PART 1 GENERAL

1.01 THE REQUIREMENT

A. The specific attention of the Contractor is directed to the fact that the Owner has an existing TAC II SCADA System manufactured by Data Flow Systems, Inc. (DFS), of Melbourne, Florida (321) 259-5009. For compatibility purposes, the Contractor will be required to obtain the Remote Terminal Unit (RTU) specified herein from DFS.

B. The Contractor shall coordinate tower and antenna requirements with DFS and shall provide station(s) physical location information to DFS for radio communication study purposes. Information shall be provided in the form of GPS readings or street map with actual site location(s) clearly marked. A complete radio survey shall be conducted by DFS to verify antenna and tower height requirements. DFS shall license the new RTU with the FCC for operation under the existing radio frequency.

C. These specifications are intended to cover the furnishing, the shop testing, the delivery, complete installation and field testing of all equipment and appurtenances for the complete RTU (remote telemetry unit) system herein specified, whether specifically mentioned in the Specifications or not.

D. The unit RTU shall be furnished and installed with all necessary and desirable accessory equipment and auxiliaries whether specifically mentioned in these specifications or not. This installation shall include field-testing of the entire installation.

E. The RTU shall be supplied with a NEMA 4X enclosure and mounted as shown on the Drawings. The RTU shall support the input/output signals specified in Section 17920.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Section 17000 - Control and Information System Scope and General Requirements

B. Section 17560 – Transient Voltage Surge Suppression Devices

C. Section 17920 – Control System Input/Output Schedules

PART 2 PRODUCTS

2.01 REMOTE TERMINAL UNIT (RTU)

A. The remote terminal unit shall be a PLC based data collection and dissemination subsystem. Communications. The remote terminal unit shall communicate with the central site (or forwarding terminal unit) via a Data Flow Systems two-way radio link. The RTU shall be capable of operating in a temperature ranging from -10 to 60 Degrees Celsius (14 to 140 Degrees Fahrenheit).
B. The RTUs shall meet or exceed the quality, reliability, performance and versatility of those manufactured by Data Flow Systems, Inc. of Melbourne, Florida.

A. The RTU (Remote Terminal Unit) panel shall be a PLC based data collection and dissemination subsystem that communicates with the central site (or forwarding terminal unit) via a two-way radio link. The complete RTU panel as shown on the P&IDs and as described in Division 17 shall be provided by the instrumentation and controls subcontractor, with the exception of the RTU unit.

B. The RTU unit shall be equipped with a compact backplane, PLC module, power supply and radio interface module. The RTU unit shall be furnished by Data Flow Systems, Inc. (DFS), of Melbourne, Florida (321) 259-5009. For compatibility purposes, the Contractor will be required to obtain the RTU unit specified herein from DFS. DFS shall ship the RTU unit to the instrumentation and controls subcontractor.

C. The Contractor shall coordinate tower and antenna requirements with DFS and shall provide station(s) physical location information to DFS for radio communication study purposes. Information shall be provided in the form of GPS readings or street map with actual site location(s) clearly marked. A complete radio survey shall be conducted by DFS to verify antenna and tower height requirements. DFS shall license the new RTU with the FCC for operation under the existing radio frequency.

D. The contractor shall facilitate coordination between the instrumentation and controls subcontractor, DFS and the City as required for a fully functioning RTU System.

E. DFS shall coordinate with the instrumentation subcontractor and configure the DFS RTU equipment in the RTU-0109 enclosure provided by the instrumentation subcontractor to establish a modbus serial (RS-485) communications link between the DFS RTU (radio) in RTU-0109 and the instrumentation and controls subcontractor furnished PLC.

F. DFS shall develop new HMI screen graphics and modify existing DFS HMI graphics for well No. 9 in the existing Hyper-V SCADA system. DFS shall configure the Hyper-V SCADA server DFS communications driver, DFS master radio and DFS RTU unit as required to fully integrate the new DFS RTU unit into the existing DFS network.

G. The instrumentation subcontractor shall:

   a. Develop the RTU PLC logic, and configure the WTP’s existing VTSCADA SCADA HMI software as required to facilitate Well No. 9 status and control signal communication over the DFS radio link.

   b. Develop one or more SCADA HMI graphic screens and modify existing SCADA HMI screens as required to incorporate Well No. 9 into the SCADA system.
c. Develop new pump controller faceplate graphics or modify an existing faceplate template as required to control and monitor the well pump from SCADA.

H. SCADA software modifications performed shall adhere to the WTPs current HMI graphics standards and have the same general look and feel of the existing HMI graphics. Submit the PLC logic and HMI graphics screens to Engineer and City for review and approval by prior to system startup in accordance with Section 17030.

I. RTU shall be capable of operating in a temperature ranging from -10 to 60 Degrees Celsius (14 to 140 Degrees Fahrenheit).

