

ITEM 37

TELEMETRY

1.0 DESCRIPTION. This specification covers the requirements for furnishing all labor, equipment and materials associated with the installation of telemetry needs for the Stark County Metropolitan Sewer District Supervisory Control and Data Acquisition (SCADA) system. The County's SCADA system is based upon the Samsara Gateway IG41 product.

2.0 SUBMITTALS. The Contractor shall submit the following:

A. Reference Standards. Latest revisions.

1. IEC 60068-2-32 (Freefall).
2. IEC 60068-2-27 (Operating shock), half-sine wave, 30G 11ms, 18 shocks.
3. IEC 60068-2-27, half-sine wave, 50G 3ms, 18 shocks.
4. IEC 60068-2-64, 5~500 Hz, 5Grms, 30 min/axis, total 90 min (vibration).
5. IEC 60068-2-6, 10~500 Hz, 5G, 30 min/axis, total 90 min.
6. Hazardous Locations US (UL).
7. Class I, Division 2, Groups A, B, C, D, Temperature Class T4.
8. Class I, Zone 2, Group IIC.
9. UL/IEC 61010-1 (Safety).
10. UL/IEC 61010-2-201 (Safety).
11. UL 121201, CSA C22.2#213 (Hazardous Locations).
12. FCC 47 CFR Part 15B, Class A.
13. ICES-003 (ITE).
14. FCC 47 CFR, Class A equipment is intended for use in commercial, light-industrial, and heavy-industrial locations.

B. Shop Drawings.

1. Work plan: Prior to beginning work, the Contractor must submit to the Engineer a general work plan outlining the procedure and schedule to be used to execute the project. Plan should document the thoughtful planning required to successfully complete the project.
2. Materials, equipment lists & spare parts data. Shop drawings shall include but not be limited to all materials as listed Section 37.03 below:
All shop drawing shall be submitted in accordance with the following requirements.
3. The Contractor shall provide one (1) electronic copy of all materials listed herein this section for approval. Shop drawings shall be complete and detail all telemetry equipment ancillary supplies and equipment necessary to install the telemetry/SCADA system utilizing the listed materials as specified herein.

4. Manufacturer's catalog or general web-site information will not be sufficient to fulfill shop-drawing requirements.
5. After examination of such drawings by the Engineer and the return thereof, the Contractor shall make such correction(s) to the drawings as have been indicated and shall furnish the Engineer with electronic corrections.

C. Calculations. This section is not applicable.

D. Certifications.

1. Components used shall be IEC certified.

3.0 MATERIALS.

A. Terminology. Reference to the Contractor under this item/specification refers to the Contractor who is performing the SCADA installation. This contractor may or may not be the prime contractor on the project. All other Contractors referenced/utilized under this item/specification such as the prime, electrician, integrator etc., will be indicated in accordance with the specific trade which the said contractor performs.

B. Scope. All work under this specification shall include, but not be limited to:

1. Coordination with all Contractors.
2. Furnishing and installing all equipment, wiring, panels (except for Samsara Gateway, All Samsara DI/DO, AI/AO modules and Multiband Antenna).
 - a. 24-volt DC Power Supply.
 - b. Uninterruptable Power Supply.
 - c. Mounting Stainless-steel control cabinet per plan location.
 - d. Installing 120V power to control cabinet.
 - e. Mounting all components into control cabinet on DIN rails as specified herein.
 - f. Installing the multiband antenna, cable and all connections.
 - g. All wiring (power and SCADA).
3. Assisting with equipment startup to ensure that all alarm, monitoring and control signals are sent to the master with the correct labeling, recording and control results.
4. All incidental work such as post or grip strut installation to mount control box, conduit installation to bring power to the control box, locating a power source for the SCADA controls, antenna mast installation if necessary along with adjusting the antenna for best signal.

C. Manufacturer's Specifications.

1. All material purchased and installed on this project shall be new and unused unless otherwise specified and all workmanship shall be of the best quality.

