

ADDENDUM NO. ONE (1)
to the
CONTRACT DOCUMENTS, TECHNICAL SPECIFICATIONS, AND CONSTRUCTION DRAWINGS
for construction of
WASTEWATER TREATMENT PLANT EXPANSION TO 1.5 MGD
for
WILBARGER CREEK MUNICIPAL UTILITY DISTRICT NO. 2
TRAVIS COUNTY, TEXAS

October 23, 2026

Addendum No. One (1) covers the following changes to the contract documents, technical specifications, and construction drawings:

CONTRACT DOCUMENTS

No Changes.

TECHNICAL SPECIFICATIONS

1. SECTION 11171 – MULTI-STAGE CENTRIFUGAL BLOWERS

Remove and replace with the attached and revised Section 11171 – Multi-Stage Centrifugal Blowers notable revisions include:

- a. Revised Section 2.5 to remove the requirement that the PLC's make and model conform with Division 13.

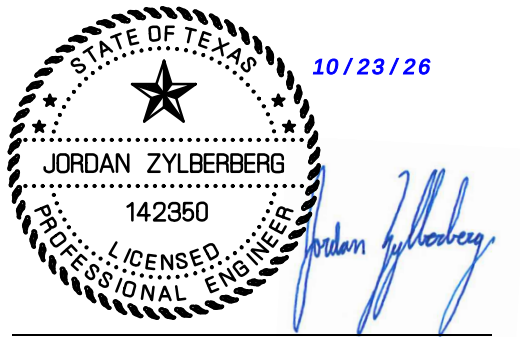
2. SECTION 13300 – INSTRUMENTATION AND CONTROLS – GENERAL PROVISIONS (PLC)

Remove and replace with the attached and revised Section 13300 – Instrumentation and Controls – General Provisions (PLC) notable revisions include:

- a. Revised Section 1.1.E to clarify that the Contractor is responsible for providing all PLC and HMI software programming and engineering not provided by the equipment vendors.

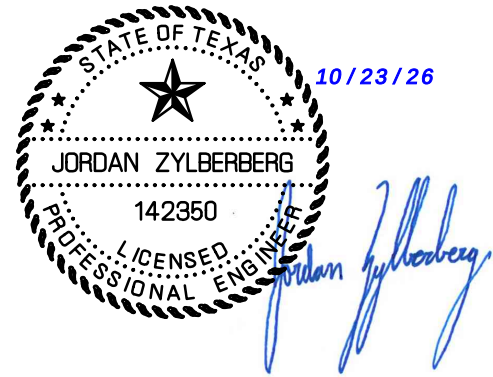
CONSTRUCTION DRAWINGS

No Changes.



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END OF ADDENDUM NO. 1



**SECTION 11171
MULTI-STAGE CENTRIFUGAL BLOWERS**

PART 1 – GENERAL

1.1 SCOPE

- A. This section provides for furnishing, installation, and training of multi-stage centrifugal blowers, including motor, couplings, coupling guards, and all associated piping, filters, silencers, valves and other appurtenances for a complete working unit.

1.2 RELATED SECTIONS

- A. All sections of the contract documents and technical specifications are related sections. Failure to review contract documents and technical specifications does not relieve the Contractor, Supplier, or Manufacturer of complying with the requirements therein.

1.3 REFERENCES

- A. Reference Standards:
1. Air Movement and Control Association International (AMCA)
 2. American National Standards Institute (ANSI)
 3. American Gear Manufacturers Association (AGMA)
 4. American Welding Society (AWS)
 5. ASTM International (ASTM)
 6. Institute of Electrical and Electronic Engineers (IEEE)
 7. International Organization for Standardization (ISO)
 8. National Electric Code (NEC)
 9. National Electrical Manufacturers Association (NEMA)
 10. National Fire Protection Association (NFPA)
 11. Occupational Safety and Health Administration (OSHA)
 12. Underwriters Laboratories (UL)

1.4 SUBMITTALS

- A. Submit shop drawings, product data, samples, and descriptive literature as specified in Specifications 01300 and 01340. Include the following, arranged to facilitate submittal review.
1. Scope of supply including part numbers, quantity, location and Manufacturer listed in table format.
 2. Cut sheets, construction materials, dimensions, weights, electrical power requirements, and shop coatings.
 3. Performance characteristics and motor data.
 4. Inlet filter ratings.
 5. Certified shop test results.
 6. L-10 bearing life calculations based on the proposed design conditions.
- B. The Manufacturer shall provide the following certifications.
1. The Manufacturer has examined the Contract Documents and agrees to the process performance guarantee and material specifications, warranty conditions, and other requirements of the Contract.
 2. The maximum power required of any motor will not exceed the motor rating under the proposed operating conditions.

3. The final installation is as specified herein, as intended by the Manufacturer, and suitable for continued operation by Owner's personnel.
 4. Owner's personnel have received sufficient training and are qualified to operate the equipment.
 5. Written certification of a proper and correct installation.
 6. Field test results are satisfactory and match the intent of this specification, as well as the expectations of the Owner, Engineer, and Manufacturer.
 7. The Manufacturer can provide a complete stock of spare parts within 48 hours of request.
- C. Submit operation and maintenance (O&M) data under provisions of Section 01300 – Submittals. Operation and maintenance manuals shall be prepared specifically for this installation and shall include curves, cut sheets, drawings, equipment lists, descriptions, etc. that are required to instruct operation and maintenance manuals.
- D. Submit record drawings under provisions of the Contract.
- E. This Section does not necessarily include all required information, reports, testing, services, and certifications. The Manufacturer shall provide all information necessary to fulfill the intent of this Section and of the Contract.

1.5 QUALITY ASSURANCE

- A. A single Manufacturer shall provide and warrant all herein specified equipment, components, and subcomponents.
- B. Test each blower at the factory before shipment. All tests shall be in conformity with ASME and shall extend from surge to 120 percent (120%) of design volume. ASME tests are not required for blowers built as parts cast in patterns, from which previous units have been cast, built, and tested. Only ship after Engineer approval of factory test results.
- C. Each furnished equipment item shall be designed and rated for its intended service environment, performance requirements, and area classification.
- D. Use only new, high-grade materials with properties best suited to the herein specified performance requirements and installation environment.
- E. Manufacturer and Contractor shall coordinate all dimensions to ensure adequate clearances for equipment maintenance, removal, or replacement.
- F. The requirements of this Section shall be considered the minimum limits of acceptability.

