Dietrich Elevated Storage Tank
Solicitation Number: CO-00274
Job No.: 16-6003

ADDENDUM 3

August 12, 2021

To Bidder of Record:

This addendum, applicable to work referenced above, is an amendment to the bid proposal, plans and specifications and as such will be a part of and included in the Contract Documents. Acknowledge receipt of this addendum by entering the Addendum number and issue date on the space provided in submitted copies of the bid proposal.

RESPONSES TO QUESTIONS

1. **In reference to Specifications 17302 and 17305, specifically the training requirements, there are Rockwell Training courses identified that are no longer available. Additionally there appears to be Rockwell Training and PCSI/ASP training courses that are duplicated between Specifications 17302 and 17305. Due to these questions, we would ask for confirmation on the exact Rockwell Training courses required, as well as confirmation on the exact the PCSI/ASP Training that is to be provided by the PCSI/ASP for the project.**

   For Rockwell Training refer to Section 17302-3.05.B.1.a. Note that Rockwell is currently revising this course (formally PRS013) so a number is not available. However, the course shall follow the general description provided. Other training shall be provided as indicated in Section 17305-3.06. See changes to the Specifications revising Section 17302 "Process Instrumentation and Control System Testing" and Section 17305 "Application Services" which are included in this Addendum.

CHANGES TO THE SPECIFICATIONS

1. Remove and replace Section 17302 "Process Instrumentation and Control System Testing" in its entirety.
2. Remove and replace Section 17305 "Application Services" in its entirety.

CHANGES TO THE PLANS

1. None

CLARIFICATIONS

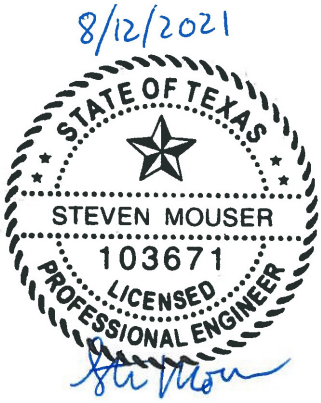
1. Revise the estimated construction cost to be $6,868,400.

END OF ADDENDUM No. 2

This Addendum is twenty (20) page(s) in its entirety with its attachments.

Attachments:

1. Specification Section 17302 “Process Instrumentation and Control System Testing” (8 Pages)
2. Specification Section 17305 “Application Services” (10 Pages)

Addendum No. 3	Specification Section 17302 “Process Instrumentation and Control System Testing” Specification Section 17305 “Application Services”
August 12, 2021  FREESE AND NICHOLS, INC. TEXAS REGISTERED ENGINEERING FIRM F-2144	8/12/2021  GRUBB ENGINEERING, INC. TEXAS REGISTERED ENGINEERING FIRM F-3904

SECTION 17302

PROCESS INSTRUMENTATION AND CONTROL SYSTEM TESTING

PART 1 – GENERAL

1.01 SCOPE:

A. The PCSI shall provide, in coordination with the ASP as required, all labor and materials necessary to coordinate and perform the testing of the Process Instrumentation and Control System as specified herein.

B. The Process Control Systems Integrator (PCSI) shall supervise and/or perform the requirements of this Section. As part of these services, the PCSI shall include, for those equipment items not manufactured by him, the services of an authorized manufacturer's representative to check the equipment installation and place that portion of the equipment in operation. The manufacturer's representative shall be thoroughly knowledgeable about the installation, operation, and maintenance of the manufacturer’s equipment.

C. The Contractor shall provide all test equipment necessary to perform the testing as specified herein.

D. All Process Instrumentation and Control System hardware and software shall be thoroughly tested to verify proper operation as an integrated system.

E. Any defects or problems found during the testing activities shall be corrected by the Contractor and then retested to demonstrate proper operation.

F. Check and confirm the proper installation of all instrumentation and control components and all cable and wiring connections between the various system components prior to placing the various processes and equipment into operation.

G. Conduct a complete system checkout and adjustment, tuning of control loops, checking operation functions, and testing of final control actions. All problems encountered shall be promptly corrected to prevent any delays in startup of the various unit processes.

H. The PCSI shall be responsible for initial operation of the Process Instrumentation and Control System and shall make any required changes, adjustment or replacements for operation, monitoring, and control of the various processes and equipment necessary to perform the functions intended.

