

SECTION 16903

SUPERVISORY CONTROL AND DATA ACQUISITION SYSTEM **(Extension of Existing System)**

PART 1 GENERAL

1.1 DESCRIPTION OF WORK

- A.** Provide an extension to the existing PLC based Sanitary Sewer SCADA System. This shall include Remote Telemetry Units, and modifications and interface to existing MTU and personal computer operator interface.
- B.** Radio communication telemetry between the Master Telemetry Unit (MTU) and the Remote Telemetry Units (RTU's) shall be via an existing FCC licensed frequency of 173.2375. Provide SCADA radio communication to match existing.
- C.** Provide RTU PLC configuration to accomplish monitoring and control functions as indicated for each RTU. Establish typical lift station configurations.
- D.** Modify Wonderware graphics software and configuration to display the additional SCADA system information. Configure software and graphics at direction of Owner and Engineer. Utilize Contractor Wonderware development package to make changes to Owners system. Provide complete update of system changes for O&M Manuals.
- E.** Provide PLC network interface with existing PLC networks to monitor status of existing wastewater plant control systems. Provide modifications of existing PLC programming to extract and exchange information. The existing PLC systems shall remain unchanged.
- F.** Provide installation, testing, and commissioning of system. Provide all documentation and O&M Manuals for hardware. Provide electronic and hardcopy printouts of software configuration.

1.2 QUALITY ASSURANCE

- A.** All Wonderware programming and integration shall be performed by a company certified in Wonderware software.

- B. All PLC programming and radio interface shall be performed by a programmer certified in Rockwell Automation (Allen Bradley) programming.
- C. All Work completed according to the latest edition of the National Electric Code.
- D. All material to be U.L. listed.
- E. All equipment to conform to ANSI and NEMA standards.

1.3 QUALIFICATIONS OF BIDDERS

- A. To ensure a complete and totally integrated system, a single system supplier (Systems Integrator) who has had at least five years experience in furnishing similar microcomputer based control and telemetry systems shall supply all specified equipment and services. This shall include: hardware, software, communications equipment, training, installation coordination, startup and warranty services as required. To ensure an integrated and operational system it is required that one supplier be the manufacturer of remote telemetry units and be responsible for all application software and thus have overall responsibility of the system. The supplier shall supply all necessary control equipment and employ the personnel necessary to provide and support the system.
- B. Hardware: Include product literature and installation literature.
- C. Software Configurations: Include printouts of proposed PLC programming and color printouts of graphics screen displays for Owner and Engineer review.

1.4 APPROVAL SUBMITTAL

- A. Provide shop drawings of Hardware separate from software to allow delivery and fabrication of hardware while software configuration is being developed.
- B. Provide shop drawings for software and software configuration. Coordinate software configuration with Owner and Engineer. Include color printouts for initial shop drawing submittal. Provide "live" software configuration during review of second submittal.

1.5 SYSTEM SCOPE

- A. The system will be capable of monitoring at least 100 remote terminal units.

1.6 EXISTING CONDITIONS

- A. Visit the site and become familiar with existing conditions and limitations.

PART 2 PRODUCTS

1.7 CONTROL PANELS

- A. Manufacturer: HSQ Technology, to match existing. OR by engineer approved equal.
- B. Control panels, including Remote Telemetry Units and PLC's are to be completely factory assembled, wired and tested prior to shipment. Factory testing shall include software configuration and telecommunication techniques.

1.8 PROGRAMMABLE LOGIC CONTROLLER (PLC)

- A. Remote Telemetry Units (RTU) shall be PLC based. See RTU schedule for type of PLC per location.
- B. Remote Telemetry Units – Standard Lift Station locations.

Standard Lift Station RTU's shall be PLC based and shall include Allen-Bradley Micrologix 1500 series and the following components.

1764-LRP	Processor Module
1764-28BXB	Base Unit with 16 DC and 12 Outputs
1764-M2RTC	Memory Module with real time clock.
1764-IF4	4 Channel Analog Input Card (at selected sites)
1764-ECR	End Cap

- C. RTU Components and PLC Accesories.