2. Distribution Block: Splicer block, 600 Vac, 600 Vdc, 175A, Power splicer block, Three-pole, Splicer, SCCR: 200 kA, Black, Molded Thermoplastic Base, Tin-plated aluminum connector.
 - a. Qualified manufacturers shall be: Eaton Bussmann 16204-3, Square D or approved equivalent.
3. Circuit Breakers:
 - a. 15 amp miniature circuit breaker thermal-magnetic overcurrent protection with DIN mounting.
 - i. The breaker shall be IEC, UL and CSA listed.
 - ii. Shall be RoHS compliant and mercury free.
 - iii. Qualified manufacturers shall be: Eaton FAZ-D-15/1, Square D or approved equivalent.
 - b. 30A Master Circuit Breaker:
 - i. Miniature circuit breaker thermal-magnetic overcurrent protection shall be DIN mounted.
 - ii. The breaker shall be IEC, UL and CSA listed.
 - iii. Shall be RoHS compliant, mercury free.
 - iv. Qualified manufacturer shall be: Eaton FAZ-D-30/, Square D or approved equivalent.
4. LED Cabinet Lamp:
 - a. Shall be 9" LED 120V operating temp -4 to 122 °F.
 - b. Provide a minimum of 175 lumens per LED module 60,000 hours of warm white color.
 - c. The LED modules shall be easily replaceable and allow easy access for replacing LED modules.
 - d. Qualified manufacturers shall be: Hammond (FLK5LED Light Kit), Hoffman or approved equivalent.
5. 200-Watt Heater:
 - a. The enclosure heater is a fan forced heater designed to maintain a suitable temperature inside a control panel or metal enclosure.
 - b. Qualified manufacturers shall be: Hammond Manufacturing (FLHTF200A115) or approved equivalent.
6. Outlets/Switches:
 - a. Qualified manufacturer shall be: Hubbell Wiring Device-Kellems, Legrand or approved equivalent.
7. Control Panel and Ancillary Boxes:
 - a. Shall be 304 stainless steel (NEMA 4X), piano hinged, polyurethane gasket, quick release latch with stainless steel hasp for lock,
 - b. CSA, cUL, IEC certified and UL listed.
8. Flow meter control panel minimum size is 36" high x 30" wide x 12" deep.
 - a. Qualified manufacturers shall be: Hoffman, Saginaw Control & Engineering, Hammond or approved equivalent.
9. Wire Duct:

- a. All wiring ducts shall be screw mounted with fingers along the sides of the duct hold wire and cable in place while also allowing wiring to be directed in & out of duct. (The fingers may be removed for larger wire sizes.)
 - b. These ducts have removable covers that snap on to seal the conductors inside.
 - c. Qualified manufacturer shall be: Panduit, Phoenix Contact or approved equivalent.
- 10. Electrical Boxes:
 - a. Qualified manufacturer shall be:
 - Raco Electrical, Thomas Betts/Carlson or approved equivalent.
- 11. Switch/Outlet Covers:
 - a. Material shall be of standard stainless-steel for duplex outlet/switch covers.
 - b. Qualified manufacturers shall be: Hubbell, Legrand or approved equivalent.
- 12. Surge Arrestor:
 - a. The surge protector shall be a Type 1 rated device providing the flexibility to be used with or without an Overcurrent Protection Device (OCPD).
 - b. It shall have a short circuit current rating of 25kA and be suitable for indoor & outdoor application (NEMA Type 4X rated).
 - c. All surge protectors shall have back-nipple mounting and be designed and listed for indoor or outdoor installation and surge suppression for single-phase three-wire 120/240 Vac or two-wire 120 Vac 60 Hz electrical services.
 - d. The surge protector shall be an MOV design with a response time of less than 50 nanoseconds and low clamping voltage.
 - e. Qualified manufacturer shall be: Square D SDSA1175, Sola/Hevi-Duty or approved equivalent.