J. Refer to Instrumentation Drawing I-02 for additional requirements.

2.02 RTU SERIAL INTERFACE PORTS

A. The remote terminal unit shall support one or more local serial interface ports. The local serial interface shall provide local access to all the functions of the remote terminal unit. The local serial interface shall support the monitoring of the radio communications link. The system shall support an automatic antenna alignment function utilizing the local serial interface.

B. The PLC specified herein shall communicate all input/output signal data with the RTU via an RS-485 serial modbus communications link as shown on Drawing I-02. The instrumentation supplier and DFS shall coordinate to establish the RS-485 communications link.

2.03 RTU POWER SUPPLY

A. All function modules in the remote terminal unit shall run off DC voltage from +7.5 volts to +13 volts. The power supply module shall supply +12 volts. A battery backup shall be provided to operate the system for a minimum of 120 minutes in event of power failure. The power supply shall be surge protected. The power supply shall be short circuit protected by current limiting. Normal operation shall automatically resume when the short circuit overload is removed. The power supply shall be sized to operate the system with the battery removed. The power supply module shall provide a battery backed, isolated bias voltage source. The isolated bias voltage source shall be utilized to monitor the high well alarm so as to make sure the alarm is detected and reported during power outages. The circuit breaker for the power supply module shall be part of the power supply module. Neither the use of tools nor the disconnection of any wires shall be required to replace the power supply module.

2.04 RTU SURGE PROTECTION

A. Multiple staged surge protection shall be provided for all power supply and power monitoring circuits. One stage of protection shall be equipped with both energy limiting and clamping circuits with slow blow fuses designed for overload conditions. This design shall provide a very high level of non-destructive transient immunity. With the exception of a direct lightning strike, the device shall protect the RTU power supply and power
monitoring circuits from damage due to voltage transients. The unit shall provide circuit protection to withstand multiple transients in excess of 6,500 volts, 3,250 amps, without damage. Damage shall be limited to a blown fuse when exposed to larger transients. The device shall be transient-tested to ANSI standard C62.41. The unit shall meet or exceed the quality, reliability and performance of the Transient Filter Shield TFS001 as manufactured by Data Flow Systems. The AC power input protection shall meet or exceed the quality, reliability and performance of the Single Phase Supresser, SPS001 (or, if three phase power is in use, the Three Phase Supresser, TPS001) as manufactured by Data Flow Systems. See Section 17560 for additional requirements.

2.05 RTU BATTERIES

A. The RTU radio shall have the a built-in uninterruptible power supply (UPS) function built-in. The unit’s internal power supply shall keep the batteries at a float charge. The batteries shall not be damaged by deep discharges.

2.06 PROGRAMABLE LOGIC CONTROLLERS (PLC)

A. Provide a PLC in the RTU enclosure that shall function as the main controller for the RTU. All Well Pump Local Control Panel LCP-0109 input and output signals shall be wired to the PLC I/O. The PLC shall send well pump and well instrumentation status signals to the DFS RTU radio interface module and shall receive remote control signals from the DFS RTU radio interface module via RS-485 serial communications.

B. Instrumentation and controls subcontractor shall provide all PLC programing required for a fully functioning RTU system. PLC logic shall be well organized with detailed documentation of all PLC logic segment functionality clearly defined within the logic file.

C. The PLC shall be equipped with 12 digital fast 24V dc inputs, 8 digital normal 24V dc inputs, 12 relays outputs, 4 Analog (12 bits) inputs, 2 Analog (12 bits) outputs and shall be supplied by 110/240V AC power. The PLC shall be an Allen-Bradley MicroLogix 1400, model 1766-L32BWAA as manufactured by Rockwell Automation. Provide 1762 Series Expansion I/O modules as required to meet all primary and spare PLC I/O requirements. Refer to Section 17920 for input/output requirements.

D. All PLC 4-20mA analog inputs connected to field instruments shall be surge protected by analog surge suppressors. See Section 17560 for surge suppressor requirements.

E. Provide a minimum of 20% active, prewired spare digital and analog PLC outputs and inputs with all required fuses and surge suppression.

F. Provide redundant 120Vac to 24Vdc control power supplies with auto-failover as required.

G. Instrumentation and controls subcontractor shall provide a UPS to provide PLC and control power. Provide UPS shall be a 120Vac UPS with minimum 10 minutes of PLC backup time and UPS common fault status output wired to a PLC digital input.

2.07 RTU RADIO INTERFACE MODULE

A. Each remote terminal unit utilizing radio communications shall require one radio interface module (RIM). The RIM shall control the terminal radio during the polling sequence. The
radio interface module shall have a service port to provide communications link monitoring. The service port shall also provide the capability to directly monitor and/or control each module in the remote terminal unit. The radio interface module utilized at the remote terminal units shall be interchangeable with the radio interface module at the central site. The system shall be capable of utilizing up to 505 radio interface modules per communications link and up to 15 function modules per radio interface module. All communications shall be in ASCII and utilize an error detecting and correction data transfer protocol. Each radio interface module shall have a radio transceiver mounted to it. The radio shall be an FM transceiver. The radio interface module shall measure and transmit to the central site computer system the received signal strength (RSS). Replacement of the radio interface module shall trigger an automatic configuration of the new module to accommodate the site address and function (plug & play).

