

SECTION 432100 - PUMPING EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

1.2 DESCRIPTION OF WORK

- A. The Contractor shall provide all labor, materials, tools and equipment required to furnish and install all pumps under this section, complete as shown on the Contract Drawings and as specified herein.
- B. The pumps shall include all drives, drive shafts, couplings, belts, belt guards, drive bases, pump bases, anchor bolts, and other appurtenances as specified or required for a complete installation.
- C. All work performed under this section shall be in accordance with all approved trade practices and manufacturer's recommendations.

1.3 QUALITY ASSURANCE

- A. In addition to requirements of these specifications, comply with manufacturer's instructions and recommendations for work.

1.4 SUBMITTALS

- A. Submittals shall be in accordance with the General Requirements.
- B. Submittals with the bid
 - 1. At the time of bidding, the Contractor shall submit, as a minimum, the following information:
 - a. Manufacturer's Certificates, including certified test curves with the design points clearly marked (computer model printouts are not acceptable). Performance curves shall be submitted for each pump to be supplied.
 - b. Motor data, including starting Kva, starting torque, full load current, full load torque efficiency curves, and power factor curves (computer model printouts not acceptable).
 - c. Where required, verification that the variable speed drive is capable of delivering the required torque and power over the entire speed range of the pump.
 - d. Materials of construction for all components.

2. The bid submittal package shall be enclosed in a separate envelope with the section number marked clearly on the outside and shall be submitted with the Contractor's bid.

PART 2 - PRODUCTS

2.1 SUBMERSIBLE PUMPS

- A. Submersible, electrically operated pumps shall be in accordance with the requirements described in the following paragraphs and in the Equipment Schedule. In addition, they will be capable of continuous pumping without being submerged.
- B. All pumps at each pump station shall be by the manufacturer listed in the Equipment Schedule. Equipment has been selected to match existing pumps and to provide shelf spares.
- C. Pumps shall be of the manufacturer and model noted in the Equipment Schedule or equal.
- D. Each pump shall be shop tested for capacity, head, speed, power and efficiency in accordance with Standards of the Hydraulic Institute. Six (6) certified copies of each test curve shall be furnished to the Engineer for approval. The pumps shall not leave the manufacturer's plant until receipt of the Engineer's approval.
- E. Each pump shall be connected to the discharge line by means of a quick disconnect sealed flange, mounted on the pump and the outlet line. Fitting shall be such that sealing is accomplished by metal-to-metal contact between machined surfaces. No secondary sealing compounds, rectangular gaskets, elliptical O-rings, grease or other devices shall be used.
- F. The pumping units shall come complete with sliding brackets, motors, guide bars, cadmium plated pull chain, power cables and all other necessary appurtenances.
- G. All major pump parts such as the casing, sliding bracket, volute, and impeller shall be of high quality cast iron. All exposed bolts and nuts shall be of stainless steel 304. Pump exterior shall be sprayed with PVC epoxy primer, with chloric rubber paint finish. The pump impeller shall be coated with rilsan or approved equal.
- H. The impeller shall be of gray cast iron, Class 30, dynamically balanced, double shrouded and of non-clogging design. The impeller shall be capable of handling solids, fibrous materials, heavy sludge and other matter found in normal sewage applications. The fit between the impeller and the shaft shall be a sliding fit with one (1) key.

- I. Thermal sensors shall be used to monitor stator temperatures. The stator shall be equipped with three (3) thermal switches, embedded in the end coils of the stator winding. These shall be used in conjunction with and supplemental to the external motor over protection and wired to the control panel.
- J. The pump shaft shall be stainless steel ANSI 431.
- K. A wearing ring system shall be installed to provide efficient sealing between the volute and impeller.
- L. Each pump shall be provided with a tandem mechanical rotating shaft seal arrangement running in an oil reservoir. The lower seal unit between the pump and oil chamber shall contain one stationary and one positively driven tungsten-carbide ring. The upper seal unit between the oil sump and motor housing shall contain one stationary tungsten-carbide ring and one positively driven rotating carbon ring. The seals shall require neither maintenance nor adjustment, but shall be readily inspected and replaced. The following seal types shall not be considered acceptable nor equal to the dual independent seal specified.

Shaft seals without positively driven rotating members, or conventional double mechanical seals containing either a common single or double spring acting between the upper and lower units. No conventional system requiring a pressure differential to offset external pressure and to effect sealing will be accepted.