1.6 WARRANTY

- A. For a period of 12 months from substantial completion of the work, the Manufacturer shall warrant that equipment, when properly installed, shall be free of defects in material and workmanship under normal use and service. The Manufacturer shall repair or replace such equipment or any part thereof furnished by the Manufacturer and found defective after inspection by the Manufacturer.

1.7 DELIVERY, STORAGE AND HANDLING

- A. Deliver and store equipment as per Manufacturer's recommendations at a minimum.
- B. Crate and protect all equipment against damage during shipment. Exposed flanges shall be covered and sealed with shrink wrap to prevent the entrance of moisture. Take proper measures to prevent rust and corrosion.

- C. Ship packaged or pre-fabricated equipment in the largest sections permitted by carrier regulations, properly match-marked for ease of field assembly. The control panel of each system shall be shipped separately.
- D. Accept units on site. Inspect for damage upon delivery.
- E. Store equipment off the ground in a secure, enclosed shelter, where it is protected from the public. Store and maintain equipment in accordance with Manufacturer's recommendations. Protect all exposed surfaces.
- F. Do not remove shipping blocks, plugs, or caps installed to protect equipment during shipment until the equipment is installed and permanent connections made.

PART 2 – PRODUCTS

2.1 GENERAL

- A. Provide multi-stage centrifugal blowers which are specifically designed for the blower application. Refer to the service design conditions outlined in Section 2.2 Performance Requirements.
- B. Furnish blowers of standard dimensions such that parts will be interchangeable between like units.

2.2 PERFORMANCE REQUIREMENTS

Design Conditions	Units	MSB-09-601
Location (Indoor/Outdoor)	-	Outdoor
Ambient Temperature (max)	°F	110
Ambient Relative Humidity (max)	-	60%
Setting Elevation for Critical Equipment	ft	507.00
Design Capacity	scfm/ea	1,200
Discharge Pressure	psig	8.00
Maximum Motor Size	HP	75
Speed	rpm	3,600

2.3 ACCEPTABLE MANUFACTURERS

- A. Provide multi-stage centrifugal blowers of one of the following Manufacturers. No others will be allowed:
 - 1. Lone Star Blower
- B. Listing an acceptable Manufacturer will not relieve the Manufacturer from conforming to these specifications.

2.4 CENTRIFUGAL AIR BLOWERS

A. Performance and Design Requirements.

1. Provide curves which show blower performance at 120°F, 105°F, 68°F, and 20°F.
2. When the volume of flow is reduced by at least 50 percent (50%), the blower under specified inlet conditions shall develop at least 0.5 PSIG above the specified discharge pressure without surging or overloading the motor.
3. Test each blower at the factory before shipment. All tests shall be in conformity with ASME and shall extend from surge to 120 percent (120%) of design volume. ASME tests are not required for blowers built as parts cast in patterns, from which previous units have been cast, built, and tested.
4. After installation, as soon as conditions permit, the blower unit will be subjected to running tests. These tests are to determine that units operate satisfactorily throughout entire operating pressure and capacity ranges at rated speeds.

B. Blowers. The blower unit shall be multi-stage, direct-coupled and mounted on a skid-type frame..

1. The blower casing shall be of rigid cast iron sections with inlet and discharge connections having an ASA 125 lb. flange pattern.
2. Impellers shall be cast of high grade aluminum with a ground and polished steel shaft. Dynamically balance shaft and impeller as a unit with tip speeds not exceeding 375 FPS.
3. All bearings are to run in an oil bath, with reservoir, and be of the anti-friction type having a minimum B-10 life of 40,000 hours.

C. Motors shall conform to the requirements of Section 16013, Electric Motors:

1. The motor shall be 460 Volt, 3 Phase, 60 HZ, 3600 RPM, 1.15 service factor, NEMA design B type motor with NEMA MG-1, Class "F" insulation, severe duty rated TEFC enclosure and a maximum of 75 HP.

D. Motor/Blower Drive Coupling. After installation of the blowers, air piping, check valves, and all other appurtenances, the Contractor shall have the blower Manufacturer's representative verify the alignment of the blower to the motor and check the vibration levels under normal operating conditions. The alignment tolerance shall be within plus or minus 2 mils (0.002 inches), and the vibration levels shall not exceed 0.3 in/sec (peak). Vibration readings shall be in the vertical, horizontal, and axial planes, and shall be taken at both the inboard and outboard bearings. The Contractor shall provide a written report of all readings including maximum, minimum, and mean vibration readings. If any readings are found in excess of these levels, the Contractor shall remedy the cause of the excursions, and retest the alignment and vibration levels. The blowers may not be placed into service until the report(s) are approved by the Engineer. Couplings shall be covered with 16-gauge base mounted sheet metal guards.

E. Accessories.

1. Provide the following filter/silencers rated at 120 percent (120%) of the blower capacity to be mounted on the inlet piping as shown on the plans:
 - a. AF-09-601
2. The blower Manufacturer may provide the following as a part of a complete and working package. However, it is the responsibility of the blower Manufacturer to coordinate with all applicable specifications and the Contractor to provide valves, fittings, and accessories that are compatible with the system.
 - a. BFV-09-601
 - b. BFV-09-602
 - c. SAE-09-601
 - d. DCV-09-601

2.5 ELECTRICAL CONTROLS AND DEVICES

- A. Provide separately mounted NEMA 4X stainless steel white epoxy coated Surge Local Control Panel at each blower with:
1. An HMI capable of displaying Amps, Surge, and alarm status.
 2. Provide a means of UV protection for digital displays.
 3. Nameplates.
 4. Provide the current transformer (shipped loose), for each blower, to be installed at MCC.
 5. A PLC programmed to provide the functionality described in the Process Control Narrative of this section. PLC shall conform to specification 13311 requirements or shall match existing site blower PLC installation.
- B. Process Control Narrative:

Process Description:	One (1) multistage centrifugal blower will be provided to supply air, along with five (5) existing blowers, to a common bifurcated air header at the blower slab. Three blowers supply air to the secondary processes, chlorine contact basin, scum pump stations, and RAS/WAS pump stations (Air Header No. 2), Two blowers will be dedicated to the sludge holding tank (Air Header No. 1), and one blower will be a common spare. The blowers will be operated continuously at a constant speed. Each blower will have a Surge Local Control Panel (Vendor Provided) and local padlock-able Lock-Stop Switch (By Contractor). Three low pressure switches, one on each branch of the air header, will send an alarm when the pressure drops below a set point.
P&ID:	9-I-1 Blowers P&ID
Controlled Devices:	MSB-09-601 – Multistage Blower No. 6
Instrumentation Devices:	See Specification Section 13441 – Process Control Narratives
Local Functions:	Blower Surge Local Control Panel will be vendor supplied and controlled by the vendor supplied control panel which will at a minimum provide the following: • An On-Off switch. In the On position, the blower will operate if the switch at the MCC is also in the Hand position or is in the Auto position and the PLC has engaged a Call relay if the interlocks listed in the INTERLOCKS section below are not active. • An Emergency Stop Switch (E-Stop) • HMI for status and alarm indication
MCC Functions:	Blower MCC section will have the following: • A Hand-Off-Auto switch. In the Hand position, the blower will operate if the switch at the Surge Local Control Panel is also in the On position and if the interlocks listed in the INTERLOCKS section below are not active. • An SSRV providing fault status indication • A Standby Power Bypass On-Off switch. In On position, the blower will be locked out under standby power. • Phase Failure Bypass On-Off Switch • Running Status Light • Elapsed Time Meter (Shipped loosed by vendor) • Current Transformer (Shipped loosed by vendor) • The blower shall incorporate user-adjustable time delays for the startup

HMI Functions:	HMI shall have a graphical layout similar to what is shown on the five existing blowers HMI. At a minimum the graphic provided at the blowers local control panel will include indication of the following status and alarms: • Hand/Off/Auto • Running • Overload • Surge • CFM • Amps • Runtime • SSRV Fail
PLC Functions:	When the Hand-Off-Auto switch is in the Auto position, the PLC will call the blowers to run when it receives an operator call from the SCADA interface, if the interlocks listed in the INTERLOCKS section below are not active. The PLC will sequence the restart of the blowers when the plant goes on stand-by power. The PLC will automatically call the blowers to run once power is returned. In case of blower failure, the PLC will automatically re-sequence the blower rotation order. MSB—09-601 will not be included in this blower rotation as it is dedicated to the Sludge Holding Tank. All other blowers will rotate and be re-sequenced to operate upon blower failure.
SCADA Functions:	See Specification Section - 13441 – Process Control Narratives
Interlocks:	<u>Interlocks below are hardwired:</u> MSB-09-601 Phase Failure MSB-09-601 E-Stop MSB-09-601 SSRV Fail MSB-09-601 Surge MSB-09-601 Overload MSB-09-601 Lock Stop Switch MSB-09-601 Standby Power Lockout
Alarms and Indications:	<u>Alarms Indicated at the HMI</u> MSB-09-601 Surge Alarm MSB-09-601 Overload MSB-09-601 E-Stop <u>Alarms Indicated on SCADA</u> MSB-09-601 Phase Failure MSB-09-601 E-Stop MSB-09-601 SSRV Fail MSB-09-601 Surge MSB-09-601 Overload See Specification Section - 13441 – Process Control Narratives for a complete list of SCADA alarms See IO list for a complete list of alarms and status indications

2.6 COATING SYSTEM

- A. Shop prime in accordance with the Manufacturer's recommendations for transportation and storage. Field prep and coat in accordance with Section 09921 – Protective Coatings.
- B. Field touch-up damaged areas of coating with same coating system in accordance with Manufacturer's recommendations.

2.7 SPARE PARTS

- A. Provide one (1) year's supply of inlet filters for each blower and one (1) year's supply of oil for each blower.

PART 3 – EXECUTION

3.1 INSPECTION

- A. Inspect and verify that structures or surfaces on which equipment will be installed have no defects which will adversely affect installation
- B. Inspect all equipment prior to installation.
- C. Promptly report defects which may affect the Work to Engineer.

3.2 INSTALLATION

- A. Install and adjust equipment in accordance with the Drawings, approved shop drawings, and the Manufacturer's instructions.
- B. Do not operate the equipment until the installation is approved by the Manufacturer's on-site representative.
- C. Remove temporary bracing supports and other construction debris that may damage equipment.
- D. Remove any temporary protective coatings and oils used for protection during shipment.
- E. Check equipment for correct operation and freedom of moving parts.
- F. Align equipment to Manufacturer's tolerances. Adjust clearances and torques.
- G. Flush and fill lubricated systems in accordance with Manufacturer's instructions.
- H. Provide sufficient clearances for thermal expansion and contraction.
- I. Mount duplicate blower nameplates(s) inside front panel of blower control panel, using stainless steel fasteners.

3.3 FIELD TESTING

- A. Prior to startup, the Manufacturer's representative, shall inspect all equipment for proper assembly, alignment, and proper operation.

- B. Blowers shall be checked for proper alignment to avoid imbalance and excessive vibration. Any misalignment of greater than ¼" shall be remedied prior to demonstration period.
- C. The Manufacturer's representative with assistance from the Contractor shall perform equipment tests in order to certify compliance with the herein specified performance requirements.
- D. The Contractor shall provide all necessary test equipment, including temporary flow meters, pressure gauges, piping plugs or caps, or temporary bulkheads, and current meters.
- E. Contractor shall ensure there is sufficient volume in the basin to conduct tests. If there is no flow to the basin upon start up, the Contractor shall provide water for testing purposes. If downstream components are not in place, Contractor shall make provisions for recycling and/or disposal of the provided water.
- F. Place the system into operation. All components shall continue to operate without alarms or shutdowns, except as intended, for eight consecutive hours to be considered ready for startup.
- G. Field tests shall consist of operating the blowers under normal and abnormal conditions.
- H. Operate each blower through its entire performance range. Adjust, balance, and calibrate and verify that the equipment, safety devices, controls, and process system are operating as intended. Test safety devices for proper settings and signals.
- I. Flow, pressure, and current shall be measured and documented for at least three operating points on each blower.
- J. Should the tests indicate any malfunction, the Contractor shall make any necessary repairs and adjustments, and then re-test the equipment. Such test and adjustments shall be repeated until, in the opinion of the Engineer, the installation is complete and the equipment functions properly and accurately and is ready for permanent operation.
- K. A copy of all information from functional tests, including data, worksheets, and other materials shall be turned over to the Owner at the completion of the testing program, and copies shall be included in the Operations & Maintenance Manual for the project.

