

EXHIBIT X

Submittals, Reviews, and Hold Points

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1.0 Submittal Review

A. Definitions:

1. Shop Drawings, product data, and Samples are technical Submittals prepared by Contractor, Subcontractor, manufacturer, or supplier and submitted by Contractor to Owner as a basis for approval of the use of Equipment and Materials proposed for incorporation in the Work or needed to describe installation, operation, maintenance, or technical properties, as specified in each Division of the Specifications.
 - a. Shop Drawings include custom-prepared data of all types including drawings, diagrams, performance curves, material schedules, templates, instructions, and similar information not in standard printed form applicable to other projects.
 - b. Product data includes standard printed information on materials, products, and systems; not custom-prepared for this Project, other than the designation of selections from available choices.
 - c. Samples include both fabricated and unfabricated physical examples of materials, products, and Work; both as complete units and as smaller portions of units of Work; either for limited visual inspection or (where indicated) for more detailed testing and analysis.
2. Informational Submittals are those technical reports, administrative Submittals, certificates, and guarantees not defined as Shop Drawings, product data, or Samples.
 - a. Technical reports include laboratory reports, tests, technical procedures, technical records, and Contractor's design analysis.
 - b. Administrative Submittals are those nontechnical Submittals required by the Contract Documents or deemed necessary for administrative records. These Submittals include maintenance agreements, Bonds, Project photographs, physical work records, statements of applicability, copies of industry standards, Project record data, schedules, security/protection/safety data, and similar type Submittals.
 - c. Certificates and guarantees are those Submittals on Equipment and Materials where a written certificate or guarantee from the manufacturer or supplier is called for in the Specifications.
3. Refer to ARTICLES 1.03 and 1.04 of this Part for detailed lists of Submittals and specific requirements.

B. Quality Requirements:

1. Submittals such as Shop Drawings and product data shall be of suitable quality for legibility and reproduction purposes. Every line, character, and letter shall be clearly legible. Drawings such as reproducibles shall be useable for further reproduction to yield legible hard copy.
2. Documents submitted to Owner that do not conform to specified requirements shall be subject to rejection by Owner, and upon request by Owner, Contractor shall resubmit conforming documents. If conforming Submittals cannot be obtained, such documents shall be retraced, redrawn, or photographically restored as may be necessary to meet such requirements. Contractor's, or his Subcontractor's, failure to initially satisfy the legibility quality requirements will

not relieve Contractor, or his Subcontractors from meeting the required schedule for Submittals.

C. Language and Dimensions:

1. All words and dimensional units shall be in the English language.
2. Metric dimensional unit equivalents may be stated in addition to the English units. However, English units of measurement shall prevail.

D. Submittal Completeness:

1. Submittals shall be complete with respect to dimensions, design criteria, materials of construction, and other information specified to enable Owner to review the information effectively.
2. Where standard drawings are furnished which cover a number of variations of the general class of Equipment, each drawing shall be annotated to indicate exactly which parts of the drawing apply to the Equipment being furnished. Use hatch marks to indicate variations that do not apply to the Submittal. The use of "highlighting markers" will not be an acceptable means of annotating Submittals. Annotation shall also include proper identification of the Submittal permanently attached to the drawing.
3. Reproductions or copies of Contract Drawings or portions thereof will not be accepted as complete fabrication or erection drawings. Contractor may use a reproduction of Contract Drawings for erection drawings to indicate information on erection or to identify detail drawing references. Whenever the Drawings are revised to show this additional Contractor information, Owner's title block shall be replaced with Contractor's title block, and Engineer's professional seal shall be removed from the drawing. Contractor shall revise these erection drawings for subsequent revisions to the Contract Drawings.

E. Form of Submittals:

1. Submittals and other Project documents shall be transmitted in electronic format as specified.
 - a. Selected Submittals may be provided in paper ("hardcopy") copies with advance approval of Owner, and using procedures specified herein.
 - b. Equipment instruction books and operating manuals shall be provided in paper copies in addition to specified electronic format.
2. Electronic Format using Engineer's Document Management System:
 - a. Scanned Submittals and documents are not acceptable. Transmit Submittal and Project documents in:
 - 1) Adobe *PDF files created directly from native electronic format, or
 - 2) Owner-approved equal.
 - 3) Electronic Submittals in .tif format are permitted only with specific Owner approval.
 - b. Each drawing shall be submitted with an electronic filename that is equivalent to the drawing number, and any resubmitted drawing shall use the same filename as the original file name each time.
 - c. Contractor Submittals shall be accompanied with a completed transmittal letter. Submittals that are not accompanied with an approved transmittal letter will not be accepted and will be returned to Contractor.
 - d. All Contractor transmittal letters submitted to Owner shall be in the form supplied and shall contain as a minimum the following information:
 - 1) Contractor's Name.
 - 2) Engineer's Project number.
 - 3) Owner's Contract number.

- 4) Filename.
 - 5) Description of the information contained in the specific Submittal.
 - 6) Revision number.
 - 7) Submittal type.
 - 8) Date of Submittal.
- e. Nonconforming Submittals are subject to rejection by Owner.
3. Owner's review comments will be provided electronically in Adobe *PDF format.
 4. Digital delivery media for transmittal of electronic documents and Submittals shall be through Engineer's Document Management (DM) Project website in accordance with the procedures specified herein, as addressed below. More information will be provided in the pre-construction conference for this Contract.
 - a. DM guidelines and procedures:
 - 1) Contractor shall complete the DM transmittal letter spreadsheet (provided by Owner after award), package Submittals in one ZIP file, and upload transmittal to the DM website.
 - 2) Contractor shall collect and download reviewed Submittals after notification from Owner that the reviewed Submittals have been posted to the DM website.
 - 3) A confirmation email is automatically distributed to Contractor after a successful upload to the DM website. If a confirmation email is not received by Contractor, a potential error has occurred; and Contractor shall contact Owner.
 - b. Refer to Appendix A for summary of DM System.

F. Technical Submittals:

1. Items shall include, but not be limited to, the following:
 - a. Manufacturer's specifications.
 - b. Catalogs, or parts thereof, of manufactured Equipment.
 - c. Shop fabrication and erection drawings.
 - d. General outline drawings of Equipment showing overall dimensions, location of major components, weights, and location of required building openings and floor plates.
 - e. Detailed Equipment installation drawings, showing foundation details, anchor bolt sizes and locations, baseplate sizes, location of Owner's connections; and all clearances required for erection, operation, and disassembly for maintenance.
 - f. Schematic diagrams for electrical items, showing external connections, terminal block numbers, internal wiring diagrams and one-line diagrams.
 - g. Bills of material and spare parts list.
 - h. Instruction books and operating manuals.
 - i. Material lists or schedules.
 - j. Performance tests on Equipment by manufacturers.
 - k. Concrete mix design information.
 - l. Samples and color charts.
 - m. All drawings, catalogs or parts thereof, manufacturer's specifications and data, Samples, instructions, and other information specified or necessary:
 - 1) For Owner to determine that Equipment and Materials conform to the design concept and comply with intent of the Contract Documents.
 - 2) For proper erection, installation, operation, and maintenance of Equipment and Materials which Owner will review for general content but not for basic details.

- 3) For Owner to determine what supports, anchorages, structural details, connections, and services are required for Equipment and Materials, and effects on contiguous or related structures and Equipment and Materials.
2. Prepare and submit the following lists for review:
 - a. Equipment List
 - b. Manual Valve List
 - c. Actuated / Control Valve List
 - d. Line List
 - e. Electric Motor List
 - f. Instrument List
 - g. Terminal Point/Connection List

Lists shall include the data fields defined in examples to be provided by the Owner. Lists shall be in Microsoft Excel ® format and Contractor shall not modify the format or sequence without Owner approval. Lists shall be submitted for initial review and resubmitted as a final list. The electronic template files to be used will be provided by Owner to the Contractor after Contract Award
3. Schedule of Submittals:
 - a. Prepare for Owner's concurrence, a schedule for submission of all Submittals specified or necessary for Owner's approval of the use of Equipment and Materials proposed for incorporation in the Work or needed for proper installation, operation, or maintenance. Submit the schedule with the procurement schedule and construction progress schedule. Schedule submission of all Submittals to permit review, fabrication, and delivery in time so as to not cause a delay in the Work of Contractor or his Subcontractors or any other contractors as described in the Contract Documents.
 - b. In establishing schedule for Submittals, allow 15 days in Owner's office for reviewing original Submittals and 7 days in Owner's office for reviewing resubmittals.
 - c. Submittals requiring revision shall be resubmitted within 7 days after receipt of Owner's review notations.
 - d. The schedule shall indicate the anticipated dates of original submission for each item and Owner's approval thereof, and shall be based upon at least one resubmission of each item.
 - e. Schedule all Submittals (Shop Drawings, product data, and Samples) required prior to fabrication or manufacture for submission within 30 days of the Effective Date of Contract. Schedule Submittals pertaining to storage, installation, and operation at the Site for Owner's approval prior to delivery of the Equipment and Materials.
 - f. Resubmit Submittals the number of times required for Owner's "Submittal Approved." However, any need for resubmittals in excess of the number set forth in the accepted schedule, or any other delay in obtaining approval of Submittals, will not be grounds for extension of the Contract Times, provided Owner completes his reviews within the times specified.
 - g. Where a Submittal is required by the Contract Documents or the accepted schedule of Submittals, any related Work performed prior to Owner's review and approval of the pertaining Submittal will be at the sole expense and responsibility of Contractor.
4. Transmittal of Submittals:

- a. All Submittals (Shop Drawings, product data, and Samples) for Equipment and Materials furnished by Contractor, Subcontractors, manufacturers, and suppliers shall be submitted to Owner by Contractor.
- b. After checking and verifying all field measurements, transmit all Submittals to Owner for approval as follows:
 - 1) Submittal Information Block:
 - a) Affix to all paper copies whether Submittal is prepared by Contractor, Subcontractor, or supplier. Use transparent decal type Submittal Information Blocks for Shop Drawings and use gummed paper type for product data and Sample Submittals. All Submittal Information Blocks needed for this Contract will be furnished to Contractor at no charge at the initial coordination conference.
 - b) Electronic files of Submittal Information Blocks will be provided to Contractor for use on electronic Submittals.
 - c) An example of the Submittal Information Block is included as Appendix C at the end of this Exhibit.
 - 2) Mark each Submittal by Project name and number, Contract title and number, and applicable Specification Section and Article number. Include in the letter of transmittal the Drawing number and title, sheet number (if applicable), revision number, and electronic filename (if applicable). Unidentifiable Submittals will be returned for proper identification.
 - 3) Check and approve Submittals of Subcontractors, suppliers, and manufacturers prior to transmitting them to Owner. Contractor's submission shall constitute a representation to Owner that Contractor approves Submittals and has determined and verified all design criteria, quantities, dimensions, field construction and installation criteria, materials, catalog numbers, compliance with Laws and Regulations, and similar data, and Contractor assumes full responsibility for doing so; and Contractor has coordinated each Submittal with the requirements of the Work and the Contract Documents.
 - 4) At the time of each submission, call to the attention of Owner in the letter of transmittal any deviations from requirements of the Contract Documents.
 - 5) Make all modifications noted or indicated by Owner and return the required number of revised Submittals until approved. Direct specific attention in writing, or on revised Submittals, to changes other than the modifications called for by Owner on previous Submittals. After paper copy Submittals have been approved, submit copies thereof for final distribution. Previously approved Submittals transmitted for final distribution will not be further reviewed and are not to be revised. If errors are discovered during manufacture or fabrication, correct the Submittal and resubmit for review.
 - 6) Following completion of the Work and prior to final payment, furnish record documents and approved Samples and Shop Drawings necessary to indicate "as constructed" conditions, including field modifications, in the number of copies specified. Furnish additional copies for insertion in Equipment instruction books and operating manuals as required. All such copies shall be clearly marked "PROJECT RECORD."
 - a) Submit a final record copy of the Master Field Drawing list which shall indicate the final revision status of each drawing on the list.

- 7) Keep a copy or sample of each Submittal in good order at the Site.
5. Quantity Requirements:
 - a. Except as otherwise specified, transmit all Shop Drawings as follows:
 - 1) Initial Submittal:
 - a) Electronic - One copy to Owner.
 - 2) Resubmittals:
 - b) Electronic - One copy to Owner.
 - 3) Submittal for final distribution:
 - c) Electronic - One copy to Owner.
 - 4) As-constructed documents:
 - d) Paper – Original copy to Owner.
 - e) Electronic - One copy to Owner.
 - b. Transmit Submittals of product data as follows:
 - 1) Initial Submittal:
 - a) Electronic - One copy to Owner.
 - 2) Resubmittals:
 - b) Electronic - One copy to Owner.
 - 3) Submittal for final distribution:
 - c) Electronic - One copy to Owner.
 - c. Transmit Submittals of Material Samples, color charts, and similar items as follows:
 - 1) Initial Submittal – Two to Owner.
 - 2) Resubmittal - Two to Owner.
 - d. Transmit Submittals of Equipment instruction books and operating manuals as follows:
 - 1) Initial Submittal:
 - a) Electronic - One copy to Owner.
 - 2) Resubmittals:
 - b) Electronic - One copy to Owner.
 - 3) Submittal for Final Distribution - Five paper copies and one electronic copy to Owner.
 - e. When all Submittals have been updated to "as-constructed" conditions, transmit to Owner in electronic format.
 - f. Owner may copy and use for internal operations and staff training purposes any and all document Submittals required by this Contract and approved for final distribution, whether or not such documents are copyrighted, at no additional cost to Owner. If permission to copy any such Submittal for the purposes stated is unreasonably withheld from Owner by Contractor or any Subcontractor, manufacturer, or supplier, Contractor shall provide to Owner 15 copies plus the number of copies required by Contractor at each final distribution issue.
6. Equipment erection drawings and other Submittals required for installation of Equipment furnished by others under separate contract for installation under this Contract will be transmitted to Contractor by Owner in the final distribution of such Submittals.
7. Information to Manufacturer's District Office: Contractor shall arrange for manufacturers and suppliers of Equipment and Materials to furnish copies of all agreements, drawings, specifications, operating instructions, correspondence, and other matters associated with this Contract to the manufacturer's district office servicing Owner. Insofar as practicable, all business matters relative to

Equipment and Materials included in this Contract shall be conducted through such local district offices.

G. Owner's Review:

1. Owner will review and take appropriate action on Submittals in accordance with the accepted schedule of Submittals. Owner's review and approval will be only to determine if the items of Equipment and Materials covered by the Submittals will, after installation or incorporation in the Work, conform to information given in the Contract Documents and be compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents.
2. Owner's review and approval will not extend to design data reflected in Submittals which is peculiarly within the special expertise of Contractor or Contractor's Subcontractors or suppliers. Review and approval of a component item as such will not indicate approval of the assembly in which the item functions.
3. Owner's review and approval of Shop Drawings, product data, or Samples will not relieve Contractor of responsibility for any deviation from requirements of the Contract Documents unless Contractor has in writing called Owner's attention to such deviation at the time of submission, and Owner has given written concurrence in and approval of the specific deviation. Approval by Owner shall not relieve Contractor from responsibility for errors or omissions in Submittals.

H. Submittal Action Stamp:

1. Owner's review action stamp, appropriately completed, will appear on all Submittals of Contractor when returned by Owner. Review status designations listed on Owner's action stamp are defined as follows:
 - a. **SUBMITTAL APPROVED:** Signifies Equipment or Material represented by the Submittal conforms to the design concept and complies with the intent of the Contract Documents and is approved for incorporation in the Work. Contractor is to proceed with fabrication or procurement of the items and with related Work. Copies of the Submittal are to be transmitted to Owner for final distribution.
 - b. **SUBMITTAL APPROVED AS NOTED (RESUBMIT):** Signifies Equipment and Material represented by the Submittal conforms to the design concept and complies with the intent of the Contract Documents and is approved for incorporation in the Work in accordance with Owner's notations. Contractor is to proceed with fabrication or procurement of the items and with related Work in accordance with Owner's notations and is to submit a revised Submittal responsive to notations marked on the returned Submittal or written in the letter of transmittal.
 - c. **SUBMITTAL RETURNED FOR REVISION (RESUBMIT):** Signifies Equipment and Material represented by the Submittal appears to conform to the design concept and comply with the intent of the Contract Documents but information is either insufficient in detail or contains discrepancies which prevent Owner from completing his review. Contractor is to resubmit revised information responsive to Owner's annotations on the returned Submittal or written in the letter of transmittal. Fabrication or procurement of items represented by the Submittal and related Work is not to proceed until the Submittal is approved.

- d. **SUBMITTAL NOT APPROVED (SUBMIT ANEW):** Signifies Equipment and Material represented by the Submittal does not conform to the design concept or comply with the intent of the Contract Documents and is disapproved for use in the Work. Contractor is to provide Submittals responsive to the Contract Documents.
- e. **PRELIMINARY SUBMITTAL:** Signifies Submittals of such preliminary nature that a determination of conformance with the design concept or compliance with the intent of the Contract Documents must be deferred until additional information is furnished. Contractor is to submit such additional information to permit layout and related activities to proceed.
- f. **FOR REFERENCE, NO APPROVAL REQUIRED:** Signifies Submittals which are for supplementary information only; pamphlets, general information sheets, catalog cuts, standard sheets, bulletins and similar data, all of which are useful to Owner in design, operation, or maintenance, but which by their nature do not constitute a basis for determining that items represented thereby conform with the design concept or comply with the intent of the Contract Documents. Owner reviews such Submittals for general content but not for basic details.
- g. **G - DISTRIBUTION COPY (PREVIOUSLY APPROVED):** Signifies Submittals which have been previously approved and are being distributed to Contractor, Owner, Resident Project Representative, and others for coordination and construction purposes.

I. Instruction Books and Operating Manuals:

- 1. In addition to electronic Submittals specified above, Equipment instruction books and operating manuals prepared by the manufacturer shall include the following:
 - a. Index and tabs.
 - b. Instructions for installation, start-up, operation, inspection, maintenance, parts lists and recommended spare parts, and data sheets showing model numbers.
 - c. Applicable drawings.
 - d. Warranties and guarantees.
 - e. Address of nearest manufacturer-authorized service facility.
 - f. All additional data specified.
- 2. Information listed above shall be bound into hard-back binders of (Bok-Hinge Split Prong or McBee Swing Hinge) three-ring type as selected by Owner. Sheet size shall be 8-1/2 x 11 and 11 x 17 as applicable. Binder color shall be black. Capacity shall be a minimum of 1-1/2 inches, but sufficient to contain and use sheets with ease.
 - a. Provide the following accessories:
 - 1) Label holder.
 - 2) Business card holder.
 - 3) Sheet lifters.
 - 4) Horizontal pockets.
 - b. The following information shall be imprinted, inserted, or affixed by label on the binder front cover:
 - 1) Owner's name.