2.08 ENCLOSURES

A. Each The RTU shall be housed in a NEMA 4X-316 stainless steel enclosure with removable steel lifting eyes, drip shields and sunshields. Both the enclosure and sunshields shall be polyester powder coated white.

B. The enclosure shall be no more than 36 inches in width. Other panel dimensions shall be increased as required to allow for proper heat dissipation to ensure that enclosure internal temperature does not exceed the limits of any of the hardware inside the RTU enclosure, including, but not limited to the RTU radio, PLC, UPS and DC power supplies.

C. All mounting hardware utilized shall be stainless steel.

D. The enclosure door shall be equipped with a 3-point latching mechanism with a pad lockable handle. A foldable laptop shelf and a sleeve with a laminated copy of the final as-built RTU electrical schematics shall be mounted on the inside of the enclosure door.

E. The enclosure shall have a Hoffman H20MIT vent drain, catalog number: AVDR4SS4 or approved equal at the bottom corner of the control panel. Vent drain shall be NEMA 4X stainless steel type.

F. Provide a 120Vac service receptacle.

G. Provide a PaneLite LED Enclosure Light, as manufactured by Hoffman. The panel light shall be wired to turn on when the intrusion switch is activated (door is open).

H. Refer to Electrical Drawings for additional requirements.

2.09 ANTENNA SUBSYSTEM

A. A high gain directional antenna shall be used to transmit and receive data at the Remote Terminal Units. The directional antennas shall have all welded aluminum elements, and a single radiator element connected to a type N female connector. Element connections utilizing nuts and bolts are not acceptable. The antennas shall meet or exceed the quality, reliability and performance of the RTA series as provided by Data Flow Systems, Inc. of Melbourne, Florida. When an antenna mast/pole is utilized, it shall be hot dipped galvanized for corrosion protection. All mounting hardware shall be made of stainless steel. The mast shall meet or exceed the quality and reliability of the AG20 manufactured
by Rohn. The coax cable shall be the type that utilizes an inert semi-liquid compound to flood the copper braid. The coax cable shall be of the RG-8 construction type and have the RF-loss characteristic of foam flex. The coax cable shall meet or exceed the quality, reliability and performance of RTC 400 as supplied by Data Flow Systems, Inc. of Melbourne, Florida. Type N connectors shall be utilized at both ends of the coax. The Type N connectors shall be sealed with 3-inch sections of Alpha FIT321-1-0 sealant shrink tubing. The coax cable shall be secured to the mast/pole with EVA-coated 316 stainless steel cable ties. The cable ties shall meet or exceed the quality, reliability and performance of AE112 cable ties manufactured by Band-It. The RTU shall be protected from electrical surge or transients entering through the coaxial cable by use of a coaxial cable surge protector. The coaxial cable surge protector shall meet or exceed the quality, reliability and performance of the IS-B50LN-C2 manufactured by Polyphaser.

2.10 WARRANTY

A. The instrumentation and controls subcontractor system supplier shall warrant all hardware and software PLC logic provided under this contract against all defects in material and workmanship for a period of one year. The instrumentation and controls subcontractor system supplier shall warrant the SCADA software modifications to be free of defects for as long as it is in operation by the Owner. The RTU supplier shall also provide free RTU SCADA Software updates for the life of the system.

B. The function modules utilized in the remote terminal units RTU radio furnished by DFS shall carry an additional 2-year return-to-factory warranty. The 2-year return-to-factory warranty shall cover damage due to lightning and surge.

2.11 SERVICE

A. The system supplier shall offer full factory support of the installed system through the use of factory-trained employees. The Owner shall have 24-hour per day access to service personnel through a pager and/or cell phone.

2.12 SPARES

A. One spare of each type of Data Flow System module supplied, including but not limited to radio interface modules, controllers and serial communications modules.

B. Provide one spare of each type of Data Flow Systems backup battery.

C. One spare complete PLC with CPU and all required expansion I/O modules shall be supplied. The current PLC logic program shall pre-loaded on the spare PLC CPU.

D. One spare 24VDC control power supply.

E. One spare main AC input surge suppressor.

F. Three spare PLC analog input surge suppressors.

G. Five spare fuses of each make/model provided.
PART 3  EXECUTION

(NOT USED)

- END OF SECTION -
SECTION 17000 - CONTROL AND INFORMATION SYSTEM, GENERAL

PART 1 -- GENERAL

1.01 SCOPE

A. The Contractor shall provide, through the services of the instrumentation and control system subcontractor, all components, system installation services, as well as all required and specified ancillary services in connection with the Instrumentation, Control and Information System. The System includes all materials, labor, tools, fees, charges and documentation required to furnish, install, test and place in operation a complete and operable instrumentation, control and information system as shown and/or specified. The system shall include all measuring elements, signal converters, transmitters, control panels, cabinets, digital hardware and software, operator interface terminals, signal and data transmission systems, interconnecting wiring, brackets, supports, piping, tubing, valves, mounting hardware, and such accessories as shown, specified, and/or required to provide the functions indicated.

