



Hallandale Beach
PROGRESS. INNOVATION. OPPORTUNITY.

ADDENDUM # 18
BID # FY 2017-2018-006
CITY OF HALLANDALE BEACH S.W. DRAINAGE
IMPROVEMENT PROJECT FEMA PROJECT NUMBER 1609-75-B

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.

Firm must provide this form signed by an authorized officer of your firm to acknowledge receipt of ADDENDUM # 18 and provide with your firm's response.

PLEASE NOTE: PLEASE DISCARD, DO NOT USE, PAGES 392-411 HAVE BEEN REVISED FOR EXHIBIT A – TECHNICAL SPECIFICATIONS AS OF 1/5/2018, PROVIDED THROUGH ADDENDUM 3.

REPLACE EXHIBIT A – TECHNICAL SPECIFICATIONS DATED 1/5/2018, SECTION 13000 CONTROLS AND INSTRUMENTATION WITH THE FOLLOWING 14 PAGES.

All other Technical Specification Sections, Divisions, and Appendices in Addendum 3 – Exhibit A – Technical Specifications remain the same.

SECTION 13000

CONTROLS AND INSTRUMENTATION

PART 1 - GENERAL

1.01 DESCRIPTION

The project entails the addition of a monitoring system for the proposed storm water Injection Well (SIW) system. The SIW will consist of 17 storm water injection wells, and 4 Monitoring Wells. Two of the Monitoring wells will be outfitted with level sensors, and will be interlocked with the new controls for the SIW system. The new SIW system will be coordinated with the existing SCADA system, located in the Water Plant Control Room.

Upgrading of the existing SCADA hardware and software to provide for Internet connectivity is required and includes the following.

Data Storage and Retrieval Capabilities Upgrade. The existing SCADA system has no Internet connectivity. Upgrade to the existing system to have Internet and Smart Phone connectivity to operate in conjunction with the proposed system shall be included in the contract.

Operational reporting shall be included, as required by FDEP

System must be integrated with another existing SCADA system for Membrane Filtration.

All set-points and control levels shall be field and control room adjustable.

- A. Work under this section includes: Systems to monitor and control process variables and equipment.
- B. Furnish and install instrumentation and controls hereinafter specified to perform the intended function. Work shall include all necessary materials, equipment, labor, and testing services. Equipment shall include at least the following as shown on the schematic diagrams and Contract Drawings.
 - 1. Pump Control Panel (CP-1)
 - 2. Control Structure Control Panel (CP-2)

1.02 QUALITY ASSURANCE

- A. A. System Responsibility
 - 1. The CONTRACTOR shall be responsible for all details which may be necessary to properly install, wire, adjust and place in operation a complete and working process control and instrumentation system.
 - 2. The SYSTEM SUPPLIER shall be responsible for all coordination between all system components.
 - 3. The process control and instrumentation SYSTEM SUPPLIER shall be directly responsible to the CONTRACTOR in providing a complete and working system. The SYSTEM SUPPLIER shall be responsible for installation and placing in operation the intended process controls and instrumentation described herein.
 - 4. All control panels shall bear a U.L. label.

B. Acceptable Manufacturers and Suppliers

1. Controls and instrumentation shall be manufactured in accordance with these specifications by a manufacturer whose high quality has been demonstrated by providing a minimum of at least five (5) years of service in five (5) similar installations.
2. Acceptable Pump System Control Suppliers are Data Flow Systems, Melbourne, FL, CC Controls, Jupiter FL, or Champion Controls, Oakland Park, FL. Additional suppliers will require approval during the project bidding phase.

1.03 DESCRIPTION OF SYSTEMS

A. One pump control system is to be provided. The pump system shall be designed to transport storm water from the collection system to the drainage wells. All pumps shall be operable in "Manual" when the automatic mode is out of service. The "Lead" and "Lag" pumps shall operate automatically. See Drawing I-2 for a complete description of the control system.

B. Pump system operation

1. The pump station contains two (2) pumps.
2. "Lead" pump is designated as the first pump scheduled to start.
3. "Lag" pump is the second to start.
4. Lead and Lag pumps shall alternate.
5. See contract drawings for additional control details.