3.4 MANUFACTURER'S REPRESENTATIVE

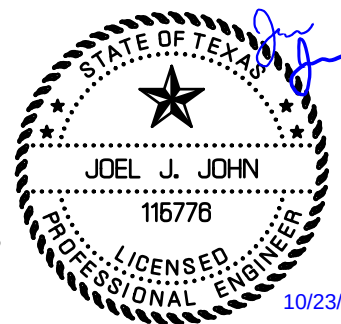
- A. A factory trained representative of the Manufacturer shall provide services for installation, supervision, start-up, field testing services, and operation and maintenance personnel training services.
- B. Manufacturer's representative shall perform on-site services according to the following schedule, excluding travel time:

Work	Person Days	Trips
Manufacturer's inspection and certification of installation	1	1
Pre-demonstration functional and performance testing	1	1
Pre-demonstration onsite training of owner personnel	1	Can be combined w/ pre-demonstration start up
Pre-demonstration start	1	1
Demonstration remedial inspection, field testing, and training	As Required	As Required by Engineer

- C. Manufacturer shall provide a written report certifying that the installation has been checked, is adequate for the intended purpose, and that the equipment is ready to be placed into service.
- D. Manufacturer shall operate the system in the presence of the Engineer and verify that the equipment meets or exceeds the specified requirements. Representative shall revisit the Site as often as necessary until all trouble is corrected and the installation is entirely satisfactory. The Manufacturer's Representative shall provide a written report documenting the results of the field testing.
- E. All costs, including travel, lodging, meals and incidentals, for additional visits shall be at no additional cost to the Owner.
- F. Contractor will be back charged by the Client for an unsuccessful field testing demonstration. Schedule the field demonstration a minimum of 48 hours following a successful startup procedure.

END OF SECTION

SECTION 13300
INSTRUMENTATION AND CONTROLS - GENERAL PROVISIONS



PART 1 – GENERAL

1.1 SCOPE OF WORK

- A. The Contractor shall procure the services of a Process Control System Supplier (PCSS) to furnish and install all materials, equipment, labor and services, required to achieve a fully integrated and operational system as specified herein, in the Specification Sections listed below, and in related drawings, except for those services and materials specifically noted.

1.	Section No	Title
	13302	Testing
	13303	Training
	13306	Application Engineering Services
	13310	Computer System Hardware
	13311	PLC Hardware and Software
	13315	HMI System Software
	13320	Control and Data Network Equipment
	13321	Fiber Optic Cabling and Equipment
	13330	Control Panels and Panel Mounted Equipment
	13335	Uninterruptible Power Supply (1 Phase)
	13340	Instruments
	13441	Process Control Narrative

- B. Auxiliary and accessory devices necessary for system operation or performance, such as transducers, relays, signal amplifiers, intrinsic safety barriers, signal isolators, software, and drivers to interface with existing equipment or equipment provided by others under other Sections of these specifications, shall be included whether they are shown on the Drawings or not.
- C. All equipment and installations shall satisfy applicable Federal, State and local codes.
- D. Use the equipment, instrument, and loop numbering scheme shown on the Drawings and specifications in the development of the submittals. Do not deviate from or modify the numbering scheme without the Engineer's approval.
- E. An Application Engineer System Supplier (AESS) shall be selected by the Contractor to provide all PLC and HMI software programming and engineering not provided by equipment vendors. The PCSS, and not the AESS, shall procure all required PLC and HMI hardware, software and licenses.

1.2 RELATED WORK

- A. Fiber optic cabling is specified in Section 13321.
- B. Relevant equipment Sections in Divisions 11, 13, and 15.
- C. For the migration of the chemical system controls, the PCSS shall coordinate with the owner to ensure chemical dosage based on the plant's effluent flow is not disturbed but is continued through the project's construction

phase. This could be executed using temporary controls, the existing control cabinet IO signals or by using devices such as 4-20mA splitters.

1.3 SUBMITTALS

1. General Requirements:

2. Refer to [Section 01300] for general submittal requirements.
3. Shop drawings shall demonstrate that the equipment and services to be furnished comply with the provisions of these specifications and shall provide a complete record of the equipment as manufactured and delivered.
4. Submittals shall be complete; giving equipment specifications, details of connections, wiring, ranges, installation requirements, and specific dimensions. Submittals consisting of only general sales literature shall not be acceptable.
5. Substitutions on functions or type of equipment specified shall not be acceptable unless specifically noted.
6. Separate submittals shall be made for each submittal listed below.
7. In case of specified equipment being discontinued within eighteen (18) months of submittal, notify and submit manufacturer suggested equivalent replacement.

B. Qualifications Submittal:

1. Submit, within 30 calendar days after Notice to Proceed, detailed information on staff and organization to show compliance with the Quality Assurance requirements of this Section. The Qualifications submittal shall be submitted and approved before any further submittals will be accepted. Failure to meet the minimum requirements shall be grounds for rejection as a PCSS. The Qualifications Submittal shall, as a minimum, contain the following:
2. Copies of ISA CCST Level 1 certificates for all field technicians or resumes demonstrating field experience.
3. Notarized statement from the firm's financial institution demonstrating ability for the firm to meet the obligations necessary for the performance of the work.
4. Copy of UL-508 certificate for panel fabrication facilities.
5. Project references for water or wastewater projects as defined in the Quality Assurance paragraphs.
6. Documentation to demonstrate the ability to complete this project including: resumes of key staff, financial capacities, details on engineering, design, fabrication, and field service capacity, and location of staff responsible for responding to the site within four hours to resolve startup issues.

C. Project Plan, Deviation List, and Schedule Submittal:

1. Submit, within 45 calendar days after Notice to Proceed, a Project plan. The Project Plan shall be submitted and approved before further submittals shall be accepted. The Project Plan shall, at a minimum, contain the following:
2. Overview of the proposed control system describing the understanding of the project work, a preliminary system architecture drawing, interfaces to other systems, schedule, startup, and coordination. A discussion of startup, replacement of existing equipment with new, switchover (Maintaining Plant Operations during system transition), approach to testing and training, and other tasks as required by these specifications shall be included as applicable.
3. Preliminary list of HMI software, PLC software, and PLC hardware, including version numbers, solely to determine compliance with the requirements of the Contract Documents prior to beginning development of system programming. Review and approval of software and hardware systems as part of this Project Plan stage shall not relieve the PCSS of meeting all the functional and performance requirements of the system as specified herein. Substitution of manufacturer or model of these systems after the submittal is approved is not allowed without Engineer approval.