- 2) Owner's facility or plant name.
 - 3) Equipment item name.
 - 4) Volume number (if applicable).
 - 5) Contract number.
 - 6) Manufacturer's name and address.
- c. The following information shall be imprinted, inserted, or affixed by label on the binder spine:
- 1) Equipment item name.
 - 2) Owner's name and Owner's facility or plant name.
 - 3) Manufacturer's name.
 - 4) Contract number.
 - 5) Volume number (if applicable).
- d. Submit mockup of cover and spine for Owner's review.

J. Samples:

1. Office Samples shall be of sufficient size and quantity to clearly illustrate the following:
 - a. Functional characteristics of the product, with integrally related parts and attachment devices.
 - b. Full range of color, texture, and pattern.
 - c. Material, manufacturer, pertinent catalog number, and intended use.

K. Informational Submittals:

1. Informational Submittals are comprised of technical reports, administrative Submittals, and guarantees which relate to the Work, but do not require Owner approval prior to proceeding with the Work. Informational Submittals include:
 - a. Welder qualification tests.
 - b. Welding procedure qualification tests.
 - c. X-ray and radiographic reports.
 - d. Hydrostatic testing of pipes.
 - e. Field test reports.
 - f. Concrete cylinder test reports.
 - g. ASME pressure vessel test reports.
 - h. Certification on Materials:
 - 1) Steel mill tests.
 - 2) Roofing laboratory tests.
 - 3) Brick and concrete masonry unit laboratory tests.
 - 4) Paint laboratory tests.
 - 5) Metal paneling laboratory tests.
 - 6) Cement tests.
 - i. Soil test reports.
 - j. Air handling balancing reports.
 - k. Temperature records.
 - l. Piping stress analysis.
 - m. Shipping or packing lists.
 - n. Job progress schedules.
 - o. Equipment and Material delivery schedules.
 - p. Progress photographs.
 - q. Warranties and guarantees.
 - r. Fire protection and hydraulic calculations.Transmittal of Informational Submittals:

2. All informational Submittals furnished by Subcontractors, manufacturers, and suppliers shall be submitted to Owner by Contractor unless otherwise specified.
 - a. Identify each informational Submittal by Project name and number, Contract title and number, and Specification Section and Article number marked thereon or in letter of transmittal. Unidentifiable Submittals will be returned for proper identification.
 - b. At the time of each submission, call to the attention of Owner in the letter of transmittal any deviations from requirements of the Contract Documents.
3. Quantity Requirements:
 - a. Technical reports and administrative Submittals except as otherwise specified:
 - 1) Paper: One copy to Owner.
 - 2) Electronic: One to Owner.
 - b. Written Certificates and Guarantees:
 - 1) Owner: One copy.
4. Test Reports:
 - a. Responsibilities of Contractor and Owner regarding tests and inspections of Equipment and Materials and completed Work are set forth elsewhere in these Contract Documents.
 - b. The party specified responsible for testing or inspection shall in each case, unless otherwise specified, arrange for the testing laboratory or reporting agency to distribute test reports as follows:
 - 1) Owner: Two copies.
 - 2) Contractor: Two copies.
 - 3) Manufacturer or supplier: One copy.

2.0 Submittal Schedule

The list below is not a complete list and shall be supplemented with Article 3.0 – Required Submittals below and Appendix B at the end of the Exhibit.

Item No.	Reference Document	Submittals Item	Submittal Dates			LDs apply?
			Calendar Days		Event	
General						
1		Plant Startup Procedures, including sample Turnover Packages	60	Before	Startup of first system	No
2		Training		Before	Turn-over of each system	
3		Installation & Commissioning Spare Parts List	60	After	Effective Date	No
4		Recommended Two-year Operational Spare Parts List			With Proposal	No
5		Preliminary Project Schedule			With Proposal	No
6		Detailed Project Schedule	30	After	Effective Date	No
7		Detailed Drawing Submittal Schedule	30	After	Effective Date	No
8		Equipment O&M Manuals	30	Before	Equipment Delivery Date	No
9		Final Power Plant Operations and Maintenance Manuals	30	Before	Start of Training	No
10		Factory Acceptance Test Procedures	60	Before	Equipment Test	No
11		Copies of Certified Test & Inspection Reports	15	After	Equipment Test	No
12		Transportation and Shipping Plan	30	Before	First Shipment	No
13		Notice of Shipment	21	Before	Shipment	No

14		Lubrication List & Initial Fill Requirements	60	Before	Shipment	No
15		Material Data Safety Sheets			With Notice of Shipments & with each shipment	
16		Final Bill of Materials			Prior to Final Payment	
17		Final As-Manufactured Submittals			Prior to Delivery	
18		Equipment Descriptions, Performance, and Details			With Proposal	
19		List of Previously Completed Projects			With Proposal	
20		List of Repair & Service Facilities in the Continental U.S.			With Proposal	
21	0000	Certificate of Insurance		Before	Effective Date	
22	0000	Intl' Transportation Insurance Certificate		With/ 45 Days Prior	Shipping Documents/ Shipment	
23	0000	Acknowledge Acceptance and Return of Contract	7	After	Receipt of Contract	
24	0000	Letter of Credit	14	After	Effective Date	
25	0000	Notice of any Cancellation, Termination or Material Changes of Insurance Policies	30	Before	Cancellation or Change	
26	0000	Project Organizational Chart, Including key personnel resumes		Through out	Project duration	
27	0000	Catalog Data Sheets with Dimensions				
28	0000	Manufacturer Field Staffing Plan, including Names and Durations of Visits	90	Before	Arrival to Site	
29	0000	Progress Reports	30	After/ Monthly	Effective Date/ Thereafter	
30	0000	Partial Lien Waiver		With	Invoice	
31	0000	MBE/WBE Reporting	30	After/ Monthly	Effective Date/ Thereafter	
32	0000	Accruals	30	After/ Monthly	Effective Date/ Thereafter	
33	0000	Packing Lists		Before	Shipment	
34	0000	List of all accessory equipment to be shipped loose to Jobsite	210	After	Effective Date	
35	0000	Shipment Bill of Materials		With	Each Shipment	
36	0000	Unloading and Handling Requirements and Procedures	60	Before/ With	Shipment/ Shipment	Each
37	0000	Description and details of preservation and protection systems and recommended storage procedures	30	After	Effective Date	
38	0000	Final Lien Waiver		With	Final Invoice	
39	0000	Exhibit W	90	After	Effective Date	
Civil/Structural						
40		Site survey	15	After	Survey completed	No
41		Dewatering and settlement records			Final / As-Built	No
42		Subsurface / Site Prep Design			With Proposal	no

43		Proposed dewatering system including: • Calculations • Piezometer locations • Dewatering Plan Layout • Installation Details • Filler materials • Backup system	15	Before	Mobilization	No
44		Pile design details including pile lengths, calculations, reinforcing, uplift details, reinforcing steel and concrete strengths, concrete mix design, and concrete compressive test results (if applicable).	60	Before	Pile installation begins	No
45		Individual Pile Driving Records, including all test results (if applicable)		After	Pile Installation complete	No
46		Concrete placement plan for special structures	30	Before	Concrete placement	No
47		Not to Exceed Enclosure Dimensions & Weights			With Proposal	No
48		Foundations Loading and Details	60	After	Effective Date	
49		Results of testing and test reports	7	After	Tests	No
50		Plant building and equipment foundations key plan with dimensions or coordinates, standard details and general notes	90	After	Effective Date	No
51		Foundation drawings	90	After	Effective Date	No
Structural Steel						
52	051200	Structural Steel Material Certification			Upon request	No
53	051200	High Strength Bolts Material Certification			Upon request	No
54	051200	Direct Tension Indicators Material Certification			Upon request	No
55	051200	Structural Steel Drawings for designed buildings and structures (including pipe rack)	90	After	Effective Date	No
Material Handling						
56		Preliminary CCR handling process flow diagrams	60	After	Effective Date	No
57		Preliminary CCR conveyor plans and elevations	60	After	Effective Date	No
Buildings						
58		Final location, arrangement, and size of the buildings	60	After	Effective Date	No
59		Preliminary building floor plans and elevations	60	After	Effective Date	No
60		Building architectural notes, standard details, schedules for doors, windows, openings and miscellaneous hardware	120	After	Effective Date	No
Underground Piping						
61		U/G piping systems drawings and details	90	After	Effective Date	No
Protective Coatings						
62	099000	Product data sheets	60	After	Effective Date	No

