

**SECTION 02732  
BUILDING SEWERS**

**PART 1 GENERAL**

1.01 SECTION INCLUDES

- A. Lateral piping, fittings, and accessories.
- B. Connection of building sanitary drainage system to municipal sewers.

1.02 REGULATORY REQUIREMENTS

- A. Conform to applicable Authority, State Department of Environmental Protection and Department of Transportation code for materials and installation of the Work of this Section.
- B. A building sewer permit is required from the Authority prior to constructing any building sewer.
- C. All local, state, and other laws and regulations governing blasting.
- D. A road occupancy permit must be received from PennDOT (State owned roads) or Hilltown Township (Township owned roads).

1.03 SUBMITTALS

- A. Submit shop drawings under provisions of Section 01300.
- B. Submit shop drawings indicating dimensions, layout of piping, gradient of slope between corners and intersections, locations and elevations of manholes, and laterals.
- C. Submit product data under provisions of Section 01300.
- D. Submit product data for pipe, pipe accessories, and manholes.
- E. Submit manufacturer's installation instructions under provisions of Section 01300.

1.04 PROJECT RECORD DOCUMENTS

- A. Submit documents under provisions of Section 01410.
- B. Accurately record location of pipe runs, connections, manholes, and invert elevations.
- C. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

1.05 QUALITY CONTROL

- A. Inspection and testing shall be performed in accordance with Section 01400.
- B. Prior to covering any portion of the Building Sewer, it must be inspected by the Authority.
  - 1. Gravity laterals must be tested with either air or water to 4 PSI for 15 minutes in the presence of the Authority inspector.
  - 2. Pressure laterals must be tested with water to 50 PSI for 15 minutes in the presence of the Authority inspector.

No work will be accepted unless it has been inspected and tested. All testing shall be per the pipe manufacturer's specifications.

1.06 NOTIFICATION OF AUTHORITY ENGINEER

The Contractor must notify the Engineer at least 48 hours prior to beginning operation so that an Observer can be scheduled to be present. Under no condition are operations to commence without this notification and an Observer present.

**PART 2 PRODUCTS**

2.01 PIPE MATERIALS

- A. Ductile Iron Pipe (DIP)

Ductile iron sewer pipe and ductile iron pipe shall be centrifugally cast pipe with cement mortar lining and with bitumastic coating inside and outside. Joints shall conform with ANSI Specification A-21.11 Class 52. Pipes shall be laid in accordance with the Manufacturer's recommendations.
- B. Polyvinyl Chloride
  - 1. Gravity Laterals
    - a. Gravity pipe (20' maximum length) shall meet SDR-35 requirements of ASTM Specification D-3034-74. Pipe shall have integral wall, bell, and spigot joints with elastomeric gasket. Maximum allowable deflection after installation shall be 5%. Installation shall be in accordance with ASTM D-2321, "Underground Installation of Flexible Thermoplastic Sewer Pipe", and as specified herein.
    - b. All fittings and accessories shall be SDR-35 and shall be manufactured by the pipe supplier.

2. Pressure Laterals

- a. The pipe shall meet the requirements of ASTM D1785, Schedule 40 or SDR 21 as follows:
  - 1) Schedule 40 PVC pipe shall be solvent cemented and the cement shall conform to ASTM D2564.
  - 2) SDR-21 pipe shall have integral wall, bell, and spigot joints with elastomeric gasket.
  - 3) Maximum allowable deflection after installation shall be 5%. Installation shall be in accordance with ASTM D-2321, "Underground Installation of Flexible Thermoplastic Sewer Pipe", and as specified herein.
- b. Pipe, fittings, etc. shall meet the requirements of ASTM D2467, Type 1, Grade 1.

2.02 PIPE ACCESSORIES

- A. *Fittings:* Same material as pipe, molded or formed to suit pipe size and end design, in required 'T', bends, elbows, clean-outs, reducers, traps, and other configurations required.
- B. *Pipe Saddles:* Pipe saddles are only to be used when connecting into an existing line where a wye has not been installed. These wyes shall be Sealtite Type "E" Multi-Range Wye Sewer Saddle manufactured by The General Engineering Company (GENECO) or approved equal.