I. All spare parts must be on site and accepted prior to commencement of field testing.

J. The Contractor shall provide the following documentation for use during the testing activities.

1. Complete panel schematic and internal point-to-point wiring interconnect drawings.

2. Complete electrical control schematics in accordance with JIC standards.

3. Complete panel layout drawings.

4. Complete field wiring diagrams.

5. Complete instrument loop diagrams.

6. Completed Calibration/Recalibration Certificates for all field and panel devices that require adjustment or calibration.

K. Contractor shall provide a complete test procedure and I/O List. See 17302 Appendix A for example test procedure and I/O List.

L. Contractor shall provide one set of the above listed documentation for the Owner's personnel, one set for the Engineer's use, one set for field use, and the required number of sets for the Contractor's use.

M. The drawings corrected and modified during testing shall form the basis for the "As-Built" record drawing requirement.

N. Contractor shall furnish to Engineer two copies of an installation inspection report certifying that all equipment has been installed correctly and is operating properly. The report shall be signed by authorized representatives of both Contractor and the system supplier.

1.02 TESTS – GENERAL:

A. The PCSI shall test all equipment at the prior to shipment to the project site. Unless otherwise specified in the individual specification sections, all equipment provided by the PCSI shall be tested as a single fully integrated system as far as possible.

B. At a minimum, the testing shall include the following:

C.

1. Factory Testing

   a. Un-witnessed Factory Test (UFT)

      1) The Un-witnessed Factory Test shall be performed by the PCSI at his facility.

2. Field Testing

   a. Operational Readiness Test (ORT)

      1) The Operational Readiness Test shall be a joint test performed by the PCSI and ASP, with coordination as required, with the electrical subcontractor and other subcontractors or equipment suppliers if needed.

   b. Functional Demonstration Tests (FDT)

      1) The Functional Demonstration Tests shall be performed by the PCSI in coordination with the ASP as necessary to demonstrate the system operating in compliance with the requirements of the Contract Documents. The FDT(s) shall be conducted by the PCSI and witnessed by the Owner's representative(s) and the Engineer.

   c. 30-Day Site Acceptance Tests (SAT)

1) The SAT shall be a 30-day field test of the fully operating system as detailed below in this Section.

D. Each test shall be in the cause and effect format. The person conducting the test shall initiate an input (cause) and, upon the system's or subsystem's producing the correct result (effect), the specific test requirement shall be satisfied.

E. All tests shall be conducted in accordance with prior Engineer-approved procedures, forms, and check lists. Each specific test shall be described and followed by a section for sign off by the appropriate party after its satisfactory completion.

F. Copies of these sign off test procedures, forms, and check lists will constitute the required test documentation.

G. Provide all special testing materials and equipment. Wherever possible, perform tests using actual process variables, equipment, and data. Where it is not practical to test with real process variables, equipment, and data, provides suitable means of simulation. Define these simulation techniques in the test procedures.

H. The General Contractor shall require the Integration Subcontractor to coordinate all testing with the Engineer, all affected Subcontractors, and the Owner.

I. The Engineer reserves the right to test or retest all specified functions whether or not explicitly stated in the prior approved Test Procedures.

J. The Engineer's decision shall be final regarding the acceptability and completeness of all testing.

K. No equipment shall be shipped to the Project Site until the Engineer has received all test results and approved the system as ready for shipment.

L. The PCSI shall furnish the services of servicemen, all special calibration and test equipment and labor to perform the field tests.

M. Correction of Deficiencies:

1. All deficiencies in workmanship and/or items not meeting specified testing requirements shall be corrected to meet specification requirements at no additional cost to the Owner.

2. Testing, as specified herein, shall be repeated after correction of deficiencies is made until the specified requirements are met. This work shall be performed at no additional cost to the Owner.

PART 2 - PRODUCTS (NOT APPLICABLE)

PART 3 - EXECUTION

3.01 UN-WITNESSED FACTORY TESTS (UFT):

A. The entire system, except primary elements, final control elements, and field mounted transmitters, shall be interconnected and tested to ensure the system operates as specified. All analog and discrete input/output points not interconnected at this time shall be simulated to

ensure proper operation of all alarms, monitoring devices/functions, and control devices/functions.

