



E-54 Regional Lift Station RFCSP  
Solicitation Number: CO-00652  
Job No.: 22-2502

**ADDENDUM 4**  
**May 4, 2023**

To Respondent of Record:

This addendum, applicable to work referenced above, is an amendment to the price 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 Respondent Questionnaire.

**RESPONSES TO QUESTIONS**

1. Question: Reference Spec Section 16921-14.3.05 below: Is it possible to have this Rockwell training as an allowance item on the bid form since a Rockwell course number will be given at a later date? Please advise on how this pricing needs to be handled.

3.05 TRAINING

A. Programmable Logic Controller (PLC) Hardware and Software and HMI System Software:

1. Provide 32-40 hours of manufacturer's standard training course for five (5) of the Owner's personnel in the operation, configuration, programming, installation, and maintenance of the HMI System software, SAWS Programmer staff will provide the Rockwell course number at a later date.

**Response: Section 3.05 – Training of Specification Section 16921 – Supervisory Control and Data Acquisition (SCADA) System and Local Station Control and Monitoring has been deleted. See Changes to the Specifications #1.**

2. Question: On Sheet C6.06, what is the depth of the manhole immediately upstream southwest of the Fossil Ridge LS, which is to be abandoned?

**Response: According to SAWS block maps, this manhole is approximately 9.93 feet deep. No indication of manhole diameter is given on the block map, but it is estimated that it is a four foot diameter manhole.**

**CHANGES TO SPECIFICATIONS**

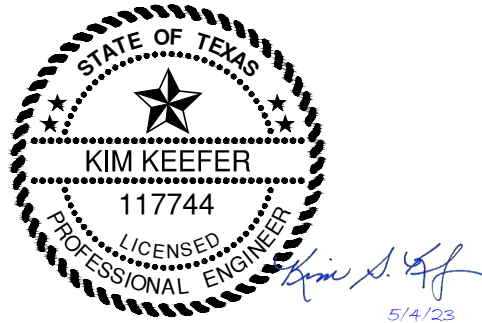
1. Remove Specification 16921 – Supervisory Control and Data Acquisition (SCADA) System and Local Station Control and Monitoring in its entirety and replace with the revised version attached to this addendum.

**END OF ADDENDUM 4**

This Addendum, including these two (2) pages, is sixteen (16) pages with attachments in its entirety.

Attachment:

Specification Section 16921: Supervisory Control and Data Acquisition (SCADA) System and Local Station Control and Monitoring (14 pages)



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**SECTION 16921****SUPERVISORY CONTROL AND DATA ACQUISITION (SCADA) SYSTEM  
AND LOCAL STATION CONTROL AND MONITORING**

## PART 1 GENERAL

## 1.01 SCOPE

- A. Contractor shall furnish all labor, materials, and components, and shall provide all design, assembly, licensing and start-up services, as specified herein and as shown on the Contract Drawings.
1. Contractor will be responsible for HMI SCADA System, programming, at the Owner's Production Control Center (PCC).
  2. Contractor will be responsible for programming the Local PLC System.
  3. Contractor to provide latest version of RS Studio 5000 Logix Designer, Standard Edition, Part number 9324-RLD300ENE.
  4. SCADA panel to be designed and certified to UL 508A standards.
- B. Contractor General Qualifications
1. Have a local office within one hundred (100) miles of the City of San Antonio.
  2. Be able to provide resumes, project experience history and references for all employees that will be qualified to work on the SCADA system.
  3. Have a local full time staff of employees that have developed and commissioned a minimum of three new Allen Bradley based systems within the past twelve months. Must have a minimum five years' experience designing, installing and commissioning SCADA systems.
  4. Have a minimum of three local full time employees qualified to perform the SCADA system configuration work.
  5. All proposals submitted to the San Antonio Water System must be accompanied by documentation supporting the qualifications of the Contractor as detailed above. The San Antonio Water System reserves the right to reject any proposal if the above qualifications are not met.
- C. The control, monitoring and SCADA system shall include, but is not limited to, the following component equipment:
1. SCADA PLC Panel to include:
    - a. PLC Processor.
    - b. PLC modules, chassis, and power supplies.