B. The Contractor shall take note that the Section entitled “Summary of Work” includes specific construction sequencing restrictions that impact the performance of the Work as specified in Division 17. The Contractor shall coordinate sequence requirements between its various Project subcontractors as necessary to meet all requirements as specified in the contract documents.

C. The general scope of work to be performed under this Division includes, but is not limited to, the following:

1. The Contractor shall retain overall responsibility for the instrumentation and control system as specified herein.

2. Furnish and install process instrumentation and associated taps, nipples, valves, tubing, and supports as scheduled or shown on the Drawings, unless otherwise noted or supplied by equipment vendors.

3. Furnish and install control equipment, field panels and associated cabinets and control panels as shown on the drawings and as specified in this Division.

4. Furnish and install digital control system hardware and software as specified in this Division, including but not limited to:

   a. One (1) complete Data Flow Systems (DFS) remote terminal unit (RTU) panel with Allen-Bradley MicroLogix 1400 and appurtenances provided by the instrumentation and controls subcontractor. An RTU unit with PLC and radio module shall be furnished separately by Data Flow Systems.

   b. Radio telemetry antenna, cable, tower and appurtenances.

   c. Modification of the existing DFS Hyper SCADA Server and workstation to incorporate the new RTU. Modifications are to be performed by DFS.

   d. Modification of the existing VTSCADA SCADA Server and workstation to incorporate the new RTU.

   e. Refer to Section 17131 and Instrumentation Drawing I-02 for additional requirements.

5. Final termination and testing of all instrumentation and control system signal wiring and power supply wiring at equipment furnished under this Division.
6. Furnish and install transient voltage surge suppression systems for all digital equipment, data communications equipment, local control panels, and field instruments provided under this Division, including connections to grounding system(s) provided under Division 16.

7. Coordinate grounding requirements with the electrical subcontractor for all digital equipment, local control panels, and field instrumentation provided under this Division. Terminate grounding system cables at all equipment provided under this Division.

8. Provide system testing, calibration, training and startup services as specified herein and as required to make all systems fully operational.

9. Furnish and install embedded supports, instrument stands, brackets, mounting hardware, piping, tubing, isolation valves and related items required for instrumentation and equipment furnished under Division 17.

10. The Contractor shall coordinate all work specified herein with related work specified in other Divisions, and shall schedule the work to minimize downtime of equipment and controls as described in the Section entitled "Maintenance of Utility Operations During Construction". The Contractor shall provide temporary equipment and interconnecting cables as described herein and as shown on the Drawings.

D. It is the intent of the Contract Documents to construct a complete and working installation. Items of equipment or materials that may reasonably be assumed as necessary to accomplish this end shall be supplied whether or not they are specifically stated herein.

1.02 RELATED ITEMS
A. Field mounted switches, torque switches, limit switches, valve and gate operator position transmitters, sump pump controls and other instrumentation and controls furnished with mechanical or electrical equipment not listed in the instrument schedule shall be furnished, installed, tested and calibrated as specified under other Divisions.

B. Additional and related work performed under Division 16 includes the following:
   1. Conduit and raceways for all instrumentation and control system signal wiring, grounding systems, special cables and data highway cables.
   2. Instrumentation and control system signal wiring. See termination requirements below.
   4. Install (pull in conduit system) Ethernet data highway network and fiber optic data communications cables.
   5. Furnish and install grounding systems for all digital equipment, local control panels, and field instrumentation provided under Division 17. Grounding systems shall be complete to the equipment provided under Division 17, ready for termination by the instrumentation subcontractor.
   6. Termination of all instrumentation and control system grounding, signal and data communications cables, wiring and surge suppression devices at the equipment end of all equipment furnished under other Divisions of the Specifications. Wiring systems shall be installed complete to the equipment provided under Division 17, ready for termination by the instrumentation subcontractor.
   7. Final wiring and termination to A.C. grounding systems and to A.C. power sources (e.g. panelboards, motor control centers, and other sources of electrical power).
1.03 GENERAL INFORMATION AND DESCRIPTION

A. Where manufacturers are named for a particular item of equipment, it is intended as a guide to acceptable quality and performance and does not exempt such equipment from the requirements of these Specifications or Drawings.

B. In order to centralize responsibility, it is required that all equipment (including field instrumentation and control system hardware and software) offered under this Division shall be furnished and installed by the instrumentation subcontractor, or under the supervision of the instrumentation subcontractor, who shall assume complete responsibility for proper operation of the instrumentation and control system equipment, including that of coordinating all signals, and furnishing all appurtenant equipment.