63	099000	Surface preparation/coating procedures	60	After	Effective Date	No
64	099000	Lining/coating inspection/test procedures	60	After	Effective Date	No
65	099000	Coating system application/repair procedures	60	After	Effective Date	No
66	099000	Color scheme /coating samples	60	After	Effective Date	No
67	099000	Painting certification	10	After	Completion of work	No
Mechanical						
68		Plot plan / general arrangement	60	After	Effective Date	No
69		P&ID's and System Descriptions for EACH system, including - All major mechanical systems - HVAC and plumbing	60	After	Effective Date	No
70		Process Flow Diagrams			With Proposal	
71		Sump/Tank Capacities in gallons and hours	60	After	Effective Date	No
72		Major Equipment List	60	After	Effective Date	No
73		Valve List	90	After	Effective Date	No
74		Pipeline List	90	After	Effective Date	No
75		Mechanical Device List	90	After	Effective Date	No
76		Tie-in list				No
77		Facility access arrangement drawings (walkways, platforms, ladders, and stairways)	90	After	Effective Date	No
78		Major maintenance arrangements to include - required crane capacities for major lifts - crane locations - mobile and fixed - crane hook clearances - lay-down areas for materials and components	90	After	Effective Date	No
79		Piping arrangement composite drawings	120	After	Effective Date	No
80		Demolition Drawings	120	After	Effective Date	No
81		Pipe Support Drawings	160	After	Effective Date	No
82		Major equipment specifications, including, but not limited to the following: - Bulk Material Handling Equipment - Fly Ash Silos - Slurry Pumps - General Service Pumps - Tanks - Fire Protection Systems - Agitators - Compressed Air Equipment		Before	Equipment Procurement	No

83		Vendor equipment drawings, including - detailed equipment arrangement drawings - performance curves and data - shop testing plan, schedule, and test results - lubrication requirements - utility requirements (air, water, etc.) - motor nameplate data - maintenance / pull space requirements - operating instructions / requirements		Before	Shipment to jobsite	No
84		Fire protection system drawings, including - hydraulic calculations - hydrant layout - extinguisher layout - hose station layout - fire protection system(s) layout - fire panel details, location, arrangement - Design submittal for submittal to insurer - Final conformed to construction drawings and documentation	90	After	Effective Date	No
85		Field Erected Tank drawings, including - outline drawings - nozzle schedule - calculations - tank inspection reports	120	After	Effective Date	No
86		Valve data, including valve drawings / cut sheets, test reports, operator information, Cv curves		Before	Shipment to jobsite	No
87		Control Valve data, including valve drawings / cut sheets, calculations, test reports, flow data (Cv, Cg, or Cs), instrumentation		Before	Shipment to jobsite	No
88		Safety and Relief Valve data, including valve drawings / cut sheets, calculations, test reports		Before	Shipment to jobsite	No
89		HVAC Systems design information and drawings, including - ductwork and equipment arrangement - system calculations - vendor drawings	90	After	Effective Date	No
Electrical						
90		Overall one-line diagrams	70	After	Effective Date	No
91		Guaranteed Auxiliary Power Consumption Limit			With Proposal	No
92		Electrical Load List	90	After	Effective Date	No
93		Transformer & Medium Voltage Meter and Relay One-Line Diagrams		Before	Equipment Procurement	No

94		Low Voltage Switchgear Meter and Relay One-Line Diagrams		Before	Equipment Procurement	No
95		Three Line Diagrams		Before	Equipment Procurement	No
96		Modifications to Existing One-Line, Metering/Relaying, and/or Three-Line Diagrams		Before	Equipment Procurement	No
97		Load Flow and motor starting calculation		Before	Equipment Procurement	No
98		Short circuit calculation		Before	Equipment Procurement	No
99		Transformer sizing		Before	Equipment Procurement	No
100	264100	Grounding and lightning protection design calculation		Before	Equipment Procurement	No
101		Cable Sizing		Before	Equipment Procurement	No
102		Underground duct bank cable sizing		Before	Equipment Procurement	No
103		Transformer specifications		Before	Equipment Procurement	No
104		Medium and Low Voltage Switchgear Specifications		Before	Equipment Procurement	No
105		Motor Control Center Specifications		Before	Equipment Procurement	No
106		Electrical Tie-In List		Before	Release for Construction	No
107		Circuit and Raceway Schedule as a sort-able data file (Refer to Client Format Standards)		Before	Release for Construction	No
108	260551	Completed motor data sheets for each individual motor		Before	Release for Construction	No
109		Lightning protection drawings		Before	Release for Construction	No
110		Grounding Drawings		Before	Release for Construction	No
111		Lighting/paging/communication/security drawings		Before	Release for Construction	No
112		Cable Tray Drawings		Before	Release for Construction	No
113		Raceway Drawings		Before	Release for Construction	No
114		Schematic Diagrams, Wiring diagrams, termination drawings	90	After	Effective Date	No
115	260507	Heat tracing drawings		Before	Release for Construction	No
116		Protective relay settings and device coordination calculation		Before	Equipment Energization	No
117		Relay instruction and service manuals, device setting summary, setting sheets, protective device software files, coordination curves, CT ratio correction factor and excitation curves		Before	Equipment Energization	No
118		Final arc flash analysis		Before	Equipment Energization	No
119		Transformer tap selection calculation		Before	Equipment Energization	No

120		Engineering Detailed Design Documents listed above.			Each Revision	No
121		Manufacturers Design Documents			Each Revision	No
Instrumentation & Controls						
122		I/O List - Hardware Cutoff		Before	Release for Fabrication	No
123		I/O List - Software Cutoff		Before	Release for Configuration	No
124		Analog control loop functional descriptions		Before	Release for Configuration	No
125		Control Logic Narrative		Before	Release for Configuration	No
126		Logic diagrams	120	After	Effective Date	No
127		Operator graphic sketches	120	After	Release for Configuration	No
128		Instrument list		Before	Equipment Procurement	No
129		Flow element calculation data sheets showing beta ratio, dP, flow		Before	Equipment Procurement	No
130		Instrument installation details		Before	Release for Construction	No
131		Instrument factory calibration sheets		Upon	Shipment to jobsite	No
132		Engineering Detailed Design Documents listed above.			Each Revision	No
133		Manufacturers Design Documents			Each Revision	No
Quality System Requirements						
134	014000	Quality Manual, controlled copy	30	After	Effective Date	No
135	014000	Certification Letter or Certificate of Authorization (copy), if certified by a registered agency, e.g., ASME Certificate of Authorization, ISO Certificate	30	After	Effective Date	No
136	014000	Sub-supplier listing	30	After	Effective Date	No
137	014000	Inspection and test plan	60	After	Effective Date	No
138	014000	Notification of inspection/test (for Owner hold/witness points)	14	Before	Test/Inspection	No
General Welding Requirements						
139	485990	Welding Procedure Specifications (WPS) with applicable Procedure Qualification Records (PQR)	30	Before	Start of Fabrication	No
140	485990	Welder and welding operator qualification records		Upon	Request	No
141	485990	Procedures for storing, issuing, and reconditioning of electrodes, wires, and fluxes	30	Before	Start of Fabrication	No
142	485990	Repair procedures associated with a nonconformance report	5	After	Discovery of Repair	No
143	485990	Visual inspectors' qualifications and certificates	30	Before	Start of Fabrication	No
144	485990	Nondestructive examination procedures	30	Before	Start of Fabrication	No
145	485990	Nonconformance reports	5	After	Discovery of Nonconf.	No

3.0 Required Submittals

Contractor shall provide submittals in accordance with each listed technical SECTION, respectively:

014000 – CONTRACTOR QA/QC

1. Qualification Data: For testing agencies specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include proof of qualifications in the form of a recent report on the inspection of the testing agency by a recognized authority.
2. Schedule of Tests and Inspections: Prepare in tabular form and include the following:
 - a. Specification Section number and title.
 - b. Description of test and inspection.
 - c. Identification of applicable standards.
 - d. Identification of test and inspection methods.
 - e. Number of tests and inspections required.
 - f. Time schedule or time span for tests and inspections.
 - g. Entity responsible for performing tests and inspections.
 - h. Requirements for obtaining samples.
 - i. Unique characteristics of each quality control service.
3. Reports: Arrange for testing agency/laboratory to prepare and submit certified written reports that include the following:
 - a. Date of issue.
 - b. Project title and number.
 - c. Name, address, and telephone number of testing agency.
 - d. Dates and locations of samples and tests or inspections.
 - e. Names of individuals making tests and inspections.
 - f. Description of the Work and test and inspection method.
 - g. Identification of product and Specification Section.
 - h. Complete test or inspection data.
 - i. Test and inspection results and an interpretation of test results.
 - j. Record of temperature and weather conditions at time of sample taking and testing and inspecting.
 - k. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
 - l. Name and signature of laboratory inspector.
 - m. Recommendations on retesting and re-inspecting.
4. Permits, Licenses, and Certificates: For Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents, established for compliance with standards and regulations bearing on performance of the Work.

024100 - DEMOLITION

1. Submit proposed methods and operations of demolition for review prior to the start of Work. Include in the schedule the coordination for shutoff, capping, and continuation of utility services as required, together with details for dust, noise, and erosion control protection.
2. Provide a detailed sequence of demolition and removal Work to ensure the uninterrupted progress of Owner's operations.

026625 - HDPE Pipe

1. Submittals required shall include the following:
 - a. Pipe and jointing details.
 - b. Special, fitting, and coupling details.

2. Certificates and Affidavits:
 - a. Prior to shipment, furnish affidavit of compliance with applicable standards.
 - b. Provide documentation of field testing including date, time, witnesses, and test results.
 - c. Contractor shall certify that personnel to perform fusion joining have received factory training.

