

New Connection to Lake Tishomingo Sewer System

From Addendum 3.

Section 336250 - STEP SYSTEM & COLLECTION SYSTEM GENERAL SPECIFICATIONS shall be amended as follows:

Section 4.1. General shall be revised to read precast concrete tanks, fiberglass tanks, or polyethylene tanks shall have been designed by a registered engineer and approved by state or local regulatory agencies or authorities."

The attached specification for Polyethylene Tanks shall be inserted as item number 4 of Section A.

Polyethylene Step System Tanks 334310

4. POLYETHYLENE STEP SYSTEM TANKS

PART 1 _ GENERAL

1.1. Contractor shall furnish and install HDPE polyethylene step tank(s) plus fittings and fixtures as approved by the Engineer. Approved suppliers include Flow Systems Process Equipment, Inc., Vandevanter Engineering, or approved equal. The tank shall strictly meet the following performance specifications. The tank shall be of 1000 gallon capacity and shall meet all requirements of the Missouri Department of Natural Resources. As such, the tank shall have (2) manhole openings, and riser system as specified in Section 336250 B. The Tank shall be furnished with two (2) 4" Schedule 40 PVC Stiffening Posts in place.

1.2. Reference: All tanks provided must be certified to both CAN/CSA B66-05 and IAPMO/ANSI Z1000-2007 standards as indicated by the IAPMO cUPC mark permanently molded into the tank. In addition, all state and local regulations and codes shall be followed.

1.3. Standards

The following generally recognized testing methods for plastic materials shall apply:

- 2.1.1 ASTM D 1248 - Standard Specification for Polyethylene Plastics Extrusion Materials for Wire and Cable;
- 2.1.2 ASTM D 1693 - Standard Test Method for Environmental Stress-Cracking of Ethylene Plastics,
- 2.1.3 ASTM D638 - Standard Test Method for Tensile Properties of Plastics;
- 2.1.4 CAN/CSA - 866-05 Prefabricated Septic Tanks and Sewage Holding Tanks;
- 2.1.5 International Association of Plumbing and Mechanical Officials - IAPMO/ANSI Z1000-2007 Material and Property Standard for Prefabricated Septic Tanks.
- 2.1.6 ASTM D790 - Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials

PART 2 - PRODUCTS

2.1 Material

The polyethylene used shall comply with ASTM Standard D1248, Specification for Polyethylene Plastics Molding and Extrusion Materials. Raw materials shall meet or exceed the following:

D1248, Class B - requiring ultraviolet stabilizer or
D1248, Class C - requiring a minimum 1% carbon black and
D638 - Tensile strength of 2,400 pounds or greater
D1693 - Environmental stress crack resistance of 150 hours or more
D790 - Flexural modulus of elasticity of 85,000 pounds or greater

2.2 Tank Construction

- A. All tanks shall be of monolithic construction and shall be blow molded using high molecular weight HDPE resin. There shall be no metal parts molded into polyethylene tanks.
- B. Tanks shall include factory installed internal support posts'
- C. Wall Thickness and Tank Weight

Wall thickness of all polyethylene tanks shall be determined by manufacturer's design and shall be a minimum of 0.25 inches. Internal baffles and partitions shall be determined by manufacturer's design and shall be a minimum of 0.1875 inches.

The tanks shall have a minimum weight to volume ratio of 0.35 pounds per total gallon of capacity. This ratio shall be calculated by dividing the net weight of the tank only (without lids, risers, compartment walls, t-baffles etc.) by the total capacity of the tank. Total capacity shall be defined as the volume in gallons of the tank when completely filled and without airspace.

D. Tank Pumping

All tanks shall have sufficient structural integrity to withstand being pumped dry without incurring structural deformation (i.e. rib collapse).

E. Riser Connections

All risers shall be watertight, available in 6-inch increments and be able to extend to grade from the maximum burial depth. Tanks shall include Manufacturer provided step riser to tank adapter.

PART 3 _ EXECUTION

3.1 - Installation

Excavation, tank installation, inlet installation, fastening of fittings, pipe connections, and backfilling of tanks shall be per Manufacturer's specifications and approved by Engineer.

SECTION 336250

STEP SYSTEM & COLLECTION SYSTEM GENERAL SPECIFICATIONS

Throughout this document you will find the term “or approved equal”. For this project this term “approved equal” shall mean equal in the judgment of the engineer. Plan Holders may submit a product to be included as an “approved equal”. Submittals are required no later than 15 days prior to the bid. The Engineer will issue an addendum indicating any additional approved equipment.