Surge Protection: Transector ACP100BWN3

Power Supplies: Sola Heavy Duty SLS-15-060T (2 ea required per RTU)

Relay Allen-Bradley 700-HB33A1

Relay Socket	Allen-Bradley 700-HN154
Intrinsic Barrier	Gems Zener Barrier 111956
Relays	P&B R10-E172-v700
Socket	P&B 27E126
Fuses	Littlefuse FLM Series
Fuse holders & accessories	Allen-Bradley 1492 Series
Radio Modem	MDS, See Section 16901
Isolation Transformer	Quality QTC2517 250VA 120-120v
Batteries:	Interstate DCS-33 (Note 2 per each power supply)
UHF Lighting Protector:	Polyphaser ISB50

1.9 REMOTE TELEMETRY UNITS (RTU)

- A.** The basic function of the RTU shall be to transmit and receive data from the MTU.
1. Communication shall be over Radio at existing licensed frequency.
 2. A Self-diagnostic program with LED indicators shall be provided to indicate:
 - a. CPU Power-On, indication of all RTU inputs and outputs communicating properly including analog signals.
 - b. Communication operation shall be AB DF1 protocol
 3. Provide a 24 VDC power supply and battery backup with minimum rating of 4.0 amp/hours.
 4. All wiring shall be marked with wire labels numbered at both ends as referred to on the system schematics.
 5. All wiring diagrams shall be prepared in ladder logic format with individual prints for each panel. Diagrams shall be laminated and affixed to the inside of the door on all panels. Diagrams shall be prepared utilizing AutoCAD and also be provided electronically to the engineer and the owner.

1.10 MASTER TELEMETRY UNIT – Existing to Remain

1.11 TELEMETERY RADIOS

- A. Manufacturer: MDS to match existing.
- B. Communication Baud Rate shall be minimum 9,600 baud. Provide necessary modem and interface between radio and PLC.
- C. Provide radio self diagnostic software. Software to log the following information:
 - Temperature
 - Battery Voltage
 - Local RSSI
 - Forward Power (W)
 - Reverse Power (good/bad)
 - Remote RSSI
 - Rx Quality

1.12 ANTENNA AND COAXIAL CABLE

- A. Antenna shall be provided for each RTU. See individual station for antenna type.
 - 1. $\frac{1}{4}$ wave "whip" antenna trimmed to the 173MHz Frequency.

1.13 "HMI" COMPUTER – Existing to Remain

- A. Modify all existing graphics, databases, and reports to include addition of new stations.

1.14 SANITARY LIFT STATIONS

- A. Provide monitoring, alarm, and provisions for future control of Sanitary Lift Stations. Refer to the drawings for Process Control and Instrumentation details. Provide identical configurations for all lift stations. This shall include run indication, alarms, flows, levels, generator, and incidentals. Configure the software for these points even though not all components are present.

PART 3 CONSTRUCTION REQUIREMENTS

1.15 RTU's

- A. Install and commission each RTU one at a time.

1.16 EXISTING SCADA SYSTEM

- A. The existing SCADA system shall remain in operation throughout the entire construction process.

PART 4 EXECUTION

1.17 INSTALLATION

- A. Securely mount equipment where shown on the Drawings.
- B. Complete all conductor connections to remote sensing devices, control relays and monitor relays as shown on the Drawings. Use same color coding of conductors throughout.
- C. Securely mount equipment where shown on the Drawings.

1.18 STARTUP PROCEDURES

- A. Provide a certified technical representative from the system integrator for the purpose of final connections, testing, calibration and startup.
- B. Prior to startup, the system shall be factory tested for proper connections and installation to assure that the monitoring system is properly installed. This factory test may be inspected by the Engineer.
- C. The system integrator shall test and verify that all software is running properly and that all alarms and status changes are being properly logged.
- D. System integrator shall provide documentation of testing. Include point address, description, and point type. Where applicable, provide calibration and scaling information.
- E. The system integrator shall submit a letter of certification stating that the system is fully operable as verified by field test results.

1.19 SPARE PARTS

- A. Provide the following Spare Parts. Turn over to Owner upon completion of project.
- B. RTU Power Supplies. (qty 1 each)

- C. Telemetry Radios. (qty 1 each)
- D. Radio Modems (qty 1each)
- E. Lightning Protector (qty 1 each)
- F. Intrinsic Barriers. (qty 1 each)

1.20 SYSTEM WARRANTY

- A. Provide a full ONE-YEAR parts, labor and software support warranty for all materials, work and software associated with the system.
- B. Replace all defective material, work and software during this period at no cost to the Owner.

**** END OF SECTION 16903 ****