032000 - CONCRETE REINFORCEMENT

1. Submittals required shall include the following:
 - a. Complete bar schedule, bar details, and erection drawings to conform to ACI SP-66.
 - b. Drawing with each type of bent bar marked with identification mark. Straight bars shall have mark number or be identified by size and length.
 - c. Erection drawings shall be clear, easily legible, and to a minimum scale of:
 - (1) 1/4 inch = 1 foot (1:50).
 - (2) 1/8 inch = 1 foot (1:100) if bars in each face are shown in separate views.
 - d. Size and location of all openings.
 - e. Concrete protective cover.
 - f. Grade of steel.
 - g. Lap splice lengths.

033000 - CONCRETE

1. Submittals required shall include the following:
 - a. Nonshrink grouts.
 - b. Admixtures.
 - c. Bonding agents.
 - d. Curing agents.
 - e. Concrete floor hardeners, sealers, and coloring compounds.
 - f. Expansion joint materials.
 - g. Joint sealants.
 - h. Waterstops.
2. Mill Certificates:
 - a. Submit to Company a minimum of one copy for each cement shipment.
3. Concrete Mix Design Proportions:
 - a. Submit as specified in PART 2, paragraph 2.01D - Mix Proportions, of SECTION 033000.
 - b. Submit for each mix design, including aggregate gradation data.
 - c. Resubmit for any change in each mix design.
4. Production Test Reports: Submit as specified in EXHIBIT M and PART 2, paragraph 2.01E - Measurement of Materials, of SECTION 033000.

051200 - STEEL

1. Submittals required shall include the following:
 - a. Fabrication and erection drawings for all Work. A reproduction of Engineer-prepared Contract Drawings may be used for erection drawings such as to indicate information on erection or to identify detail drawing references. Where the drawings are revised to show this additional information, Engineer's title block and professional seal shall be removed from the drawing. These erection drawings shall be revised for subsequent Company revisions to the Contract Drawings.

- b. Fabrication and erection drawings shall be grouped in sets or sequences and shall be identified separately for each building, structure, or area.
 - c. Fabrication and erection drawings shall be prepared using a three dimensional steel modeling and detailing software system. All miscellaneous steel items such as guardrail, handrail, stairs, and ladders shall be included in the same three dimensional model as main structural steel and detailed using the same system.
 - d. In the event that drawing revisions are necessary, fabrication and erection drawings shall be clearly clouded showing all changes from the previous revision.
 - e. All necessary information for the fabrication, including connection material specifications and sizes as well as filler metal for welds, of the component part of the structure, presented on drawings to conform to recognized standard practice, AISC Manual and AWS Code.
 - f. Drawings indicating stud shear connector spacing regardless of whether connectors are shop-applied or field-applied.
 - g. Drawings showing each piece including anchor bolts marked for identification to correspond to erection drawings.
 - h. Proposed method and location for erection piece mark numbering.
 - i. Manufacturer's literature on products including, but not limited to, grating, stair treads, stair nosings, stud shear connectors, grout, concrete anchors, and protective coatings.
 - j. AWS Certified Welding Inspector Certificates.
 - k. Welder qualification records.
 - l. Qualified welding procedure specifications and procedure qualification test results if welding processes differ from those prequalified by AWS.
 - m. Designation of the members and connections that are part of the Seismic Load Resisting System (as marked on Contract Drawings).
 - n. Locations of demand critical shop and field welds.
 - o. Locations and dimensions of protected zones.
 - p. Gusset plates drawn to scale when they are detailed to accommodate inelastic rotation.
 - q. Drawings showing access hole dimensions, surface profile, and finish requirements.
 - r. Locations where backing bars are to be removed.
 - s. Locations where supplemental fillets are required when backing is permitted to remain.
 - t. Locations where weld tabs are to be removed.
 - u. Those joints or groups of joints in which a specific assembly order, welding sequence, welding technique or other special precautions are required.
 - v. Non-destructive testing to be performed by the fabricator/erector, if any.
2. Mill Tests:
 - a. Perform for each melt of material used in the fabrication.
 - b. Furnish two copies of each certified mill test to Company.
 3. High-Strength Connection Bolt and Nut Manufacturer's Inspections Certificate:
 - a. Certify that bolts, nuts, and washers furnished comply with all of the requirements of these Specifications, and shall provide complete manufacturer's mill test reports (Manufacturer's Inspections Certificate).
 - b. Certificate numbers shall appear on the product containers and correspond to the identification numbers on the mill test reports.
 - c. Manufacturer's symbol and grade markings shall appear on all bolts and nuts.

079200 - JOINT SEALANTS

1. Includes, but not limited to, the following for each type of sealant or associated material required:
 - a. Product data and Specifications, including instructions for joint preparation and sealer application.
 - b. Color charts.
 - c. Samples for Initial Selection Purposes: Submit Samples consisting of strips of actual product showing full range of colors available for each type of sealant exposed to view.
2. Certificates: Review the joint design and Specifications and verify that the joint system is appropriate for its location and that sealant materials comply with Specifications.

083323 - OVERHEAD COILING DOORS

1. Product Data: For each type and size of overhead coiling door and accessory. Include details of construction relative to materials, dimensions of individual components, profiles, and finishes. Provide roughing-in diagrams, operating instructions, and maintenance information. Include the following:
 - a. Setting drawings, templates, and installation instructions for built-in or embedded anchor devices.
 - b. Summary of forces and loads on walls and jambs.
 - c. Motors: Show nameplate data and ratings; characteristics; mounting arrangements; size and location of winding termination lugs, conduit entry, and grounding lug; and coatings.
 - d. Fire-Rated Doors: Information describing fire-release system, including testing and resetting instructions.
2. Shop Drawings: For special components and installations not dimensioned or detailed in manufacturer's data sheets.
 - a. Wiring Diagrams: Detail wiring for power, signal, and control systems. Differentiate between manufacturer-installed and field-installed wiring and between components provided by door manufacturer and those provided by others.
3. Samples for Initial Selection: Manufacturer's color charts showing the full range of colors available for units with factory-applied finishes.
4. Samples for Verification: Of each type of exposed finish required, prepared on Samples of size indicated below and of same thickness and material indicated for Work. Where finishes involve normal color and texture variations, include Sample sets showing the full range of variations expected.
 - a. Curtain Slats: 12-inch (300-mm) length.
 - b. Bottom Bar: 6-inch (150-mm) length.
 - c. Guides: 6-inch (150-mm) length.
 - d. Brackets: 6-inches (150-mm) square.
 - e. Hood: 6-inches (150-mm) square.
5. Installer Certificates: Signed by manufacturer certifying that installers comply with specified requirements.

099000 - PROTECTIVE COATINGS

1. Schedule of products and paint systems to be used. Schedule shall include the following information:
 - a. Surfaces for system to be applied.

- b. Surface preparation method and degree of cleanliness.
- c. Product manufacturer, name, and number.
- d. Method of application.
- e. Dry film mil thickness per coat of coating to be applied.
2. Color charts for selection and acceptance.
3. Technical and material safety data sheets.

133419 - METAL BUILDING SYSTEMS

1. Product Data: Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of the following metal building system components:
 - a. Structural-framing system.
 - b. Roof panels.
 - c. Wall panels and liners.
 - d. Insulation.
 - e. Vapor retarders.
 - f. Trim and closures.
 - g. Doors.
 - h. Louvers.
 - i. Accessories.
2. Shop Drawings: For the metal building systems and components. Include plans, elevations, sections, details, and attachments to other Work.
 - a. For the metal building system, framing, and components supplied, provide to verify compliance with the contract documents, the following submittals which shall be prepared under the immediate personal supervision of, and sealed by a licensed professional engineer:
 - 1) Structural analysis and calculations.
 - 2) Anchor-Bolt Plans: Include location, diameter, and projection of anchor bolts required to attach metal building to foundation. Indicate column reactions at each location.
 - 3) Structural Framing Drawings: Show all primary and secondary structural member sizes and proportions, including frame cross-sections and framing connections. Indicate welds and bolted connections, distinguishing between shop and field applications.
 - 4) Roof and Wall Panel Layout Drawings: Show layouts of panels on support framing, structural connections to framing, details of edge conditions, joints, panel profiles, corners, custom profiles, supports, anchorages, trim, flashings, closures, and special details. Distinguish between factory and field assembled work.
 - b. Personnel Door Schedule: Provide schedule of doors and frames, using the same reference numbers as indicated on Drawings. Include details of reinforcement and installation requirements for finish hardware.
 - 1) Provide hardware schedule.
 - c. Accessory Drawings: Include details of the following items, at a scale of not less than 1-1/2 inches per 12 inches (1:10):
 - 1) Ventilators.
 - 2) Louvers.
 - 3) Gutters.
 - 4) Downspouts.

