SECTION 11307
SEWAGEPUMPING UNITS

1.0 GENERAL

A. Description

Sewage Pumping Units shall include but not necessarily be limited to furnishing and installing the sewage pumping units, including basin, (tank), pumps and motors, check valves, and control and alarm panels of the size and type shown on the plans and in accordance with the Contract Documents.

B. Submittals

Shop drawings shall be furnished for review and approval to the Engineer with subsequent review and approval by the Commission for the following items:

1. Pump Selection

   a. In the interest of limiting inventory of pump units and replacement parts, unless special permission is granted to the contrary, only the units shown in the List of Approved Materials and Manufacturers Appendix shall be allowed for use in St. Mary's County.

2. Design Factors

   a. Design factors shall be based on individual pump specifications in relation to expected usage, i.e., single family dwelling, restaurant, etc. All pumps shall be designed following chapter 5 of the design manual.

   b. Provide calculations to support usage.

3. Plans

   a. Plans and specifications shall clearly state the design engineer's choice as to manufacturer, pump size and model number on each application.

   b. Show easements required for access.

A. Related Work Specified Elsewhere

1. Trench Excavation, Backfill and Compaction: Section 02250

2. Gravity Sanitary Sewer and House Connections: Section 02561

3. Low Pressure Sewer: Section: 02566

4. Sanitary Sewer Force Mains: Section 02563

5. Cast-in-Place Concrete: Section 03300

B. Quality Assurance

1. All pump installations, regardless of maintenance responsibilities, shall be

inspected, with initial start-up, by a Commission Inspector. The sole purpose behind the Commission Inspector inspecting a non-Commission pump is to affix a sign stating owner maintenance responsibility on the pump and to ensure against inflow/infiltration.

2. The pump shall be free from electrical and fire hazards as required in residential and commercial environments.

3. The pump shall meet accepted standards for plumbing equipment for use for residential and commercial environments and shall be free from noise, odor, or health hazards, and shall have been tested by an independent laboratory to certify its capability to perform as specified in either individual or low pressure sewer system applications. As evidence of compliance with this requirement, the pump shall display the seal of NSF International.

2.0 MATERIALS

A. General

1. Materials shall be furnished in accordance with the Contract Documents.

B. Sewage Pump Units

1. The Contractor shall furnish new, factory-built sewage pump units consisting of simplex or duplex pump units and all necessary parts and equipment installed in fiberglass basin.

2. For pumps that will be maintained by the Commission, shall be specified in the List of Approved Materials and Manufacturers, depending on the system providing service, are acceptable.

   For pumps that will be maintained by the property owners, the manufacturers shown in the List of Approved Materials and Manufacturers Appendix are acceptable. Other pumps may be allowed by the Chief Engineer if documentation is submitted (and approved by the Commission) from a reputable source (i.e., Engineer, pump manufacturer, etc.) that the desired pump is completely compatible with the existing system. Other pumps will not be serviced by the Commission in the event of an emergency.

3. Operating Conditions:

   a. Operating characteristics as shown on Contract Drawings.

4. Pump Model:

   a. Pump shall be of the centrifugal type with an integrally built in unit and submersible type motor. The unit shall be capable of macerating all material in normal domestic and commercial sewage including reasonable amounts of foreign objects such as small wood, sticks, plastic, thin rubber, sanitary napkins, disposable diapers and the like to a fine slurry that will pass freely through the pump and discharge pipe.

5. Pump Impeller:

a. The pump impeller shall be of the recessed type to provide an open unobstructed passage through the volute for the ground solids. Impeller shall be cast iron and shall be threaded onto stainless steel shaft.

6. Electric Motor:

a. Pump motor shall be of the submersible type rated 2 horsepower at 3450 RPM. Motor shall be for single phase 230 volts. Single phase motors shall be capacitor start, capacitor run. NEMA L type.

b. Stator winding shall be of the open type with Class F insulation good for 155ºC (311ºF) maximum operating temperature. Winding housing shall be filled with a clean high dielectric oil that lubricates bearings and seals and transfers heat from windings and rotor to outer shell. Air-filled motors which do not have the superior heat dissipating capabilities of oil filled motors shall not be considered equal.

c. Motor shall have two heavy-duty ball bearings to support pump shaft and take radial and thrust loads. Ball bearings shall be designed for 50,000 hours B-10 life. Stator shall be pressed into motor housing.

d. Single-phase motors shall have a heat sensor thermostat and overload attached to the top end of the motor winding to stop the motor if the motor winding temperature reaches 200ºF. The high temperature shut-off will cause the pump to cease operation, should a control failure cause the pump to run in a dry wet well. The thermostat shall reset automatically when the motor cools to safe operating temperature.

e. The common motor pump and shaft shall be of #416 stainless steel thread to take pump impeller and impeller.