4. Project personnel and organization including the PCSS project manager, project engineer, and lead project technicians. Include resumes of each these individuals and specify in writing their commitment to this project. These do not need to be submitted again if already submitted in the Qualification submittal.
 5. Sample formats of the shop drawings to be submitted and in conformance with the requirements of the Specifications. At a minimum include samples of panel fabrication drawings, loop, and I/O wiring diagrams.
 6. Exceptions to the Specifications or Drawings shall be clearly defined in a Deviation List. The Deviation List shall consist of a paragraph by paragraph review of the Specifications indicating acceptance or any proposed deviations, the reason for exception, the exact nature of the exception and the proposed substitution so that an evaluation may be made by the Engineer. If no exceptions are taken to the specifications or drawings the PCSS shall make a statement as such. If there is no statement by the PCSS, then it is acknowledged that no exceptions are taken.
 7. Project schedule shall be prepared in Gantt chart format clearly showing task linkages for all tasks and identifying critical path elements. PCSS schedule must be based on the General Contractor schedule and must meet all field installation, testing, and start-up milestones in that schedule. The project schedule shall illustrate I&C related major project milestones including the following:
 - a. Schedule for all subsequent project submittals. Include the time required for Contractor submittal preparation, Engineer's review time, and a minimum of two complete review cycles.
 - b. Proposed dates for all project coordination meetings.
 - c. Hardware purchasing, fabrication, and assembly (following approval of related submittals).
 - d. Software purchasing and configuration (following approval of related submittals).
 - e. Shipment of instrument and control system equipment.
 - f. Installation of instrument and control system equipment.
 - g. Testing: Schedule for all testing.
 - h. Schedule for system cutover, startup, and/or going on-line for each major system. At a minimum include the schedule for each process controller and HMI server/workstation provided under this Contract.
 - i. Schedule for all training including submittal and approval of O&M manuals, factory training, and site training.
 - j. Incorporate time constraints for AESS activities as defined in [Section 13306].
- D. Input/Output (I/O) List Submittal:
1. Submit, within 60 days after Notice to Proceed, a complete system Input/Output (I/O) address list for equipment connected to the control system under this Contract.
 2. I/O list shall be based on the P&ID's, the Drawings, the design I/O list (if included), and requirements in the Specifications.
 3. The I/O list shall be submitted in both a Microsoft Excel readable electronic file format and an 8-1/2 inch by 11-inch hard copy.
 4. The I/O list shall reflect all active and spare I/O points. Add points to accommodate spare I/O as required in the specifications.
 5. The I/O list shall be arranged such that each control panel has a dedicated worksheet. At a minimum, I/O worksheet shall include the following information:

TAG NUMBER(S): As indicated on the Drawings, the identifier assigned to a device that performs a function in the control system. As part of this information, the loop number of the tag shall be broken out to allow for sorting by loop.

DESCRIPTION: A description of the function of the device (text that includes signal source, control function, etc.) Include the text "Spare Points" for all I/O module points that are not connected to equipment.

PHYSICAL LOCATION: The Control Panel designation of where the I/O point is wired to.

Physical POINT ADDRESS: Rack, Slot, and Point (or Channel) assignment for each I/O point.

I/O TYPE: use DO - Discrete Output, DI - Discrete Input, AO - Analog Output, AI - Analog Input, PI - Pulse Input, or PO - Pulse Output.

RANGE/STATE: The range in engineering units corresponding to an analog 4-20 mA signal, or, the state at which the value of the discrete points are "1."

ENGINEERING UNITS: The engineering units associated with the Analog I/O.

ALARM LIMITS: Include alarm limits based on the control descriptions and the Drawings.

P&ID - the P&ID or drawing where the I/O point appears on. Mark as "NA" (Not Applicable) if the I/O point is derived from a specification requirement and is not on the P&IDs.

6. The I/O list shall be sorted in order by:
 - Physical location.
 - I/O Type.
 - Loop Number.
 - Device Tag.
7. Once the I/O list is approved, the PLC I/O addresses shall not be modified without approval by the Engineer.
8. For I/O layout requirements, see the PLC Section 13311.

E. Field Instruments Submittal:

1. Refer to the Instruments section for submittal requirements.

F. Hardware and Software Packages Submittal:

1. Refer to the sections below for specific Hardware and Software Packages submittal requirements:
 - a. 13311 - PLC Hardware and Software.
 - b. 13315 - HMI System Software.
 - c. 13320 - Control and Data Network Equipment.
 - d. 13321 - Fiber Optic Cabling and Equipment.
 - e. 13330 - Control Panels and Panel Mounted Equipment.
2. For each hardware and software packages component specified in the sections above, submit a cover page that lists, at a minimum, date, specification number, product name, manufacturer, model number, Location(s), and power required. Preferred format for the cover page is ISA-TR20.00.01-2001 (updated in 2004-2006), general data sheet; however, other formats will be acceptable provided they contain all required information.
3. The purpose of this submittal is to review the control panel and wiring diagrams. This could be combined with other submittals like the "Hardware and Software Submittal" if project is small enough.

G. Panel Layout Drawings and Wiring Diagrams Submittal:

1. Refer to the Control Panels section for submittal requirements.

H. Testing Plan Submittals:

1. Refer to Section 13302 - Testing for specific testing submittal requirements.

I. Training Plan Submittals:

1. Refer to Section 13303 for specific training requirements.

J. Spares, Expendables, and Test Equipment Lists Submittal:

1. Submit a list of, and descriptive literature for, spares, expendables, and test equipment.
2. Submit a list of, and descriptive literature for, additional spares, expendables, and test equipment recommended by the manufacturer.
3. Submit unit and total costs for the additional spare items specified or recommended for each subsystem.