C. The Contractor shall retain total responsibility for the proper detailed design, fabrication, inspection, test, delivery, assembly, installation, activation, checkout, adjustment and operation of the entire instrumentation and control system as well as equipment and controls furnished under other Divisions of the Specifications. The Contractor shall be responsible for the delivery of all detailed drawings, manuals and other documentation required for the complete coordination, installation, activation and operation of mechanical equipment, equipment control panels, local control panels, field instrumentation, control systems and related equipment and/or systems and shall provide for the services of a qualified installation engineer to supervise all activities required to place the completed facility in stable operation under full digital control.

D. The instrumentation and control system shall be capable of simultaneously implementing all real-time control and information system functions, and servicing all operator service requests as specified, without degrading the data handling and processing capability of any system component. It shall also be possible to simultaneously generate displays on all workstations and print out data on all printers without degradation of system performance.

E. Control system inputs and outputs are listed in the Input/Output Schedule. This information, together with the control strategy descriptions, process and instrumentation diagrams, and electrical control schematics, describes the real-time monitoring and control functions to be performed. In addition, the system shall provide various man/machine interface and data reporting functions as specified in the software sections of this Specification.

F. The mechanical, process, and electrical drawings indicate the approximate locations of field instruments, control panels, systems and equipment as well as field-mounted equipment provided by others. The instrumentation subcontractor shall examine the mechanical, process and electrical drawings to determine actual size and locations of process connections and wiring requirements for instrumentation and controls furnished under this Contract. The instrumentation subcontractor shall inspect all equipment, panels, instrumentation, controls and appurtenances either existing or furnished under other Divisions of the Specifications to determine all requirements to interface same with the control and information system. The Contractor shall coordinate the completion of any required modifications with the associated supplier of the item furnished.

G. The instrumentation subcontractor shall review and approve the size and routing of all instrumentation and control cable and conduit systems furnished by the Electrical Contractor for suitability for use with the associated cable system.

H. The Contractor shall coordinate the efforts of each supplier to aid in interfacing all systems. This effort shall include, but shall not be limited to, the distribution of approved shop
drawings to the Electrical Contractor and to the instrumentation subcontractor furnishing the equipment under this Division.

I. The Contractor shall be responsible for providing a signal transmission system free from electrical interference that would be detrimental to the proper functioning of the instrumentation and control system equipment.

J. The Owner shall have the right of access to the subcontractor's facility and the facilities of its equipment suppliers to inspect materials and parts; witness inspections, tests and work in progress; and examine applicable design documents, records and certifications during any stage of design, fabrication and tests. The instrumentation subcontractor and its equipment suppliers shall furnish office space, supplies and services required for these surveillance activities.

K. The terms "Instrumentation", "Instrumentation and Control System", and "Instrumentation, Control and Information System" shall hereinafter be defined as all equipment, labor, services and documents necessary to meet the intent of the Specifications.

1.04  INSTRUMENTATION AND CONTROL SYSTEM SUBCONTRACTORS

A. Instrumentation and control system subcontractors shall be regularly engaged in the detailed design, fabrication, installation, and startup of instrumentation and control systems for municipal water treatment facilities. Instrumentation and control system subcontractors shall have a minimum of five years of such experience, and shall have completed a minimum of three projects of similar type and size as that specified herein. As used herein, the term “completed” shall mean that a project has been brought to final completion and final payment has been made. Any instrumentation and control system subcontractor that has been subject to litigation or the assessment of liquidated damages for nonperformance on any project within the last five calendar years shall not be acceptable.

1.05  DEFINITIONS

A. **Solid State**: Wherever the term solid state is used to describe circuitry or components in the Specifications, it is intended that the circuitry or components shall be of the type that convey electrons by means of solid materials such as crystals or that work on magnetic principles such as ferrite cores. Vacuum tubes, gas tubes, slide wires, mechanical relays, stepping motors or other devices will not be considered as satisfying the requirements for solid state components of circuitry.

B. **Bit or Data Bit**: Whenever the terms bit or data bit are used in the Specification, it is intended that one bit shall be equivalent to one binary digit of information. In specifying data transmission rate, the bit rate or data bit rate shall be the number of binary digits transmitted per second and shall not necessarily be equal to either the maximum pulse rate or average pulse rate.

C. **Integrated Circuit**: Integrated circuit shall mean the physical realization of a number of circuit elements inseparably associated on or within a continuous body to perform the function of a circuit.

D. **Mean Time Between Failures (MTBF)**: The MTBF shall be calculated by taking the number of system operating hours logged during an arbitrary period of not less than six months and dividing by the number of failures experienced during this period plus one.

E. **Mean Time to Repair (MTTR)**: The MTTR shall be calculated by taking the total system down time for repair over an arbitrary period of not less than six months coinciding with
that used for calculation of MTBF and dividing by the number of failures causing down
time during the period.