3. Samples for Initial Selection: Manufacturer's color charts showing the full range of colors available for each type of the following products with factory-applied color finishes:
 - a. Roof panels.
 - b. Wall panels.
 - c. Trim and closures.
 - d. Doors.
 - e. Accessories.
4. Samples for Verification: For the following products, in manufacturer's standard sizes, showing the full range of color, texture, and pattern variations expected, in the profile and style indicated. Prepare Samples from the same material to be used for the Work.
 - a. Roof Panels: 12 inches (300 mm) long by actual panel width. Include clips, caps, battens, fasteners, closures, and other exposed panel accessories.
 - b. Wall Panels: 12 inches (300 mm) long by actual panel width. Include clips, caps, battens, fasteners, closures, and other exposed panel accessories.
 - c. Trim and Closures: 12 inches (300 mm) long. Include fasteners and other exposed accessories.
 - d. Vapor Retarders: 6-inch- (150-mm-) square samples.
 - e. Accessories: 12-inch- (300-mm-) long samples for each type of accessory.
5. Product Certificates: Signed by manufacturers of metal building systems certifying that products furnished comply with requirements.
 - a. Advance Letter of Design Certification: Within 4 weeks of Notice to Proceed, provide the same information as described below for Letter of Design Certification indicating intended compliance. The Advance Letter of Design Certification will be signed and sealed by the qualified professional engineer under whose immediate personal supervision the design will be performed.
 - b. Letter of Design Certification: Signed and sealed by a qualified professional engineer under whose immediate personal supervision the design was performed. Include the following:
 - 1) Name and location of Project.
 - 2) Order number.
 - 3) Name of manufacturer.
 - 4) Name of Contractor.
 - 5) Building dimensions, including width, length, height, and roof slope.
 - 6) Indicate compliance with AISC standards for hot-rolled steel and AISI standards for cold-rolled steel, including edition dates of each standard.
 - 7) Governing building code and year of edition [as required by contract documents].
 - a) Building-Use Category: Indicate category of building use and its effect on load importance factors.
 - b) Design Loads: Include dead load, roof live load, collateral loads, roof snow load, deflection, wind loads/speeds and exposure, seismic design criteria, and auxiliary loads (cranes).
 - c) Load Combinations: Indicate that loads were applied acting simultaneously with concentrated loads, according to governing building code.
 - d) IAS Certification under AC472: Include statement that the metal building system and components were designed and manufactured under procedures and facilities certified by IAS.

- 8) Provide a specific list of exceptions to the contract documents taken by the metal building systems manufacturer in the design and manufacture of the building and components supplied.
- c. Welding Certificates: Copies of certificates for welding procedures and personnel.
- d. Erector Certificates: Signed by manufacturer certifying that erectors comply with requirements.
- e. Manufacturer Certificates: Signed by manufacturers certifying that they comply with requirements. Include evidence of manufacturing experience.
- f. Qualification Data: For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.
- g. Material Test Reports: From a qualified testing agency indicating and interpreting test results of steel for compliance with requirements indicated.
- h. Material Certificates: Signed by manufacturers certifying that each of the following items complies with requirements:
 - 1) Thermal insulation.
 - 2) Vapor retarders.
- i. Product Test Reports: Based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified testing agency, indicating the following current products comply with requirements:
 - 1) Insulation and Vapor Retarders: Include reports for thermal resistance, fire-test-response characteristics, water-vapor transmission, and water absorption.
- j. Warranties: Special warranties specified in this Section.

260504 - WIRE, CABLE AND ACCESSORIES

1. Data sheets for each wire and cable type specified.
2. Data sheets for wire and cable accessories.
3. Cable manufacturer's approval of splicing and terminating materials.
4. Cable manufacturer's approval of pulling compounds.
5. Cable manufacturer's installation requirements such as maximum pulling tensions, sidewall pressures, minimum bending radii, etc.
6. Other equipment and materials to be used.
7. Un-priced wire and cable purchase orders.
8. Two 1-foot samples of fiber-optic cable.
9. Factory test results of each fiber-optic cable reel provided.

260506 - SPECIALS

1. Includes, but not limited to, the following:
 - a. Power and control schematic diagrams.
 - b. General arrangement and outline information.
 - c. Bills of material.
 - d. Instruction books.
 - e. Technical specifications for all components.
 - f. Mounting details for all components.
 - g. Control Panels - Provide schematic and point-to-point wiring diagrams.
2. For "Fire Stops" and Fire Resistive Coatings:

- a. Product data, specifications, and installation instructions. Include product characteristics, performance, and limiting criteria and UL listings.
- b. Samples of each type of fire stop / smoke seal product and accessory specified or required to meet system requirements.

260507 - PIPE FREEZE PROTECTION SYSTEM

- A. Includes, but not limited to, the following:
 1. Piping line lists and isometrics including, but not limited to the following:
 - a. Heating cable length.
 - b. Heating cable type.
 - c. Circuit Number/Heater Number.
 - d. Insulation Information.
 - e. Minimum Maintenance Temperature.
 - f. Minimum Ambient Temperature.
 - g. Maximum Exposure Temperature.
 - h. Heater cable Volts, Current (Operating/Starting), and Wattage (Operating/Starting).
 - i. Electrical Classification.
 - j. Bill of Materials.
 - k. Trace ratio.
 - l. Heat loss calculations.
 - m. Heat loss rate per foot.
 - n. Heater output rate.
 - o. Branch circuit starting and continuous load amperes.
 - p. The process line number protected by each circuit.
 2. Provide total ampere loading (starting and continuous load amps), schematics and point-to-point wiring diagrams for all freeze protection control panels.
 3. Installation details, instructions, and drawings outlining the recommended installation of heat trace for all equipment including valves, instruments, taps, drains, junction boxes, power connections, etc.
 4. Panel schedules indicating line numbers and system being protected.
 5. Standard factory test records and reports.
 6. Bill of Materials.
 7. Instruction and Operation books.
 8. Technical data for all components.
 9. Commissioning reports including copies of all commissioning test reports.
 10. Electrical Schematic.
 - a. Detailed schematics showing all lights, switches, controllers, relays, timers, and all other wired equipment within the panel, associated with a systems control circuit.
 - b. All voltage and current ratings and special wiring requirements shall be detailed.
 11. Physical diagrams of all supplied control panels (internal and external) showing all light and switches including color, all wiring internal to the panel, all Tagging/Labeling, and panel NEMA rating.
 12. Equipment Installation Details. Drawings showing how to install all devices that require field installation with details including support/mounting devices, Instrument installation details inside Instrument Enclosures including tubing and isolation/drain valves and/or manifolds installation, etc.
 13. A detailed list of all available I/O points, either hardwired or communication link.
 14. Interconnection Wiring Diagrams. Overall system diagram showing 100% of the wiring required to interface with other plant systems (such as Plant DCS).
 15. Control Logic Diagrams to include normal start/stop sequence, alarm development, identification of all time delays, auto stop/start sequence, identification of digital control, and identification of analog control.
- B. As constructed drawings showing actual locations of all system components shall be provided by Contractor at the completion of the project.

1. Drawings shall include general arrangement and elevation for actual locations of all devices.

260526 - GROUNDING

1. Includes, but not limited to, catalog cuts for the following:
 - a. Cable.
 - b. Ground Rods.
 - c. Connection Materials.
 - d. Miscellaneous Grounding Equipment.

260533 - CONDUIT AND ACCESSORIES

1. Catalog cuts.
2. Electronic "Record Drawings" showing installation details (conduit size and location dimensions) for all conduits which are concealed, cast-in-concrete, buried, and home run circuits.

260536 - CABLE TRAY

1. Construction details of all straight sections and fittings showing cross-sectional dimensions.
2. Catalog cuts of installation and mounting materials used.
3. Details of special support arrangements.
4. Sample of labels for cable tray identification.

260543 - UNDERGROUND DUCT BANKS AND MANHOLES

1. Catalog cuts

260551 - ALTERNATING CURRENT ELECTRIC MOTORS

1. Submittals required include, but are not limited to, the following items:
 - a. Outline drawing for each group of identical motors.
 - b. Nameplate data for each group of identical motors rated 460 volts and below, including the following data:
 - 1) Manufacturer's name and serial number.
 - 2) Manufacturer's type and frame designation.
 - 3) Horsepower output.
 - 4) Time rating.
 - 5) Maximum ambient temperature for which motor is designed.
 - 6) Insulation system designation.
 - 7) Temperature rise and method of measurement.
 - 8) RPM at rated load.
 - 9) Frequency.
 - 10) Number of phases.
 - 11) Rated-load amperes.
 - 12) Voltage.
 - 13) Code letter for locked-rotor kVA.
 - 14) Design letter for polyphase integral-horsepower motors.
 - 15) Nominal efficiency for motors rated 1 through 199 horsepower.
 - 16) Service factor.
 - 17) For motors equipped with thermal protectors, the words "thermally protected."
 - c. Nameplate data for each group of identical motors rated above 460 volts, including the following data:

- 1) Manufacturer's name and serial number.
 - 2) Manufacturer's type and frame designation.
 - 3) Horsepower output.
 - 4) Time rating.
 - 5) Maximum ambient temperature.
 - 6) Insulation class.
 - 7) Temperature rise and method of measurement.
 - 8) RPM at rated load.
 - 9) Frequency.
 - 10) Number of phases.
 - 11) Voltage.
 - 12) Rated load amperes.
 - 13) Code letter.
 - 14) Service factor.
 - 15) Efficiency.
- d. Additional data for each group of identical motors rated above 100 horsepower:
- 1) Acceleration time with connected load.
 - 2) Allowable locked rotor time.
 - 3) Starting capabilities.
 - 4) Thermal limit curve, superimposed on time-current curves during acceleration of the driven equipment at rated voltage and at minimum specified starting voltage.
- e. If requested by the Owner for 460-volt motors rated 1 through 199 horsepower, copies of test reports of efficiency and power factor tests performed on electrically duplicate motors.
- f. Torque and speed curves.
- g. For each motor rated above 460 volts, certified factory test report.
- h. For each type of thermocouple furnished, manufacturer's standard calibration curve showing predicted millivolt output versus temperature.
- i. For each type of resistance temperature detector furnished, manufacturer's standard calibration curve showing predicted resistance in ohms versus temperature.
2. Perform the following factory tests on each motor rated 460 volts and below in conformance with NEMA MG 1 and IEEE 112:
- a. No-load current and speed at normal voltage and frequency.
 - b. High potential test.
 - c. Other standard factory tests.
3. Perform the following factory tests on each motor rated above 460 volts in conformance with ANSI C50.41 and IEEE 112:
- a. Measurement of winding resistance.
 - b. No-load readings of current, power, and nominal speed at rated voltage and frequency.
 - c. Mechanical vibration.
 - d. Direction of rotation versus phase sequence.
 - e. Insulation resistance.
 - f. High-potential test.
4. Tests to confirm guaranteed sound pressure levels may be required at Owner's option and expense.