4.0 EXECUTION.

- A. General.** The Contractor shall take precautions to protect all telemetry components while being handled. All components shall be kept inside off the ground surface in an environmentally controlled area.
 - 1. Care shall be taken to protect all telemetry components from any form of damage.
 - 2. Telemetry equipment installation must not interfere or cause delays with surface activity. Areas outside designated work areas should not be disturbed. Examine work area and notify Engineer of conditions that may adversely affect work.
 - 3. Contractor shall conduct operations and schedule cleanup in a manner to cause the least possible obstruction and inconvenience to other contractors working on site.
 - 4. Safety: The Contractor shall carry out the operations in strict accordance with all applicable OSHA regulations.

B. DIN Rail Mounting System.

1. The following are to be mounted: wire, circuit breakers/connector blocks, outlet/switch type and boxes, control cabinet, cabinet and antenna mounting hardware, perforation gromets/gaskets, conduit/wire ducts, lighting and heater.
2. NOTE: All signal wires installed shall include 20% spare twisted pairs than required at the time of installation. Spares shall terminate in the panel from which the existing signal wires originate.
3. The Samsara components and the 24-volt power supply are all DIN rail mounted.

C. Contractor's Qualifications.

1. The following qualifications shall have been met by the telemetry contractor for approval to perform any services on this Contract.
 - a. All personnel shall be fully trained in their respective duties as part of the telemetry/SCADA installation team.
 - b. The telemetry contractor shall have actively engaged in the installation of SCADA/telemetry systems for a minimum of five (5) years.
 - c. The Contractor shall submit three (3) reference projects of equal or similar size in which they have performed SCADA/telemetry installations of similar complexity as specified herein, within the last five (5) years. The following evidence of qualification shall be submitted with the Bid and shall be from the contractor who will actually perform the work and include the following information:
 - i. Description of project (including project size).
 - ii. Location of project.
 - iii. Point of contact and phone number for each project.
 - iv. Project costs, start and completion dates.
 - v. Field supervisory personnel employed by the telemetry installer shall have at least five (5) years' experience in the performance of the work. Qualifications shall be submitted with Bid.

D. Installation.

1. The contractor shall, under this item, furnish and install at the location shown on the plans Samsara IG41 Gateway telemetry equipment as specified.
2. Installation shall be complete and shall include the control panel, panel mounting, telemetry equipment, electrical connections, connection of flow meter output wiring, and programming of the Stark County Metropolitan Sewer District's computers to accept the flow data.
 - a. All data will be transmitted to the Sanitary Engineer's main office at 1701 Mahoning Road NE.
 - b. The telemetry equipment will be used in one of three ways, for transmission of lift station alarm/control signals, for transmission of flow meter data or for the transmission of wastewater alarm/control signals.
3. The installation, programming and startup of the telemetry equipment is a requirement of the SCADA system support coordinator.

4. RTU's required are specified in contract drawings.
5. Equipment:
 - a. The contractor shall install the supplied Samsara IG41 Gateway Remote Telemetry Unit (RTU) complete in its stainless-steel enclosure box. Refer to the Flow Meter Control Panel Layout on the plans for the back-panel arrangement.
 - b. Provide and install new antenna and antenna mast (if necessary), power supply/surge equipment, disconnect switch, LED light, heater, circuit breakers, outlet and switches, distribution block(s), wire duct, antenna cable and fittings as necessary at the specified location.
 - i. The antenna is mounted to the outside of the enclosure using a 0.5-inch hole to allow installed antenna cables to enter the enclosure.
 - ii. Samsara ACC-AANT-CBLG Multiband Antenna:
 - c. Coordinate the installation of the flow meter and connection to the analog module of the Samsara gateway.
 - d. The Samsara hardware to be installed shall include the following:
 - i. Samsara IG41 Gateway Module.
 - ii. Samsara IG41AI Module.
 - iii. Samsara IG41DIO Module.
 - e. Enclosure, Large NEMA 4X up to 7 I/O Frames.
 - f. Programming and installation are to be included.

