

TECHNICAL PROVISIONS

SECTION 24 – AUTOMATION IMPROVEMENTS INCLUDING

SCADA TP-2401 SCOPE:

The work covered under this section consists of furnishing all software, programming, and incidentals necessary for the complete integration of the new SCADA (Supervisory Control And Data Acquisition) system at the locations described in the Scope of Work. The system shall include software and programming in strict accordance with these specifications. The programming of the newly installed PLCs shall also be part of this contract. The PLCs shall be programmed as outlined below.

TP-2402 GENERAL:

The SCADA system shall be constructed in the locations and of the sizes and materials shown on the drawings, or as directed by the Owner or Owner's Representative.

Defined Terms:

Remote Terminal Units (RTUs) or Programmable Logic Controllers (PLCs): RTUs or PLCs collect data from field devices, perform basic processing and control functions, and transmit data to the master terminal unit (MTU).

Communication network: The communication network is responsible for data transmission between the field level and the master terminal unit. This network can use different communication technologies depending on the system's needs, such as wired or wireless communication.

Master Terminal Unit (MTU or MTP): The MTU is the main control center for the SCADA system and is responsible for collecting data from RTUs, performing advanced processing and control functions, and presenting data to the operator via an HMI.

Human Machine Interface (HMI): The HMI is a graphical user interface (GUI) that provides operators with a visual representation of the process that's being monitored and controlled. Operators can interact with the system, view process data and make control decisions via the HMI.

TP-2403 CONTROL SYSTEM NARRATIVE:

Remote Terminal Unit: The work covered under this section consists of furnishing programming for newly installed equipment as necessary for the proper operation. The programming shall complete the system in order provide monitoring as outlined below. The information shall be relayed back to the MTP (Master Telemetry Panel) located at the Tribal Utility Authority

Office. An RTU (Remote Terminal Unit) shall be installed at locations in the Scope of Work. This RTU will deliver the water level and fluctuations to the SCADA computer located at the Tribal Utility Authority Office. The RTU shall be solar powered, if specified.

The controls shall be programmed by an integrator who is part of a UL shop and has at least 15 years' experience in designing, building and installing water system controls. The company shall have a representative locally (in the state of New Mexico) with 24/7 service available to respond to emergencies. The control system, as well as the system as a whole, shall have a 3-year warranty on parts and labor.

TP-2404 SCADA COMPUTER:

The new SCADA computer shall be the main user interface for the remote monitoring of the new equipment. This computer is located in the office of the Tribal Utility Authority. The SCADA HMI (Human Machine Interface) package consists of the following basic components:

- a. Graphical interface
- b. Historical logging of selected data
- c. Trending of logged data
- d. Reporting of logged data
- e. Alarming
- f. Alarm and event logging

Programming, especially PLC programming, shall be well documented, and will become the property of the Owner after successful implementation. Every bit, word, timer, counter, input, output or any other file type shall be labeled within the PLC application. Comments shall be provided where needed to provide a way for future programmers to understand the applications and how they function.

All programs and applications shall become the property of the owner. If programs are password protected that password shall be given to the owner at the conclusion of the project before final payment is made. All Applications including HMI and PLC programming shall be provided for the owner on the SCADA computer and also on USB or digital transmission. Copies shall be made available to the owner. The electronic files and folders shall be professionally labeled with the contents. Other data included shall be items such as radio configuration, tag lists, as well as report templates.

B. Graphical Interface of Real-Time Data: The graphical interface shall provide logical navigation to and from each page shall be implemented. Graphics shall at a minimum contain the following data:

- a. AC power failure
- b. DC battery failure

- c. Communication failure
 - d. Flow(s)
 - e. Flow Total(s)
- C. Trending: The SCADA software shall be programmed to present trending data for operator use. Trend data shall be:
 - a. Daily hydrograph
 - b. Daily totalized flow
- D. RTU: Each site will allow the user to click on the name of the site and navigate to a page for that site with the above data shown at each site and a trending graph shown for the entire system.
- E. Trending Pages: Trending will access historical data. Historical data will be logged at least once every minute for each historical tag. The historical buffer shall write to the hard drive at least once every 10 minutes. Historical tags shall be:
 - a. Flows
 - b. Pressure or Hydraulic Elevation
 - c. Common alarm for each site
- F. Alarms Page: An alarms page shows alarming for all areas and allows the user to see many alarms at once in one location.
- G. Reports: A systems report is configured to show statistical information about the entire water system. The report shall show at each site:
 - a. Flows (minimum, maximum and average)
 - b. Flow totals
 - c. Pressure or Hydraulic Elevation
- H. Wiring Diagrams & Manuals: The contractor shall furnish four (4) copies of the Manual of Operation including SCADA operation.