Pump Station	Capacity (GPM)	Pump On (ft.-NGVD)	Pump Off (ft.-NGVD)
Lead Pump	35,000	1.50	0.50
Lag Pump	35,000	2.50	1.50

C. The System Supplier shall provide a detailed system operation in the shop drawing submittal.

1.04 WARRANTY/GUARANTEE

A. All equipment shall be guaranteed against defects in material and workmanship for a period of one (1) year from the date of City's final inspection and acceptance to the effect that any defective equipment shall be repaired or replaced without cost to the City.

1.05 SERVICES

A. The SYSTEM SUPPLIER shall provide the following services in accordance with the Contract Documents.

1. Process start-up services
 - a. The services of a factory trained, qualified representative shall be provided to inspect the completed installation, make all adjustments necessary to place the system in trouble-free operation.

- b. Provide a minimum of three trips after installation (on-site) start-up assistance. A trip shall be a minimum of four (4) working hours on site.

2. Training services

- a. The cost of training programs to be conducted with City's personnel shall be included in the Contract price. The training and instruction, insofar as practicable, shall be directly related to the System being supplied.
- b. The Supplier shall provide onsite classroom training and detailed manuals to supplement the training courses. The manuals shall include specific details of equipment supplied and operations specific to the project.
- c. The Supplier shall make use of teaching aids, manuals, slide/video presentations, etc. After the training services, such materials shall be delivered to City.
- d. The training program shall represent a comprehensive program covering all aspects of the programmable logic controller, pump control panel, and maintenance of the systems.
- e. All training schedules shall be coordinated with, and at the convenience of the City. Shift training may be required to correspond to the City's working schedule.

1.06 SUBMITTALS

- A. Submit shop drawings and product data in compliance with the Front End specifications.
- B. SYSTEM SUPPLIERS seeking approval shall submit the following during the bidding phase.
 - 1. A SYSTEM SUPPLIER company profile, showing how long the company has been in business and resumes for programmers and designers.
 - 2. A listing of five (5) similar existing installations that have been provided by the company. References shall be included.
- C. The approved SYSTEM SUPPLIER shall submit the following:
 - 1. A comprehensive list of all new equipment to be supplied for the control and instrumentation system.
 - 2. Catalog cut-sheets for equipment to be supplied as part of this project.
 - 3. System manuals, which shall contain:
 - a. System overview.
 - b. Installation and start-up instructions.
 - c. Troubleshooting instructions.
 - d. Specifications of the various input/output devices.
 - 4. A copy of the proposed manufacturer's guarantee and information on the locations of the repair facilities and available services.
 - 5. Detailed information for each instrument and control device, including manufacturer's descriptive literature and a specific data sheet for each device which shall include the following:

- a. Product (item) name used herein.
 - b. Manufacturer's complete model number.
 - c. Location of the device.
 - d. Input-output characteristics.
 - e. Range, size and graduations.
 - f. Physical size with dimensions, enclosure NEMA classification and mounting details.
 - g. Materials of construction for all components.
 - h. Instrument or control device sizing calculations where applicable.
 - i. Calibration and maintenance requirements.
6. After the submittals described above are approved, the following items shall be submitted as a minimum. These items may be submitted simultaneously with the above information.
- a. Panel layout drawings showing the locations and dimensions of the panel mounted equipment. Sub-panel layout drawings shall be made reasonably to scale.
 - b. Point-to-point termination diagrams showing each termination number and wire identification.
 - c. Panel front views - to scale.
7. Exceptions to the Specifications shall be clearly defined by the SYSTEM SUPPLIER. Data shall contain sufficient details so that a proper evaluation may be made by the Engineer.
8. Five (5) copies of the Operation and Maintenance Manuals for the entire process controls and instrumentation system, including all instrumentation and field devices, shall be provided in accordance with the Front End specifications.
9. Record Documents
- a. The SYSTEM SUPPLIER shall provide record documents in accordance with the Contract Documents.
 - b. Record documents shall be on 8½" x 11" sheets bound in an indexed three-ring binder.
 - c. Upon final acceptance of the project, the following documents shall be submitted:
 - 1) As-built drawings for all panel layouts.
 - 2) As-built drawings of the point-to-point termination diagrams.
 - 3) As-built drawings of the control system block diagram.