- c. 24Vdc power supply.
    - d. Surge protection.
    - e. UPS
    - f. Heater
    - g. All local indication and local control devices specified herein or indicated on the Contract Drawings.
  2. Raco Verbatim Autodialar
    - a. Autodialer
    - b. All local indication and local control devices specified herein or indicated on the Contract Drawings.
  3. Radio Transceiver and accessories
  4. Communication Panel to include
    - a. Industrial Grade Router
    - b. Radio Transceiver System.
    - c. Cambium POE Injector
    - d. SMA-JE to THCFE adaptor
    - e. All local indication and local control devices specified herein or indicated on the Contract Drawings.
- D. The Application Service Provider (ASP) shall schedule and conduct separate workshops as further defined in this specification section.
- E. The SCADA system shall be furnished in accordance with the requirements stated herein to assure compatibility with Owner's existing facilities and systems. No deviation from specified equipment will be allowed.

## 1.02 SUBMITTALS

- A. Pre-submittal Conference
  1. Prior to the Submittal Process, the Application Services Provider (ASP) shall hold a workshop, 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. 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.

- C. If the Process Control Systems Integrator (PCSI's) 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.
- D. CONTRACTOR shall submit the following in addition to the information in item A:
  - 1. Bill of Materials
  - 2. Catalog Cuts
  - 3. Component Data Sheets
  - 4. Panel Construction Drawings, including wiring and component layout
  - 5. List of Labels and Tags
  - 6. Include power supplies, network switches, signal isolators and other equipment as listed in this specification.
  - 7. CONTRACTOR shall submit control loop drawings complete with rack, card slot and point configuration.
  - 8. CONTRACTOR shall submit calculations as required.
  - 9. Proposed HMI SCADA System Screens.

#### 1.03 OPERATION AND MAINTENANCE MANUAL

- A. CONTRACTOR shall provide the final O & M manual which shall contain a complete set of as-built control loop and wiring drawings in "11x17" format. Manual shall be submitted to OWNER electronically in PDF format on a CD.
- B. Complete and tested PLC Programs will be provided by CONTRACTOR to be inserted in the final O&M manual.

#### 1.04 PLC INPUT/OUTPUT POINT LIST

- A. The Input/Output (I/O) Point List is attached to this specification as Appendix "A" and indicates nomenclature, and signal functions, and defines the scope of interface requirements for this project. All analog I/O shall be 4-20ma.
- B. The quantity of Input/Output modules furnished shall not be less than shown in the PLC I/O capacity summary in Appendix "A". Input/Output modules shall have the capacity to accommodate for an additional 25% spare I/O points. Otherwise an additional input/output module is required.
- C. Field wiring to complete all interconnections listed in the I/O are included in the Contractor's scope of work whether or not shown on the Contract Drawings.

- D. All spare points to be wired to terminal blocks.

#### 1.05 PLC SYSTEM PROGRAMMING

- A. Programming of the PLC CPU will be provided by CONTRACTOR. CONTRACTOR shall coordinate with SAWS Inspector regarding witnessed SCADA testing.

#### 1.06 HMI SYSTEM PROGRAMMING

- A. Programming of the HMI will be provided by CONTRACTOR. CONTRACTOR shall coordinate with SAWS Inspector regarding witnessed SCADA testing.

#### 1.07 AUTO DIALER INPUT/OUTPUT POINTS

- A. The Input/Output (I/O) Points are shown on contract drawings
- B. Field wiring to complete all interconnections for the I/O shown on plans are included in the Contractor's scope of work whether or not shown on the Contract Drawings.

#### 1.08 AUTO DIALER SYSTEM PROGRAMMING

- A. Programming of the Auto Dialer will be provided by contractor. CONTRACTOR shall provide coordinate with SAWS Inspector regarding witnessed SCADA testing.
- B. Contractor shall provide programmed auto dialer and shall document all I/O terminations. Contractor will provide field tracing for any programmed loop that does not function.

### PART 2 PRODUCTS

#### 2.01 SCADA PANEL

1. General:
2. Install PLC, 24Vdc power supply, interposing relays, power supplies and interface wiring terminals.
3. Provide mounting hardware, terminal blocks, circuit breakers, electrical wiring, communications wiring and all other items required for a complete operational system.
4. Panel layout and fabrication shall allow for convenient maintenance and removal of all equipment after installation.
5. Provide switched LED interior panel light and receptacle. Also provide one single non-GFCI receptacle dedicated to UPS.
6. Provide an enclosed thermostat controlled space heater with fan rated at 120Vac and sized to prevent condensation within the SCADA panel. Locate heater to avoid overheating electronic hardware or producing large temperature fluctuations on the hardware. The thermostat shall have an adjustment range of 40 degrees Fahrenheit

to 90 degrees Fahrenheit. Heater shall have circuit breaker as shown on the contract drawings shall be Hoffman type DAH or equal.