7. Seals:

a. Motor shall be protected by two mechanical seals mounted in tandem with a seal chamber between the seals. Seal chamber shall be oil filled to lubricate seal face and to transmit heat from shaft to outer shell.

b. Seal face shall be carbon and ceramic and lapped to a flatness of one light band. Optional seal material shall be used when required by the Commission.

c. An electrode shall be mounted in the seal chamber to detect any water entering the chamber through the lower seal. Water in the chamber shall cause a red light to turn on at the control box. This signal shall not stop the motor but shall act as a warning only, indicating service is required.

8. Check Valve:

a. The pump discharge shall be equipped with a factory installed, check valve that is built into the discharge pipe. The valve shall be constructed with a cast iron housing and stainless steel interior components. The valve will provide a full-port passageway when open.

9. Working parts shall be made of 316 stainless steel. The valve operation shall provide maximum seating capability, even at very low back pressure. The check valve will provide a full-ported passageway when open.

C. Controls

1. All necessary controls shall be located in the pump control panel.

2. Non-fouling waste water level detection for controlling pump operation shall be accomplished by float switches.

3. To assure reliable operation of the level controls, installation shall be per manufacturer's instructions and St. Mary's County Metropolitan Commission Standard Details.

4. The importance of using only approved electrical materials cannot be over emphasized. Close adherence to the following is mandatory:

   a. The control/power (cable) leading from the control panel to the basin connection box shall be in accordance to Standard Detail for each pump manufacturer. Wiring diagram and color codes shall be strictly enforced by the Commission.

   b. All wires shall be encased 1¼" in conduit and shall be buried at a minimum depth of 24 inches. Conduit protection is required for wires leading down from the control panel and the cable grips exiting the pump basin. All wires shall enter the basin through the factory provided sealing type cord grips. Any holes otherwise drilled shall be cleared and repaired to water tight integrity prior to final approval of the installation.

   c. All wiring shall be installed in compliance with NEC, state and local codes, with electrical inspection by the designated inspection agency for St. Mary's County. The pump test prior to final approval will not be conducted by Commission inspectors until ALL associated wiring has been inspected and approved by the designated inspection agency for St. Mary's County.

   d. The Contractor shall coordinate the order length of control/power cable between the pump location and the control panel. The control/power cable between the pump and the pump control panel shall be one piece with no splices. The maximum length shall not exceed 150'.

D. Pump Control Panel

1. The control panel, which also serves as an alarm device (flashing light), shall be mounted on the dwelling, easily visible from the pump basin and routinely observable by the home occupants or installed on a 4 x 4 vinyl or composite post, mounted to composite or stainless steel cross members with stainless steel hardware. The post will be secured in concrete adjacent to the pump location. The control panel shall be mounted at a height of 36 inches to the bottom of the panel, For control panels that are located away from the pump basin a 10 foot utility easement is required, centered over the electric lines,

2. Each sewer pumping unit shall include a NEMA 4x, UL listed pump control panel suitable for mounting on the exterior of a residential dwelling. The NEMA 4x enclosure shall be manufactured of UV-stabilized thermal plastic. The enclosure shall include a hinged, pad-lockable cover secured dead front (protection from exposed wires), and component knockouts.

3. For each pump, the control panel shall contain one (1) 20 amp dedicated double pole circuit breaker for the power circuit.

4. The control panel shall contain at least, but not be limited to, terminal blocks, integral power bus, push to run feature, and a complete alarm circuit. The visual alarm lamp shall be inside a red fluted lens. The visual alarm shall be mounted to the top of the pump control in such a manner as to maintain NEMA 4x rating.