B. All panels and assemblies shall be inspected and tested to verify that they are in conformance with related submittals, specifications, and Contract Drawings.

C. During the tests all digital system hardware and software shall have operated continuously for five (5) days without a failure to verify the system is capable of continuous operation. The Un-Witnessed Factory Test results shall be submitted to the Engineer for approval prior to the scheduling of the Operational Readiness Test (ORT).

3.02 OPERATIONAL READINESS TESTS (ORT):

A. Prior to startup and the Functional Demonstration Test, the entire system shall be certified (inspected, tested, and documented) that it is ready for operation.

B. Loop/Component Inspections and Tests: The entire system shall be checked for proper installation, calibrated, and adjusted on a loop-by-loop and component-by-component basis to ensure that it is in conformance with related submittals and these Specifications.

1. The Loop/Component Inspections and Tests shall be implemented using Engineer approved forms and check lists.

a. Each loop shall have a Loop Status Report to organize and track its inspection, adjustment, and calibration. These reports shall include the following information and check off items with space for sign off by the PCSI.

1) Project Name
2) Loop Number
3) Tag Number for each component
4) Check offs/sign offs for each component

b. Tag/identification
c. Installation
d. Termination – wiring
e. Calibration/adjustment – Check offs/sign offs for the loop
f. Panel interface terminations
g. I/O interface terminations
h. I/O signal operation
i. Inputs/outputs operational: received/sent, processed, and adjusted
j. Total loop operation – Provide space for comments
k. Each active Analog Subsystem element and each I/O module shall have a Component Calibration Sheet. These sheets shall have the following information, spaces for data entry, and a space for sign off by the PCSI:

1) Project Name
2) Loop Number
3) Component Tag Number of I/O Module Number
4) Component Code Number Analog System
5) Manufacturer (for Analog system element)
6) Model Number/Serial Number (for Analog system)
7) Summary of Functional Requirements:

a) Indicators: Scale
b) Transmitters/Converters: Scale
c) Computing Elements: Function
d) Controllers: Action (direct/reverse) control Modes (PID)
e) Switching Elements: Unit range, differential (FIXED/ADJUSTABLE), Preset (AUTO/MANUAL)
f) I/O Modules: Input or output

2. Calibrations:

a. Analog Devices: Required and actual inputs and outputs at 0, 25, 50, 75, and 100 percent of span, rising and falling.
b. Discrete Devices: Required and actual trip points and reset points
c. Controllers: Mode settings (PID)
d. I/O Modules: Required and actual inputs or outputs for 0, 25, 50, 75, and 100 percent of span, rising and falling.

1) Provide space for comments
2) Space for sign off by the PCSI

3. The General Contractor shall require the PCSI to maintain the Loop Status Reports and Component Calibration Sheets at the job-site and make them available to the Engineer/Owner at any time.

4. These inspections and tests do not require witnessing. However, the Engineer shall review and initial all Loop Status Sheets and Component Calibration Sheets and spot-check their entries periodically and upon completion of the Operational Readiness Test. Any deficiencies found shall be corrected.

3.03 FUNCTIONAL DEMONSTRATION TEST (FDT):

A. Prior to startup and the 30-Day Test, the entire installed instrument and control system shall be certified that it is ready for operation. All preliminary testing, inspection, and calibration shall be complete as defined in the Operational Readiness Tests (ORT).

B. The ORT findings are to be submitted by Contractor two (2) weeks before the Functional Demonstration Tests (FDT) are performed and must be approved two (2) weeks prior to the FDT. (i.e. ORT must be completed and accepted two (2) weeks prior to the start of FDT. The FDT will be a joint test by the PCSI and the Equipment suppliers.

C. Once the facility has been started up and is operating, a witnessed Functional Demonstration Test shall be performed on the complete system to demonstrate that it is operating and in compliance with these Specifications. Each specified function shall be demonstrated on a paragraph-by-paragraph and loop-by-loop basis.

D. Loop-specific and non-loop-specific tests shall be the same as specified under Functional Demonstration Tests except that the entire installed system shall be tested and all functionality demonstrated.

E. Updated versions of the documentation specified to be provided for during the tests shall be made available to the Engineer at the job-site both before and during the tests. In addition, one (1) copy of all O&M Manuals shall be made available to the Engineer at the job-site both before and during testing.