- 7. Provide an enclosed thermostat controlled filet fan rated at 120Vac. Filter fan to vent the heat out of the SCADA enclosure into the Electrical Building.
- 8. Provide UL508A certification label on panel.

B. Wiring:

- 1. Internal wiring for control and low voltage power circuits shall be flame retardant NFPA 70, Type SIS, single conductor, Class B, stranded copper, rated 600 volts. Minimum wire size shall be #14 AWG.
- 2. Analog signal wiring shall be #16 AWG twisted shielded pairs with drain wire and outer jacket. Refer to section 16120.
- 3. Segregate signal wiring from control wiring, group functionally and arrange to facilitate tracing of circuits.
- 4. Arrange wiring on terminal blocks to segregate field incoming conductors on a common side separate from internal wiring.
- 5. Wire routing and bundling shall utilize wiring duct and plastic wire wrap, secured to the structure and with spare space.
- 6. Color code wiring as follows:
  - a. AC power at line voltage .....Black
  - b. AC switched power .....Red
  - c. Ground/earth ground..... Green or green w/ yellow tracer
  - d. Ungrounded DC power..... Blue
  - e. DC grounded common .....Blue w/ white stripes or white w/ blue stripes
  - f. 4-20mA Twisted shielded pair ..... Red+/Black-

C. Terminal Blocks:

- 1. Provide screw type 600 volt terminal blocks with pressure plate and marking strip. Do not use miniature terminal blocks.
- 2. Provide a minimum of 25 percent spare terminals.
- 3. Group interface terminals together.

D. Grounding:

- 1. Provide a ground bus connected to rack structure ground for grounding shields, cabinet, and components.
- 2. DC signal common shall be ungrounded.

## E. Enclosure:

1. Enclosure shall be a NEMA 12 cabinet.
2. Doors shall have three-point latch with lockable hasp, and shall have full length hinges with stainless steel pins. Lock to be keyed for Owner's key.
3. Fabricate using mild steel. Grind and sand welds to a smooth finish. Surfaces shall be free of ridges, nuts, and boltheads.
4. Internal structural framing to provide enclosure bracing and equipment support.
5. Provide removable lifting lugs, with plugs for use after installation is complete.
6. Enclosure shall be complete with interior back panels, as required for component mounting. Interior shall be white.
7. Provide a print pocket on inside of each door.
8. Provide laminated wiring schematics of the entire panel.
9. Provide a foldable lap top table installed inside the SCADA panel door.

## F. Devices:

1. Reference is made to Section 16050, BASIC ELECTRICAL MATERIALS AND METHODS, for devices not specified in this Section or on the Contract Drawings.
2. Interposing relays, auxiliary relays, and selector switches shall be as indicated on Contract Drawings. Interposing relays used for isolation purposes only shall be SPDT type.
3. Surge protective device for power main shall be Phoenix contact EMC filter surge protection device mounted using DIN-rail assembly in the SCP, P/N 2856702.
4. Temperature sensor shall be Ultra Electronics model # 753-PC-X4-(0°F to 150°F) transmitter with RTD.

## G. Nameplates, Labels and Tags:

1. Furnish face-of-panel mounted nameplates to identify systems and equipment. Use plastic laminate nameplates having white letters on red background for 120V system equipment, and white letter on blue background for 24V system equipment. Center lettering on each line.
2. Use plastic tags with letters on a red (120V) and blue (24V) background in the panel interior to identify each device mounted on the panel exterior and interior. Place the tags adjacent to, but not on, the device. Do not obstruct visibility by wire bundles or other equipment.