1.07 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Comply with the manufacturer's written instructions.
- B. Store instrumentation equipment off the ground in weather-tight enclosures. Keep equipment dry at all times. If stored outdoors space heaters shall be provided.
- C. All plug-in equipment which can be removed from panels without the necessity of disconnecting any wire terminations shall be removed from the panels before shipping and shall be shipped in separate shipping containers.

1.08 LIGHTNING/SURGE PROTECTION

- A. General - Additional Lightning/Surge protection shall be provided to protect all systems from included surges propagating along the signal and power supply lines. The protection systems shall be such that the protective level shall not interfere with normal operation, but shall be lower than the instrument surge withstand level, and be maintenance-free and self-restoring. Instruments shall be housed in a suitable metallic case, and properly grounded. Ground wires for all surge protectors shall be connected to a good earth ground consisting of a 5/8-inch x 10-foot-long copper ground rod and the system ground conductor. The ground rod shall be connected to the service entrance ground. Where practical, each ground wire shall be run individually and insulated from each other. Where instruments are located outdoors, these protectors and specified instrumentation/transmitters shall be mounted in a separate NEMA 4X stainless steel vented enclosure with 3-point latch. The units shall be as manufactured by Telecommunications Industries Inc., Joslyn, EDCO, E-Clips or approved equal.
- B. Power Supply - Additional protection of all alternating current (AC) instrument power supply lines shall be provided. Cabinet(s)/panel(s) and groups of field instruments, as approved by the ENGINEER, may be protected by isolation transformers and surge suppressors. Individual field instruments shall be protected by individual gas tube surge suppressors, EDCO SLAC series hybrid AC suppressor with noise filter, or E-Clips. The hybrid AC suppressor shall be three stage types with a response time of less than 5 nanoseconds, a maximum surge current of 10K amps, an input voltage of 120 VAC, 50/60 Hz, and can withstand a minimum of 50 occurrences at 500 amps each.
- C. Signal Line - Protection of all field analog, discrete, digital and telemetered signal lines shall be provided. Protection devices shall be installed at the both ends as close to the instrument being protected as possible. Where signal lines enter control rooms through an interface cabinet, the protection devices shall be mounted in the interface cabinet. Protection shall be with the combined use of gas-tube surge arresters and Zener diode protectors, EDCO SS65 series multi-stage hybrid suppressor or E-Clips data line protectors. The multi-stage hybrid suppressor shall be capable of protecting a signal pair plus the cable shield with a DC clamping level of 36V \pm 10% (L-G) and 72V \pm 10% (L-L), a maximum let thru voltage of 44V @ 400A (L-G) and 90V @ 400A (L-L) and capable of withstanding a minimum of 400 occurrences at 500 amps each.

1.09 GENERAL

- A. These specifications are intended to give a general description of what is required but do not cover details of construction which may vary in accordance with the exact requirements of the equipment offered.
- B. All equipment, cabinets and devices furnished hereunder shall be heavy-duty type, designed for continuous industrial service. The system shall contain products of a single manufacturer, in-so-far as possible, and shall consist of equipment models which are currently in production. Equipment provided shall be of modular construction.

1.10 ENCLOSURES

- A. The pump control panel shall be in wall mounted NEMA 4X enclosures, constructed of #14-gauge 304 stainless steel with single operating handle and 3-point latch. The enclosures shall be continuous hinged, equipped with doors and shall incorporate a

removable back panel on which control components shall be mounted. Back panels shall be secured to the enclosures with collar studs. Print storage pockets shall be provided on the inside of each panel. Pockets shall be of sufficient size to hold all the prints required to describe the equipment. Laminated reduced size drawings shall be provided to be stored in these pockets. Cabinets shall be of sufficient depth to accommodate all control components and shall comply with FBC wind requirements.

B. Operating Controls and Instruments

1. All operating controls and instruments shall be securely mounted on the inner compartment door. All control and instruments shall be clearly labeled to indicate function.
2. Mode selector switches shall be HAND-OFF-AUTO type to permit override of automatic control and manual actuation of shutdown. Operation of equipment in manual mode shall bypass all safety shutdown circuits except motor overload and low suction pressure shutdowns. Switches shall be NEMA 4X/13, rated 10 amperes minimum at 120 volts, Type SK, Class 9001 by Allen-Bradley, or equal, providing 3 switch positions, each of which shall be clearly labeled according to function. Separate indicator lamps, which shall operate at 120 volts input, shall be provided mounted above H/O/A selector switches.
3. Run indicator lamps shall be mounted in NEMA 4X/13 modules, Square D, Class 9001, Type SK, or approved equal. Lamp modules shall be push-to-test, heavy-duty, transformer type with 6-volt lamps

Lamps shall be easily replaceable from the front of the control compartment door without removing lamp module from its mounted position.