**PART 3 EXECUTION**

3.01 GENERAL

- A. All pipes shall be unloaded, handled and stored in conformance with the manufacturer's recommendations.
- B. Pipes shall be laid at a grade not less than 1/4 inch per foot (2.08%) unless a lesser grade is approved by the Engineer. Each section of pipe shall rest upon the pipe bed for the full length of its barrel, with recesses excavated to accommodate bells and joints. Any pipe, which has its grade or joints, disturbed after lying shall be taken up and relaid. Pipe sections shall be inspected, and the interior and ends of all pipe shall be cleaned before lowered into the trench. During construction, the Contractor shall use all precautions to keep the pipe clean and clear of debris and free from damage until finally inspected and accepted. The mouth of the completed sewer pipe shall be properly closed at all times with an expanded rubber plug or other approved device, except when pipe lying is in progress.
- C. Pipe laying shall be done only in the presence of an Observer. The Contractor shall notify the Authority at least 48 hours prior to beginning pipe laying.

- D. When necessary to cut pipe to size, it shall be done by saw cutting, neatly and cleanly.
- E. Bedding and laying of pipe shall be in accordance with the pipe manufacturer's recommendations. Pipe joints shall be made in accordance with the joint manufacturer's recommendations.
- F. Regardless of its material, all pipe shall be laid on a minimum six-inch (6") thickness of AASHTO No. 67 stone as approved by the Authority.
- G. If the house sewer is not to be connected immediately to the lateral, the lateral pipe stub shall be capped with a watertight pressure type fitting capable of withstanding the exfiltration tests and is to remain until future connection to the house sewer. The ends of all laterals not immediately connected to the house sewer shall be physically marked to show location and depth of pipe end. Method of marking to be a 1" x 3" board extending from the end of the lateral to a height of 12" above grade. Depth of lateral is to be marked with a felt-tipped marking pen on that portion extending above grade.
- H. Laterals shall be of the same type of material as the sewer line to which the lateral connects unless otherwise approved by the Engineer.
- I. Laterals shall not be installed directly from a manhole unless written approval is received from the Engineer.

3.02 EXCAVATION

- A. Existing road surfaces are to be neatly cut along edges of the proposed trench prior to excavation.
- B. Extreme care is required when excavating to expose the existing sewer main. To prevent damage to the main sewer line, machine excavation shall be terminated and hand excavation begun within a radius of two feet of the main sewer line.
- C. Trenches shall be dug to depths and widths as specified herein or as approved by the Engineer. Sides of trenches shall be nearly vertical as possible.
- D. Trenches shall be excavated true to line so that a clear space of eight (8) inches, no more, is provided on each side of the pipe bell to a height not less than the top of the pipe. These dimensions are applicable to the inside face of sheeting, if such is required at the elevation of the pipe. Trenches may be wider above the top of pipe.
- E. When the width below top exceeds bell plus 16 inches, the Engineer may call for stronger pipe at no expense to HTWSA.
- F. Where a section of trench has, by the Contractors own mistake, been excavated to a greater depth than specified, it shall be brought to the proper grade using AASHTO No. 67 crushed stoned.

3.03 TRENCH DEWATERING

- A. Maintain excavations free of water. Water removed from excavations shall be disposed of in such a manner as to prevent damage to public or private property, or to any portion of the work completed or in progress. ***In no case shall water be permitted to rise into or flow through a completed sewer unless written permission is obtained by the Authority.***