F. The daily schedule specified to be followed during the tests shall also be followed during the Functional Demonstration Test.

G. The system shall operate for 100 continuous hours without failure before this test shall be considered successful.

H. Demonstrate communication failure and recovery.

3.04 30-DAY SITE ACCEPTANCE TEST (SAT):

A. After completion of the Operational Readiness and Functional Demonstration Tests, the PCSI shall be responsible for operation of the entire system for a period of 30 consecutive days, under conditions of full pump station process operation, without a single non-field repairable malfunction.

B. During this test, station operating and PCSI personnel shall be present as required. For this test, the PCSI is expected to provide personnel who have an intimate knowledge of the system hardware and software.

C. While this test is proceeding, the Owner shall have full use of the system. Only station operating personnel shall be allowed to operate equipment associated with live station processes.

D. Any malfunction during the tests shall be analyzed and corrected by the PCSI. The Engineer and/or Owner will determine whether any such malfunctions are sufficiently serious to warrant a repeat of this test.

E. During this 30 consecutive day test period, any malfunction which cannot be corrected within 24 hours of occurrence by PCSI personnel, or more than two similar failures of any duration, will be considered a non-field-repairable malfunction.

F. Upon completion of repairs by the PCSI, the test shall be repeated as specified herein.

G. In the event of rejection of any part or function, the PCSI shall perform repairs or replacement within 90 days.

H. The total availability of the system shall be greater than 99.5 percent (99.5%) during this test period. Availability shall be defined as:

1. Availability = (Total Testing Time-Down Time) / Total Testing Time

I. Down times due to power outages or other factors outside the normal protection devices or back-up power supplies provided shall not contribute to the availability test times above.

J. Upon successful completion of the 30-day site acceptance test and subsequent review and approval of complete system final documentation, the system shall be considered substantially complete, and the two year warranty period shall commence.

3.05 TRAINING:

1. General: The SAWS Production Control System is based on the Rockwall PlantPax platform. It is configured to provide server-level redundancy, operator view and control access, historian and view access for remote users (Vantage Point), change management tools (AssetCentre), access for staff training, and a means to pre-test software modifications and patches prior to implementing on the live system.

2. The cost of training programs for the Owner's personnel shall be included in the Contract price. Where practical, the training and instruction shall be directly related to the system being supplied.

3. Training shall be conducted at the Owners facilities.

4. All Technicians, Operators, Engineers, and Managers of the Facility shall require training on the Process Control System (PCS). The training courses shall address operation, maintenance, and troubleshooting of the system provided. The courses shall be designed specifically for the type of personnel attending, such as Operators, Engineers, etc.

5. All training schedules shall be coordinated with and at the convenience of the Owner. Shift training may be required to correspond to the Owner's working schedule.

6. Provide detailed training manuals to supplement the training courses. The manuals shall include specific details of equipment supplied and operations specific to the project.

7. The trainer shall make use of teaching aids, manuals, slide/video presentations, etc. After the training services, all training materials shall be delivered to Owner.

8. The Owner reserves the right to videotape all training sessions. All training tapes shall become the sole property of the Owner.

B. Training:
   1. Manufacturer's Training:
      a. Rockwell PlantPax: This training shall be provided by the ASP.
         1) Provide 4.5 Days of manufacturer's training course for four (4) of Owner's personnel which shall include the following:
            a. This course is intended for students familiar with fundamentals of process control but may not be current on the Rockwell Automation PlantPAx System. Course introduces new students to the core components of a PlantPAx distributed control system, including controllers, HMI, networks and instrumentation devices. Students will configure the individual components and gain understanding of their relationship to a complete PlantPAx system.
         2) Training shall include classroom and hands-on instruction.
      b. Programmable Logic Controller (PLC) Hardware and Software:
         1) Refer to Section 17305-3.06.D.

C. Field Training:
   1. Field Instruments:
      a. Refer to Section 17305-3.06E.

2. Panel Instruments:

   a. Refer to Section 17305-3.06E.