C. Wiring

1. Power distribution wiring on the line side of fuses shall be MTW Type 14 AWG minimum. Control wiring on the secondary side of fuses shall be MTW Type 16 AWG minimum. Electronic analog circuits shall utilize 16 AWG shielded, twisted pair cables, insulated for not less than 300 volts.
2. Power and low voltage DC wiring systems shall be routed in separate wireways. Crossing of different system wires shall be at right angles. Different system wires routed parallel to each other shall be separated by at least 2-inches. Different wiring systems shall terminate on separate terminal blocks. Wiring troughs shall not be filled to more than 60% percent visible fill.
3. All wiring shall terminate in a master terminal board, rigid type, numbered. The master terminal board shall have a minimum of 25% percent spares. Terminal blocks shall be arranged in vertical rows and separated into the following groups: Power, AC control, DC signal, and alarm. Terminal blocks shall be barrier type with the appropriate voltage rating (600 volts minimum). They shall be raised channel mounted type. Wire connectors shall be the hook fork type with non-insulated barrel for crimp type compression connection to the wire. Wire and type markers shall be the sleeve type, with heat impressed letters and numbers. Direct interlock wiring between equipment will not be allowed. Only one side of a terminal block row shall be used for internal wiring. The field wiring side of the terminal shall not be within 6-inches of the side panel or adjacent terminal.

4. All wiring to hand switches, etc., which are live circuits independent of the panel's normal circuit breaker protection shall be clearly identified as such.
5. All wiring shall be clearly tagged and color coded. All tagged numbers and color coding shall correspond to the panel wiring diagrams and loop drawings. Wires shall be numbered with crimp connectors. Stick on labels utilizing adhesives is not approved. All power wiring, control wiring, grounding, and dc wiring shall utilize different color insulation for each wiring system used. Provide a terminal block schedule, typewritten describing all terminal point end-to-end functions.
6. Each control circuit shall be individually protected by fuses or breakers. All protecting devices shall be clearly labeled and located for ease of maintenance.
7. Provide surge protectors on all incoming power supply lines at each panel. Provide surge protection on instrumentation and control circuits.

D. Equipment Mounting/Arrangement

1. All components shall be mounted in a manner that shall permit servicing, adjustment, testing and removal without disconnecting, moving or removing any other component. Components mounted on the inside of panels shall be mounted on removable plates and not directly to the enclosure. Mounting shall be rigid and stable unless shock mounting is required otherwise by the manufacturer to protect equipment from vibration. Components mounting shall be oriented in accordance with the internal components and shall be identified with suitable plastic or metal engraved tags attached with drive pins adjacent to (not on) each component identifying the component in accordance with the drawing, specifications, and supplier's data.
2. All exterior panel mounted equipment shall be installed with suitable nameplates which identify the panel and individual devices as required.

E. Nameplates

1. All panels shall be supplied with suitable nameplates which identify the panel and individual devices as required.

1.11 COMPONENTS - PANEL & FIELD MOUNTED

A. Level Transmitter (2 Required) For Wet Wells

1. The hydrostatic pressure sensor shall provide a two-wire, loop-powered, 4-20 mA signal proportional to the hydrostatic head of the liquid. In addition to the analog signal, the transmitter shall also provide a simultaneous digital signal superimposed on the analog output, but shall not affect this analog value. The digital signal shall utilize the HART protocol. The unit shall operate with 11.5 to 30 VDC for non-hazardous and FM approved.
2. The sensor shall be constructed with a Hastelloy C diaphragm and 316 SS body. It shall be furnished a cable version for top mounted installations. This sensor design shall eliminate the need for diaphragm seal assemblies. The cable version shall be made of polyethylene (PE) material.
3. The sensor shall incorporate a polysilicon resistive measuring element and shall be of an all welded construction and hermetically sealed from outside

influences such as moisture, dirt, etc. The device shall incorporate multiple integral moisture Gortex filters to prevent condensation from forming in the atmospheric reference tube. This filter mechanism shall not require use of any desiccant devices which need to be routinely replaced. The transmitter shall have an aluminum housing. The unit shall also be capable of remote mounting the housing and electronics from the sensor. With this remote electronics option, the sensor measuring point shall be completely submersible.

