

SECTION 13411

SPECIAL CONTROL SYSTEM PROGRAMMING AND TESTING REQUIREMENTS

PART 1 GENERAL

1.01 Summary

A. Section Includes

1. Description of Contractor Responsibilities for:
 - a. Interfacing with the System Programmer.
 - b. Control System Delivery.
 - c. Control System Testing.
 - d. Control System Start Up.
 - e. Control System Maintenance.

B. Contract Documents are a single integrated document, and as such all Divisions and Sections apply. It is the responsibility of the Contractor and its Sub-Contractors to review all sections to ensure a complete and coordinated project.

C. In order to maintain interoperability with the existing control system, portions of the control system shall be provided from the named vendor as follows:

1. Programmable Logic Controllers and Remote IO: Modicon
2. LOP Software: Wonderware

D. Scope of Work:

1. The Contractor, through the use of its Instrumentation System Supplier (ISS), shall be responsible for providing a complete and operating control system. The Contractor shall furnish all labor, material and supervision required to complete the work, except as modified in the paragraphs below.
2. Provided by Owner - The Owner shall provide the required software and licenses for operating the Wonderware LOP software on the host computer system.
3. Work by Owner's Programmer
 - a. The Owner, through the services of its representative (Programmer) assigned to perform process control system configuration tasks, will perform the programming and configuration of the SCADA/DCS PLCs and Operator Stations for the Project. The following will not be programmed or configured by the Owner.
 - 1) Owner will not program the PLCs or local interface displays provided by equipment manufacturers as part of packaged systems.

- 2) Owner will not program or configure other programmable devices provided under this contract, such as VFDs, switchgear relays, etc.
 - b. The Owner's programming representative, referred to as Programmer, shall operate under the direction of the Owner.
 - c. Devices configured under the Programmer's scope of work includes:
 - 1) PLC 3 and LOP in SUACP.
 - d. Programming work excluded from the Programmer's scope of work shall include:
 - 1) PLC Programming for packaged systems described in paragraph 1.01 D5 of this Section.
 - 2) Configuration of Local Operator Interfaces provided as part of the packaged systems described in paragraph 1.01 D5 of this Section.]
4. Contractor Responsibilities:
- a. The Contractor shall be responsible for all control systems work described in these specifications and drawings, including but not limited to, PLCs, OISs, LOPs, computers, network equipment, and control system software, except for programming and configuration services explicitly specified to be provided by the Programmer herein.
 - b. The Contractor shall be responsible for all submittals, procurement, assembly, wiring, packing, shipping, installation, set up, startup, specified testing, and as-built drawings for all control system equipment and purchased software.
 - c. The Contractor, through the services of his equipment suppliers, shall provide all programming and set-up of vendor supplied control panels provided as part of packaged systems.
 - d. The Contractor shall provide information on packaged systems, as required, to coordinate between control equipment provided under this Contract and services provided by the Programmer.
 - e. The Contractor shall provide all material, labor and equipment required for a complete and operable control system, except for items specifically excluded from the Contractor's work.
 - f. After approvals of the PLC and other related equipment and software submittals, all PLCs, computers, purchased software and related control system equipment shall be promptly delivered by Contractor to the Programmer's facility for use in the application software development and the testing of control system software. Upon completion of the Programmer's software development, the Contractor shall disassemble, pack, and transport PLC and other control system equipment to the panel assembly shop for installation and PPFT and ISST testing.
 - g. The Contractor shall prepare and submit for approval complete Loop Diagram, I/O Elementary and other drawings as required.

- h. The Contractor shall test the PLC I/O system as specified herein to verify proper performance independent of the use of the software provided by the Programmer.
 - i. The Programmer and Contractor shall perform certain control system and start-up tests jointly to ensure proper system operation. For tests that are conducted jointly, the Contractor shall provide appropriate full-time on-site support. The Contractor shall maintain familiarity with the Control Strategy Descriptions to support the startup and testing activities.
 - j. The Contractor shall provide the communications network as specified herein and indicated on the Drawings and other sections of the specification.
 - k. The Contractor shall perform testing and training as described in Part 3 below.
5. The Contractor shall coordinate the Work between the Contractor's equipment vendors and the Programmer. Each equipment vendor supplying control system components shall be provided with a complete set of Instrumentation and Control System Division 13 documents and drawings prior to bidding, such that vendor provided control work adheres to the same specifications and requirements as the work performed under the requirements of Division 13.
6. The Contractor shall provide, for use by the Programmer, complete documentation of all vendor provided control system components including:
- a. Control Strategy Descriptions.
 - b. Electrical drawings.
 - c. PLC I/O lists.
 - d. PLC memory maps.
 - e. Documented program listings.
 - f. Operating instructions.
 - g. Supplemental information.

Note that this information may overlap drawing requirements required as part of an Operation and Maintenance manual submittal, however, this information shall be provided per the early delivery schedule provided in Part 3 of this Section.

1.02 **References**

- A. Section 13410 – Process Instrumentation and Controls – General Provisions
- B. Section 13421 – Programmable Logic Controllers and Computer Control System
- C. Section 13482 – Process Control Descriptions

1.03 **Definitions**

- A. Where a term is used in specification section number series (Division 13) relating to instrumentation, and the meaning is not defined therein or elsewhere in the Contract

Documents, the meaning of the term shall be as defined in ISA S51.1 Process Instrumentation Terminology, or if not contained in ISA 51.1, as defined in listed reference standards under "References".