- M. The pump shall be easily removed from its chamber to ground level for inspection or service without requiring dewatering of the chamber. This shall be accomplished by utilizing a sliding guide bracket attached to the pump, two guide bars adequately braced, a stainless steel pull chain reaching ground level, and a specially formed discharge flange that will automatically and firmly connect and disconnect with the discharge pipe without bolts, nuts, fasteners, or extreme force.

NOTE: AT ALL PUMP STATION LOCATIONS THE GUIDE RAILS ARE TO REMAIN BUT ALL NEW STAINLESS STEEL BRACKETS AND BOLTS ARE TO BE PROVIDED.

- N. The cable entry shall be an integral part of the stator casing. The cable entry shall be comprised of a single cylindrical elastomer grommet, flanked by washers and a ferrule designed with close tolerance fit against the cable outside diameter and the entry inside diameter. This will provide a leakproof, torque free seal at the cable entrance. The assembly shall bear against a shoulder in the stator casing opening and compressed by a brass gland nut threaded into it. Interaction between the gland nut and the ferrule moves the grommet along the cable axially instead of with a rotary motion. Epoxies, silicones, or other secondary sealing systems shall not be considered acceptable.
- O. Motors
 - 1. The motor shall be a NEMA Design B, with Class F insulation for a 60 degree C maximum temperature rise above 40 degree C ambient and suitable for continuous submersible service.

2. Each pump motor shall be supplied with sufficient power cable to extend from the motor in operating position to the underside of the top slab of the chamber with sufficient excess length to extend to the panel box.
3. The motor shall be separated from the cable entry junction chamber by a watertight terminal board which shall isolate the motor interior from foreign material gaining access through the pump top.
4. The motor shall be in conformance with the latest recommendations of IEEE and NEMA, including noise requirements.

P. Electrical Controls:

1. The Contractor shall furnish all labor, equipment and materials to install pump control centers as shown on the Drawings in a Nema 4x enclosure, for operation on a 480 volt, 3 phase, 60 Hertz, 3 wire service. For each pump motor, there shall be included: a combination circuit breaker/overload unit providing overload protection, short circuit protection, manual reset and individual disconnect for all phases; across-the-line magnetic contractor; a 24 volt control circuit transformer with disconnect and overload protection shall be included with an automatic electrical alternator providing alternating operation of pumps under normal conditions or, in case of high level, allowing two pumps to operate simultaneously.
2. If a motor is disabled (e.g. overload, overtemp, or in off position) it shall shut down and lock out. If the faulted motor is lead, an induced alternation shall occur. If the faulted motor is lag, the next motor shall automatically substitute. Overload and disconnect functions shall be provided by a single magnetic-hydraulic, temperature-insensitive component.
3. Units shall be precalibrated to match motor and control characteristics and factory sealed to insure trip setting is tamper-proof; hand/off/automatic pump operation selector switch; provide all necessary auxiliary isolated contacts for computer interface; pump running pilot lights on operator's control plate; running time meters mounted on operator's control plate, a minimum 2 watt strip heater to provide condensation protection, lightning arrestor, and high level alarm. A delayed start feature shall be incorporated into the control panel, preventing, in the event of power failure, simultaneous starting of both pumps.
4. Terminal strips shall be provided prewired to the pump motor controls for wet well level float control wiring.
5. The pump control center shall be manufactured by the same manufacturer as the existing/replacement pump(s).

2.2 SHOP PAINTING

- A. All surfaces shall be thoroughly cleaned of dirt, grease, oil, rust, scale, or other injurious substances. All metal surfaces shall be sandblasted in accordance with SSPC-SP10, Near-White Blast Cleaning.

- B. All metal surfaces which shall be partially or wholly submerged shall receive a shop coat of polyester resin primer. All non-galvanized metal surfaces which will be above water surfaces shall receive a shop coat of a universally compatible primer.

2.3 ACCESSORIES

- A. Each pump shall be provided with easily identifiable terminal points to facilitate the exchange of the central control functions between the pumps and the process control system as indicated on the Contract Drawings.
- B. Pressure Gauges and Connections:
 - 1. Pump suction and discharge flanges shall be tapped for gauge connections as indicated in the Specifications.
 - 2. Gauge connections shall be 1/2 in. in diameter.
 - 3. Each connection shall include a shutoff needle valve and necessary lengths of pipe to allow the mounting of a pressure gauge. The open end on the gauge connection shall be plugged to prevent the accumulation of debris.
 - 4. Each pump shall be supplied with two liquid filled pressure gauges with snubber and diaphragm seals. Liquid shall be silicone, capable of withstanding a temperature range of -60°F to +150°F. One gauge shall be adequately sized to indicate discharge pressure while the other shall be adequately sized to indicate the suction conditions. The gauges shall be properly installed on the pump suction and discharge lines. The gauges shall operate over a range of 30 inches of mercury vacuum to 50 psig pressure. Gauges shall be a product of H.O. Trerice, Ashcroft, or equal.
- C. Each set of pumps shall be provided with one set of special tools required for complete service and maintenance.