It is the desire of the Engineer to seek quality bids with TOTAL SYSTEMS RESPONSIBILITIES, not various “piece meal” components of the system from various suppliers. The manufacturers shall have a minimum of 10 years of manufacturing and operations experience with a minimum of no less than 5 operating installations in the State of Missouri.

Should the plan holder seek approval of a product other than the brand or brands named in the specifications, it shall furnish written evidence that such product conforms in all respects to the specified requirements, and that it has been used successfully elsewhere under similar conditions. If the product includes the pumps within the STEP Tank Effluent Pumping Systems, plan holder shall submit a hydraulic analysis for the pressure sewer system showing proposed pumps will adequately operate within the designed parameters. Where the specified requirements involve conformance to recognized codes or standards the plan holder shall furnish evidence of such conformance in the form of test or inspection reports, prepared by a recognized agency, and bearing an authorized signature.

Manufacturer’s standard data and catalog cut sheets will not be considered sufficient in themselves, and the engineer will not be responsible for seeking further data from the manufacturer, or for otherwise researching the product. Failure to provide complete data will be cause for rejection of the product. The submission shall include any impacts that could be expected from the alternative product and shall also indicate any product that would require a license or royalty, the actual fees, and a note that these fees would be handled by the plan holder.

The plan holder shall provide submissions, meeting the above parameters no less than 15 days prior to bid opening for review and comment by the engineer.

A. ONSITE STEP TANKS

1. **General:** The manufacturer shall provide the structural design and certification to the engineer for review. The design shall be in accordance with accepted engineering practice. Precast concrete tanks shall have been designed by a registered engineer and approved by state or local regulatory agencies or

authorities. To achieve effective performance and minimize pump-out occurrences, residential interceptor tanks shall have a nominal liquid capacity of 1000 gallons.

a. Loading Criteria:

- There shall be 140 lbs./cu.ft. for minimum weight of saturated backfill, or 127 lbs./cu.ft. for unsaturated backfill (500 lbs./sq.ft. minimum).
- Minimum lateral loading shall be 62.4 lbs./cu.ft. Lateral loading shall be determined from ground surface.
- The tank shall also support a concentrated wheel load of 2500 lbs.

There are four (4) typical loading conditions that should be analyzed:

1. 4 ft. Bury + Full Exterior Hydrostatic Load
2. 4 ft. Bury + Full Exterior Hydrostatic Load + 2500 lb. Wheel Load.
3. 1 ft. Bury + 2500 lb. Wheel Load.
4. Tank Full, Interior Hydrostatic Load and Unsupported by Soil.

Load Case 4 represents the tank full of liquid at 62.4 lbs/cu.ft. This condition addresses seam and haunch stress-strain relationships that occur during water tightness testing, as well as poor soil bedding conditions that provide inadequate support.

- b. Tanks requiring deep burial (>48”) or subject to truck or heavy traffic loading require special consideration. (A minimum soil cover of 12” shall be used, unless specified otherwise by manufacturer.)
- c. *All tanks shall be structurally sound and watertight and shall be guaranteed in writing by the tank manufacturer for a period of two years from the date of final acceptance. Manufacturer shall also provide certification of ability to produce STEP tanks as needed to allow Contractor to complete installation of said tanks within contract times. Manufacturer's signed guarantee and production certification shall accompany bids. The tank guarantee/warranty shall be furnished at the time of submittal. Tank warranty shall not be limited liability to replacement cost of the tanks. The STEP tank shall be capable of*

withstanding long-term hydrostatic loading, in addition to the soil loading, due to a water table maintained at ground surface.

- d. Tanks shall be manufactured and furnished with two (2) access openings 20" in diameter and of the configuration shown on the manufacturer's drawings. Modification of completed tanks will not be permitted.
- e. Inlet plumbing shall include an inlet tee that penetrates 18" into the liquid from the inlet flow line. (The depth may vary depending on the tank's height; in all cases, though, the inlet should extend to a level below the bottom of the maximum scum depth.) The inlet plumbing shall allow for natural ventilation back through the building sewer and vent stack.
- f. Tanks shall be capable of successfully withstanding an aboveground static hydraulic test and shall be individually tested.
- g. All tanks shall be installed in strict accordance with the manufacturer's recommended installation instructions.