3.04 PIPE INSTALLATION

- A. All laying, jointing, testing for defects and for leakage shall be performed in the presence of the Authority. All defects in workmanship rejected by the Engineer shall be promptly corrected by the Contractor and defective material removed from the Project.
- B. The excavation in which pipe is being laid shall be kept free from water, and no joint shall be made under water. Care shall be used to secure water-tightness and to prevent damage to, or the disturbing of, the joints during the backfilling process or at any other time. After pipes have been laid and the joints have been made, there shall be no walking on or working over them except as may be necessary in tamping until there is a covering at least two (2) feet in depth over their top. After joint materials, which require it, have received their set, backfilling of the trench may proceed in the manner specified.
- C. Before joints are made, each pipe shall be well bedded on a solid foundation and no pipe shall be brought into position until the preceding length has been thoroughly embedded and secured in place. No pipe shall be laid in wet trench conditions that preclude proper bedding, or on a frozen trench bottom, or when in the opinion of the Authority Engineer, the trench or weather conditions are unsuitable for proper installation. Any defects due to settlement shall be corrected by the Contractor at his own expense. Bell holes or coupling holes shall be dug sufficiently large to insure making of proper joints. In no case will pipe be closer than four (4) inches from bedrock.
- D. In laying pipe, special care shall be taken to insure that each length shall abut against the next in such a manner that there shall be no shoulder or unevenness of any kind along the inside of the pipe line.
- E. No wedging or blocking will be permitted in laying pipe unless by written order from the Engineer.
- F. Pipes and fittings shall be thoroughly cleaned before they are laid and shall be kept clean until the acceptance of the completed Work. The open end shall be kept closed with a stopper until the next length is laid. At the close of work each day, the end of the pipe line shall be tightly closed with an expansion stopper so that no dirt or other foreign substances may enter the line, and this stopper shall be kept in place until pipe laying is again resumed.
- G. Cold weather protection shall be provided, during freezing weather, for all masonry, mortar and concrete construction connected with the exterior piping by maintaining a temperature of not less than 50°F. for a period of three (3) days, or by backfilling

immediately, or by covering with backfill material in a temporary manner, all as directed by the Engineer.

- H. All open ends of pipelines to be abandoned, exposed during construction operations shall have their openings plugged with a two-(2) foot minimum thickness of concrete.
- I. All dead-ends of pipelines, and fittings, shall be provided with standard plugs and caps either temporarily or permanently as directed by the Authority Engineer. A concrete or other approved thrust blocking shall be provided at all dead ends. Where plugged or capped outlets are to be tied to fittings with clamps and tie rods, as indicated on the Contract Documents or as directed by the Engineer, the minimum number and size of rods and other pertinent details shall be as shown and/or specified.
- J. Anchorage, buttresses, and thrust blocks shall be used to secure all caps, plugs, horizontal and vertical bends, branches, tees, and dead ends. They shall be constructed in accordance with the Standard Details, unless otherwise specified, and shall bear against solid, undisturbed earth.

### 3.05 INSTALLATION OF A SADDLE WYE FITTING

- A. Regardless of the combination of materials used installing a lateral to sewer main (PVC, or DIP), saddle Wye fitting shall be manufactured by The General Engineering Company (GENECO), Frederick, Maryland.
- B. On PVC pipe, installation shall be according to the following guidelines:
  - 1. Place saddle in position on pipe for use as a template and mark guide for hole cut-in. Remove saddle from pipe. If a separate template is supplied with the saddle Wye, use it for a guide.
  - 2. Using hole guide mark cut hole through pipe wall outside the hole guide mark by the thickness of the saddle stem. The diameter of the hole should not exceed the outside diameter of the saddle stem by more than 1/4". Use a hand keyhole saw or power saber saw to cut the hole. For most saber saws with heavy-duty blades, the blade should be held horizontally across the pipe and pressed downward until it penetrates the pipe wall. The blade can then be brought to the vertical position and the hole cut completed. Cut or bevel the downstream end of the hole at a 45 angle to allow the saddle stem to fit.
  - 3. Wipe clean and dry both the underside of the saddle and the mating surfaces of the pipe.
  - 4. Position saddle over the hole. Place the stainless steel strap around the pipe and connect with nuts and bolts provided by manufacturer.
  - 5. Tighten strap until the recommended torque has been reached by hand. The minimum torque applied should be 5 ft. - lbs.

6. H.E.S. concrete shall then be manually placed around the saddle and sewer main, then rodded and brought back up to the spring line to provide continuous support for both.

Note: If saddles are not properly positioned, the rubber gasket may not be touching the pipe, possibly resulting in a leak.