K. Operations and Maintenance (O&M) Manuals:

0A651-0021-02

13300-4

Bid Specifications
Rev. Per Add. No. 1

1. Submit in accordance with Section 01300.
2. Furnish O&M manuals as specified herein. If the PCSS is performing the AE work, provide AE Manuals as specified in Section 13306.
3. The operations and maintenance manuals shall, at a minimum, contain the following information:
 - a. Table of Contents:
 - i. A Table of Contents shall be provided for the entire manual with the specific contents of each volume clearly listed. The complete Table of Contents shall appear in each volume.
 - b. Instrument and Equipment Lists:
 - i. The following lists shall be developed in Microsoft Excel format and provided not only as a hardcopy in O&M but also electronically on a CD.
 - ii. An instrument list for all devices supplied including tag number, description, specification section and paragraph number, manufacturer, model number, serial number, range, span, location, manufacturer phone number, local supplier name, local supplier phone number, completion year replacement cost, and any other pertinent data.
 - iii. An equipment list for all non-instrument devices supplied listing description, specification section and paragraph number, manufacturer, model number, serial number, location, manufacturer phone number, local supplier name, local supplier phone number, completion year replacement cost, and any other pertinent data.
 - c. Equipment Operations and Maintenance Information:
 - i. ISA-TR20.00.01-2001(updated in 2004-2006) data sheets shall be provided for all field instruments. For non-field instrumentation devices, provide a cover page for each device, piece of equipment, and OEM software that lists date, specification number, product name, manufacturer, model number, Location(s), and power required. Preferred format for the cover page is ISA-TR20.00.01-2001(updated in 2004-2006), general data sheet; however, other formats will be acceptable provided they contain all required information.
 - ii. Vendor O&M documentation for each device, piece of equipment, or OEM software shall be either new documentation written specifically for this project, or modified standard vendor documentation. All standard vendor documentation furnished shall have all portions that apply clearly indicated with arrows or circles. All portions that do not apply shall be neatly lined out or crossed out. Groups of pages that do not apply at all to the specific model supplied shall be removed.
 - iii. Provide the record documentation of the system audit as specified in Section 13302 - Testing.
 - iv. Include the calibration forms developed as specified in Section 13302 - Testing.
 - d. As-Built Drawings:
 - i. Complete as-built drawings, including all drawings and diagrams specified in this section under the "Submittals" section. These drawings shall include all termination points on all equipment the system is connected to, including terminal points of equipment not supplied by the PCSS.
 - ii. As built documentation shall include information from submittals, as described in this Specification, updated to reflect the as-built system. Errors in or modifications to the system resulting from the Factory and/or Functional Acceptance Tests shall be incorporated in this documentation.
 - e. Original Licensed Software:
 - i. Submit original software diskettes or CD-ROMs of all software provided under this Contract. Submit original paper based and electronic documentation for all software provided. Submit license agreement information including serial numbers, license agreements, User Registration Numbers and related information. All software provided under this Contract shall be licensed to the Owner at the time of purchase. Provide media in software sleeves within O&M manual.

- f. Electronic O&M Information:
 - i. In addition to the hard copy of O&M data, provide an electronic version of all equipment manuals and data sheets, along with any software back-up of configuration files, on CDROM or DVD. Electronic documents shall be supplied in Adobe Acrobat format.
 - ii. Provide electronic files for all custom-developed manuals including training manuals. Text shall be supplied in both Microsoft Office format and Adobe Acrobat format.
 - iii. Provide electronic files for all drawings produced. Drawings shall be in AutoCAD ".dwg" format and in Adobe Acrobat format. Drawings shall be provided using the AutoCAD eTransmit feature to bind external references, pen/line styles, fonts, and the drawing file into individual zip files.
 - iv. Each computer system hardware device shall be backed up onto CDROM or DVD after Substantial Completion and shall be turned over to the Owner.
 - v. If specified in the training section, provide digital copies of all training videos. Videos shall be in a format that is readable by standard DVD players and by standard PC DVD drives. Format shall be a minimum of 800 by 600 pixels and shall include sound.
- 4. The cover and edge of each volume shall contain the information as specified in Section [01340].

1.4 COORDINATION MEETINGS

- A. Schedule the mandatory coordination meetings as described herein. The meetings shall be held at the Owner's designated location and shall include attendance by the Owner, the Engineer, the Contractor, the PCSS's Project Engineer, and the AESS Project Engineer, if applicable. Other Division 13 specifications may require additional meetings. Prepare and distribute an agenda for this meeting a minimum of one week before the scheduled meeting date. Meeting shall be scheduled a minimum of one week before the requested meeting date.
 - 1. A project kickoff coordination meeting shall be held within two weeks after submitting the Project Plan. The purpose of the meeting shall be to discuss the PCSS's Project Plan, to summarize the PCSS's understanding of the project; discuss any proposed substitutions or alternatives; schedule testing and delivery deadline dates; provide a forum to coordinate hardware and software related issues; and request any additional information required from the Owner. The meeting will last up to one business day.
 - 2. A submittal review coordination meeting shall be held after the Hardware, Panel Drawing, and Loop Drawing Submittal package has been reviewed by the Engineer and returned to the PCSS. The purpose of this meeting shall be to review comments made on the submittal package; to refine scheduled deadline dates; coordinate equipment installation activities; and provide a forum for any further required coordination between the PCSS and AESS. The meeting will last up to one business day.
 - 3. Regular on-site meetings when the PCSS staff is at the plant site.

1.5 REFERENCE STANDARDS

- A. Publications are referred to in the text by basic designation only. Where a date is given for reference standards, that edition shall be used. Where no date is given for reference standards, the latest edition in effect at the time of bid opening shall apply.
- B. International Society of Automation (ISA):
 - 1. ISA S5.2, Binary Logic Diagrams for Process Operations.
 - 2. ISA S5.3, Graphic Symbols for Distributed Control/Shared Display Instrumentation Logic and Computer Systems.
 - 3. ISA S5.4, Instrument Loop Diagrams.
 - 4. ISA S20, Specification Forms for Process Measurement and Control Instruments, Primary Elements and Control Valves.

5. ISA RP60.3, Human Engineering for Control Centers.
 6. ISA RP60.6, Nameplates, Labels, and Tags for Control Centers.
 7. ISA-99, Industrial Automation and Control Systems Security.
- C. National Electrical Manufacturers Association (NEMA).
- D. National Fire Protection Agency (NFPA):
1. NFPA 70, National Electrical Code (NEC).
 2. NFPA 79, Industrial Control Equipment.
- E. Underwriters Laboratories, Inc. (UL):
1. UL 508 - Industrial Control Equipment - for custom fabricated equipment.
 2. A nationally recognized testing laboratory, as approved by the Authority having jurisdiction, may substitute for UL listing on commercial off the shelf products.

1.6 QUALITY ASSURANCE

- A. The Process Control System Supplier (PCSS) shall be a "systems integrator" regularly engaged in the design and the installation of instrumentation systems and their associated subsystems as they are applied to the municipal water and wastewater industry. For the purposes of this Specification Section, a "systems integrator" shall be interpreted to mean an organization that complies with all of the following criteria:
1. Employs personnel on this project who have successfully completed ISA or manufacturers training courses on general process instrumentation and configuration and implementation of the specific programmable controllers, computers, and software proposed for this project. Key personnel shall hold ISA CCST Level 1 certification or have a minimum of 10 years of verifiable plant startup experience. Key personnel shall include, as a minimum, the lead field technician.
 2. Has successfully completed work of similar or greater complexity on at least three previous projects within the last five years. Successful completion shall be defined as a finished project completed on time, without any outstanding claims or litigation involving the PCSS. Potential references shall be for projects where the PCSS's contract was of similar size to this project.
 3. Has been actively engaged in the type of work specified in this Section for a minimum of five years.
- B. The PCSS shall maintain a permanent, fully staffed and equipped service facility within 200 miles of the project site with full time employees capable of designing, fabricating, installing, calibrating, and testing the systems specified herein. At a minimum, the PCSS shall be capable of responding to on-site problems within 12 hours of notice. Provide an on-site response within 4 hours of notification starting at two months before scheduled start up to two months after startup completion.
- C. PCSS shall hold a valid UL-508 certification for their panel fabrication facility.
- D. Actual installation of the instrumentation system need not be performed by the PCSS's employees; however, the PCSS as a minimum shall be responsible for the technical supervision of the installation by providing on site supervision to the installers of the various components.
- E. The selected PCSS shall be one of the following:
1. Prime Controls
 2. Ace Controls
 3. Texas Industrial Controls Manufacturing (TCIM)
 4. ControlPanels USA
 5. Weimar Manufacturing

6. or equal. If not listed, the contractor is required to submit the qualifications submittal for consideration.