2. Concrete Tanks:

- a. Walls, bottom and top of reinforced concrete tanks shall be designed across the shortest dimension using one-way slab analysis. Stresses in each face of monolithically constructed tanks may be determined by analyzing the tank cross-section as a continuous fixed frame.
- b. The walls and bottom slab shall be poured monolithically; alternatively, water stops may be provided.
- c. Reinforcing steel shall be ASTM A-615 Grade 60, $f_y = 60,000$ psi. Details and placement shall be in accordance with ACI 315 and ACI 318.
- d. Concrete shall be ready-mix with cement conforming to ASTM C150, Type II. It shall have a cement content of not less than six (6) sacks per cubic yard and maximum aggregate size of 3/4". Water/cement ratio shall be kept low ($0.35 \pm$) with $6.00\% \pm 1.50\%$ air entrainment, and concrete shall achieve a minimum compressive strength of 4000 psi in 28 days. The Contractor shall submit a concrete mix design to the Engineer for review and approval. Three (3) concrete sample cylinders shall be taken and tested for one (1) tank out of five (5) tanks for the first twenty (20) tanks manufactured, after the first twenty (20) tanks, one (1) sample shall be taken for each twenty (20) tanks manufactured. If contractor purchases tanks from multiple manufacturers, then each manufacturer shall individually be subject to the testing requirements. If the minimum compressive strength is not

being obtained, the manufacturer shall be required to make and test sample cylinders for each tank manufactured. Calcium chloride will not be allowed in the mix design. The cost of testing cylinders shall be the tank manufacturer's responsibility.

- e. Tanks may be protected by applying a heavy cement-base waterproof coating (similar to Thoroseal[®] or approved equal), on both inside and outside surfaces, in compliance with Council of American Building Officials (CABO) report #NRB-168; 6181; however, the tank should be watertight without the addition of seal coatings.
- f. Form release used on tank molds shall be similar to Nox Crete[™] or approved equal. Diesel or other petroleum products are not acceptable.
- g. Tanks shall not be moved from the manufacturing site to the job site until the tank has cured for seven (7) days or has reached two-thirds of the design strength.
- h. Tanks shall be manufactured and furnished with access openings of the size and configuration to accommodate individual packaged pump systems. For 24" diameter access risers, either a cast in place flanged tank adapter to facilitate the bonding of a 24" diameter access riser or a bolt-on riser adapter ring shall be supplied. The flanged tank adapter or riser adapter ring shall be made of 1/4" thick ABS and shall have an outside diameter of 27" and an inside diameter of 22-3/4". The adapter must have an overall height of no less than 3" to allow 1-1/2" exposed for sufficient bonding area once the adapter is installed in the tank. For 21" and 30" diameter access risers, either a grooved tank adapter plate or a flanged tank adapter may be installed in the tank. The adapter shall be manufactured of fiberglass or ABS and shall accommodate either a 21" or 30" diameter access riser.
- i. The STEP tank and the top slab shall be sealed with a preformed flexible plastic gasket. The flexible plastic gasket shall be similar to the flexible butyl resin sealant congeal CS-102 or CS-202 as manufactured by Concrete Sealants, Inc. of New Carlisle, Ohio, or approved equal, and shall conform to federal specification SS-S-00210(2iOA) and AASHTO M-198. A mechanical fastening method shall be used if the seasonal groundwater level may reach the top slab seam of the tank.
- j. In order to demonstrate water-tightness, tanks shall be tested at the factory prior to acceptance. Inlets to the STEP tank will be watertight pipe seal similar to Cast-A-Seal[™] (Manufactured by Press-Seal Gasket Corporation) or approved equal. Each tank shall be tested at the factory, prior to shipping, by filling with water to the soffit and letting stand. After 24 hours, the tank shall be refilled to the soffit and the exfiltration rate shall be determined by

measuring the water loss during the next two (2) hours. Any leakage shall be cause for rejection.