4. The sensor accuracy shall be 0.2% percent of calibrated span over a 10:1 turndown. The unit shall be capable of ranges as low as 0-15 in. H₂O and as high as 1660 inches H₂O. This accuracy shall include the effects of linearity, hysteresis, and repeatability. The sensor shall incorporate temperature compensation directly at the sensor to reduce the inherent effects of temperature changes on the sensor output. The temperature effects shall be less than 0.006% percent per °F product temperature change. The sensor shall also be capable of withstanding an overload pressure of up to twenty (20) times the measuring range without performance degradation.
5. The transmitter shall incorporate all of the sensor calibration and characterization data on a DAT module so as to be completely replaceable and interchangeable without the need for recalibration. The 0.2% percent accuracy shall be maintained on an interchanged sensor. The electronics shall also be replaceable without the need for recalibration on the sensor. The calibration shall be via non-interactive digital push buttons which will allow the transmitter to be rearranged without the need for any pressure source or other external handheld devices. The electronics module shall incorporate level linear, level horizontal cylinders, and other linearization functions so as to be configurable in process engineering units. The unit shall also implement a density factor field which can be modified via the local display or via the HART signal to account manually for changing product densities. In addition, there shall be capability to supply a system which continuously or at a discrete point calculates product density and recalculates the product level automatically based on this new density value.
6. The transmitter shall have an optional digital display with any of the housings showing both the digital value and a 0-100% percent bar graph. The display shall be universal to all ranges and incorporate a plug-in modular design to allow field retrofit without the need for software or electronics modification. The display shall also be capable of accessing the entire configuration matrix to program the transmitter locally without the need for other external HART devices. All the housing options shall be rated NEMA 4X.
7. The unit shall be Endress + Hauser DELTAPILOT M FMB53Model or approved equal.

B. Level Transmitter for Monitoring Well

1. RF ADMITTANCE LEVEL SENSOR/TRANSMITTER

- a. Each level gage shall consist of a sensing element assembly, and an electronic transmitter/signal converter. Level gage system shall measure level or draw down as specified. All transmitters on this project shall be field interchangeable. Level gage shall have no moving parts.

- b. Level sensor/transmitter shall be capable of measuring depths to 800 feet.
- c. Level sensor/transmitter shall have special circuitry that enables the system to ignore mineral deposits or any sticky material that may build up on the sensing element, and level gage shall ignore oil floating on top of water. Level gage shall be independent of density, conductivity, and dielectric constant changes.
- d. The sensing element assembly shall consist of a flexible and weighted sensing element, coated with a chemical and abrasive- resistant plastic. Spacers shall be furnished by the supplier, and designed to keep the sensing element away from all walls, wires, and piping.
- e. Sensing element shall be pipe union, flange, or 3/4" NPT mounted as specified. Sensing element shall be installed in space between casing and column, in an electrically grounded PVC pipe or tubing, or in steel/SS pipe/tubing, as specified.
- f. The 2-Wire Smart RF Admittance-type, continuous level transmitter shall produce an output of 4-20 mA, and HART protocol that is proportional to level (PV1) or 4-20- mA, proportional to drawdown, as specified. It shall be capable of making the measurement independent of changes in material density and not be affected by the presence of material clinging to the sensing element. The measurement shall be free from the effects of changes in temperature, density, or acoustic noise in the vapor space above the level. The output can also display a second process variable (PV2) of volume proportional to level from built in standard strapping tables or user defined tables.
- g. Calibration can be accomplished from a HART Communicator or from PC software with a modem, connected anywhere in the 2-wire loop. Calibration may be entered in user's choice of engineering units, and by entering any two level-points – not necessarily zero and full.
- h. There shall be no easily accessible controls that unauthorized persons could tamper with.
- i. The output shall be certified compatible with the HART Protocol Specification Revision 5 or later.
- j. The level measuring system shall be intrinsically safe and suitable for installation in Division 1 hazardous areas when supplied from an approved power supply. The electronic unit shall be mounted in an explosion-proof enclosure and be capable of being either located integrally with the sensor, or remotely from the sensor up to 100 feet (30 meters) away.
- k. The electronic unit shall be capable of operating in harsh environments, with temperatures ranging from -40°F to 185°F (- 40°C to 85°C). It shall be protected from corrosion with a NEMA 4X rated housing. The internal circuit boards shall be protected by a fungus resistant (tropicalized) coating.
- l. The electronic unit shall have a capacitance tuning range of 1 to 40,000 pF. The electronic unit shall have provision for field changeable fail-safe (mode), damping, and field changeable phasing in the event the measurement requires such changes to optimize the level reading. The reading shall be free from effects of Radio Frequency Interference (RFI) when plant radios (walkie- talkies) are