F. Being listed in this specification does not relieve any potential PCSS from meeting the qualifications specified in this Section.

1.7 DELIVERY, STORAGE AND HANDLING

A. Delivery, storage, and handling shall be in accordance with Section [01600].

B. Shipping Precautions:

1. After completion of shop assembly, factory test and approval of all equipment, cabinets, panels and consoles shall be packed in protective crates and enclosed in heavy duty (5 mil) polyethylene envelopes or secured sheeting to provide protection from damage, dust and moisture. Dehumidifiers shall be placed inside the polyethylene coverings. The equipment shall then be skid-mounted for final transport. Lifting rings shall be provided for moving without removing protective covering. Boxed weights shall be shown on shipping tags together with instructions for unloading, transporting, storing and handling at the job site.
2. Manufacturer's special instructions for field handling, storage and installation required for protection, shall be securely attached to the packaging for each piece of equipment prior to shipment. The instructions shall be stored in resealable plastic bags or other means of protection.
3. None of the HMI control and monitoring equipment shall be shipped to the site until the control room areas comply with specified ambient temperature and humidity. Have qualified personnel accept the equipment on delivery and supervise unloading within the control room areas.
4. If any apparatus has been damaged, such damage shall be repaired at no additional cost to the Owner.

1.8 NOMENCLATURE AND IDENTIFICATION

A. Field Instrument Tags:

1. See Section 13340.

B. Panel Nameplates:

1. See Section 13330.

1.9 WARRANTY

A. Provide warranty per Warranties and Bonds, and as specified herein.

1.10 MAINTENANCE CONTRACT

- A. A written proposal for a maintenance contract executed by the PCSS shall be provided to the Owner for on-site preventive maintenance services related to the Instrumentation and Control system. The cost of this maintenance contract shall not be included in the Contract Price.
- B. This proposal shall be provided within 30 days after final acceptance for the purpose of entering a contract for annual maintenance subsequent to the first year of maintenance. Standard per diem rates for providing breakdown service shall be set forth in the contract. Such rates shall be fair and reasonable and reflect the lowest rates offered to most favored customers. The fee quoted shall be firm for a minimum of 90 days from date of issue.

- C. This maintenance contract shall include all labor, parts, and emergency calls providing on-site response within 24 hours, to provide complete system maintenance for a period of one year after the date of Substantial Completion of the system for all equipment and software provided as part of the PCSS scope of work.
- D. Provide software updates throughout the maintenance contract period. Provide latest official released version for all software provided under this Contract. Owner shall have the latest software releases at the end of the maintenance contract period.
- E. The maintenance contract shall also include a minimum of 4 preventive maintenance visits by qualified service personnel of the Supplier who is familiar with the type of equipment provided for this project. Each preventive maintenance visit shall include routine adjustment, calibration, cleaning and lubrication of system equipment and verification of correct operation.
- F. Visits to the sites to correct deficiencies under warranty shall not be included in this preventive maintenance service contract.
- G. Emergency maintenance procedures or plant visits may coincide with a preventive maintenance visit, however, they shall not replace the work intended to be performed during a preventive maintenance visit. The Supplier shall have full responsibility for the system hardware preventive and corrective maintenance.
- H. During the one-year maintenance period, observation of maintenance operations by plant personnel and the instruction of said personnel in the details of the maintenance work being performed, shall be provided.

1.11 PROJECT/SITE REQUIREMENTS

- A. Environmental Requirements. Refer to Section [16000] and Electrical Drawings for specific environmental and hazardous area classifications.
- B. Elevation: Equipment shall be designed to operate at the project ground elevation.
- C. Temperature:
 - 1. Outdoor areas' equipment shall operate between -30 to 50 C degrees ambient.
 - 2. Equipment located in indoor locations shall operate between 10 to 35 C degrees ambient minimum.
 - 3. Storage temperatures shall range from 0 to 50 C degrees ambient minimum.
 - 4. Additional cooling or heating shall be furnished if required by the equipment as specified herein.
- D. Relative Humidity. Air conditioned area equipment shall operate between 20 to 95 percent relative, non-condensing humidity. All other equipment shall operate between 5 to 100 percent relative, condensing humidity.

PART 2 – PRODUCTS

2.1 GENERAL

- A. All instrumentation and electronic equipment shall be of the manufacturer's latest design, utilizing printed circuitry and epoxy or equal coating to prevent contamination by dust, moisture and fungus. The field mounted equipment and system components shall be designed for installation in dusty, humid and slightly corrosive service conditions.
- B. All instruments shall be provided with mounting hardware and floor stands, wall brackets, or instrument racks unless otherwise noted. Fasteners for securing control panels and enclosures to walls and floors shall be either

hot-dipped galvanized after fabrication or stainless steel. Provide stainless steel fasteners only in corrosive areas rated NEMA 4X on the Drawings or as defined under Division 16. Provide minimum size anchor of 3/8-inch.