B. RISERS & LIDS:

1. Risers:

Risers shall be required for access to internal vaults and access into the STEP tanks for septage pumping. All risers shall be constructed watertight. The risers shall be attached to the tanks such that a watertight seal is provided. Risers shall extend a minimum of 3” above final grade or maximum flood level, whichever is higher, to allow for settlement and to ensure positive drainage away from the access and prevent flooding of the access riser. Risers for inspection ports shall be a minimum of 18” in nominal diameter. Risers containing pumping assemblies or electrical splice boxes shall be a minimum of 24” in diameter and shall be of sufficient diameter to allow removal of internal vaults without removing splice boxes, etc. Risers shall be a minimum of 30” in nominal diameter when the depth of bury is 36” or greater or duplex pumping assemblies are used. All other risers shall be a minimum of 24” in nominal diameter and shall vary in height depending on the depth of bury on the various tanks. To ensure product compatibility, a single manufacturer shall supply risers, lids, and attachment components.

2. Inlet Risers:

Inlet risers shall be Orenco Systems[®], Inc. Model Perma-Loc, Ultra-Rib, KOR FLO, Polylok Model 3008-12, Zoeller Company, or engineer-approved equal. The material shall be PVC as per ASTM D-1784 and tested in accordance with AASHTO M304M-89. The risers shall be constructed of non-corrosive material and designed to be buried in soil. Risers shall have a minimum stiffness of 10 psi, when tested according to ASTM D2412. Risers shall be capable of withstanding a truck wheel load (54 square inches) of 2500 pounds for 60 minutes with a maximum vertical deflection of a 1/2 an inch. Risers shall extend to 3 inches above the ground surface to allow for settlement and shall have a minimum nominal diameter of 18 inches.

3. Outlet Risers:

Outlet risers shall be Orenco Systems[®], Inc. Model Perma-Loc, Ultra-Rib, KOR FLO, Polylok Model 3008-12, Zoeller Company, or engineer-approved equal. The material shall be PVC as per ASTM D-1784 and tested in accordance with AASHTO M304M-89. The risers shall be constructed of non-corrosive material and designed to be buried in soil. Risers shall have a minimum stiffness of 10 psi, when tested according to ASTM D2412. Risers shall be capable of withstanding a truck wheel load (54 square inches) of 2500 pounds for 60 minutes with a maximum vertical deflection of 1/2 an inch. Risers shall be at least 12 inches high, shall have a minimum nominal diameter of 24 inches for simplex pumping applications or 30 inches when used in a duplex pumping application and shall be factory-equipped with the following:

- a. Electrical and Discharge Grommets: EPDM grommets shall be installed for discharge piping, vent piping, and/or the electrical conduit to assure a watertight seal. The grommets shall be installed at the factory or provided by the manufacturer of the access risers.
- b. Adhesive: When bonding to concrete or fiberglass grooves a Manufacturer recommended adhesive shall be used.

4. Riser-To-Tank Attachment:

Risers shall be attached to tanks according to manufactures recommendations and shall be waterproof. All attachment components shall be constructed of waterproof, non-corrosive materials, such as PVC, ABS, fiberglass, or stainless steel. Adhesives and sealants shall be waterproof, corrosion resistant and approved for the intended application. The riser-to-tank connection shall be watertight and structurally sound. The riser-to-tank connection shall be capable of withstanding a vertical uplift of 5000 pounds to prevent riser separation due to tank settlement, frost heave, or accidental vehicle traffic over the tank.

5. Lids:

One lid shall be furnished with each access riser as appropriate, and shall be provided by the manufacturer of the access riser. Lids shall be fiberglass with green non-skid finish, and provided with stainless steel bolts, and wrench. Manufacturer shall provide evidence that lids have been used successfully in continuous field service for a minimum of five years to demonstrate long-term integrity and suitability for the application. Lids shall be waterproof, corrosion resistant and UV resistant. Lids shall be flat, with no noticeable upward dome. A crown or dome of no more than 1/8" is allowable. Lids shall not allow water to pond on them. Lids shall have a green non-skid finish. Self-lubricating plastics, such as polyethylene, shall not be considered non-skid without addition of a non-skid coating. Lids shall form a watertight seal with the top of riser. Lids shall be capable of withstanding a truck wheel load (54 square inches) of 2500 pounds for 60 minutes with a maximum vertical deflection of 3/4 of an inch. Lids shall be provided with tamper-resistant stainless steel fasteners and a tool for fastener removal. Tamper-resistant fasteners include recessed drives, such as hex, Torx, and square. Fasteners that can be removed with common screwdrivers, such as slotted and Phillips, or fasteners that can be removed with standard tools, such as pliers or crescent wrenches, are not considered tamper-resistant. To prevent a tripping hazard, fasteners shall not extend above the surface of the lid.

