

## SECTION 01150

### SANITARY SEWER PUMP STATIONS

#### PART I - GENERAL

- 1.0 Applicable Standards:
- 1.1 All products, installation and testing of force mains and gravity sewers shall meet the requirements of Regulation 61-67, Standards for Wastewater Facility Construction or State Primary Drinking Water Regulations (R61-58).
- 1.2 All products, installation and testing of force mains and gravity sewers shall meet the requirements of "Recommended Standards for Wastewater Facilities" (Ten State Standards), latest edition.
- 1.3 Any reference to SCDOT standard specifications was obtained from "Standard Specifications for Highway Construction" published by the South Carolina Department of Transportation. Unless otherwise noted, the most current date published applies.

#### PART II – SUBMITTALS

- 2.0 Manufacturer's Catalog Data:  
Submit for approval manufacturer's catalog data to show conformance with these specifications for the following:
  - Pumps, motors, rails, chains
  - Float switches
- 2.1 Shop Drawings:  
Submit shop drawings for approval with dimensions, legends, etc. indicating equipment to be used and arrangement for the following:
  - Control Panel and wiring diagram
  - Precast wetwell and valve vault, complete
- 2.2 Start-Up Report:  
Submit report from the manufacturer's representative detailing the initial start up testing of the pumps. Report shall include all necessary information for the representative to determine the equipment is operating properly. A drawdown test shall be conducted to verify that the rated discharge conditions are being met.
- 2.3 Operation and Maintenance Manuals:  
Provide five copies of O&M manual for complete system as installed.
- 2.4 Warranty:  
Provide a written warranty from the manufacturer of pumps that guarantees the materials, construction, and workmanship for a minimum period of two (2) years following the initial start up of the equipment. Shipping dates do not constitute warranty inception. Warranty shall be limited to the replacement or repair of any parts, units or accessories that are defective or do not provide the normal, reliable, trouble-free performance anticipated by these specifications.

## PART III - MATERIALS

- 3.1 Pumping System:  
Pumping system is to consist of two submersible pumps of the non-clog type that will pump raw wastewater. The system shall include all items required for the normal installation of submersible pumps. System is to be designed for unattended use. System is to be designed for use on raw, untreated domestic waste water and all parts of the system in contact with the wastewater shall be constructed of suitable material to resist degradation. The system shall meet the following requirements:
- 3.1.1 Pumps:  
Submersible, centrifugal, non-clog pumps shall operate under the following conditions:  
Shut Off Head:       feet, minimum  
Discharge capacity:   gallons per minute  
Total Dynamic Head:   feet  
Inlet Size (minimum):   Four (4) inches  
Outlet size (minimum): Four (4) inches  
Sphere Passed (minimum): Three (3) inches  
Impeller: Two (2) vance, non-clog type or other design specifically recommended by manufacturer for application intended.  
Efficiency: Forty (40) percent, minimum, wire to water.
- 3.1.2 Wetwell:  
Provide precast, steel reinforced, concrete wetwell conforming to ASTM C 478 and suitable for use with equipment. Wetwell is to be constructed as shown on the drawings. Wetwell base shall be constructed with inserts or anchor bolts integrally cast for anchoring the discharge piping base.
- 3.1.3 Piping:  
Provide discharge piping and disconnect to piping, including anchor bolts. All piping and fittings associated with the pumping system supplied shall be flanged ductile iron or cast-iron and shall conform to applicable ANSI/AWWA standards. No valves are to be located on the discharge piping inside the wetwell. Influent and effluent piping is to enter and exit the wetwell as show on the drawings. Provide all fittings necessary for a complete and serviceable installation.
- 3.1.4 Anchoring Bolts:  
Anchoring bolts and nuts are to be stainless steel. Pump bases may be mounted using bolts threaded into cast-in inserts.
- 3.1.5 Guide Rails:  
Provide guide rails for the pump system as required for a complete installation. Guide rails are to stainless steel.
- 3.1.6 Lifting chains:  
Provide stainless steel lifting chains for pumps to allow removal and replacement of pumps without entering the wetwells.
- 3.1.7 Plug valve:  
Valve shall be of the non-lubricated eccentric type with a port area of at least eighty (80) percent of full pipe size and be flanged. Valve body shall be cast-iron and shall have Buna-N plug facing and welded nickel seats. Valve shall have two (2) inch square operating nut and removable operating handle. Valve shall be rated at a minimum 200 psi hydrostatic test pressure.
- 3.1.8 Check valve:  
Full Flow check valves sized no less than the discharge of the pump and shall pass the same maximum size sphere as the pump. The valve shall be spring-

loaded to provide positive closing. Valve seat shall be stainless steel and shall be replaceable. Valve shall be rated a minimum 200 PSI hydrostatic test pressure.

3.1.9 Valve Vault:

Provide precast, steel reinforced, concrete vault complying with the requirements of ASTM C890 and C913 of size and arrangement as shown on the drawings.

3.1.10 Access Hatches:

Provide access hatches as shown on the plans for the wetwell and valve vault. Access hatches shall be three sixteenths (3/16) inch aluminum checker plate with stainless steel hardware. Hatch shall be corrosion resistant hardware to hold door(s) open until released for closure. Hatches shall have a handle for opening and a hasp and keeper for locking. Hatches shall be designed to be watertight and constructed to withstand a 150 pounds per square foot concentrated load.

3.1.11 Float Switches:

Mercury tube float switches to control the operation of the pumps and to activate an alarm circuit for high wetwell level. Float switches shall be constructed of a chemical resistant material suitable for the intended application. Cables and a stainless steel hanger shall be provided for the float switches.