3.06 BACKFILL

A. Ductile Iron Pipe

1. The procedure for backfilling ductile iron sewer pipe shall be as follows: After the sewers have been installed, the material directly around the pipe shall be hand tamped. Then, in such manner as not to disturb the pipe, backfill to a height of twelve (12) inches above the top of the pipe, and compact with a mechanical tamper. The remainder of the trench shall be backfilled by one of the following methods:
  - a. When the pipeline is located within a State Highway, Township road, parking lot or other roadway area, the trench shall be backfilled in layers not exceeding six (6) inches in thickness and mechanically tamped.
  - b. When the pipeline is located beneath an unpaved area, or area not subject to vehicular traffic, backfilling may be accomplished by filling to the ground surface in one operation and compacting by trench roller or special heavy-duty tamping machine. The backfill material may be deposited in the trench by the excavating equipment or a front-end loader from the end of the trench. Excavated material free of large stones, (stones greater than three (3) inches in any direction) may be used for this backfill.
  - c. When the sewer is located within an existing Pennsylvania State Highway, Township Street or road, parking lot or other roadway area, the trench shall be backfilled with compacted 2RC stone.
2. Backfilling material, placed within two (2) feet of manholes and other structures, shall be deposited uniformly around the sides in layers not exceeding eight (8) inches in depth, and solidly tamped in such a manner as to avoid impairing the structures or producing unequal pressure on them.

B. PVC Pipe

1. The procedure for backfilling PVC sewer pipe shall be as follows: After the sewers have been installed on a firm bedding as shown on the standard detail, haunching material shall be carefully placed and consolidated under the pipe haunch to provide adequate side support. The haunching material shall be placed in four (4) inch compacted layers to the top of the pipe. The material

shall be placed in such a manner as not to disturb the pipe. The haunch material shall be AASHTO No. 57 stone.

2. An eight-(8) inch layer of AASHTO No. 57 or 2RC stone backfill shall be placed above the spring line of the pipe to provide a protective cushion.
3. The remainder of the trench shall be backfilled by one of the following methods:
  - a. When the pipeline is located within a State Highway, Township road, parking lot or other roadway area, the trench shall be backfilled in layers of 2RC stone not exceeding six (6) inches in thickness and mechanically tamped.
  - b. When the pipeline is located beneath an unpaved area, or area not subject to vehicular traffic, backfilling may be accomplished by filling to the ground surface in one operation and compacting by trench roller or special heavy-duty tamping machine. The backfill material may be deposited in the trench by the excavating equipment or a front-end loader from the end of the trench. Excavated material free of large stones (stones greater than three (3) inches in any direction) may be used for this backfill.
  - c. When the sewer is located within an existing Pennsylvania State Highway, Township Street or road, parking lot or other roadway area, the trench shall be backfilled with compacted 2RC stone.
2. Backfilling material, placed within two (2) feet of manholes and other structures, shall be deposited uniformly around the sides in layers not exceeding eight (8) inches in depth, and solidly tamped in such a manner as to avoid impairing the structures or producing unequal pressures on them.

### 3.07 CONNECTION TO EXISTING SYSTEM

#### A. Connection to Existing Manhole

1. Connection to an existing manhole shall be the final operation of sewer installation in development. Sewer installation may begin at any point upstream from the existing manhole after invert of existing manhole and required slope of proposed pipe is accurately determined. All sewers and manholes must pass air and/or water tests, and be approved by Authority Engineer prior to connection to existing manhole. The line between existing manhole and first development manhole may be tested after connection is made.
2. Method of connection shall consist of two (2) operations:
  - a. Connection hole shall be a smooth opening, cored using a Vertakor 1200 portable core drilling machine or equal for core openings in manhole and pipes. Holes to be sized according to attached Kor-N-Seal I data sheet.



- b. Pipe shall be connected to existing manhole using a water-right Kor-N-Seal Connector and all applicable hardware. Connectors to be sized using attached Kor-N-Seal I data sheet.
  3. Entering pipe shall be pre-cut to such a length that it is flush with the inside face of the existing manhole. Any irregularities in space between manhole and Kor-N-Seal Connector to be filled with non-shrink grout or equal and allowed to cure sufficiently (in the opinion of the Authority Engineer or his representative) prior to backfilling.
  4. Concrete shall be placed under the pipes for a minimum of three (3) feet beyond the manhole wall, or within six (6) inches of the first pipe joint, whichever is shorter.
  5. A channel shall then be formed in the existing manhole so that development flow is smoothly directed toward effluent channel of existing manhole.
  6. Scheduling for this connection operation must be such that work, except backfilling, can be completed during one (1) day.
- B. Manhole Construction Over Existing Pipe
1. Method of cast-in-place base construction shall be to set bottom manhole riser section over existing pipe on concrete blocks and pour concrete base. Concrete benches are to be formed during this operation. Concrete is to extend a minimum of 8" above bottom of last section on inside and outside of section wall at periphery. A waterstop shall be provided on pipes through the base section by tightly wrapping a length of solid rubber "rope", minimum ½ inch diameter, at least twice around the pipe (in parallel) and securely tying off prior to placing concrete. Waterstop shall be approximately centered in wall of base. At pipe entrance and exit outside of manhole, additional concrete in the shape of a "doghouse" is to be placed around the pipe at a minimum thickness of 8". Allow concrete to cure for 24 hours before installing remaining sections. After testing and approval by the Engineer, remove top half of pipe to form manhole channel.
  2. Concrete shall be placed under the pipes for a minimum of 3 feet beyond the manhole wall, or within 6 inches of the first pipe joint.