END OF SECTION

SECTION 17305

APPLICATION SERVICES

PART 1 - GENERAL

1.01 SCOPE:

A. The PCSI shall furnish the services of qualified personnel to perform the work as defined herein, in the Related Work Paragraph of this Section, and other Specification Sections as specified herein. The service personnel shall be referred to as the Application Services Programmer (ASP). The pre-qualified ASP shall be as specified is Section 17300.

B. It shall be the responsibility of the PCSI to obtain and provide any and all information required from other Divisions, as listed in the related work below, to complete the work under this Section.

C. The ASP shall be responsible for providing all new applications programming and configuration services of the Owner's existing SCADA control system to accomplish the control and monitoring functions as described in the Contract Documents. The ASP shall provide all programming functions including, but not limited to, control strategies and communications for the station PCS PLC controller and HMI. The ASP shall also provide all applications programming and configuration services necessary to produce the HMI (graphic displays, reports, trends, historical archive, etc.) as described in the contract specifications and drawings.

D. The ASP shall provide all modifications to the control system database, control logic, graphic screens, etc. required to correctly reflect the removal of equipment and instruments, including, but not limited to pressure transmitters, flow meters and other equipment and instruments included under the scope of this Contract.

E. At a minimum the ASP shall:

a. Provide for and test communications and functionality between new instrumentation and PLC.

b. Configure and test data collection and interactivity between all software packages and Operator Workstations and Servers in order to provide a comprehensive working system of data collection, storage and reporting.

c. All Applications Software Development and Programming shall be performed in accordance with the Owner's pre-established programming conventions.

d. All Applications Software Development and Programming (i.e., PlantPAX screens, configurations, and associated attributes) shall be performed at the ASP facility before being loaded in the field on the existing PlantPAX system.

e. All Applications Software Development and Programming shall be performed by ASP approved personnel.

f. All commands issued at the PlantPAX Control System (equipment start/stop, reset, set point entry, etc.) shall be security protected.

g. ASP shall perform back-ups of the PlantPAX Control System prior to loading graphical screens, configurations, and associated attributes to SAWS PlantPAX Control System. The ASP shall coordinate with SAWS I&C.

h. ASP shall ensure that data is free of viruses, malware, adware, spyware, etc. or any other malicious programs prior to loading graphical screens, configurations, and associated attributes to SAWS PlantPAX system the ASP shall coordinate with SAWS I&C.

1.02 RELATED WORK:

A. Mechanical Equipment Division

B. Electrical Equipment Division

C. Section 17300 Instrumentation General Provisions

D. Section 17302 Testing

E. Section 17310 Field Instruments

F. Section 17325 Control Panels

G. Section 17327 Panel Mounted Equipment

H. Section 17400 Control Loop Descriptions

I. Section 17405 Input/Output List

J. Section 17410 Field Instrument List

K. Section 17500 Programmable Logic Controller (PLC)

L. Section 17515 Communications Interface Equipment

1.03 SUBMITTALS:

A. Pre-submittal Conference:

1. Prior to the Submittal Process, the Application Services Provider (ASP) shall hold workshops, in which the Engineer and Owner may observe the displays and control strategies prior to submitting database, trends, graphics, reports, and control strategies. No display generation, programming, etc. shall begin until standards have been approved.

2. Prior to commencement of any applications work, the ASP shall submit and receive approval from the Owner and Engineer for all required I/O Lists.

B. Submittal Process:

1. Submittals shall be made in accordance with the requirements of Division 1, Section 17300, and as specified herein.

2. All electronic submittals shall be submitted in an ISO/IEC 26300:2006 or Comma Separated Values (CSV) readable electronic file format on a CD-Rom and an 8 ½-inch by

11-inch hard copy. Programs shall be submitted in the native format of the PLC as suggested by the manufacturer.

C. Submittal Content:

1. Submittals shall contain the following:

a. Controller Programming:

1) I/O List with register assignments. I/O tags shall be assigned by the ASP and shall conform with SAWS existing I/O tagging format.
2) Diagrams of the process control functions by each strategy.
3) Listing of inputs to the control function.
4) A short narrative of each control strategy.
5) Listing of all Operator inputs and outputs to and from the control function. Any special displays related to the function shall be illustrated. A description of the operation of any display shall be described as it relates to the control function.
6) Cross references of all I/O, showing to which I/O modules or software modules, they are in.
7) Failure contingencies shall be described in detail.
8) An annotated program, submitted in both hard copy and electronic format.