in the vicinity of the level transmitter. Further, the measurement shall be free from harmful effects of static electricity on the sensing element, with discharges up to 10 Amperes being tolerated without damage. There shall be an optional 100 A spark protector available.

- m. If specified, the transmitter shall have an integral externally visible meter. Meter shall be 3½ digit digital LCD. The meter shall have 1/2-inch high digits and shall display in engineering units as required. Display shall show level or drawdown, as specified.
- n. System calibration, calibration checks and instrument maintenance shall be done without pulling sensor from well.
- o. The well level gage system shall be as manufactured by AMETEK Drexelbrook 509-0015-938 series, or approved equal.

2. Level Sensor (Pressure Type)

- a. Submersible Level Transmitter is to provide level measurement via direct submergence in many types of liquids for quick, accurate and reliable level measurement.
- b. The Transducer indicates the level of liquid by continuously measuring hydrostatic pressure via its isolated sensing element, an ion implanted silicon semiconductor sensor.
- c. The output signal is 4-20 mA.
- d. Accuracy at 25C +/- 1% FS
- e. All electronics are mounted in a submersible 316 stainless steel housing.
- f. Provide cable support bracket.
- g. Provide conduit adapter.
- h. Cable is factory installed and sealed to insure liquid tight performance.
- i. The customer connection end of the cable is sealed and a desiccant package is installed to limit the amount of moisture allowed to enter the barometric reference of the sensor.
- j. The transducer is available calibrated for any span needed, from 6 psi (13.8 ft. of water) to 300 psi (692 ft. of water)
- k. Model: Drexelbrook 375 Series, or approved equal.

C. Pressure Transmitter (17 Required)

- 1. NEMA 4X SS housing. EPDM O-ring(s) and elastomers.
- 2. 0-10 psi range.
- 3. 30 V Power Supply. 4-20 mA signal.
- 4. Transmitters with the 4-20mA output signal include an internal test circuit connection that permits the transmitter to be tested without disconnecting the primary 4-20 mA circuit.
- 5. All welded stainless steel measuring cell.
- 6. No internal soft sealing materials that may react with the media or deteriorate over time.
- 7. A flush diaphragm process connection.
- 8. WIKA Model F-21, or engineer approved equal.

- D. Pressure Transmitter Diaphragm Seal (18 Required)
 - 1. Ashcroft Model 50-100SS-02T-CG
- E. Float Switches (4 Required) For Wet Wells
 - 1. The supplier shall furnish, install, and wire weighted float switches in the pump suction areas as shown on the drawings. Each float shall a body fabricated of 316 stainless steel and Teflon coated, internal redundant polyurethane foam floatation, potted switch and cable connections, and fine stranded, AWG #18 cable with heavy-duty, synthetic rubber jacket in lengths as required to run unspliced to the junction box. The floats shall operate on 12 volts DC and used with the PCP, providing alarm circuitry as shown on the drawings. The float switches shall be Bulletin B100 Model 9GEF float (stainless steel), as manufactured by Consolidated Electric Company or approved equal.
- F. Signal Conditioners
 - 1. Signal conditioner shall be provided in a NEMA 6P enclosure. All connections and attachments shall be designed to maintain the NEMA 6P environment throughout the system.
 - 2. Conditioner shall be Automation Direct, Model FC-33, or approved equal.
- G. Rain Sensor
 - 1. Rain sensor shall be of the “tipping bucket” type, and shall be capable of providing a signal to a PLC corresponding to the amount of rain that has fallen over a particular time period. Coordination shall be provided between the PLC and the sensor to indicate the rain event is over, thereby resetting the starting point for the next timing period. The timing period and amount of rainfall shall be adjustable both at the site and control room.
 - 2. Tipping bucket shall be by NovaLynx, RM Young, Munro Instruments, Texas Electronics, or approved equal.

