that it does not interfere with the perforated plate screen operation or cause screenings to hang up.

3.2 FIELD QUALITY CONTROL

A. Witnessing:

1. Field-testing witnessed by Engineer.
2. Field-testing witnessed by manufacturer's field representative.
3. Provide 48 hours advanced notice of field-testing.

B. Demonstrate that the equipment is fully operational by picking up and depositing materials into specified containment without undue noise, vibration, or interruption.

C. Measurement and Operation Tests:

1. Confirm system measurements.
2. Smooth operation, as basket and screw conveyor rotate.
3. Functionality of all controls and devices.
4. Obstruction test.

3.3 MANUFACTURER'S FIELD SERVICES

A. Coordinate field service work with the manufacturer's representative, Owner, and Engineer prior to initiating such work.

B. Furnish a qualified manufacturer's representative to provide manufacturer's field services as specified in Specification Section 01 75 00.

C. Require manufacturer's representative to perform the following services described below and as specified in Specification Section 01 75 00.

1. The requirements:
   a. The specified durations are the minimum required time on the job site.
   b. Additional services and/or longer durations shall be provided as needed at no cost to Owner to meet the required quality of work.
   c. Workday: 8 hours on site, exclusive of travel time.
2. Include a minimum of 4 trips.
   a. Installation assistance:

1) Advise/observe Contractor on the installation of the perforated plate screen assembly.

b. Installation inspection: 3 workdays.

c. Start-up/testing assistance: 3 workdays.

1) Prior to start-up, the equipment shall be inspected for proper alignment, operation, and satisfactory performance.

d. Training: As specified in Specification Section 01 75 00 and defined below:

1) Operations training: 2 hours of training, presented twice, for a total of 4 hours.

2) Mechanical maintenance training: 2 hours of training, presented twice, for a total of 4 hours.

3) Electrical maintenance training: 1 hour of training, presented twice, for a total of 2 hours.

e. Post start-up checkout: 2 workdays. Scheduled up to 6 months after equipment start-up.

3.4 PLC PROGRAMMING REVIEW MEETING

A. Conduct a configuration conference with the Owner and Owner's systems integrator to review and discuss the submitted annotated copies of complete PLC software programs.

1. The purpose of the conference will be to discuss, in detail, how the packaged system will be controlled and monitored by the PLC.
2. Review of the Owner's standards, conventions, file and tag naming requirements must be part of the conference.
3. Conferences will be held at a site designated by the Owner.
4. If required, to review all subsystems, each conference will occur on multiple days.
5. Submit 10 annotated copies of complete PLC software programs via shop drawing submittal process 10 calendar days before each conference.
6. Bring equipment to project screens on wall or provide multiple monitors for viewing by attendees.

3.5 HMI SCREEN CONFIGURATION REVIEW MEETING

A. Conduct a configuration conference with the Owner and Owner's systems integrator to review and discuss system configuration programming and related topics.

1. The purpose of the conference will be to discuss, in detail, how each I/O point will be handled and the types, quantities, hierarchies, and functioning of display screens.
2. Review of the Owner's standards, conventions, file and tag naming requirements, and font type and size requirements must be part of the conference.
3. Review the navigation bar to be utilized.
4. Conferences will be held at a site designated by the Owner.
5. If required, to review all screens, each conference will occur on multiple days.
6. Submit 10 color copies of printed screens via shop drawing submittal process 10 calendar days before each conference.
7. Bring equipment to project screens on wall or provide multiple monitors for viewing by attendees.
8. Proposed graphic screens must be reviewed with the Owner throughout the configuration process.

3.6 FAT FUNCTIONAL TEST

A. Provide a FAT for the PLC control panel with the test and subsequent retests witnessed by the Owner's Representative and Owner.

1. Provide written notice to the engineer 30 working days before commencement of the FAT activity and include:

a. Schedule for the FAT.
b. Location of the FAT.
c. Testing equipment used.
d. Detailed test procedure with forms for the recording of test results.
e. Sign-off spaces for the individuals performing and witnessing the tests.

2. Network and interwire equipment and panels as applicable. Operate and check out equipment prior to the FAT. Submit certification indicating that the panels are ready for the FAT.
3. The electrical control panel shall be inspected prior to shipping for conformance to the following:
   a. NEMA rating according to Section 2.2.A.17 and bear the UL508 label.
   b. PLC program and panel mounted HMI shall be tested for proper communication and functionality.
   c. PLC digital and analog inputs shall be electrically tested to ensure input recognition in the proper area of the PLC program.
   d. All wiring between panel components and terminal strips shall be checked for proper labeling and connection.
   e. Compliance with Division 40.

END OF SECTION