b. Human Machine Interface Programming:

1) I/O List with register assignments. I/O tags shall be assigned by the ASP and shall conform with SAWS existing I/O tagging format.
2) Displays for each process area including all necessary pop ups.
3) Listing of data points on each display.
4) A short narrative of each control usage.
5) Listing of all Operator inputs and outputs to and from the control function. Any special displays related to the function shall be illustrated. A description of the operation of any display shall be described as it relates to the control function.
6) Cross references of all I/O, showing which software module at each point used.
7) Failure contingencies shall be described in detail.
8) A complete listing of all historical points.
9) Listing of all required configuration files for each SCADA client.

2. Submit a proposed Schedule of Work.

1.04 REFERENCE CODES AND STANDARDS:

A. Instrumentation equipment, materials and installation shall comply with the National Electrical Code (NEC and with the latest edition of the following codes and standards:

1. National Electrical Safety Code (NESC)

2. Occupational Safety and Health Administration (OSHA)

3. NEMA ICS 1-101 Diagrams, Designations and Symbols

4. ANSI/ISA-5.06.01-2007 - Functional Requirements Documentation for Control Software Applications.

5. ISA-TR20.00.01-2001 - Specification Forms for Process Measurement and Control Instruments Part 1: General Considerations Updated with 27 New Specification Forms in 2004-2005.

6. ISA-5.4-1991 Instrument Loop Diagrams.

7. ISA-5.5-1985 Graphic Symbols for Process Displays.

8. ISA-5.1-1984 (R1992) Instrumentation Symbols and Identification.

9. 9SA-5.3-1983 Graphic Symbols for Distributed Control/Shared Display Instrumentation, Logic, and Computer Systems.

10. ISA-20-1981 Specification Forms for Process Measurement and Control Instruments, Primary Elements, and Control Valves.

11. ISA-5.2-1976 (R1992) Binary Logic Diagrams for Process Operations

12. NEMA ICS 6 Enclosures for Industrial Controls and Systems

13. National Fire Protection Association (NFPA)

14. National Electrical Manufacturers Association (NEMA)

15. American National Standards Institute (ANSI)

16. Insulated Cable Engineers Association (ICEA)

17. International Society of Automation (ISA)

18. Underwriters Laboratories (UL)

19. UL 508, the Standard of Safety for Industrial Control Equipment

20. UL 508A, the Standard of Safety for Industrial Control Panels

21. UL 50, the Standard of Safety for Enclosures for Electrical Equipment

22. NFPA 79, Electrical Standard for Industrial Machinery

23. Factory Mutual (FM)

24. NFPA 70 National Electrical Code (NEC)

25. NFPA 70E Standard for Electrical Safety in the Workplace

26. ANSI C37.90.2 Standard Withstand Capability of Relay Systems to Radiated Electromagnetic Interference from Transceivers

27. NEMA ICS 4 Terminal Blocks for Industrial Use

28. NEMA LS1 Low Voltage Surge Protection Devices

29. UL 1283 Standard for Safety-Electromagnetic Interference Filters

30. UL 1449 Third Edition Surge Protective Devices

31. City of San Antonio, Texas Electrical Code

B. All equipment and installations shall conform to applicable Federal, State, and local codes. All equipment shall comply with the requirements of the National Electric Code and Underwriters Laboratories (UL) where applicable. Where reference is made to one of the above standards, the revision in effect at the time of bid opening shall apply.

1.05 WARRANTY:

A. Provide 2 year equipment warranty which begins after final acceptance of facility. Refer to the requirements of Division 1.

1.06 SYSTEM FINAL DOCUMENTATION

A. Prior to final acceptance of the system and owner training, operating and maintenance manuals covering instructions on the operation and maintenance on each type of equipment shall be furnished in accordance with the Section 01730.

B. Documentation shall be provided in electronic format, either in MS Word or Excel, as applicable. Submit electronic files to CPMS.

C. As a minimum, the following information shall be provided:

1. A comprehensive index.

2. A complete "As Constructed" set of approved shop Drawings.

3. A complete list of the equipment supplied, including serial numbers, ranges, and pertinent data.

4. Full specifications on each item.

5. System schematic drawings "As Constructed," illustrating all components, piping and electrical connections of the systems supplied under this Section.