1.12 PUMP STATION CONTROL PANEL (PCP)

- A. The PCP shall be provided and installed at the pumping station to monitor and control the proposed pumps. The controls shall be as shown on drawing I-2.
 - 1. Uninterruptible Power Supply (UPS): In addition to the power and signal line surge protection described in these specifications, the panel shall be provided with an uninterruptible power supply. The UPS shall be suitable for mounting on a shelf installed within a sealed enclosure, and shall provide a minimum of thirty (30) minutes of operation of the PLC, the pressure transmitter, the digital indicators and other related components of this control panel. The UPS shall be as manufactured by BEST or approved equal. A power failure control relay shall be installed in the panel, which is not powered by the UPS. This relay shall be wired as a discrete input to the PLC, and shall indicate a “POWER FAILURE” to the PLC.
- B. General
 - 1. A PLC based controller (PLC) shall be furnished as specified herein.
 - 2. All components comprising the PLC shall be manufactured by a company engaged in the manufacture of programmable controllers for at least fifteen (15) years.

- C. Description of system operation
1. The PLC shall allow interface with an RTU system via the MODBUS protocol interface. In Automatic Mode, the PLC shall start, stop and vary the speed of all variable speed pumps and constant speed pumps in response to signals acquired from the level transmitter and pressure transmitter maintaining efficient pump operation while tracking the set point.
 2. Control Switches (HOAs) and manual loading stations (speed potentiometers) shall provide the means to operate the system in Local Manual Mode.
 3. An Operator Interface Module (OIM) shall provide the, access to set points and timing ranges, system monitoring, annunciation and control necessary for "Plain English" commands and alarms. The OIM shall have Key lock switches provided for security.
 4. Pump "Add" and "Subtract" parameters, drive programmable parameters and System programmable parameters must be accessible from the OIM Keypad. These parameters shall be programmed to provide maximum energy efficiency during operation.
- D. Equipment
1. The Pump Control Panels (PCP) shall be located as shown on the Drawings.
 2. Major hardware components furnished shall include:
 - a. PLC with a minimum 21k memory capacity
 - b. Racks
 - c. Power Supply
 - d. I/O as required (Allow for 20% active and 20% future spares)
 - e. Operator Interface Module(s) Allen-Bradley "Panel View", or approved equal.
 - f. Peripheral devices as required.
 - g. Battery backed timing and memory modules.
 - h. UPS (sized for thirty (30) minutes of complete operational capability) Best or approved equal.
 - i. PLC shall be Allen-Bradley.
 3. Standard software from the PLC manufacturer shall be provided and shall be process oriented and designed for use by process control engineers or technicians after having received basic instructions on this system.
 - a. The system can accept operation directives in a conversational mode.
 - b. All parameters such as date, time, set points, alarms limits, loop tuning constants, timer and counter accumulators shall be accessible via the OIC module(s) or laptop PC.
 - c. See the electrical drawings for additional information.
 4. Spare parts
 - a. Provide one complete PLC spare.
 5. Documentation
 - a. Provide PLC ladder logic diagrams for Engineer review