6. Riser Installation:

Riser installation shall be accomplished according to the manufacturer's instructions.

C. STEP TANK EFFLUENT PUMPING ASSEMBLIES:

Single Family Residences

All pumping systems shall be supplied by a reputable manufacturer with at least ten years of experience in supplying equipment for effluent sewers. References must be available on request from the engineer. Systems shall be Orenco Systems[®], Inc. High-Head Pumping Assemblies, Myers Engineered Products, Zoeller Company, or engineer-approved equal, composed of:

1. Risers & Lids:

Refer to section B, 1 through 6.

2. Pump Vault:

Orenco Systems[®], Inc. Model PVU Series, Universal Biotube[®] Pump Vault, Myers Engineered Products Filtered Pump Vault with Polyfilter, Zoeller Company 5041 Series, or engineer-approved equal, installed in conformance with the engineer's plans. The filter shall have a minimum effective screen area of no less than 15.5 square feet. The Biotube pump vault shall consist of a 12-inch diameter polyethylene vault with eight (8) 2-inch diameter holes or equivalent openings evenly spaced around the perimeter, located appropriately to allow for maximum sludge and scum accumulation before requiring pumping (approximately 70% of minimum liquid level). Housed inside the polyethylene vault shall be the Biotube assembly consisting of 1/8-inch mesh polypropylene tubes. Attached to the vault is a flow inducer to accept one or two high-head effluent pumps.

3. Discharge Hose and Valve Assembly:

For most single-family residences, Orenco Systems[®], Inc. Model HV100BCFCAS, Myers Engineered Products Kit, Zoeller Company 170 Series with 30-0187 check valve, or engineered-approved equal. Discharge assembly shall be 1-inch diameter and include 150 psi PVC ball valve, 150 psi PVC check valve, PVC flex hose with working pressure rating of 100 psi, and Schedule 40 PVC pipe. Anti-siphon valve: When pumping downhill discharge assembly shall include Orenco Systems[®], Inc. Model HVAS100 series, Myers Engineered Products Model ASV125, Zoeller Company 170 Series w/anti-siphon, or engineer-approved equal, 1", 150 psi Schedule 40 PVC anti-siphon valve.

4. Float Switch Assembly:

Orenco Systems[®], Inc. Model MF3A, or Myer Engineered Products 3-Float Tree, Zoeller Company Panel Package 10-1037, or engineer approved equal with three mercury switch floats mounted on a PVC stem attached to the filter cartridge. The floats must be adjustable and must be removable without removing the pump vault. The high/pump on, pump off and high-level alarms shall be preset per manufacturers' recommendation and approved by the

engineer. Each float lead shall be secured with a nylon strain relief bushing at the splice box. The floats shall be UL or CSA listed.

5. High-Head Effluent Pump:

Must be approved for use in pump vault as described in D2. For most single family home applications, an Orenco Systems[®], Inc. Model PF100511, Zoeller Company Model 5030-0007, Myers Engineered Products Model 2NFL51-12E, or engineered-approved equal, 1/2 hp, 115 VAC, single phase, 60 Hz, two-wire motor, with 10 foot long extra heavy duty (SO) electrical cord with ground. Pump shall be capable of providing an approximate flow rate of 12 gpm against a head of 160 feet, or 18 gpm against a head of 50 feet. Pump must be capable of a maximum head of 240 feet. Pump shall be UL and CSA listed as an effluent pump.

Total Amp load for complete system (pump & control panel) shall not exceed 20 amps, including the pumps listed above. Pumps shall be multi-stage, high head, effluent turbine submersible pumps. Other types of pumps will not be accepted. Pumps shall be covered by full warranty for no less than five years.

6. Electrical Splice Box:

Orenco Systems[®], Inc., Model SB4 series internal splice box, Myers Engineered Products Model SJB Junction Box, Zoeller Company Model 10-1399, or engineer-approved equal, UL approved for wet locations, equipped with four (4) electrical cord grips and a 3/4-inch outlet fitting. Also included shall be UL listed waterproof wire nuts. The use of a UL-approved conduit seal kit shall be required to prevent the passage of gases, vapors, or flames through the conduit.