### 3.08 EXISTING SEPTIC SYSTEM ABANDONMENT

- A. All existing septic tanks, grease traps, cisterns, manholes or any other on-site treatment system component shall be abandoned after connection to the sewage system. All underground tanks including septic, pump, cisterns, seepage pits and cesspools shall have all liquid and sludge removed from them. After these tanks have been cleaned they shall be filled with soil, stone or other suitable material. The drain field piping does not have to be removed or filled unless the property owner wishes to do so.

3.09 GREASE TRAPS

- A. Grease, oil and sand interceptors shall be provided when, in the opinion of the Authority, they are necessary for the proper handling of liquid wastes containing floatable grease in excessive amounts, sand, or other harmful ingredients; except that such interceptors shall not be required for private living quarters or dwelling units. All interceptors shall be of a type and capacity approved by the Authority, and shall be located as to be readily and easily accessible for cleaning and inspection. In the maintaining of these interceptors the owner(s) shall be responsible for the proper removal and disposal by appropriate means of the captured material and shall maintain records of the dates, and means of disposal, which are subject to review by the Authority. Any removal and hauling of the collected materials must be performed by currently licensed waste disposal firms.
  
- B. Generally, only restaurants or other food handling facilities require grease traps. Since the type and size of grease traps will vary based on the volume of grease expected, the proposed grease trap design must be submitted to the Authority for approval at the time the application is made for connection to the sewer system.

**END OF SECTION**

**SECTION 11308**

**PACKAGED GRINDER PUMPING STATIONS**

**PART 1 GENERAL**

**1.01 COMMENTARY**

- A. This Authority recognizes the fact that there are many types of grinder pumps and manufacturers. The Authority is also aware that costs of grinder pumping stations operation and maintenance are significant.
- B. Therefore, the Developer/Homeowner shall do or cause the following elements to be done:
  - 1. Whenever possible, a pressure sewer system with grinder pumping station shall not be used.
  - 2. Prior to design of a pressure sewer system, the Developer shall discuss the proposed system in detail with the Authority.
  - 3. Any pressure sewer system and grinder pumping station design shall be of a type satisfactory to the Authority and shall meet all applicable requirements of PADEP.
  - 4. The intent of the Authority is to standardize components, as much as possible, that are used in pressure sewer systems and/or grinder pumping station applications to facilitate inventory control, equipment familiarization, and safety.

**1.02 SECTION INCLUDES**

- A. Furnish all labor, materials and equipment to install grinder pumping station(s) and appurtenances as shown on the Drawings and as specified herein. Work shall include but not be limited to:
  - 1. Excavation
  - 2. Enclosure and Component Placement
  - 3. Control Panel and Wiring
  - 4. Internal and external piping with required supports and concrete encasement
  - 5. Backfill

1.03 REFERENCES

- A. Pennsylvania Department of Transportation Publication 408, Latest Edition
- B. National Electric Code - N.E.C.
- C. National Electric Safety Code
- D. HTWSA Sewer Collection System Design Guidelines
- E. HTWSA Section 02732 - Building Sewers
- D. HTWSA Standard Drawing No. 8

1.04 JOB CONDITIONS

- A. Job Conditions shall generally meet those of the related Sections.
- B. Specific conditions will be included with each project as may be required.

1.05 SUBMITTALS

- A. Developer's Engineer or Homeowners Contractor shall provide a construction plan showing the location or property, tax parcel number, connection details, plan view of force main, grinder pump station, house and pertinent topographic features, and location of controller. Drawing shall be presented to the Authority for review and approval at least 45 days prior to start of construction.
- A. Submit shop drawings/product data from manufacturers' descriptive literature and specifications for all materials used in this Section. Submit in accordance with Section 01300.
- B. Specific submittals will be included with each project as may be required for testing, warranties, project manuals, etc.