- B. CEET - Complete End to End Testing.
- C. Programmer - A control systems specialist hired by the Owner to provide programming services as defined in other portions of this Section.
- D. ISST - Integrated Software Shop Testing.
- E. ISS - Instrumentation System Subcontractor. The Instrumentation System Subcontractor (ISS) is subcontracted by the Contractor for the purpose of providing the instrumentation subsystems.
- F. LOI - Local Operator Interface
- G. NAT - Network Acceptance Testing.
- H. Panel: An instrument support system which may be either a flat surface, a partial enclosure, or a complete enclosure for instruments and other devices used in process control systems. Unless otherwise specified or clearly indicated by the context, the term "panel" in these Contract Documents shall be interpreted as a general term, which includes flat panels, enclosures, cabinets and consoles.
- I. OIS: Operator Interface Station
- J. PPFT - PLC Panel Factory Testing.
- K. PPIT - PLC Panel Installation Testing.
- L. SFT - Strategy Field Testing.

1.04 **Submittals**

- A. Furnish complete submittals in accordance with Sections 01300, 01340, and 13410 and as listed below.
- B. Test Procedure Submittals:
 - 1. Submit the procedures to be followed during the test. Procedures shall include test descriptions, forms, and checklists to be used to control and document the required tests. (Refer to Part 3 of this Section for testing requirements).
 - a. Preliminary test procedure submittals: Prior to the preparation of the detailed test procedures, submit outlines of the specific proposed tests. Submittals shall include examples of the proposed forms and checklists.
 - b. Test Procedure Submittals: After the preliminary test procedure submittals have been reviewed by the Construction Administrator and returned stamped either "approved" or "approved as noted, confirm" submit the proposed detailed test procedures. Following this, the tests may be started.

2. Test Documentation: Upon completion of each required test, the Contractor shall document the test by submitting a copy of the signed off test procedures.
3. The Contractor shall develop and submit test plans and forms for all tests specified in this section, as well as all other control system related testing, except for the ISST and SFT tests. ISST and SFT test forms will be provided by the Owner, through the services of the Programmer.

1.05 **Delivery, Storage, and Handling**

- A. The Contractor shall be responsible for all shipping of control system equipment to and from the Programmer's facility, test sites and the final installation site. The Contractor shall be responsible for all equipment during the time it is located at the Programmer's site.
- B. The Contractor shall extend the manufacturer's warranty period, as needed, to cover the time the equipment is located at the Programmer's facility.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

3.01 **Early Delivery Items**

- A. The Contractor shall expedite the approval and purchase of any of the following equipment items which fall under the Contractor's scope of supply. These items shall include, but not be limited to:
 1. RIO, including racks, power supplies and cards.
 2. Communications Components.
 3. Configuration Software.
 4. Local Operator Interfaces.
 5. Other items, as required, for a complete control system.
- B. Unless otherwise indicated, the portions of the control system critical to the development of the application software shall be submitted to the Construction Administrator for approval within forty-five (45) days of the Notice to Proceed. Priority items shall include PLC equipment and process workstations.
- C. Unless otherwise indicated, the following portions of the PLC control system shall be shipped by the Contractor to the Programmer's facility within one hundred twenty (120) days of the Notice to Proceed. The Contractor shall be responsible for all shipping costs.
 1. LOP
- D. Unless otherwise indicated all control system submittals shall be submitted and approved within one hundred and sixty-five (165) days from the Notice to Proceed, or a minimum of one hundred (100) days prior to Witnessed Factory Tests, whichever is earlier.

- E. Unless otherwise indicated all vendor-provided control system information required for the Programmer, shall be submitted and approved within one hundred and twenty (120) days from the Notice to Proceed, or a minimum of one hundred fifty (150) days prior to Witnessed Factory Tests, whichever is earlier.
- F. Control System components needed for PPFT or ISST testing shall be made available to the Contractor's panel assembly shop 30 days prior to the start of the test. The Contractor shall notify the Programmer, in writing, of the proposed test at least 30 days prior to the shipping date. However, the Contractor shall not be entitled to ship equipment or schedule PPFT or ISST until the Contractor receives approval for the PPFT test plan.

3.02 **Coordination Meetings**

- A. In addition to the regular progress meetings, a minimum of three (3) coordination meetings shall be scheduled to coordinate the project control system software work. The Owner, the Contractor, the Programmer and appropriate packaged system manufacturers shall be in attendance.
- B. Manufacturer's representatives shall have experience with the packaged system control components and software.
- C. The first meeting shall be scheduled when approximately one-third of the contract time has elapsed to review Control Software interfaces between the Owner's Programmer's work and the Contractor's work. Equipment deliveries and initial start-up issues shall also be discussed.
- D. The second meeting shall be conducted when one-half to three-quarters of the contract time has elapsed.
- E. The final meeting shall be scheduled to review operational constraints associated with testing and start up of the control system and related process equipment.
- F. Refer to Section 13410 – Process Instrumentation and Controls – General Provisions for additional coordination meeting requirements.

3.03 **Testing**

- A. Refer to Section 13410 – Process Instrumentation and Controls – General Provisions for testing requirements.

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