

## PUMP STATION REPLACEMENT

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### PART ONE – GENERAL

#### 1.01 Description

- A. This section stipulates features, design considerations, and other requirements for replacement of existing pumping facilities receiving sewage from an 8ø gravity sewer.
- B. The replacement pump station shall be of the size indicated on the drawings and shall be constructed in conformance with these specifications.
- C. Six copies of shop drawings and the Engineer of Record's design calculations must be provided and approved by the Owner and Owner's Engineer prior to ordering materials and replacement of the existing pump station.
- D. The Owner shall determine what salvage items they will retain. All other removed items shall be disposed of by the Contractor at no cost to the Owner.

#### 1.02 General Requirements

- A. Safety: All pump station switches and wiring within the wet well shall be intrinsically safe. The wiring floats and switches within the wet well must be incapable of releasing sufficient electrical or thermal energy to cause ignition of gases.
- B. Submittals: Complete fabrication, assembly, modification and installation drawings, together with detailed specifications and data covering materials, parts, devices, and accessories shall be submitted to the Owner. Contractor shall submit six sets of shop drawings. Shop drawings shall include equipment descriptions, specifications, dimensional and assembly drawings, parts lists, and job specific drawings. The data and specifications for each unit shall include, but shall not be limited to the following:
  - 1. Pumps
    - a. Name of manufacturer.
    - b. Type and model.
    - c. Rotative speed.
    - d. Size of suction inlet
    - e. Size of discharge outlet.
    - f. Net weight of pump and motor only.
    - g. Complete performance curves showing capacity versus head, brake horsepower (BHP), net positive suction head (NPSH) required, and efficiency.
    - h. Shop paint.

2. Motors

- a. Name of manufacturer.
- b. Type and model.
- c. Type of bearings and method of lubrication.
- d. Rated size of motor (horsepower).
- e. Temperature rating.
- f. Full load rotative speed.
- g. Net weight.
- h. Efficiency at full load and rated pump condition.
- i. Full load current.
- j. Locked rotor current.

3. Cabinet, Controls, and Components

- a. Name of manufacturer.
- b. Type and model.
- c. Dimensions and net weight of complete panel.
- d. Overcurrent characteristics and details of motor control.
- e. Liquid level sensors with mounting details, high-water float cable lengths, and pump controls.

- C. The replacement pump station shall be a fully customized, above-grade package ready for installation after being factory-built and tested. Some size modifications will be required due to existing conditions. Acceptable pump station manufacturers must have a minimum of 15 years manufacturing experience. Smith & Loveless and Gorman Rupp are acceptable manufacturers.
- D. Delivery, Storage and Handling: The equipment shall be factory-built and in containers constructed for normal shipping, handling and storage. The packaging shall provide adequate protection for the equipment in a dry indoor environment until time for installation.
- E. Closeout Submittals: The Contractor shall submit three sets of Operation and Maintenance manuals to the Owner. The manuals shall include equipment descriptions, operating instructions, drawings, troubleshooting techniques, a recommended maintenance schedule, and the recommended lubricants.
- F. Acceptable Manufacturers: The existing lift station is a Smith & Loveless wet well mounted pumping station located in an existing frame and metal sided structure. It is the Owner's preference to replace the existing station with an equivalent updated Smith & Loveless Factory Built Automatic Classic Wet Well Mounted Pumping Station equivalent to the existing station.

**1.03 Design**

- A. The pump station rehabilitation to be owned, operated, and maintained by the Owner shall comply with the following general requirements:
1. The pump station rehabilitation shall be readily accessible by maintenance equipment during all weather conditions.
  2. The existing three phase electrical power converter shall remain in service. Electrical systems and components located in raw sewage wet wells where hazardous concentrations of flammable gases or vapors may be present, shall comply with the National Electrical Code requirements for Class 1 Group D, Division 1 locations. All wiring must be in accordance with the latest revisions of the National Electrical Code. The fused disconnect switch located above ground may be reutilized for the pump station. All electrical enclosures subject to weather or corrosive gases shall be constructed of corrosion resistant material. Provide NEMA rated motor starters.
  3. The pump station wet well is existing and shall remain.
  4. The pump station rehabilitation must include at least two pumps designed for pumping sewage and replace the existing ones indicated on the plans. Pump suction and discharge piping shall be 4 inches in diameter to match the existing size and type. The pump station shall include two vertical, closed coupled, vacuumed primed, 4B2B Smith & Loveless non-plugged pumps cable of delivering 100 GPM at 20 TDH with a maximum static suction lift of 20 and each driven by a 3HP, 900 RPM, 3 phase, 60 cycle 230V motor, central control panel with circuit breakers, motor starters & automatic pumping level controls, heater and primary pumps 4 inches in diameter to match the existing size and type.
  5. Control systems shall be designed for the use intended, factory wired, fully adjustable, and capable of providing fail safe operation. Control systems shall minimally have five (5) set points (Low level alarm, All Off, Lead On, Lag On, High Level alarm).
  6. High Wet Well Alarm provided contact shall remain closed during an alarm silence event.
  7. Pump Running provided for each pump, provide auxiliary motor starter contact, or power relay connected to motor starter output.
  8. Pump Failure provided for each pump, provide factory installed pump circuit breaker contact, or power relay connected to breaker output.
  9. Pump OOS (Out of Service) provided provide panel mounted DPDT switch for each pump.
  10. All metal fasteners, bolts, nut, and supports located in the wet well shall be constructed of stainless steel.

11. The pump station, motors, pump valving, and check valves shall be completely separated and be above the wet well. Provision shall be made to facilitate removal of pumps, motors, and other mechanical and electrical equipment suitable and safe means of access shall be provided to wet well.
  12. The Contractor shall provide intermittent mechanical ventilation of pump station providing 30 complete air changes per hour. On switch for ventilation shall also be located at station entrance door.
  13. The Contractor shall provide a 4" diameter PVC wet well vent to outside atmosphere. Include removal and replacement of concrete floor.
- B. Design of force mains shall comply with the following requirements:
1. Minimum pumping rate shall result in a velocity of at least two (2) feet per second and not greater than five (5) feet per second.
  2. The physical elevation of the force main should not exceed the hydraulic grade line at any location along the force main's length.
  3. Friction losses through force mains shall be based on the Hazen-Williams formula and actual pipe diameters. Hazen-Williams C values of 120 and 100 for PVC and Ductile Iron, respectively, shall be used for design. When initially installed force mains will have significantly higher C values. Designs should be checked at C values of 150 and 130 for PVC and Ductile iron, respectively, to determine power and net positive suction head requirements.
  4. A ten (10) foot horizontal separation shall be maintained between potable water mains and sewage force mains. Where water mains and force mains cross, force mains shall be laid to provide a distance of eighteen (18) inches between the outside of force main to the outside of the water main. Both joints of the force main shall be located as far as possible from the water main.

End of Section