7. Controls and Alarms:

Controls and alarms shall be listed per UL 508. Panels shall be repairable in the field without the use of soldering irons or substantial disassembly. Panel shall be Orenco Systems[®], Inc. Model MVP-S1RO HT, Zoeller Company Package Model 10-1037, Myers Engineered Products Model PZSF115CB, or engineered-approved equal control panel meeting the following:

Standard Components:

- a. Motor-Start Contactor: 120 VAC 16 FLA, 1 hp, 60 Hz; 2.5 million cycles at FLA (10 million at 50% FLA).
- b. Toggle Switch: Single-pole, double-throw HOA switch. 20 amps, 1 hp.
- c. Controls Circuit Breaker: 10 amps, OFF/ON switch. Single-pole 120 VAC. DIN rail mounting with thermal magnetic tripping characteristics.

- d. Pump Circuit Breaker: 20 amps, OFF/ON switch. Single-pole 120 VAC. DIN rail mounting with thermal magnetic tripping characteristics.
- e. Audio Alarm: 95 dB at 24", warble-tone sound.
- f. Visual Alarm: 7/8" diameter red lens, "Push-to-silence." NEMA 4, 1-watt bulb, 120 VAC
- g. Panel Enclosure: NEMA 4X rated, constructed of UV-resistant fiberglass or NEMA 4 rated, constructed of steel; hinges and latch are stainless steel. Conduit couplings provided.
- h. MVP: Panel Ratings: 120 VAC, 1 hp, 16 amps, single phase, 60 Hz.
- i. Hour Meter

Control panel may contain a heater but in no way shall the total amp draw of the pump and control panel exceed 20 amps.

8. Control Panel Location:

The pump control panel shall be mounted on a uni-strut galvanized metal post or exterior wall as dictated by the following:

For Customer's that have a signed electrical easement and that supply a dedicated electrical service with disconnect, the contractor shall attach the STEP system control panel to the home immediately next to the electrical service and disconnect. Contractor shall take great care and precautions when attaching the panel to the homes. If the Disconnect is not within sight of the pump tank or the location is not suitable for mounting of the pump control panel, the contractor shall mount the control panel immediately next to the proposed pump tank with a second disconnect.

For Customer's that do not sign an electrical easement but supply a dedicated electrical service with disconnect, the contractor shall place the STEP system control panel on a uni-strut galvanized metal post as close to the pump riser as possible. Panel shall face the pump riser. Contractor shall supply a disconnect at the panel should the homeowner's connection point not be within sight of the control panel.

For Customer's that do not supply a dedicated electrical service with disconnect, the contractor shall place the STEP system control panel on a uni-strut galvanized metal post as close to the pump riser as possible and shall connect the pump system to the control panel. Panel shall face the pump riser. Contractor shall not be responsible for any further electrical connection.

For those homes with an available electric circuit from an existing pump system or aerator, the contractor shall locate the STEP system control panel at or near the location of the existing system, either on a uni-strut galvanized metal post or on the dwelling should the homeowner sign an electrical easement.

The panel should be located at a convenient height (usually about five feet above the ground) and where it will be accessible for maintenance.

9. Service Connection:

Orenco Systems[®], Inc. Model SC100, Quanics Inc. Model PDS-SC-1.0, Zoeller Company Model 5043-003 with extra risers as necessary (Model 5083-0005) or engineered-approved equal. Service connection will include 1” swing check valve factory connected to a 1” ball valve. All components will be PVC Schedule 40 and rated for 150psi.

- a. Service connection shall be enclosed in PVC access riser as manufactured by Orenco Systems[®], Inc., Quanics Inc., Zoeller Company, or engineered-approved equal. Risers shall extend to three inches above the ground surface to allow for settlement and shall have a minimum nominal diameter of 8-inches.
- b. One lid shall be furnished with each access riser as appropriate, and shall be provided by the manufacturer of the access riser. Lids shall be fiberglass with green non-skid finish.

10. Installation:

All pumping system components shall be installed in accordance with the manufacturer's recommendations, the engineer's plans, and all state and local regulations.

D. TOOLS FOR SEPTAGE MEASUREMENT

1. Scum Measuring Utility Gauge (SMUG):

Contractor shall provide a minimum of one scum measuring utility gauge per 100 units. The gauge shall consist of a minimum 3/8” diameter stainless steel rod with an incremental scale for measuring scum levels. The rod shall be bent at a 90-degree angle at the base to aid in identifying the scum “by feeling.” The gauge shall be Orenco Systems[®], Inc. Model SMUG, Quanics Inc. Model OST-M-SJ, or engineer-approved equal.