## 2.02 PROGRAMMABLE LOGIC CONTROLLER (PLC) SYSTEM

A. Subject to compliance with the Contract Documents, the following manufacturer is acceptable:

1. Rockwell Automation Allen Bradley CompactLogix 5370 Controller with Studio 5000 Logix software (or latest version currently in use by SAWS).
2. PLC processor
3. PLC modules, chassis, and power supply
4. Connection bases
5. All connection cables
6. 25% spare capacity on all I/O modules

B. Approved Products – NO SUBSTITUTIONS

DESCRIPTION	MANUFACTURER	PART NUMBER
Power Supply Module	Allen Bradley	1769-PA4
CPU	Allen Bradley	1769-L33
Analog Input Cable	Allen Bradley	1492-ACAB025EE69
Digital Input Cable	Allen Bradley	1492-CAB025RTN32I
32 Channel Digital Input Module	Allen Bradley	1769-IQ32
8 Channel Analog Input Module	Allen Bradley	1769-IF8
CPU Battery	Allen Bradley	1769-BA
Right End Cap/Terminator	Allen Bradley	1769-ECR
Left End Cap/Terminator	Allen Bradley	1769-ECL
Right to Right bank interconnection	Allen Bradley	1769-CRR3
Right to Left bank interconnection	Allen Bradley	1769-CRL3

The listing of specific manufacturers above does not imply acceptance of their products that do not meet the specified ratings, features and functions.

C. Programming – Local PLC:

1. The PLC shall use Studio 5000 Logix (or latest version) software for programming the CPU.
2. Software license shall be relinquished to SAWS.

3. PLC Programming shall be performed by Process Control Systems Integrator (PCSI).
  4. Recommended PCSIs:
    - a. Prime Controls  
Office Park Circle  
Lewisville, Texas 75057  
Attn: Gary McNeil  
Phone: 972.221.4849
    - b. Control Panels USA  
16310 Bratton Lane, Suite 100  
Austin, Texas 78728  
Attn: Martin Salyer  
Phone: 512.863.3224
    - c. Richardson Logic Control  
8115 Hicks Hollow  
McKinney, Texas 75071  
Attn: Michael Cunningham  
Phone: 972.542.7375
- D. Programming Languages
1. The PLC program shall utilize function blocks that are compatible with Rockwell PlantPAX system.
  2. Shall adhere to SAWS Standards for Tagging, etc.
- E. Programming – Owner’s Production Control Center:
1. Programming of the Rockwell Automation system at the Owner’s Production Control Center (PCC) shall be performed by the Applications Services Provider (ASP). Contractor shall coordinate with SAWS Inspector in order to notify SAWS Programming Manager about the programming of SCADA HMI graphics 15 calendar days prior to submitting the actual construction drawings of the SCADA Panel.
  2. The ASP shall perform all work necessary to configure, customize, debug, install, connect, and place into operation HMI and SCADA software specified within this Division and other related divisions. The PCSI shall coordinate with the ASP all scheduling, installation, and startup services. The PCSI shall be on site at all times when the ASP is working on site.
  3. The ASP shall be the following:
    - a. Recommended PCSI from above.
- F. Programming Languages
1. The PLC program shall be Function Block Diagram (FBD).

2. Refer to SAWS Standards for Tagging, etc.

G. Input / Output Capacity

1. Physical Input / Output capacity shall not be less than the following:
  - a. Analog – 256
  - b. Discrete – 1024

2.03 120 VAC UNINTERRUPTIBLE POWER SUPPLY (UPS)

A. Provide power conditioning during normal power operation.

1. Lightning and surge protection: Tested to ANSI/IEEE C62.41 Category A.
2. RF noise isolation: EMI/RFI suppression.
3. On-Line input range: 100-142 Vac, output 112-128 Vac.

B. Upon loss of feeder power to UPS, maintain power to the load for a minimum of 2 hours with 4 msec transfer time at 125% of constant load. Contractor to submit load calculation of proposed components and indicate the size of UPS needed for a 2 hour run time.

C. Ratings:

1. Volt – Ampere Capacity: UPS to be sized to run devices in SCADA panel including PLC, Radio, Auto Dialer and DC Power Supplies located in the SCADA panel for 2 hour run time.
2. Nominal Input Voltage: 120 Vac.
3. On-Battery Output Voltage: 120 Vac +/- 10%.
4. On-Battery Frequency: 60 Hz. Stepped sine wave.
5. Ambient Operating Temperature: 0-40 degrees C.