2.4 SPARE PARTS

- A. Each pump shall be provided with one spare set of packings, valve seats, seals, drive belts and gaskets and any other necessary spare parts as recommended by the pump manufacturer. Any special tools required for maintenance shall be supplied with each pump.

PART 3 - WOWEXECUTION

3.1 INSTALLATION

- A. The equipment shall be installed in accordance with the manufacturer's recommendations.

3.2 INITIAL LUBRICATION

- A. Initial lubrication required for startup and field test operation shall be furnished and applied in accordance with the manufacturer's recommendations.

3.3 INSPECTION, STARTUP, AND TESTING

- A. The manufacturer of the pumps with drive motors of 25 Hp or larger shall provide a representative to check the installation, make final adjustments, supervise initial startup of each pump, and prepare a written test report thereof for the Owner.
- B. The representative shall instruct the Owner's personnel in the operation and maintenance of the equipment.
- C. For smaller pumps with drive motors of less than 25 Hp, the manufacturer shall make final adjustments, provide initial startup, and instruct the Owner's personnel in the operation and maintenance of the equipment.

3.4 PUMP TEST

- A. Unless otherwise noted, certified performance data based upon tests of each actual pump proposed to be furnished shall be submitted to the Engineer for acceptance. Tests shall be performed in accordance with the Test Code of the Hydraulic Institute Standards and shall demonstrate compliance with the operating conditions specified. The Engineer shall be notified and afforded the opportunity to witness the test.

3.5 MOTOR TEST

- A. Tests shall be performed in accordance with the American Standard Test Code.
- B. Short commercial test: For motors of less than 25 Hp, a certified report of the short commercial test of each actual motor proposed to be furnished shall be submitted to the Engineer for acceptance.
- C. Complete test: For motors of 25 Hp and greater, certified motor efficiency curve at 100, 75, and 50 percent of full load based upon a complete test of a motor of identical design specifications to the motor proposed to be furnished shall be submitted.

3.6 OPERATION AND MAINTENANCE MANUALS

- A. Operation and maintenance (O&M) manuals shall be provided prior to or with the delivery of the equipment. The O & M manuals shall include instructions on storage, installation, start-up, and operation and maintenance, together with a complete parts list and a recommended spare parts list. The O & M manuals shall be in compliance with the General Requirements.

3.7 EQUIPMENT SCHEDULE

All pumps are pumping wastewater at a temperature of 35-75°F.

Location	Name	Number of New	Pump Manuf.	Pump HP	Pump Requirements	Power Requirements	Discharge Size
1	Haywood Beach	0	Meyers	15	425 GPM @ 47' TDH	460V / 3Φ / 60 Hz	4"
2	Red Brook	2	Meyers	10	205 GPM @ 76' TDH	240V / 3Φ / 60 Hz	4"
3	Westminster	1	Meyers	15	350 GPM @ 38' TDH	460V / 3Φ / 60 Hz	4"
4	Elm	2	Meyers	15	650 GPM @ 29' TDH	460V / 3Φ / 60 Hz	6"
5	North Ridge - Rockwell	2	Barnes	18	800 GPM @ 32' TDH	460V / 3Φ / 60 Hz	6"
6	North Ridge - Old Orchard	2	Hydromatic	15	710 GPM @ 42' TDH	460V / 3Φ / 60 Hz	6"
7	New London	2	Hydromatic	10	540 GPM @ 45' TDH	460V / 3Φ / 60 Hz	6"
8	North Ridge - Depot	1	Meyers	7.5	300 GPM @ 41' TDH	460V / 3Φ / 60 Hz	4"
9	Runkle - West 63rd	0	Meyers	7.5	130 GPM @ 57' TDH	460V / 3Φ / 60 Hz	4"
10	Jefferson Road	2	Meyers	20	410 GPM @ 85' TDH	460V / 3Φ / 60 Hz	4"
11	Rte 84	1	Meyers	3	m/n 4030M4-21	240V / 1Φ / 60 Hz	

END OF SECTION 432100