5. The audio alarm shall be a printed circuit board in conjunction with an 86-Db buzzer with a quick mounting terminal strip mounted in the interior of the enclosure. The audio alarm shall be capable of being de-activated by depressing a push-type switch which is weather proof and mounted on the enclosure.

E. Interior Piping and Fittings

1. All discharge piping and fittings shall be stainless steel or PVC Schedule 80.

   Interior Parts/Stainless

   a. Float Rack -- Stainless
   b. Lifting Chain -- Stainless

F. Warranty

1. The pump manufacturer shall provide parts and labor warranty on the entire sewage pumping unit and accessories, including but not limited to, control panel, electrical parts, pump core, tank basin and cabling and internal piping, valves and appurtenances for a period of 12 months after pump core is placed into service. All service calls during this 12-month period will be deemed necessary as warranty work. Responsibility for installation flaws, either material or workmanship, shall remain with the contractor for a period of eighteen months from date of installation.

2. When the Commission receives a service call request from a customer, they will determine ownership of the unit and repair/maintenance responsibilities to restore the service as soon as possible. If the unit is deemed defective, the Commission will contact the Contractor and arrange for repair or replacement. The repair or replacement must be completed by the Contractor after the notification. The Commission shall not be responsible for any labor, freight, transportation, taxes or any other costs associated with service deemed as warranty work. If the Contractor cannot or will not perform the repair on a timely basis, the Commission will repair the unit and will back charge the Developer or Contractor as per the Public Works Agreement or the Contract Documents. If the pump is not one of the models approved by the commission, the Commission will not provide repairs. The Commission will provide septic pump truck at the Contractor’s expense until repairs are complete.

3. The Contractor shall supply the Commission with the 24-hour telephone number of their representative who will be responding to warranty service calls.

G. Level Sensor

1. Pump alarm operation shall be accomplished by use of floats specifically designed for use in a sewage basin and installed per manufacturer’s instructions. Level detection shall not require any regular maintenance. The control assembly

shall be specifically approved by Underwriters Laboratories. Conventional mercury floats shall be acceptable.

H. Shut-off Valve

1. The pump discharge piping shall be equipped with a factory-installed, full port, stainless steel or Schedule 80 union type manual ball valve with a minimum rated pressure of 150 psi.

2. The valve shall be equipped with a valve key terminating within 8-inches from top of the cover.

I. Anti-Siphon Capability

1. The pump shall be constructed with a positively primed flooded suction configuration.

2. As added assurance that the pump cannot lose prime even under negative pressure conditions in the discharge piping system, the design shall provide protection against siphoning. This device will automatically close when the pump is running and open to atmosphere when the pump is off. Use of small-diameter orifices in the discharge piping between the pump and check valve for anti-siphoning purposes is not acceptable.

J. Material Storage Note: Materials shall be stored in order to insure the preservation of their quantity, quality and fitness for Work. The Contractor shall place materials on wooden platforms, or other hard, clean surfaces, not on the ground, and the materials shall be placed under cover when directed by the Owner. Stored materials shall be located in order to facilitate prompt inspection by the Owner. Lawns, grass plots, or other private or public property shall not be used for storage purposes without written permission of the owner or lessee. Unless directed or noted otherwise in the Contract documents, there will be no payment for stored materials.

3.0 EXECUTION

A. Factory Test

1. All components for the sewage pumping unit shall be factory tested and certified.

Certified test results shall be available upon request by the Commission. The Commission reserves the right to inspect such testing procedures with representatives of the pump manufacturer at the manufacturer's facilities and at their expense.

All completed stations shall be factory leak tested to assure the integrity of all joints, seams and penetrations. All necessary penetrations such as inlets, discharge fittings, and cable connections shall be included in this test along with their respective sealing means (grommets, gaskets, etc.).

B. Delivery

1. All pump tanks, including ball valve, disconnects, and watertight penetrations, shall be delivered to the job site 100% complete assembled including testing, ready for installation.

2. The pump basin with pump lift-out rail system is assembled complete at the factory, except for insertion of the core unit (pump and motor) and preparation of the inlet orifice which is completed with a five inch (5") hole saw in the field. In keeping with manufacturer's warranty provisions, the basin must remain in an upright position at all times.