260810 - ELECTRICAL TESTING

1. Maintain a written record of all tests showing date, testing equipment, personnel making test, equipment or material tested, tests performed, and results, including deficiencies found. Test reports shall include nameplate data of equipment being tested.
2. Complete test forms supplied by Contractor.

261200 – SMALL POWER TRANSFORMERS

1. Includes, but not limited to, the following:
 - a. Outline drawings.
 - b. Nameplate drawings.
 - c. Wiring diagrams.
 - d. Schematic diagrams.
 - e. Instrument transformer performance curves and data.
 - f. Instruction books.

261313 - 4,160-VOLT METALCLAD SWITCHGEAR

1. Includes, but not limited to, the following:
 - a. Switchgear:
 - 1) Arrangement and outline drawings.
 - 2) Installation drawings.
 - 3) Bills of material.
 - 4) AC Three-line diagrams.
 - 5) AC Schematic diagrams.
 - 6) Wiring diagrams, including external connection terminals.
 - 7) Instrument transformer performance curves and data.
 - 8) Protective device coordination curves.
 - 9) Communications protocol information for all data communication devices and systems.
 - 10) Instruction books.
 - 11) Separate schematic and wiring drawings shall be submitted for each breaker furnished. "Typical" drawings covering several breakers will not be acceptable.
 - b. Bus Duct:
 - 1) Arrangement and outline drawings.
 - 2) Installation drawings.
 - 3) Bills of Material.
 - 4) Three-line diagrams.
 - 5) Wiring diagrams.
 - 6) Instruction books.
 - 7) Support details.
 - 8) Structural design calculations for bus duct supports shall be performed by a Professional Engineer licensed to practice in the jurisdiction where the Project is located, and the data sheets shall be sealed by this Professional Engineer.

262300 - 480-VOLT LOAD CENTERS AND BUS EQUIPMENT

1. Transformers:
 - a. Transformer nameplate drawings.
 - b. Arrangement and outline drawings.
 - c. Installation drawings.

- d. AC and DC schematic diagrams.
- e. Wiring diagrams including external connection terminals.
- f. Instrument transformer performance curves and data.
- g. Instruction books.
2. Load Centers:
 - a. Arrangement and outline drawings.
 - b. Installation drawings.
 - c. Bills of Material.
 - d. AC three-line diagrams.
 - e. AC & DC schematic diagrams.
 - f. Wiring diagrams, including external connections terminals.
 - g. Instrument transformer performance curves and data.
 - h. Protective device coordination curves.
 - i. Communications protocol information for all data communication devices and systems.
 - j. Instruction books.
 - k. Separate schematic and wiring drawings shall be submitted for each breaker. "Typical" drawings covering several breakers will not be acceptable.
 - l. Details on insulating barriers between cable terminals and main bus.
3. Bus Duct:
 - a. Arrangement and outline drawings.
 - b. Installation drawings.
 - c. Bills of material.
 - d. Three-line diagrams.
 - e. Instruction books.

262400 - PANELBOARDS, SWITCHBOARDS AND TRANSFORMERS

1. General arrangement and outline information.
2. Schematic power diagrams.
3. Wiring diagrams.
4. Bills of material.
5. Nameplate information.
6. Protective device coordination curves.

262419 - 480 VOLT MOTOR CONTROL CENTER EQUIPMENT

1. Arrangement and outline drawings.
2. Bills of Material.
3. Installation drawings.
4. Wiring diagrams.
5. Schematic diagrams.
6. Instrument transformer performance curves and data.
7. Instruction books.

262900 - POWER SWITCHING AND CONTROL DEVICES

1. Outline information.
2. Internal arrangement information.
3. Schematic power and control diagrams.
4. Wiring diagrams.
5. Protective device coordination curves.

263353 - UNINTERRUPTIBLE POWER SYSTEM

1. Arrangement and outline drawings.
2. Installation drawings.
3. External connection diagrams.
4. Schematic diagrams.
5. Bills of Material.
6. One-line diagrams.
7. Instruction books.
8. Protective device coordination curves.
9. Efficiency curves (showing heat losses).

264100 - LIGHTNING PROTECTION SYSTEMS

1. General arrangement and outline information.
2. Bills of material.
3. Instruction books.
4. Technical specifications for all components.
5. Mounting details for all components.
6. Detailed layout drawings.

264200 - CATHODIC PROTECTION EQUIPMENT AND MATERIALS

1. Cathodic protection rectifiers.
2. Anode junction box.
3. Impressed current anodes.
4. Galvanic anodes.
5. Cathodic protection wire.
6. Coke-breeze.
7. Exothermic weld equipment.
8. Ground rod.
9. Ground wire and clamp.
10. Conduit.
11. Concrete terminal boxes with terminal boards and shunts.
12. Plastic caps for exothermic welds.
13. Temporary fill pipe.
14. Vent pipe.
15. Centering spacer.
16. Ties.
17. Supports, anchor bolts.
18. Well casing pipe.
19. Gravel backfill gradation.
20. Painting procedure, including color chart.
21. Permanent reference electrodes.
22. Rheostat control boxes.
23. Test coupons.

265000 - LIGHTING, RECEPTACLES AND CONTROLLING DEVICES

1. Information for each light fixture, switch, receptacle outlet, and accessories.
2. In the event of a proposed substitution of the lighting fixture specified, Contractor shall submit the following information to Owner for approval before an order is placed for such fixtures:
 - f. A complete fixture description.

- g. A complete set of photometrics for proposed fixture.
- h. If required by Owner, operating sample units of fixtures proposed as substitutes to those specified.

0275116 – INTERCOMMUNICATIONS AND PUBLIC ADDRESS SYSTEM

1. Schematic power and control diagrams.
2. General arrangement and outline information.
3. Bills of material.
4. Instruction books.
5. Technical specifications for all components.
6. Mounting details for all components.

409513 - PLC CONTROL CABINETS

1. Submittals required shall include the following:
 - a. Seller's factory test report.
 - b. Instruction books and operating manuals.
 - c. Drawings, wiring diagrams, product data, and other items specified.

411209 – BELT CONVEYORS

1. Hydraulic take-up logic.
2. Special start-up logic (if required).
3. Standard details.
4. Pulley and bearing schedule.
5. Drive schedule.

411212 – RADIAL STACKER

1. Anchor bolt requirements.
2. General arrangements.
3. Complete motor data.
4. Accessory information (drives, hoists, and the like).

411230 – CHUTES, HOPPERS, AND GATES

1. General arrangement drawings.
2. Liner plate cutout and bolt location drawings (two sets at end of job).
3. Gate operators including applicable schematics (electric, hydraulic, air).

411435 – BELT SCALES

1. Scale general arrangement.
2. Calibration chain.
3. Chain rack and/or reel.
4. Field wiring schematics.
5. Internal wiring diagrams.
6. Electrical equipment drawings.
7. Instruction manuals.
8. Recommended spare parts list.

411525 – CONTROL DEVICES FOR MATERIAL HANDLING

1. Furnish complete Master Device List, or bill of material of all electrical equipment, devices, and accessories by this Contract. This shall include the following for each device:

- a. Tag number.
 - b. Manufacturer.
 - c. Data or specification sheet number, if any.
 - d. Scheduling information, showing dates for ordering, fabrication, shipment, and the like.
2. Furnish outline drawings for each type of device furnished. One drawing may be used for all devices of the same type, but the drawing shall be marked to list the tag numbers of all devices to which it applies. Outline drawing shall clearly show terminal arrangement and numbering.
 3. In addition to the above, Contractor shall prepare a set of system flow diagrams locating all control devices furnished. A separate flow diagram shall be submitted for each of the following groups:
 - a. Belt misalignment switches.
 - b. Emergency pull cord switches.
 - c. Under-speed switches.
 - d. Plugged chute switches (tilt type, ultrasonic and nuclear).
 - e. Solenoid valves (air blasters and the like).
 - f. Position limit switches (tripper) (and) (shuttle) travel, telescoping chute, take-up overtravel, flop gate position, slack cable, belt rip, and the like).
 - g. Vibration switches.
 - h. Material level switches and monitors.
 - i. Warning bells and horns.
 - j. Warning lights (beacons and strobes).
 4. Complete mounting details for each type and application of switch.