3.1.12 Cable Bracket:

Provide stainless steel bracket for holding cables. Bracket to be mounted at a position easily accessible from the hatch opening.

3.1.13 Sign:

Provide a painted aluminum sign for mounting on the pump station fencing that reads: "IN CASE OF EMERGENCY – CALL 803-359-8373". Letters shall be a minimum of two inch high and of a block style. The number to include will be provided by the Owner prior to Project Closeout.

3.2 Electrical Items:

General:

Pumping system is to be supplied complete with all electrical items and accessories required to be ready for use including control panels, switches, cables, starters, breakers, transformers and any other items required by codes or recommended by the manufacturer. The only field wiring that will be required will be from the service disconnect to the control panel and the motor cables and level controls into the panel. Control panel is to be provided by a manufacturer with an Underwriters Laboratories (UL) listing.

3.2.1 Surge Protection Equipment:

Provide solid state surge protection device to protect the control panel components and the pumps from the transient power surges due to line sources or lighting.

3.2.2 Motors:

Provide motors housed in an air filled, watertight housing with a minimum 1.15 service factor, sized for load. Motors shall have a minimum NEMA Class "F" insulation rating. Motors shall be factory packed with the proper lubricant. Motors shall be equipped with sensors to protect against high windings temperatures. Sensors shall be coupled to the control circuit to cause shutoff should high temperatures be encountered. Each motor shall be specifically recommended by manufacturers for the installation intended and be able to operate continuously without exceeding its service factor. Manufacturer's nameplate must be securely fastened and indicate the voltage, speed, insulation class, amperage, service factor, serial number and manufacturer's name and address.

3.2.3 Enclosure:

Stainless steel, NEMA Class 3R, dead front type, with piano hinges, door pocket for wiring diagram and lock.

- 3.2.4 Cables:  
One piece, insulated, suitable for the installation intended.
- 3.2.5 Switches:  
Hand-Off-Auto, oil tight, 3-position maintained and located on an interior panel door for controlled operation.
- 3.2.6 Breakers:  
Thermal-magnetic trip circuit, sized for load.
- 3.2.7 Starters:  
Full voltage, non-reversing across the line starters shall have thermal overload protection and undervoltage release.
- 3.2.8 Sequence Selectors:  
Provide circuitry and alternator relay(s) to alternate pumps on each successive cycle, to operate both pumps if well level rises to lag "pump on" elevation and to start "lag" pump should "lead" pump fail to operate.
- 3.2.9 Alarms:  
Provide flushing alarm beacon and audible signal on top of control panel to indicate a high wetwell level.
- 3.2.10 Phase Monitors:  
Solid-state, phase sequence/failure and undervoltage release relay. Relay shall have two LEDs to indicate proper phase sequence, phases in operation and voltage limits.
- 3.2.11 Temperature Protection Circuit:  
Provide magnetic switch to receive input signal from pump sensors and to cause drop out of the motor starter. Circuitry shall be arranged as to cause a visible indicator that pump has been tripped due to high temperature and circuit must remain tripped until pump has cooled and the circuit has been manually reset.
- 3.2.12 Convenience Outlet:  
Provide a 110 volt, 15 amp ground fault type duplex receptacle and breaker mounted in the control panel for ease of use.
- 3.2.13 Wiring Diagrams:  
Complete and legible showing schematic and coding of wires and circuitry items.
- 3.2.14 Indicator Lights:  
Provide two nominal one (1) inch pilot type lights for each pump with green indicating pump running and red indicating pump failure.

### **PART III - EXECUTION**

- 4.1 General  
The pump station is to be installed level and plumb and with influent and effluent pipe openings properly aligned.
- 4.2 Delivery, Storage and Handling
  - 4.2.1 Coordinate delivery of the pump station components to provide a minimum delay between receipt of the station and its installation.
  - 4.2.2 Store all electrical equipment in a dry location pending its installation.
  - 4.2.3 Protect pumps and motors from exposure, damage and submergence until properly installed and sealed.
- 4.3 Installation of Pumps
  - 4.3.1 Mount Pump base supports using stainless steel bolts or nuts to anchors cast in base section.
  - 4.3.2 Grout bottom of wetwell as necessary to provide slope toward pumps of one inch per foot on all sides.

- 4.3.3 Install guide rails plumb and true. Ensure that pumps slide along rails without binding.
- 4.3.4 Seal motor power cable connections to ensure watertightness.
- 4.3.5 Connect lifting chains to pumps and top of wetwell.
- 4.4 Installation of Piping
  - 4.4.1 Install influent pipe to the grade shown on the plans. Grout annular space or provide flexible boot between pipe and wall opening to ensure watertightness.
  - 4.4.2 Install effluent piping, quick disconnect and valves as shown on the drawings. Make up all joints watertight. Grout annular space or provide flexible boot between pipe and wall opening to ensure watertightness.
- 4.5 Installation of Control Panel
  - 4.5.1 Mount control panels as shown on plans. Make connections for control cables, power supply and pump power cables in accordance with NEC and other applicable local codes.
- 4.6 Testing and Start-up
  - 4.6.1 Upon completion of installation of all items, notify the Owner and the pump station's manufacturer's representative. Perform the initial start-up of the facility under the direct supervision of the manufacturer's representative and witnessed by a representative of the Owner.
  - 4.6.2 Any items found not to perform as anticipated shall be immediately repaired or replaced as necessary.
  - 4.6.3 Submit a Start Up Report as required in Submittals Section.
  - 4.6.4 Do not place the system into operation until a final inspection is conducted by SCDHEC and a Permit to Operate has been issued.

END OF SECTION