E. Cleaning, Site Restoration.

1. Following the installation of the telemetry equipment, the telemetry contractor will demobilize and restore the worksite to original condition.
2. The Contractor is required to maintain the work site in a neat and orderly condition throughout the period of work and after completing the work at each site, remove debris, surplus material and temporary structures erected by the Contractor.

F. Data Transmitted. The following data shall be sent by the Samsara IG41 RTU:

Stark County Samsara Inputs (Lift Stations)								
Analog Input Module			Digital I/O Module 1			Digital I/O Module 2		
Pin #	DI #	Module 3	Pin #	DI #	Module 1	Pin #	DI #	Module 2
1	AI1+	Hyd. Sol. Level +		COM	24V dc		COM	24V dc
2	AI1-	Hyd. Sol. Level -		DI 0	Pump 1 Run		DI 0	Pump 3 Run
3	AI2+	Flow Rate +		DI 1	Pump 2 Run		DI 1	Pump 3 Fail
4	AI2-	Flow Rate -		DI 2	High Wet Well		DI 2	Air Comp. Fail
5	AI3+	Spare		DI 3	Pump 1 Fail		DI 3	Grinder Fail
6	AI3-	Spare		DI 4	Pump 2 Fail		DI 4	High Dry Well
7	AI4+	Spare		DI 5	Intrusion		DI 5	Pump 1 Seal Fail
8	AI4-	Spare		DI 6	Spare		DI 6	Pump 2 Seal Fail
9	AI5+	Spare		DI 7	Radio AC Power Fail		DI 7	Pump 3 Seal Fail
10	AI5-	Spare		GND	GND		GND	GND
11	AI6+	Spare		COM	24V dc		COM	24V dc
12	AI6-	Spare		DI 8	Generator Run		DI 8	Spare
13	AI7+	Spare		DI 9	Phase Fail		DI 9	Spare
14	AI7-	Spare		DI 10	Control Power Fail		DI 10	Spare
				DI 11	Low Level Fuel		DI 11	Spare
				DI 12	Fuel Leak		DI 12	Spare
				DI 13	Fire Alarm		DI 13	Spare
				DI 14	High Inlet		DI 14	Spare
				DI 15	Generator Fail		DI 15	Spare
				GND	GND		GND	GND
Connect all common terminals on radio unit together and to the Positive terminal on power supply!								
Connect all Ground terminals on radio unit together along with common wire from all control panel/alarms to the								
Negative terminal on power supply!								

Stark County Flow Meter Sites SCADA Inputs (Samsara)					
Digital I/O Module 1			Analog Input Module		
Pin #	DI #	DI Module	Pin #	AI #	AI Module
1	COM	+24V dc	1	AI1+	Flow Meter 1 +
2	DI 0	Spare	2	AI1-	Flow Meter 1 -

3	DI 1	Spare	3	AI2+	Flow Meter 2 +
4	DI 2	Spare	4	AI2-	Flow Meter 2 -
5	DI 3	Spare	5	AI3+	Level 1 +
6	DI 4	Spare	6	AI3-	Level 1 -
7	DI 5	Intrusion	7	AI4+	Level 2 +
8	DI 6	Phase Fail	8	AI4-	Level 2 -
9	DI 7	Control Power Fail	9	AI5+	Rain Gauge +
10	GND	GND	10	AI5-	Rain Gauge
11	COM	+24V dc	11	AI6+	Spare
12	DI 8	Generator Run	12	AI6-	Spare
13	DI 9	Spare	13	AI7+	Spare
14	DI 10	Spare	14	AI7-	Spare
15	DI 11	Spare			
16	DI 12	Spare			
17	DI 13	Spare			
18	DI 14	Spare			
19	DI 15	Spare			
20	GND	GND			

5.0 ELECTRICAL.

A. Power.

1. Telemetry equipment requires 120 VAC single phase power. The telemetry shall be powered from the control panel or as shown on the plans.
2. New 120 VAC, conduit and wiring shall be provided as shown on the drawings.
3. Mean Well HDR-60-24, 24 Volt DC Power Supply.
4. APC BE-425M Uninterruptable Power Supply.