6. Detailed service, maintenance and operation instructions for each item supplied.

7. Special maintenance requirements particular to this system shall be clearly defined, along with special calibration and test procedures.

8. Operating instructions which incorporate a functional description of the entire system with references to the systems schematic Drawings and instructions.

9. Complete parts lists with stock numbers and name, address, and telephone number of the local supplier.

D. The final documentation shall be new documentation written specifically for this project, but may include standard and modified standard documentation. Modifications to existing

hardware or software manuals shall be made on the respective pages or inserted adjacent to the modified pages. All standard documentation furnished shall have all portions that apply clearly indicated. All portions that do not apply shall be lined out.

E. The manuals shall contain all illustrations, detailed drawings, wiring diagrams, and instructions necessary for installing, operating, and maintaining the equipment. The illustrated parts shall be numbered for identification. All information contained therein shall apply specifically to the equipment furnished and shall only include instructions that are applicable. All such illustrations shall be incorporated within the printing of the page to form a durable and permanent reference book.

F. If the PCSI's ASP transmits any documentation or other technical information which he considers proprietary, such information shall be designated. Documentation or technical information which is designated as being proprietary will be used only for the design, construction, operation, or maintenance of the System and, to the extent permitted by law, will not be published or otherwise disclosed.

G. The requirements for the final documentation are as follows:

1. As built documentation shall include all previous submittals, as described in this Specification, updated to reflect the as built system as well as any corrections or modifications to the System resulting from the Factory and/or Functional Demonstration Tests.

PART 2 - PRODUCTS (NOT APPLICABLE)

PART 3 - EXECUTION

3.01 COORDINATION MEETINGS:

A. The ASP shall be responsible to coordinate the work with the PCSI and/or the Contractor. He shall schedule and administer a minimum of three (3) coordination meetings for the purpose of discussing progress of the work under this Section. The ASP shall make arrangements for the meetings and prepare and send a proposed agenda to all participants at least two (2) weeks before scheduled meetings. The ASP shall be responsible for promptly preparing and distributing meeting minutes to all attendees.

B. The meetings shall be held at the Owner's designated location and shall include, at a minimum, attendance by the Owner, Engineer, General Contractor's project engineer, ASP, and PCSI if necessary.

1. The First Coordination Meeting shall be held in advance of the first ASP Shop Drawing submittal. The first meeting may run concurrent to a PCSI coordination meeting, if desired and timed to meet all other contract requirements. The purpose of the first meeting shall be for the ASP to:

a. Summarize their understanding of the project
b. Discuss any proposed deviations, substitutions or alternatives
c. Present the ASP project schedule
d. Schedule testing and delivery milestone dates
e. Provide a forum for the ASP and Owner to coordinate hardware and software related issues
f. Request any additional information required from the Owner and/or Engineer

g. The ASP shall bring a draft version of shop drawings to the meeting to provide the basis for the Owner/Engineer's input into their development
h. Discuss format of required reports to be developed

2. The Second Coordination Meeting shall be held after all ASP shop drawings have been reviewed and returned to the ASP. Attendance by the Owner, Engineer, General Contractor's project engineer, ASP, and PCSI shall be required. The purpose of the second meeting shall be for the ASP to:

a. Discuss comments made during submittal process
b. Refine schedule milestone dates
c. Coordinate installation activities
d. Discuss any remaining coordination requirements

3. A typical agenda may include, but shall not be limited to, the following:

a. Review minutes of previous meetings
b. Review of work progress
c. Field observations, problems, and decisions
d. Identification of problems which may impede planned progress
e. Review of submittal schedule and submittal status
f. Review of offsite fabrications and delivery schedules
g. Maintenance of progress schedule
h. Corrective measures to regain projected schedules
i. Planned activities for subsequent work period
j. Coordination of projected progress
k. Maintenance of quality and work standards
l. Effect of proposed changes on progress schedule and coordination
m. Other business relating to work

3.02 TESTING:

A. Refer to Section 17302.

3.03 OPERATIONAL READINESS TEST (ORT):

A. Refer to Section 17302.

B. Each active Analog Subsystem element and each I/O module shall have a Component Calibration Sheet. These sheets shall have spaces for data entry, space for sign off by the ASP and the PCSI, and the following information:

1. Project Name

2. Loop Number

3. Component Tag Number of I/O Module Number

4. Component Code Number Analog System

5. Manufacturer (for Analog system element)

6. Model Number/Serial Number (for Analog system)

7. Summary of Functional Requirements:

    a. Indicators: Scale
    b. Transmitters/Converters: Scale
    c. Computing Elements: Function
    d. Controllers: Action (direct/reverse) control Modes (PID)
    e. Switching Elements: Unit range, differential (FIXED/ADJUSTABLE), Preset (AUTO/MANUAL)
    f. I/O Modules: Input or output

8. Calibrations:

    a. Analog Devices: Required and actual inputs and outputs at 0, 10, 50, and 100 percent of span, rising and falling
    b. Discrete Devices: Required and actual trip points and reset points
    c. Controllers: Mode settings (PID)
    d. I/O Modules: Required and actual inputs or outputs for 0, 10, 50, and 100 percent of span, rising and falling
    e. Space for comments
    f. Space for sign off by the General Contractor

3.04 FUNCTIONAL DEMONSTRATION TEST (FDT):

A. Refer to Section 17302.

3.05 30-DAY SITE ACCEPTANCE TEST (SAT):

A. Refer to Section 17302.

3.06 TRAINING:

A. General:

1. The cost of Owner training programs shall be included in the Contract price. The training and instruction, insofar as practicable, shall be directly related to the system being supplied. The training program shall represent a comprehensive program covering all aspects of the operation and maintenance of the system.

2. All instructors shall be intimately familiar with the operation and control of the Owner's facilities.

3. Training shall be provided to accommodate shift personnel. Coordinate with Owner.

4. Owner reserves the right to record (video and/or audio) all training sessions. All training tapes shall become the sole property of the Owner.

B. Refer to Section 17302 for additional training requirements.

C. Scheduling of all training sessions shall be coordinated with the Owner.

D. Manufacturer's Training

a. Programmable Logic Controller (PLC) Hardware and Software

1) A single 1-day session for four (4) of the Owner's personnel shall be held before the FDT, but not more than one month before the FDT.

2) Training and instruction shall be specific to the system that is being supplied.

3) Training shall consist of classroom and hands-on instruction utilizing the Owner's system.

4) Detailed training shall be provided on the actual configuration and implementation for this Contract. Training shall cover all aspects of the system that will allow the Owner's personnel to maintain, modify, troubleshoot, and develop future additions/deletions to the system. The training shall cover the following subjects, as a minimum:

a) System overview
b) System hardware components and specific equipment arrangements
c) System startup, shut down, load, backup, and historical archival/retrieval procedures
d) Specific application configuration covering the overall design and implementation of the applications provided under this Contract. The intent is to make the student fully knowledgeable in all aspects of the system provided.
e) Periodic maintenance
f) Troubleshooting and diagnosis
g) Network configuration, communications, and operation

E. Field Training

1. Field Instruments

a. Provide a minimum of one 8-hour hardware training and instruction on the maintenance of the field instrumentation for four (4) of the Owners instrumentation technicians. This training shall be conducted before the Functional Demonstration Test, but no more than one (1) month before and at a time suitable to the Owner. This training shall take place at the Owners facility. As a minimum the following shall be included:

1) Training in standard hardware maintenance for the instruments provided
2) Specific training for the actual instrumentation configuration to provide a detailed understanding of how the equipment and components are arranges, connected and set up for this Contract.
3) Test, adjustment and calibration procedures
4) Troubleshooting and diagnosis
5) Periodic maintenance

2. Panel Instruments

a. Provide a minimum of one 8-hour hardware training and instruction on the maintenance of the field instrumentation for four (4) of the Owners instrumentation technicians. This training shall be conducted before the Functional Demonstration Test, but no more than one (1) month before and at a time suitable to the Owner. This training shall take place at the Owners facility. As a minimum the following shall be included:

1) Training in standard hardware maintenance for the instruments provided
2) Specific training for the actual instrumentation configuration to provide a detailed understanding of how the equipment and components are arranged, connected, and configured for this Contract
3) Test, adjustment, and calibration procedures
4) Troubleshooting and diagnosis
5) Periodic maintenance

END OF SECTION