The manual of operation shall contain illustrations of each element of the system and explain in narrative and graphical terms how the system operates.

Specifically, the manual shall have as a minimum the following:

- a. Index or table of contents
- b. Description of operation
- c. Contact information for obtaining spare or replacement parts for all components of this installation including name, address, and telephone number of supplier.

TP-2405 START UP:

The contractor shall furnish trained personnel, equipment and supplies as needed for startup of the system controls. The contractor shall also coordinate start-up with the Utility Authority. Upon start up, all of the system controls specified herein shall be placed into service.

A. Conduct for a period of 4 hours:

- a. All major process, maintenance, operations, and monitoring equipment fully functional before and throughout the entire scheduled period.
- b. Once start-up operations begin, continue operations until scheduled period of successful operation is achieved.
- c. If equipment fails (as determined by Owner/Owner's Representative) during start up, re-start start-up procedure once problem(s) is/are corrected.

B. The Contractor shall:

- a. Maintain, monitor, and adjust all new equipment and facilities.
- b. Notify Engineer and Owner in writing 7 calendar days prior to start up.
- c. Include startup operation in contract time.
- d. With notice of startup, include proposed written schedule of all field instruction specified for review by Engineer and Owner. Schedule all instruction to facilitate Owner's and Engineer's participation. Revise proposed schedule as required to accomplish this objective.
- e. Where practical for the equipment or system involved, instructions prior to start up; all other instructions to occur prior to completing start-up operations unless specifically approved in writing by Engineer.

C. The Owner shall operate the system controls installed under this contract with guidance from the Contractor and manufacturer's representatives (i.e. Training staff).

D. System Controls Start Up Schedule

- a. Test to be conducted on system controls to ensure correct operation.
- b. Re-start the startup sequence if system controls are not smooth or steady operation of the system controls cannot be achieved.

TP-2406 TRAINING

The Contractor shall provide the water system operator(s) with four (4) hours minimum of training and instructions on the system operation and use of the equipment and software. In the presence of the Project Engineer during the contract final inspection, the Contractor shall provide instructions on the system.

TP-2407 MAINTENANCE & EXTENDED WARRANTY

The Contractor shall supply a three (3) year maintenance program to the Owner for the system installation. The procedures described below shall be carried out by the Contractor for the period of the maintenance contract. The maintenance contract shall begin on the date of substantial completion.

The required maintenance on the system shall be performed as described below and shall perform the checklist below at 6-month intervals. The Contractor shall coordinate the bi-annual maintenance inspections with the Owner and Project Engineer and shall perform the following at each maintenance visit:

1. Check for proper operation of controls.
2. Check control setup such as transducer ranges, etc.
3. Check that documentation is present and up to date.
4. Discuss with operations personnel (if available) any issues that come up during visit or any issues that they have (ongoing training).
5. Create backup copy of logged data in master computer.
6. Check that all data points are registering with master station.
7. Look through data to determine if event logging is occurring properly.
8. Look through all SCADA elements for proper functioning.
9. Check for alarm patterns.
10. Check for anomalies in within data ranges.
11. Create inspection report with checklist for above listed items. Send report to the Owner and Project Engineer.

This maintenance and warranty contract shall become void if persons or companies other than the Contractor changes, modifies, removes, repairs or otherwise alters any programming that is part of this contract during the time period that this contract is in effect.

TP-2408 SUBMITTALS:

Submittals are required for the following items:

- a. Electrical and Controls Design
- b. PLC Ladder Logic for each Panel
- c. Tag Lists
- d. Historical Tag List
- e. Software