2. Sludge Measuring Device:

Contractor shall provide a minimum of one engineer-approved sludge-measuring device per 100 interceptor tanks.

E. SUBMITTALS:

Contractor shall furnish at a minimum complete manufacturers specifications and installation instructions/drawings for all STEP system appurtenances and components. Manufacturer's information shall include a hydraulic analysis proving the proposed pumps and other appurtenances will operate satisfactorily within designed parameters.

F. SERVICE:

The pump manufacturer shall have a full capable certified service facility, both shop service and field service, within 120 miles of the jobsite capable of providing 24 hour emergency response.

G. MEASUREMENT AND PAYMENT

Measurement and Payment for individual STEP systems shall be as follows:

The contractor shall provide in his bid the cost to furnish and install a complete STEP system as a lump sum item per connection and shall include all items in Sections A through D. The bid shall also include the connection of the homeowners existing sewer line to the STEP tank and the complete electric connection from the pump to the control panel and the control panel to the homeowner provided electrical service connection point.

The cost of all fittings and appurtenances necessary to complete the service connection at the trunk line shall also be part of the lump sum item for the STEP system.

Measurement and payment for sewer force main laterals shall be per lineal foot and will be paid at the same price bid per lineal foot of service line whether it is 1.25" or 1.50" pipe. The cost of all fittings and appurtenances necessary to make a complete and useable system shall be considered incidental to the price per lineal foot for sewer force main laterals.

Septic tank locations are approximate and location may be adjusted in field. Changes less than 10' shall not affect the contract price.

NOTE: If a homeowner fails to provide an electrical service of any kind, contractor will only be required to install STEP tank, pump system, control panel, and service connection at the street. The service connection shall be stubbed out on the homeowners' side of the street and outside of the pavement. Contractor shall also fill new STEP tank with water. Contractor will not be required to connect STEP tank to

existing gravity service line, install sewer force main lateral, or decommission existing septic tank.

SECTION 336500

STEP SYSTEM **ELECTRICAL WORK**

1. **SCOPE:**

The work covered by this section consists of furnishing all plant, labor, materials, equipment, supervision and performing all operations necessary to furnish and install the electrical and control system for the Individual Septic Tank Effluent Pumping (STEP) Systems.

2. **MATERIALS:**

A. Pump Controls - The pump control panel shall be furnished by the supplier of the pumps. This panel is pre-wired at the factory and the electrical contractor shall be responsible for mounting the unit either on a service pole or on each individual home immediately next to the homeowner supplied electrical connection and making all external conduit and wiring connections. The panel consists of a built-in disconnect transformer, H-O-A switch for each pump, alarm circuit and light, magnetic starters, overload heaters and circuit breakers. The control panel shall be NEMA 4X rated. The pumps shall be operated by floats.

B. Conduit - Shall be rigid, heavy wall, schedule 40 PVC electrical conduit with waterproof couplings and fittings, NEMA 12, copper free aluminum, ferrous alloy or hot-dipped galvanized steel, on service pole. P.V.C. underground. All conduit above ground shall be rigid, heavy wall, schedule 40 PVC electrical conduit.

C. Wiring - Shall be 600 volts, 98% conductivity copper, conforming to the latest requirements of the National Electrical code and shall be new wire or cable. Wire for motor leads shall be #10 wire and float leads shall be #12 wire.

D. Disconnect Switch – as required by local codes, lockable, NEMA 4X enclosure, Square D or equal.

E. General. All electrical material shall conform to the National Electrical Code and bear the U. L. label.

3. **CONSTRUCTION METHODS:**

In general, all electrical construction and installation shall conform to the latest revision of the National Electrical Code.

Contractor will be required to bring power to STEP system control panel from homeowner provided dedicated electrical circuit and disconnect.

The Contractor shall receive, handle, store, install and assemble all equipment specified herein in accordance with manufacturer's requirements and recommendations.

The Contractor shall check all measurements and adjust his work to fit into the spaces allotted for same. Close cooperation between all trades will be required. All necessary offsets, bends, fittings, appliances, etc., required throughout the work, or to prevent interference in the respective installation shall be installed whether indicated or not.

The Contractor shall perform all ditching, excavation backfilling required for the electrical work. The conditions governing the excavation for electrical facilities shall be in accordance with general construction requirements and specifications.

Extreme care shall be taken by the Contractor in establishment of the exact depths and routing of new underground electrical facilities so as not to conflict or damage existing or new underground water, sewer, electric, or other service lines.