F. **Availability:** The availability of a non-redundant device or system shall be related to its
MTBF and MTTR by the following formula:

\[
A = 100 \times \frac{MTBF}{MTBF + MTTR} \text{ Percent}
\]

The availability of a device or system provided with an automatically switched backup
device or system shall be determined by the following formula:

\[
A = A2 + 1 - ((1-A1) \times (1-A1))
\]

where:

\[
A1 = \text{availability of non-redundant device or system}
\]

\[
A2 = \text{availability of device or system provided with an automatically switched backup}
\]
device or system

G. **Abbreviations:** Specification abbreviations include the following:

- **A** - Availability
- **ADC** - Analog to Digital Converter
- **AVAIL** - Available
- **ATA** - Advanced Technology Attachment
- **BCD** - Binary Coded Decimal
- **CSMA/CD** - Carrier Sense Multiple Access/Collision Detect
- **CPU** - Central Processing Unit
- **CRC** - Cyclic Redundancy Check
- **CRT** - Cathode Ray Tube
- **CS** - Control Strategy
- **DAC** - Digital to Analog Converter
- **DBMS** - Data Base Management System
- **DDR** - Double Data Rate
- **DIMM** - Dual In-line Memory Module
- **DMA** - Direct Memory Access
- **DPDT** - Double Pole, Double Throw
- **DVD** - Digital Video Disc
- **DVE** - Digital to Video Electronics
- **ECC** - Error Correction Coding
- **EPROM** - Erasable Programmable Read Only Memory
- **FDM** - Frequency Division Multiplexing
- **FSK** - Frequency Shift Keyed
- **GB** - Gigabyte
<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Full Form</th>
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<tbody>
<tr>
<td>Gbps</td>
<td>Gigabits per second</td>
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<tr>
<td>HMI</td>
<td>Human Machine Interface</td>
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<tr>
<td>I/O</td>
<td>Input/Output</td>
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<tr>
<td>LAN</td>
<td>Local Area Network</td>
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<tr>
<td>LCD</td>
<td>Liquid Crystal Display</td>
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<tr>
<td>LED</td>
<td>Light Emitting Diode</td>
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<td>MB</td>
<td>Megabyte</td>
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<tr>
<td>Mbps</td>
<td>Megabits per second</td>
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<tr>
<td>MCC</td>
<td>Motor Control Center</td>
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<td>MTBF</td>
<td>Mean Time Between Failures</td>
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<tr>
<td>MTTR</td>
<td>Mean Time To Repair</td>
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<tr>
<td>OS</td>
<td>Operating System</td>
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<tr>
<td>OIT</td>
<td>Operator Interface Terminal</td>
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<tr>
<td>PCB</td>
<td>Printed Circuit Board</td>
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<tr>
<td>PLC</td>
<td>Programmable Logic Controller</td>
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<tr>
<td>RAID</td>
<td>Redundant Array of Inexpensive Discs</td>
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<td>PROM</td>
<td>Programmable Read Only Memory</td>
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<tr>
<td>RAM</td>
<td>Random Access Memory</td>
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<tr>
<td>RMSS</td>
<td>Root Mean Square Summation</td>
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<tr>
<td>ROM</td>
<td>Read Only Memory</td>
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<tr>
<td>RTU</td>
<td>Remote Telemetry Unit</td>
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<tr>
<td>SATA</td>
<td>Serial ATA</td>
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<tr>
<td>SCADA</td>
<td>Supervisory Control and Data Acquisition</td>
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<tr>
<td>SDRAM</td>
<td>Synchronous Dynamic Random Access Memory</td>
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<tr>
<td>SIMM</td>
<td>Single In-line Memory Module</td>
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<tr>
<td>SPDT</td>
<td>Single Pole, Double Throw</td>
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<tr>
<td>TB</td>
<td>Terabyte</td>
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<tr>
<td>TDM</td>
<td>Time Division Multiplexing</td>
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<tr>
<td>TFT</td>
<td>Thin Film Transistor</td>
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<tr>
<td>USB</td>
<td>Universal Serial Bus</td>
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<tr>
<td>UPS</td>
<td>Uninterruptible Power Supply</td>
</tr>
<tr>
<td>WAN</td>
<td>Wide Area Network</td>
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</table>

H. To minimize the number of characters in words used in textual descriptions on displays, printouts and nameplates, abbreviations may be used subject to Engineer approval. If a specified abbreviation does not exist for a particular word, an abbreviation may be generated using the principles of masking and or vowel deletion. Masking involves...
1.06 ENVIRONMENTAL CONDITIONS

A. Instrumentation equipment and enclosures shall be suitable for ambient conditions specified. All system elements shall operate properly in the presence of telephone lines, power lines, and electrical equipment.

B. Inside control rooms and climate-controlled electrical rooms, the temperature will normally be 20 to 25 degrees Celsius; relative humidity 40 to 80 percent without condensation and the air will be essentially free of corrosive contaminants and moisture. Appropriate air filtering shall be provided to meet environmental conditions (i.e., for dust).