485272 - BOTTOM ASH EQUIPMENT

1. Submittals required shall include the following:
 - a. Foundation design information.
 - b. Structural fabrication information.
 - c. Piping fabrication information.
 - d. Erection information.
 - e. Internal arrangement information.
 - f. Piping connection information.
 - g. Valve information.
 - h. Instrumentation information.
 - i. Block and/or logic control diagrams.
 - j. Wiring diagrams.
 - k. Electric motor data.
 - l. Bills of material.
 - m. Test information.
 - n. Nameplate information.

485280 - FLY ASH & GYPSUM EQUIPMENT

1. Submittals required shall include the following:
 - a. General arrangement and outline information.
 - b. Foundation design information.
 - c. Structural fabrication information.
 - d. Piping fabrication information.
 - e. Erection information.
 - f. Internal arrangement information.

- g. Piping connection information.
- h. Valve information.
- i. Instrumentation information.
- j. Block and/or logic control diagrams.
- k. Wiring diagrams.
- l. Electric motor data.
- m. Bills of material.
- n. Test information.
- o. Nameplate information.

485285 - GYPSUM DEWATERING SYSTEM

- 1. Submittals required shall include the following:
 - a. General arrangement and outline information.
 - b. Foundation design information.
 - c. Structural fabrication information.
 - d. Erection information.
 - e. Piping connection information.
 - f. Valve information.
 - g. Instrumentation information.
 - h. Block and/or logic control diagrams.
 - i. Wiring diagrams.
 - j. Electric motor data.
 - k. Bills of material.
 - l. Test information.
 - m. Nameplate information.
 - n. Material balance for gypsum dewatering system.
 - p.

485290 - ASH HANDLING PIPING, VALVES & FITTINGS

- 1. Submittals required shall include the following:
 - a. General arrangement and outline information.
 - b. Foundation design information.
 - c. Structural fabrication information.
 - d. Erection information.
 - e. Piping connection information.
 - f. Valve information.
 - g. Bills of material.
 - h. Test information.

485295 - ASH HANDLING INSTRUMENTS & CONTROLS

- 1. Submittals required shall include the following:
 - a. General arrangement and outline information.
 - b. Foundation design information.
 - c. Internal arrangement information.
 - d. Piping connection information.
 - e. Instrumentation information.
 - f. Logic control diagrams or logic narrative
 - g. Graphis screens and control menus.
 - h. Wiring diagrams.
 - i. Printed circuit board information.

- j. Bills of material.
- k. Test information.
- l. Nameplate information.

485422 - HORIZONTAL END-SUCTION PUMPS

1. Standard performance curves covering the range from shutoff to 120% of design flow rate and for the following parameters as a function of capacity at design temperature.
 - a. Total developed head.
 - b. Required NPSH.
 - c. Efficiency.
 - d. Required brake horsepower.
2. Submit the following drawings:
 - a. Cross-section of seal housing showing seal arrangement, type, manufacturer, and model number.
 - b. Schematic of seal and bearing water piping arrangement.
 - c. Seal injection and bearing water requirements.
 - d. Foundation details with loads, base plate bolt configurations, and other data as required for foundation design.
 - e. Piping connection information showing:
 - (1) Size, type, and location for each connection.
 - (2) Allowable forces and moments on each connection.
 - f. Bill of material.
3. Submit test reports and performance data specified.
4. Motor performance data and results of shop test.

485435 – VERTICAL CAN PUMPS

1. Standard performance curves covering the range from shutoff to 120% of design flow rate and for the following parameters as a function of capacity at design temperature.
 - a. Total developed head.
 - b. Required NPSH.
 - c. Efficiency.
 - d. Required brake horsepower.
2. Submit the following drawings:
 - a. Cross-section of seal housing showing seal arrangement, type, manufacturer, and model number.
 - b. Schematic of seal and bearing water piping arrangement.
 - c. Seal injection and bearing water requirements.
 - d. Foundation details with loads, base plate bolt configurations, and other data as required for foundation design.
 - e. Piping connection information showing:
 - (1) Size, type, and location for each connection.
 - (2) Allowable forces and moments on each connection.
 - f. Bill of material.
3. Submit test reports and performance data specified.
4. Motor performance data and results of shop test.

485460 - HORIZONTAL HARD METAL SLURRY PUMPS

1. Standard performance curves covering the range from shutoff to 120% of design flow rate and for the following parameters as a function of capacity at design temperature.
 - a. Total developed head.

- b. Required NPSH.
- c. Efficiency.
- d. Required brake horsepower.
2. Submit the following drawings:
 - a. Cross-section of seal housing showing seal arrangement, type, manufacturer, and model number.
 - b. Schematic of seal and bearing water piping arrangement.
 - c. Seal injection and bearing water requirements.
 - d. Foundation details with loads, base plate bolt configurations, and other data as required for foundation design.
 - e. Piping connection information showing:
 - (1) Size, type, and location for each connection.
 - (2) Allowable forces and moments on each connection.
 - f. Bill of material.
3. Submit test reports and performance data specified.
4. Motor performance data and results of shop test.

485502 – COMPRESSED AIR SYSTEM EQUIPMENT

1. General arrangement and outline drawings.
2. Foundation design information including static/dynamic loads, and anchor bolt size and arrangement.
3. Piping layout and connection information.
4. Rated capacities of air compressors, after-coolers, air dryers, filters, and automatic drains.
5. Equipment shipping, installed, and operating weights.
6. Certificates of Shop Inspection and Data Report: As required by ASME Boiler and Pressure Vessel Code.
7. Wiring Diagrams: For each item of equipment with electric power supply. Include ladder-type wiring diagrams for interlock and control wiring.
8. Bills of material.
9. Nameplate information.
10. Information on materials of construction.
11. Complete lubrication system information.
12. Acceptable lubricant manufacturer information.
13. Surface preparation and painting specification information.
14. Drawings showing additional detail if requested by Engineer, and as required for installation and maintenance.

485660 – FIELD ERECTED TANKS

1. Outline and general arrangement drawings showing all supports, connections, weights, and clearances required.
2. Drawings showing location and details of connections.
3. Drawings showing anchor bolt sizes and locations and base plate details.
4. Drawings showing details of tank accessories.
5. Welding procedures.
6. Welders' qualification test records prior to beginning production welding.
7. Bills of material.
8. Drawings showing additional detail if requested by Engineer and as required for the erection and maintenance of each tank and/or accompanying accessories.
9. Surface preparations and painting procedures.

485935 - POWER PIPING WELDING AND FABRICATION

1. Welding procedures as specified.
2. Welders' qualification test records as specified.
3. Post-heat treatment temperature records as specified.
4. ASME manufacturer's data reports for piping as required by ASME B31.1 and the ASME Boiler and Pressure Vessel Code.

485940 – POWER PIPING HANGERS & SUPPORTS

1. Detail drawings of engineered hanger assemblies on 8-1/2"x11" sheets indicating the following:
 - a. Illustrate each support in the install position. Show each support correctly oriented with respect to piping and building structure. Hanger drawings shall have a bill of material list referenced by part number to the hanger illustration. Indicate in the plan view location of the support attachment to the building structure including the orientation and elevation of added supplementary steel or existing steel, and support attachment to the piping for each support. All field welds shall be shown and sized.
 - b. Plan location of the piping.
 - c. Plan locations of the hanger attachment to the steel and to the pipe.
 - d. Location and size of all supplementary steel.
 - e. Elevation location of the support steel.
 - f. Elevation location of the piping.
 - g. Total hanger load.
 - h. Complete bill of material referenced with part number to the hanger illustration.
 - i. Hanger tagging designations shall be in a manner as approved by Owner.
 - j. Equipment connection reaction list.
 - k. Concrete pad, grout, and foundation details.
 - l. Supports from suspended concrete slabs require Owner review and approval.
2. Hanger load calculations if requested.
3. Certificate of completion of factory tests, where applicable.
4. Submit hanger detail drawings by piping system in loose-leaf binders on the first submittal with a separate binder for each set of copies. Submit only a completed system set of drawings covering all the hangers in a system on the first submittal. Each complete system set shall include index cover sheet. Index cover sheet shall indicate support tag numbers, number of sheets for each support revision, and date issued of each support. On revised submittals, submit individual revised detail sheets with the revised index sheets indicating supports that have been revised.

485965 - EQUIPMENT ERECTION

1. Welding procedures as specified.
2. Welders' qualification test records as specified.
3. Weld inspection reports as specified.
4. Post-heat treatment temperature records as specified.
5. Pipe hangers.
6. Touch-up paint.
7. Detailed erection procedures for the following:
 - a. Remote Submerged Flight Conveyors.
8. Detailed power station crane load test procedure.

485990 – ERECTION AND INSTALLATION OF POWER PIPING

1. Welding procedures as specified.
2. Welder's qualification test records as specified.
3. Hanger and support adjustment reports as specified.
4. Post-heat treatment temperature records as specified.
5. Data reports as required by ASME B31.1 and the ASME Boiler and Pressure Vessel Code.

4.0 Hold Points

The following list of activities shall be treated as Hold Points as defined in the Agreement:

- A. Backfill Placement Compaction Testing
- B. Rebar Placement
- C. Concrete Placement
- D. Insulation Placement over Ductwork (Weld Inspections)
- E. Paint Primer and Final Coat
- F. Bearing Pile Blow Count
- G. Structural Steel Connection Final Bolt Up
- E. Embedded Grounding and Conduits (Prior to Concrete Pour)
- F. Electrical Devices (Transformers, Switchgear, MCC, Controls) Prior to Energization