1.13 INSTALLATION

A. Mounting of Instruments, Control Panels, etc.

1. Instruments shall be mounted by the CONTRACTOR in accordance with the installation detailed drawings as prepared by the CONTRACTOR and reviewed by the CITY'S Representative. As a minimum, 2-inch aluminum posts shall be sleeved and cemented in the ground and 3/4-inch aluminum strut used to support all equipment. Where slab is existing, a 6-inch wide aluminum channel may be used and bolted to top of slab. CITY reserves the right to require instruments to be mounted as shown or as recommended by MANUFACTURER. Instruments shall be mounted so that they are rigidly supported, level and plumb, in such a manner as to provide accessibility; protection from damages; isolation from heat, shock, and vibration; and freedom from interference with other equipment, piping, and electrical work. Instruments, cabinets, and panels shall not be installed until heavy construction work adjacent to instruments has been completed to the extent that there shall be no damage to the instruments installation by such construction work.
2. The CONTRACTOR shall coordinate the installation of the electrical services to components related to the instrumentation system to assure a compatible and functionally correct System. All accessories shall be coordinated and installation supervised by the instrument and controls supplier.
3. All instrumentation equipment mounted outdoors shall be mounted in NEMA 3R vented stainless steel enclosures and shall be designed to withstand 150 mph winds. Cabinets shall be sized to allow all additional protective components to fit inside.

1.14 FACTORY TEST

- A. The Manufacturer (SYSTEM SUPPLIER) shall test all equipment at the factory prior to shipment. Unless otherwise specified in the individual specification sections, all equipment provided under all sections of the specification as listed under related work shall be tested at the factory as a single fully integrated system.
- B. Implicit in the scheduling of the factory test is the assumption that the Manufacturer has determined through his own tests and quality assurance programs that the equipment is ready for shipment. Certification that testing was successfully passed shall be shipped with the equipment.
- C. Any additional test equipment or services that may be required to successfully perform the Factory Acceptance Test shall be provided, at no additional cost to the CITY, until the test has been satisfactorily completed.
- D. ENGINEER shall be notified fourteen (14) days in advance of this test and permitted to observe all factory testing.

1.15 FIELD TESTS AND ACCEPTANCE

- A. The CONTRACTOR shall furnish the services of Manufacturer servicemen, all special tools, calibration and test equipment, and labor to perform the field tests. Certified copies of the test data shall be furnished to the ENGINEER and the Project Record Documents. Test report data shall cover each instrument device and control panel.

- B. Field tests shall consist of installation check-out, and Field Acceptance Test, in sequence. Each stage of testing shall not be commenced until the preceding stage is substantially complete as determined by the ENGINEER.
- C. Field Check-out and Calibration: Following connection, check-out, and final adjustment of all equipment in the field, a performance check shall be made on each as follows:
1. All analog signals shall be tested at 0% percent, 25% percent, 50% percent, 75% percent, 100% percent and 101% percent of scale, as required.
 2. All discrete signals shall be tested in both states.
 3. Each device shall be signed-off by the ENGINEER/CONTRACTOR, and as being acceptable. Testing shall be done from the signal source and include all field wiring.
 4. If, during running of the tests, one or more points appear to be out by more than the specified amount, the Manufacturer's servicemen shall make such adjustments or alterations as are necessary to bring equipment up to specification performance. Following such adjustment, the tests shall be repeated to demonstrate compliance.
- D. Field Acceptance Test: Final acceptance testing shall consist of a seven (7) day test. The CONTRACTOR shall be responsible for operation of the entire control and instrumentation system for a period of seven (7) consecutive days, under conditions of full plant process operation, without a single non-field-repairable malfunction. During this test:
1. Plant operating and CONTRACTOR personnel shall be present as required. The CONTRACTOR is expected to provide personnel for this test who have an intimate knowledge of the hardware and software of the system.
 2. The CITY shall have full use of the system. Only plant operating personnel shall be allowed to operate equipment associated with live plant processes.
 3. Any malfunction which cannot be corrected within twenty-four (24) hours of occurrence of the City's personnel, or more than two (2) similar failures of any duration, will be considered as a non-field-repairable malfunction; and upon completion of repairs, by the CONTRACTOR, the test shall be repeated.
 4. In the event of rejection of any part or function, the CONTRACTOR shall perform repairs or replacement within ninety (90) days.
- E. System Acceptance. Upon successful completion of the seven (7) day test and subsequent review and approval of complete operating instructions, the system shall be considered acceptable.

END OF SECTION

ADDENDUM # 18

PLEASE NOTE RECEIPT OF ADDENDUM # 18 BY SIGNING BELOW AND INCLUDE WITH YOUR FIRM'S SUBMISSION.

I ACKNOWLEDGE RECEIPT OF ADDENDUM # 18:

Company:	
Name:	
Title:	
Signature:	
Date:	

Sincerely,



Andrea Lues, Director, Procurement Department