C. Other indoor areas may not be air conditioned/heated; temperatures may range between 0 and 40 degrees Celsius with relative humidity between 40 and 95 percent.

D. Outdoor equipment including instrumentation and panels may be subjected to wind, rain, lightning, and corrosives in the environment, with ambient temperatures from -20 to 40 degrees Celsius and relative humidity from 10 to 100 percent. All supports, brackets and interconnecting hardware shall be aluminum or Type 316 stainless steel as shown on the installation detail drawings.

PART 2 -- PRODUCTS

2.01 NAMEPLATES

A. All items of equipment listed in the instrument schedule, control panels, and all items of digital hardware shall be identified with nameplates. Each nameplate shall be located so that it is readable from the normal observation position and is clearly associated with the device or devices it identifies. Nameplates shall be positioned so that removal of the device for maintenance and repair shall not disturb the nameplate. Nameplates shall include the equipment identification number and description. Abbreviations of the description shall be subject to Engineer approval.

B. Nameplates shall be made of 1/16-inch thick machine engraved laminated phenolic plastic having white numbers and letters not less than 3/16-inch high on a black background.

C. Nameplates shall be attached to metal equipment by stainless steel screws and to other surfaces by an epoxy-based adhesive that is resistant to oil and moisture. In cases where the label cannot be attached by the above methods, it shall be drilled and attached to the associated device by means of stainless steel wire.

PART 3 -- EXECUTION

3.01 SCHEDULE OF PAYMENT

A. Payment to the Contractor for Control and Information System materials, equipment, and labor shall be in accordance with the General and Supplementary Conditions. The schedule of values submitted as required by the General and Supplementary Conditions shall reflect a breakdown of the work required for completion of the Control and Information System. The breakdown shall include sufficient detail to permit the Engineer to administer payment for the Control and Information System including, but not necessarily limited to, the following items:

1. Mobilization
2. Shop Drawing Submittals
3. Process Instrumentation
4. Control Panels
5. Programming
6. Process Instrumentation Testing and Startup
7. Control Panel Loop Testing
8. Process Control Strategy Testing and Startup
9. Training
10. Final System Acceptance Testing
11. Final Acceptance

B. Requests for payment for materials and equipment that are not installed on site, but are required for shop fabrication and testing (e.g., digital hardware), or are properly stored as described in the Contract Documents and herein, shall be accompanied by invoices from the original supplier to the Contractor or instrumentation subcontractor substantiating the cost of the materials or equipment.

C. No payment for programming shall be paid prior to approval of associated shop drawings. Upon approval of programming shop drawings, up to 50% of programming shall be payable. Upon completion of on-site loop checkout, up to 70% of programming shall be payable. Upon completion of functional tests, up to 90% of programming shall be payable. The remaining 10% shall be payable upon completion of the Final Acceptance Test.

D. Any balance remaining within the schedule of values for field instruments and other materials installed on the site, or for other materials, for which payment is made by invoice, will be considered due upon completion of the Final Acceptance Test.

3.02 CLEANING

A. The Contractor shall thoroughly clean all soiled surfaces of installed equipment and materials.

B. Upon completion of the instrumentation and control work, the Contractor shall remove all surplus materials, rubbish, and debris that has accumulated during the construction work. The entire area shall be left neat, clean, and acceptable to the Owner.

3.03 FINAL ACCEPTANCE

A. Final acceptance of the Instrumentation, Control and Information System will be determined complete by the Engineer, and shall be based upon the following:

1. Receipt of acceptable start up completion and availability reports and other documentation as required by the Contract Documents.

2. Completion of the Availability Demonstration of the System as a whole.

3. Completion of all punch-list items.

B. Refer to the Section entitled “Project Closeout” for additional requirements.

-END OF SECTION-
ADDENDUM # 2
BID # FY 2019-2020-002 CITY OF HALLANDALE BEACH
RAW WATER WELL # 9

Please ensure you check the City’s website for the latest addendum released for this project. Below find the link to the City’s website: www.cohb.org\solicitations.

Proposing firms must provide this Addendum # 2 form signed by an authorized officer of the firm to acknowledge receipt of ADDENDUM # 2. The form must be provided with firm’s response.

**PLEASE NOTE:**

**QUESTION #1.**
There is a bid schedule at the front of the technical specs section 00002. There is also a bid schedule in the bid forms in the ITB. Please confirm which one we are to use.

**ANSWER #1.**
Pricing is to be provided by utilizing pages 10-11 of the Bid Price Sheet. Please ignore the pricing section found in Exhibit A.

**QUESTION #2.**
Is builder's risk insurance actually required for this project? It is in the ITB.

**ANSWER #2.**
Builders Risk Insurance is not required for this Bid. Please ignore section 3.4.10 of the Agreement on page 43.

**QUESTION #3.**
What is the estimated cost of construction?

**ANSWER #3.**
Excluding the allowance items listed in “Bid Price Sheet” on page 10 of 90 on the Invitation to Bid, the Engineer-of-Record’s construction cost estimate is $1.1 million.
QUESTION #4.
Are any permits required for temporary discharge of the well development water?