Connect the pump control panel to each individual pump with wiring in rigid heavy wall conduit. Provide power wiring and control wiring as required for proper operation of the pumps, control and alarm systems.

All above ground wiring shall be in rigid heavy wall conduit. All external boxes shall be rated at a minimum NEMA 3R

Electrical Service Wiring from the Customer supplied disconnect to the control panel may be either in rigid heavy wall conduit or of the direct bury variety.

Wire and cable shall be suitably protected from weather and damage during storage and handling and shall be in first class condition when installed.

All conduits shall be securely camped and supported in place before wires are pulled.

For Customer's that have a signed electrical easement and that supply a dedicated electrical service with disconnect, the contractor shall attach the STEP system control panel to the home immediately next to the electrical service and disconnect. Contractor shall take great care and precautions when attaching the panel to the homes. If the Disconnect is not within sight of the pump tank or the location is not suitable for mounting of the pump control panel, the contractor shall mount the control panel immediately next to the proposed pump tank with a second disconnect.

For Customer's that do not sign an electrical easement but supply a dedicated electrical service with disconnect, the contractor shall place the STEP system control panel on a uni-strut galvanized metal post as close to the pump riser as possible. Panel shall face the pump riser. Contractor shall supply a disconnect at the panel should the homeowner's connection point not be within sight of the control panel.

For Customer's that do not supply a dedicated electrical service with disconnect, the contractor shall place the STEP system control panel on a uni-strut galvanized metal post as close to the pump riser as possible and shall connect the pump system to the control panel. Panel shall face the pump riser. Contractor shall not be responsible for any further electrical connection.

For those homes with an available electric circuit from an existing pump system or aerator, the contractor shall locate the STEP system control panel at or near the location of the existing system, either on a uni-strut galvanized metal post or on the dwelling should the homeowner sign an electrical easement.

The panel should be located at a convenient height (usually about five feet above the ground) and where it will be accessible for maintenance.

No conductors shall be installed in conduits until the conduit system has been completed and shall be free of any dirt or water. When installing conductors, the contractor shall exercise due care to prevent damage to conductors or insulation. Only approved cable lubricants shall be used when necessary.

Wire 10 gauge or smaller shall be spliced, taped, or joined in outlet or junction boxes with solderless spring-type connectors, Scotch Hypaflex or Ideal.

Wire or cable larger than 10 gauge shall be stranded and shall be terminated by bolted, pressure type or compression type connectors.

All feeder cables shall be continuous from origin to panel or equipment termination without running splices in intermediate pull or splice boxes or raceway runs. Where taps and splices are necessary and approved, they shall be made in approved splice boxes with suitable compression type connectors as noted herein.

Underground conduit shall be installed a minimum of 18" below existing grade. All backfill to grade shall be made of compacted earth.

Connect wire and conduits from customer supplied disconnect to the individual control panels as per manufacturer's instructions. STEP system is intensely pre-wired.

Prior to the startup of any electrical equipment and systems, carefully check manufacturer's instructions for proper startup procedures. Manufacturer's startup service shall be included in Contractor's bid when such services are recommended by the manufacturer.

Check service entrance voltages and make all necessary adjustments on transformer taps to compensate for any over-voltage or under-voltage conditions.

Check grounding conditions and grounding resistance for code compliance.

Check all devices and energize all systems. Verify the proper performance of all operating features for conformance with this specification and with the manufacturer's specifications and requirements.

A combination motor starter and thermal magnetic circuit breaker shall be provided for each pump. The unit shall have instantaneous trip magnetic overcurrent protection.

The control circuit shall be 115 volts. The control circuit shall be connected through the heat sensing switches in the pump and shall disconnect the control circuit in case of a high temperature condition in the pump motor.

An HP rated contactor for each pump shall be provided.

Single phase controls to have start and run capacitors and start relays mounted in control cabinet.

An alternator relay shall be supplied to alternate pumps on each successive cycle.

A terminal strip shall be supplied to make all power and control connections for the pump. All terminals shall be marked for easy identification. A ground terminal strip shall also be provided.

Perform acceptance demonstrations to prove satisfactory performance characteristics of the electrical and control systems.

Provisions shall be made for a disconnect before power enters each control panel.

Measurement and Payment for all electrical shall be considered incidental to price bid per STEP System installed.