C. Installation Procedure

1. Location of the Installation

a. Prior to excavation, the Contractor shall contact the Commission to schedule the Pre-construction meeting and to establish the pump in-ground location and/or service connection (Tap) location.

b. Unless otherwise stated, the property owner shall be responsible for the installation of the pump and all associated lines necessary to provide service. The property owner shall install at their expense a (comment #60) valve and roadway box at the property line. Maintenance responsibility for all on-site facilities, i.e., upstream of the ball valve, shall be determined by the Commission. Emergency repairs will be provided by the Commission personnel, if requested by the property owner. Emergency repairs will be on an "as available" and a reimbursable basis.

c. Earth excavation and backfill shall be specified in accordance with the Standard Specifications and/or the Specifications and the Drawings to be done as a part of the work under this section, (including any necessary sheeting and bracing). The Contractor shall be responsible for control of groundwater to provide a firm, dry subgrade for the structure and shall guard against flotation or other damage resulting from general water or flooding. The pump stations shall not be set into the excavation until the installation procedures and excavation have been approved by the Commission Inspector.

2. Installation

a. If a sewer service connection is not available, a connection shall be completed at the low pressure sewer main as shown in the Standard Details. The tapping location point shall be located by the Commission Inspector. All discharge piping shall be through a brass (Ford B11-555) in-line ball valve with the 2" x 2" operating nut (Ford QT67), ¼ turn counter-clockwise to open. Use of 90º bends in the discharge line is prohibited. This service valve shall be located by the Commission Inspector.

b. The operating nut shall be accessible via a six inch (6"), screw type, open base (arched), cast iron, roadway valve box with "SEWER" lid. The valve box shall rest on a standard 3 5/8" x 7 5/8" x 15 5/8", solid building block positioned on undisturbed earth.

c. The Contractor shall remove packing material. User's instructions shall be given to the Commission Inspector. Hardware supplied with the unit, if required, shall be used at time of installation. Appropriate inlet piping shall be used. When moving the basin, use of the lifting eyes provided at the lower end of the concrete collar attached to the tank shall be required. The basin may not be dropped, rolled, or laid on its side for any reason.

d. A concrete anti-floatation collar, as shown on the drawings and details and sized according to the Commission Inspector, shall be required and shall be precast to the pump basin. Each pump basin with its precast anti-floatation collar shall have four (4) lifting eyes embedded, equally spaced for setting purposes.

All anti-floatation concrete collars shall be cast-in place integrally with the pump basin above ground in a form, as shown in the Standard Details.

e. The excavation shall be made as shown in the standard details The Contractor shall remove unsuitable soil s where post-installation settling may damage inlet/outlet piping.

. The unit shall be leveled and plumb.

If the basin cover is not properly set at grade or the basin is not plumb, the Commission Inspector will require adjustment prior to final approval.

f. After a firm, level gravel base has been prepared, the unit shall be carefully lowered into the excavation with correct orientation of the discharge fitting. The basin must remain level and setting firm on the gravel base during placement. This requires continuous evacuation (by pump) of any and all ground water which may invade the hole.

g. The contractor shall provide and install pump house connection piping as shown on the manufacturer's instructions and Standard Details.

The pump inlet orifice shall be cut in the basin wall 36 inches from the bottom of the basin, well clear of the rail lift-out system, as shown on the standard detail (comment # 60) and only with a five inch (5") hole saw. Proceed as follows:

1) Lightly sand inlet hole edges.

2) Coat mating surfaces of the inlet fitting and the five inch (5") orifice with silicon sealant; join mating parts and gasket.

3) Chamber end of four inch (4") SCH 40 sewer soil pipe. Lubricate end of pipe and inlet fitting; insert pipe in fitting not to exceed one inch (1") past basin wall. Note: Use of petroleum or solvent based lube is prohibited-damaged to flex-fitting will result.

4) Generously apply silicon caulk over and around where fitting mates with basin wall and 4 inch sewer soil pipe.

h. The pump exterior discharge piping shall be connected to the discharge flanged through a NPT bronze, one way flow valve as shown on the standard details. Proceed as follows:

1) From the check valve, continue to the property line with SCH 80 with solvent weld pressure couplings.

2) If the low pressure sewer service connection at the property line is already installed, connect the pump discharge pipe to the

existing ball valve. Open all in-line ball valves to ensure proper operation when pump is activated.