ANSWER #4.
See Article 8.1 of the “Construction Contract”.

See Exhibit A technical specification 01010 Article 1.07.

See NEW Exhibit C issued with this addendum.

QUESTION #5.
Is a temporary fence required around the work area?

ANSWER #5.
See requirements in Exhibit A technical specifications 02832 and Exhibit A specification section 01510-1.05.

QUESTION #6.
Spec section 10525 does not appear to apply to this project, please advise.

ANSWER #6.
Exhibit A specification section 10525 applies to this project.

QUESTION #7.
Spec section 12400 does not appear to apply to this project, please advise.

ANSWER #7.
Exhibit A specification section 12400 applies to this project.

QUESTION #8.
Can the MOT barriers, etc. be left in place continuously or do they have to be removed at the end of each work day and put back up the following day?

ANSWER #8.
See “Maintenance of Traffic Notes” added to revised Drawing C-02 issued with this Addendum.

QUESTION #9.
Section 02100 part 3.04 does this apply to sanitary sewer manholes or just storm drains and manholes?
ANSWER #9.
Exhibit A specification section 02100 part 3.04 applies only to storm drainage catch basins and storm drainage manholes.

QUESTION #10.
Dwg C-07 keyed note 1 refers to manhole rehabilitation specifications. There do not appear to be any manhole rehab specs included in the bid docs. Please advise.

ANSWER # 10.
See revised drawings C-03, C-04, C-05, C-06 and C-07 issued with this addendum.

QUESTION #11.
Is any bypass pumping required for the sanitary sewer pipe replacement?

ANSWER # 11
See revised drawings C-03, C-04, C-05, C-06 and C-07 issued with this addendum.

QUESTION #12.
Note 2 on M-04 says all pipe shall be schedule 40 but M-02 calls out the 10" drop pipe as schedule 10. Please confirm schedule of the drop pipe.

ANSWER # 12.
See revised drawing M-04 issued with this addendum.

QUESTION #13.
Detail 3/C-10 is for bollards but I cannot locate any bollards required on the plans.

ANSWER # 13.
See revised drawing C-10 issued with this addendum.

QUESTION #14.
General note 3 on dwg C-05 calls for 150 PSI pressure testing of sanitary sewer pipe. This is an unusual requirement. Please confirm that this note is correct.

ANSWER # 14.
See revised drawings C-03, C-04, C-05, C-06 and C-07 issued with this addendum.

QUESTION #15.
Is a curb required near the new sidewalk due to the proximity of the new sidewalk to the road?

**ANSWER # 15.**
See revised drawing C-08 issued with this addendum.

**QUESTION #16.**
VT SCADA computer/software is shown on diagram, DFS does not provide services for VT SCADA. A separate I & C subcontractor will need to be acquired to provide services on VT SCADA.

**ANSWER # 16.**
See revised Technical Specification Sections 17000 and 17132 issued with this addendum. See revised drawing I-02 issued with this addendum.

**QUESTION #17.**
What work, other than station configuration, is to be done on the DFS SCADA server?

**ANSWER # 17.**
See revised Technical Specification Sections 17000 and 17132 issued with this addendum. See revised drawing I-02 issued with this addendum.

**QUESTION #18.**
It is noted (17000 1.01 C 4) that the RTU is expected to contain a MicroLogix 1400 PLC. DFS does not provide, install, service or support non-DFS automations system. DFS cannot maintain our warranty and service obligation using third party automation devices. DFS has used 1400 PLC as protocol converters, but not for site primary automation. With this said, DFS will not be providing the 1400 PLC within the RTU and a separate I & C subcontractor will need to be acquired to provide these services:

a. Who is expected to provide the PLC and Programming?

b. Where is the PLC expected to be located, outside the RTU?

c. A DFS PLC must be in the RTU in order to communicate with the MicroLogix via a protocol, the native industrial protocol DFS can use to communicate will be Modbus.

**ANSWER # 18.**
See revised Technical Specification Sections 17000 and 17132 issued with this addendum. See revised drawing I-02 issued with this addendum.

**QUESTION #19.**
As DFS will only be providing the RTU and not be providing the Automation System. The specification will need to call for DFS to be the “RTU provider” responsible for Section 17132 only. A separate Instrumentation and Control System Subcontractor will need to be called out to provide the instrumentation, PLC and other services outside section 17132.

**ANSWER # 19.**
See revised Technical Specification Sections 17000 and 17132 issued with this addendum. See revised drawing I-02 issued with this addendum.

**PLEASE NOTE RECEIPT OF ADDENDUM # 2 BY SIGNING BELOW AND INCLUDE WITH YOUR FIRM’S SUBMISSION.**

**I ACKNOWLEDGE RECEIPT OF ADDENDUM # 2:**

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Sincerely,

Andrea Lues, Director, Procurement Department