- C. All indicators shall be linear in process units, unless otherwise noted. All transmitters shall be provided with indicators in process units, accurate to two percent or better.
- D. All equipment, cabinets and devices furnished shall be heavy-duty type, designed for continuous industrial service. The system shall contain similar products of a single manufacturer, and shall consist of equipment models, which are currently in production. All equipment provided shall be of modular construction and shall be capable of field expansion.
- E. All electronic/digital equipment shall be provided with radio frequency interference protection.
- F. Electrical:
 - 1. Equipment shall operate on a 60 Hertz alternating current power source at a nominal 120 volts, plus or minus 10 percent, except where specifically noted. Regulators and power supplies required for compliance with the above shall be provided between power supply and interconnected instrument loop. Where equipment requires voltage regulation, constant voltage transformers shall be supplied.
 - 2. With the exception for field device network connected devices, all electronic instrumentation shall utilize linear transmission signals of isolated 4 to 20 mA DC (milliampere direct current) capable of driving a load up to 750 ohms, unless specified otherwise. However, signals between instruments within the same panel or cabinet may be 1-5 VDC (volts direct current).
 - 3. Outputs of equipment that are not of the standard signals as outlined, shall have the output immediately raised and/or converted to compatible standard signals for remote transmission. No zero based signals will be allowed.
 - 4. All switches shall have double-pole, double-throw contacts rated at a minimum of 600 VA, unless noted otherwise.
 - 5. Switches and/or signals indicating an alarm, failure or upset condition shall be wired in a fail-safe manner. A fail-safe condition is an open circuit when in an alarm state.
 - 6. Materials and equipment shall be UL approved whenever such approved equipment and materials are available.
 - 7. All equipment furnished shall be designed and constructed so that in the event of power interruption, the systems specified herein shall go through an orderly shutdown with no loss of memory, and shall resume normal operation without manual resetting when power is restored, unless otherwise noted.

2.2 ELECTRICAL SURGE PROTECTION

- A. General - Surge protection shall be provided to protect the electronic instrumentation system from induced surges propagating along the signal and power supply lines from lightning, utility, or the plant electrical system. The protection systems shall be such that the protective level shall not interfere with normal operation, but shall be lower than the instrument surge withstand level. Protection shall be maintenance free and self-restoring. Devices shall have a response time of less than 50 nanoseconds and be capable of handling a discharge surge current (at an 8x20µs impulse waveform) of at least 8 kA. Ground wires for all instrumentation device surge protectors shall be connected to a low resistance ground.
- B. Provide protection of all analog signal (4-20 mA) circuits where any part of the circuit is outside of the building envelope. Circuits shall be protected at both the transmitter and the control system end of the circuit. Protection devices located near the transmitter shall be mounted in a separate NEMA 4X stainless steel enclosure (plastic is not acceptable) or conduit mounted, and shall be Phoenix Contact PT Series, MTL Surge Technologies (Telematic) TP48, Citel TSP-10 series, or equal. Substitution of a single device to protect both 120 VAC and 4-20 mA wires to an

instrument is acceptable. Protection devices in control panels shall be MTL Surge Technologies (Telematic) SD Series, Phoenix Contact PT Series, Citel DLA series, or equal.

- C. Provide protection of all 120 VAC power feeds into control panels, instruments, and control room equipment. Surge arresters shall be Transtector ACP-100BW Series, Phoenix Contact "Mains-PlugTrab", MCG Surge Protection 400 Series, Citel DS40 series, or equal.
- D. Non-Fiber Based Data Highway or Communications Circuits - Provide protection on all communication and data highway circuits that leave a building or are routed external to a building. Circuit protection shall be provided at both ends of the line. Surge protection devices shall be Phoenix Contact PlugTrab Series, Transtector FSP Series, MTL Surge Technologies (Telematic) NP Series, Citel DLA series or MJ8 series, or equal.
- E. RF Coaxial Cable - Provide protection on communication cables between radios and antennas, mounted either inside the panel, or in the wall of the enclosure in accordance with NEMA and UL standards. Surge protection devices shall be Citel P8AX series, Polyphaser, or equal.
- F. Inductive Loads - Provide coil surge suppression devices, such as varistors or interposing relays, on all process controller outputs or switches rated 120 VA or less that drive solenoid, coil, or motor loads.
- G. Telephone Circuits - At a minimum, provide Telephone Company approved line protection units for all telephone lines used for telemetry or SCADA system use under this Contract.

2.3 SPARE PARTS

- A. All spare parts shall be wrapped in bubble wrap, sealed in a polyethylene bag complete with dehumidifier, then packed in cartons and labeled with indelible markings. Complete ordering information including manufacturer's contact information (address and phone number), part name, part number, part ordering information, and equipment name and number(s) for which the part is to be used shall be supplied with the required spare parts. The spare parts shall be delivered and stored in a location directed by the Owner or Engineer.
- B. Furnish one of each type of installed Surge protection devices.
- C. Other spare parts are specified in each section. An overview follows:
 - 1. Devices within Control Panels - See the control panels section.
 - 2. Computer Hardware and Software spare parts - See the Computer System Hardware section.
 - 3. PLC spare parts - See the PLC section.
 - 4. Network and Communications System - See the Control and Data Network Equipment section.
 - 5. Instrument related Spare Parts - see the Instrument section(s).

PART 3 – EXECUTION

3.1 GENERAL INSTALLATION

- A. Instrumentation and accessory equipment shall be installed in accordance with manufacturer instructions. The indicated locations of equipment, transmitters, alarms and similar devices indicated are approximate only. Exact locations of all devices shall be as approved by the Engineer during construction. Obtain in the field, all information relevant to the placing of process control equipment and in case of interference with other work, proceed as

directed by the Engineer and furnish all labor and materials necessary to complete the work in an approved manner at no additional cost to the Owner.

- B. Provide brackets and hangers required for mounting of equipment.
- C. The shield on each process instrumentation cable shall be continuous from source to destination and be grounded at only one ground point for each shield.
- D. Investigate each space in the building through which equipment must pass to reach its final location. If necessary, ship material in sections sized to permit passing through restricted areas in the building. Provide on-site service to oversee the installation, the placing and location of system components, their connections to the process equipment panels, cabinets and devices, subject to the Engineer's approval. Certify that field wiring associated with the equipment is installed in accordance with best industry practice. Coordinate work under this Section with that of the electrical work specified under applicable sections of Division 16.
- E. Provide sunshades for equipment mounted outdoors in direct sunlight. Sunshades shall include standoffs to allow air circulation around the cabinet. Orient equipment outdoors to face to the North or as required to minimize the impact of glare and ultraviolet exposure on digital readouts.

3.2 TESTING

- A. Refer to Section 13302.

3.3 TRAINING

- A. Refer to Section 13303.

3.4 PROCESS CONTROLLER INPUT/OUTPUT (I/O) SCHEDULE

- A. See attachment 13300A.

END OF SECTION

APPENDIX 13300-A

CONTROL SYSTEM INPUT/OUTPUT (I/O) SCHEDULE

This I/O Schedule is included for reference only. The determination of the exact number and type of I/O points shall be the responsibility of the PCSS based on the Drawings, the Specifications, Process Control Loop Descriptions (Section [13341]), auxiliary device requirements, and spare requirements.