3) Thrust blocking shall be required on all bends.

Caution – All work, from inlet fitting to sewer main wet tap (when applicable), must be inspected by a Commission Inspector prior to backfill. Failure to comply with this provision will require uncovering all work prior to final project approval.

4) Backfill with wash gravel from top of concrete anti-floatation collar to six inches (6") minimum above pump discharge pipe, then backfill in accordance with the Contract Documents. Improper backfilling may result in damage. Keep in mind that the basin top must be leveled with the surrounding soil surface, which must be then slope away from basin top.

All piping shall be bedded on a firm base of wash gravel and thereafter covered with at least 6 inches (6") of the same material.

Backfill around and in contact with the basin shall be dry, class one, select backfill only, consisting of sand, gravel or a combination thereof. Special care is required to ensure good support under piping connected.

5) Upon completion of backfilling, Contractor shall secure the pump basin lid.

It is extremely important that the finished grade shall slope away from the surface of the unit. Final grade and restoration inspection will be made when the pump is activated.

3. Start Up

a. Activation of the pump by other than Commission personnel is a violation of Chapter 113, Section 21B of the local public laws of Maryland. This provision is for the protection of the pump purchaser. Any damage caused by unauthorized pump start-up will not be covered by the manufacturer's warranty and neither shall the Commission be responsible for any such damage. The Contractor or Purchaser shall contact the Commission Engineering Department when activation and start-up of pump is desired.

b. All restoration shall be the responsibility of the Contractor. Per unit costs for this item shall be included in the Contractor's bid price for the individual pump stations. All properties shall be restored in all respects including, but not limited to, curb and sidewalk replacement, landscaping, topsoil and seeding, and restoration of the traveled ways as directed by the Commission Inspector. See Standard Details.

c. Final Inspection for Start-Up

1) Electrical Inspection: The Electrical and Code inspections shall be approved prior to the Commission inspection.

2) Accessibility: Access must be provided for the Commission Inspector and personnel to perform the Inspection.

3) Commission Inspector and personnel will verify and /or perform the following at a minimum:

a. Check all wiring color code and gauges, and for the two 12 gauge spares. Wiring diagram shall be provided by the Commission.

b. Check to see if wires are pulled in too tightly, the wires shall have six inches of slack on each end. The Commission Inspector will check to see that the spares are continuous through the conduit.

c. Take amp reading.

d. Test alarm.

e. Check location of service cut off valve.

f. Inspect junction box in vault.

g. Run pump through all float cycles with water. (Test Mode).

h. Check for Final Grade.

i. Grading: All sewer appurtenances and structures shall be finish graded in a 10 ft. radius around each item.

j. Erosion Control: All items, finish graded, must be seeded and strawed at a minimum. Soil erosion fabric, (i.e. curlex), is preferred. Where necessary, such as on slopes, silt fence should be used.

k. Markers: 2 X 4 markers must be staked on each side of each item and painted with green reflective paint.

l. .

m. Place lock or seal on the Control Panel.

n. Affix Inspection sticker (owner ship/maintenance responsibility.)

4.0 METHOD OF MEASUREMENT

A. Measurement for Sewage Pumping unit installations will be made of the number of Sewage Pumping units satisfactorily installed as shown on the plans or directed by the Commission.

5.0 BASIS OF PAYMENT

A. General

1. Payment will be made at the unit price bid. The price bid shall include furnishing all labor, tools, equipment, and materials necessary to satisfactorily complete the work as shown as specified in strict accordance with the Contract Documents.

2. The price(s) bid for furnishing and installing Sewage Pumping units shall include the following:

   a. Trench excavation, backfill, compaction and incidental items specified in Section 02250 and elsewhere.

   b. Cast-in-Place concrete, Section 03300.

B. Sewage Pump Units

1. Payment for furnishing and installing Sewage Pumping units, complete, in-place, will be made per each Sewage Pumping unit placed. The price bid shall include all sediment and erosion control, traffic control, excavation, removal and disposal of spoil materials; furnishing and placing cast-in-place concrete, furnishing and placing washed gravel beneath unit and around basin, backfill and compaction, restoration, warranty and for incidental items to complete the installation.

“END OF SECTION 11307”