D. Battery shall be a sealed maintenance-free lead acid type with 3-year minimum life.

E. UL Compliance: UPS shall conform to UL Standards and have an applied UL listing.

F. UPS shall have Ethernet connectivity. Provide Network Card-MS for communications. UPS memory registers shall be configured by Contractor to work with SCADA system.

G. Manufacturer: Contractor to verify that the UPS will have a minimum runtime capacity of 2 hours at 125% of constant load in watts for the SCADA panel.

1. Powerware 5PX 1000 RT with extended battery module 5PXEBM48R or larger based on VA calculation as specified above. Contractor to verify that the UPS will have a minimum runtime capacity of 2 hours with SCADA panel fully loaded.

2. Tripp Lite SmartOnline SU/\*750/1000/1500/2200/3000 XLCD
  - a. UPS shall be provided with an
    - (i) SNMPWEBCARD card
    - (ii) Model BPV2470. Extended Runtime Batteries for 2 hours runtime at 125% of constant load in watts.

\*Size determined by contractor based on 2 hour runtime at 125% constant load.

#### 2.04 DC POWER SUPPLY

- A. 24 Vdc Control Power shall be provided by a single-output DC Power Supply.
- B. Ratings:
  1. Input Voltage: 120 Vac, + 10% voltage adjustment
  2. Output Voltage: 24 Vdc single output.
  3. Current range  $\geq 8$  A, overload protected.
  4. Rated power  $\geq 200$ W
  5. Voltage adjust range: 22V-26.4V
  6. Frequency range: 47-63 hz
  7. Efficiency: 85%
  8. Ambient Operating Temperature: -10-60 degrees C.
- C. UL Compliance: Power Supply shall conform to UL Standards and have an applied UL listing.
- D. Manufacturer:
  1. IDEC, Model PS5R-SC24
  2. MEAN WELL, Model SP-200-24
  3. POWER-ONE, Model HN24-3.6-A.

#### 2.05 COMMUNICATION PANEL

- A. Panel shall be American Products AM-202822-9RU beige color, NEMA 3R Enclosure. Must have UL 94 compliant bulb gasket. Panel to include the following.
  1. Wall mounting hardware shall be American Products AM-2418-WM.
  2. Backpanel shall be American Products AM-202822-WB.

3. Isolated Ground Bar shall be American Products AM-2X6-RB. Exhaust fan shall be American Products AM-2418-FP-115.
  4. Telecommunication 19" Rack Grounding bus bar shall be Harger TRGBHKIT14119.25 or American Product AM-2X6RB
- B. Provide mounting hardware, terminal blocks, circuit breakers, electrical wiring, communications wiring and all other items required for a complete operational system.
- C. Panel layout and fabrication shall allow for convenient maintenance and removal of all equipment after installation.
- D. Provide switched LED interior panel light. Also provide One duplex receptacle.
- E. Provide UL508A certification label on panel.
- F. Industrial Grade Router (Communications Cabinet)
1. Subject to compliance with the Contract Documents, the following Manufacturers are acceptable:
    - a. Cisco model IR829GW-LTE-VZ-AK9
- G. The listing of specific manufacturers above does not imply acceptance of their products that do not meet the specified ratings, features and functions. Manufacturers listed above are not relieved from meeting these specifications in their entirety.
- H. Environmental:
1. Operating temperature in sealed NEMA Cabinet with no air flow: -40°F to 140°F
  2. Operating altitude: 13,800 ft.
  3. Mounting Options: Must be 19" self supporting.
- I. Physical:
1. Enclosure: Fully Modular construction to allow for field upgrades for existing and/or future technologies without requiring a platform replacement. Refer to section 2.1.D for additional requirements.
  2. Provide an enclosed thermostat controlled filter fan rated at 120Vac. Filter fan to vent the heat out of the enclosure into the Electrical Building.
  3. Power supply: 120VAC from UPS in SCADA Panel.
  4. Microprocessor based managed type.
  5. 19 inch rack mountable where shown in plans.
- J. Options and Accessories Required:

1. Provide twenty (20) percent spare port capacity for each port type.
2. Provide redundant power supply module Cisco PWR-125W-AC
3. WPA Antenna WMMG-7-27-5SP.
4. Female Adapter SMA-TNC.
5. Lighting Arrestor CGR-LA-NF-NF
6. Provide two (2) year extended maintenance: CON-SNT-IR82VZAK