B. Installation.

1. RTU programming, installation, and transmission line shall be procured from the SCADA coordinator:
Stark County Metropolitan Sewer District
1701 Mahoning Rd. NE
Canton, Ohio 44705
Contact: Mr. Tim Everly
Phone: 330-451-2363
2. The Samsara Gateway shall be installed by the Electrical Contractor in a stainless-steel cabinet with front door hinged to the left side.
When used for flow meter data, the RTU stainless-steel cabinet shall be installed inside the control panel as shown in the plans.
3. All electrical work must conform to NEC Standards and be done in accordance with Item 29 of the specifications, unless otherwise noted on the plans.

6.0 QUALITY ASSURANCE.

A. Testing.

1. The telemetry contractor shall provide the following quality assurance, testing and warranty on the installed telemetry system in accordance with the following requirements below;
2. The requirements set forth in this document specify a wide range of procedural precautions necessary to ensure that the very basic, essential aspects of a proper telemetry installation are adequately controlled. Strict adherence shall be required under specifically covered conditions outlined in this specification.
3. Adherence to the specifications contained herein, or the Engineer's approval of any aspect of the telemetry installation and SCADA testing covered by this specification, shall in no way relieve the Contractor of their ultimate responsibility for the satisfactory completion of the work authorized under the Contract.
4. All points must be tested and received at the District office with the correct assignments. The testing will be repeated over a 2-day period for reproducibility. The Stark County Metropolitan Sewer District will perform an additional test each week for 4 weeks. If any test fails and the District finds it is the fault of the telemetry system (that portion purchased and installed by the contractor), the contractor will be held responsible for repair within a 2-day period.

B. Observation.

1. Construction Notifications: The SCADA Coordinator must be notified 48 hours in advance of starting work. Programming and signal verification shall be arranged with the SCADA Coordinator before work is started.
2. The Engineer or SCADA Coordinator's approval for beginning the installation shall in no way relieve the Contractor of the ultimate responsibility for the satisfactory completion of the work as authorized under the Contract.
3. The County reserves the right to require an on-site representative of the telemetry equipment manufacturer and/or a representative of the manufacturer, knowledgeable in the use of the product(s), for a minimum of two (2) working hours per work day (5 days maximum). The cost for the on-site representative(s) will be paid by the Contractor.

C. Warranty.

1. The Contractor shall guarantee all materials except those supplied by the District and all workmanship for a period of one (1) year from the acceptance of the telemetry system after successfully passing all testing requirements above. The Contractor, at their costs, shall be responsible to repair any defects or failures, due to workmanship reported to the contractor after the testing procedures

and/or within the one (1) year warranty period. All repairs shall be made within one (1) week of notification of said defect/failure.

2. Circuit Breakers shall have a minimum of 18-month warranty.
3. Maintenance Bonding: In addition to the one (1) year warranty as specified above the Contractor shall provide a two (2) year maintenance bond on the entire system equal to the amount of the Contract.

7.0 MEASUREMENT. The unit measurement for payment shall be the lump sum price for the entire telemetry system installed which includes but is not limited to; equipment, materials, labor, programming and testing as necessary to complete the work as specified, shown or directed. No additional payment will be made.

8.0 PAYMENT. The total cost for the furnishing and installation of the telemetry equipment including testing and programming necessary to complete the work as specified, shown or directed will be included in the prices bid of other items.

END OF SECTION