**2.06 RADIO TRANSCEIVER SYSTEM**

- A. Contractor shall furnish and install the 5GHz broadband type radio system with the following features.
1. Integrated High Gain 5GHz PMP450i Subscriber:
    - a. Manufacturer: Cambium Networks
    - b. Part number: C050045C002C
  2. Tilt Bracket Assembly:
    - a. Manufacturer: Cambium Networks
    - b. Part number: N000045L002A.
  3. Power Injector:
    - a. Midspan DC power 60w
    - b. Manufacturer: Microsemi
    - c. Part number: PD-9501GI/DC
  4. Power cord:
    - a. Manufacturer: Cambium Networks
    - b. Part number: C0000065L007
  5. Lightning Protection:
    - a. Manufacturer: Cambium Networks
    - b. Part number: C000065L007
  6. Pole Mounting Kit:
    - a. Manufacturer: PolyPhaser
    - b. Part number: IX-POLE-KIT
  7. Surge Protection:
    - a. Manufacturer: Transector
    - b. Part number: ALPU-F140
  8. POE Injector:

- a. Manufacturer: Cambium Networks
    - b. Part number: N000065L001B
  9. Grounding Kit:
    - a. Manufacturer: Cambium Networks
    - b. Part number: C00006L007
  - B. Feedline:
    1. Broadband: TIA/EIA 568B OSP CAT 6, #23 AWG Ethernet Outdoor, UL Listed, 23 AWG with waterproof watertight rated IP67 rated RJ45 connectors at each ends. (Not to exceed 300 feet) cabling will be Superior ESSEX Type BBDGe cable, copper clad cabling, Part number Enduragain OSP Shielded Superior ESSEX 04-001-64, NO SUBSTITUTIONS.
  - C. Waterproof- all connections must be waterproof as per IEC 60529 IP67 2.6 ANTENNA MAST
  - D. Refer to specification 17600, ANTENNA TOWER for details
  - E. Programming:
    1. Radio programming shall be performed by contractor. SAWS Information Services will program-Security Risk.
- 2.07 AUTODIALER
- A. Contractor shall provide and install a new complete and operational new autodialer system. Autodialer System to be a Verbatim Gateway Series VPLC Autodialer with an expandable 32 digital input module. The autodialer is to use a standard rotary pulse or touch-tone "dial-up" phone line (installed by contractor) and is to be F.C.C. approved. Connection to the telephone is through 4-pin modular jack (RJ-11).
  - B. Contractor to coordinate with the phone company to get communication lines to the electrical building for the autodialer.
  - C. NEMA 12 Control panel for Autodialer to be mounted to the wall as shown on plans. Refer to section 2.1.D for additional requirements
  - D. Manufacturer:
    1. Raco Verbatim Gateway Series VPLC Autodialer with expandable 32 digital input monitoring module.
- PART 3 EXECUTION
- 3.01 COORDINATION MEETING
- A. The ASP shall be responsible to coordinate the work with the PCSI and/or the Contractor. The ASP shall schedule and administer a minimum of two mandatory control system

coordination meetings. The ASP shall make arrangements for meetings and prepare/distribute an agenda a minimum of one week before the scheduled meeting date.

### 3.02 INSTALLATION

#### A. General

1. SCADA PLC Panel shall be a freestanding enclosure mounted to a wall with bolts of sufficient size and number for load conditions. Contractor shall install all interconnect wiring from the SCADA PLC Panel to field equipment and devices, except where the field device is future and has no provision for wiring termination.

B. Follow procedures, instructions, and check sheets provided by the manufacturers for proper installation of their equipment.

### 3.03 FIELD QUALITY CONTROL

A. In accordance with Section 16950 – ELECTRICAL TESTING.FUNCTIONAL TEST

B. PLC program shall be installed on the PLC by CONTRACTOR. Programmers shall provide assistance with testing the I/O from the field to the SAWS SCADA system once the field I/O and the communications systems have been fully checked out

C. Contractor shall be responsible for testing the field I/O to the PLC panel.

### 3.04 STARTUP AND COMMISSIONING

A. Contractor shall coordinate the startup and commissioning efforts. Contractor shall develop the startup and commissioning plans and the check out forms.

B. Contractor shall coordinate with SAWS (startup and commissioning phases).