1.06 QUALITY ASSURANCE

- A. Qualifications of Workmen: Provide at least one person who shall be thoroughly trained and experienced in the skills required, who shall be completely familiar with the design and application of work described for this Section, and who shall be present at all times during progress of the work of this Section and shall direct all work performed under this Section.

**PART 2 PRODUCTS**

2.01 General

- A. Grinder pump stations shall normally be designed using components as specified herein or with only approved equals. This is done to improve inventory control (standardization), equipment familiarization, and safety.
- B. Unit shall include tank, sewage grinder pump(s), mercury switch level controls, discharge piping, with hydraulically sealed discharge flange(s), pump mounting plate(s), with bottom rail supports, upper rail supports, pump guide rails, rail supports, lifting chain, or cable, control panel, control panel enclosure, electrical wiring, alarm devices, piping, and other necessary accessories as specified herein.

2.02 PUMPS

A. General

- 1. Sewage grinder pumping stations shall be factory-built automatic stations as approved by the Engineer.
- 2. The pumping equipment must be supplied as a complete unit, and all items furnished by the manufacturer. The principal items of equipment in each pump station shall consist of a cast iron simplex or duplex grinder pump, stainless steel discharge piping, stainless steel pump mounting plates with stainless steel guide rails and hoisting chain or cable, hydraulically sealed stainless steel discharge flange, ball check valve, gate valve or ball valve, steel pump plate cover, fiberglass containment basin, mercury switch level controls, NEMA 4 junction box, NEMA 3R control panel. In addition all fasteners, clips, washers, bolts, etc. within the basin shall also be stainless steel.
- 3. The sewage grinder pump station shall be as manufactured by Peabody Barnes, Inc. or approved equal.

Pump units constructed of nonmetallic materials will not be acceptable.

B. Operating Conditions

- 1. Grinder pumps shall be capable of operating against fluctuating total dynamic head.
- 3. Pumps - Each pump shall be capable of delivering a minimum of 8 gpm against a normal rated total dynamic head of 90 feet with a shut-off of 104 feet. Pump motor shall be a minimum of 2 hp, single phase, 230 volt, 60 hertz, 3,450 rpm

(maximum). The pumps shall not overload at any point on the performance curve and shall be free from the harmful effects of cavitation at either high or low head.

C. Pumps and Motors

1. Grinder pumps and motors shall be specifically designed and manufactured to operate in a completely submerged environment in the liquid being pumped. Electrical power cord shall be sealed by use of a cord grip, with individual conductors sealed into the cord cap assembly with epoxy sealant. The cord grip shall have a male taper pipe thread threaded into a final taper pipe thread in a cord cap. The cord cap shall be sealed into the motor housing with a Buna N O-ring, providing an electrical connection that is completely watertight, yet may be easily removed from service.
2. Grinder pumps shall be of the centrifugal type with a combination impeller-grinder assembly. Pump and motor housings shall be cast iron or gray iron. The pump impeller shall be bronze or stainless steel. All fasteners shall be stainless steel.
3. The grinder assembly shall consist of a rotating cutter and a stationary cutting ring on the suction side of the impeller so the cutting assembly discharges directing into the impeller inlet. All cutters, both stationary and rotating, shall be made of hardened and ground stainless steel and shall be adjustable externally to maintain proper clearance. The upper cutter and the stationary cutting ring shall be reversible for longer service life. In the absence of reversible cutters, a spare upper cutter and cutting ring shall be furnished with each grinder pump.
4. The pump-motor shafts shall be supported by permanently oiled upper and lower bearings. Bearings and motors shall be protected from the liquid being pumped by dual mechanical seals consisting of a stationary ceramic seal and two carbon rotating sealing surfaces.

2.03 TANK

A. Tank construction of fiberglass reinforced polyester or precast concrete.

1. Fiberglass Reinforced Polyester (FRP): Tank construction shall conform to ASTM C 582 and C 581 Standards with a minimum wall thickness of 1/4-inch.
  - a. Manufactured according to ASTM D 3299 Standards for filament wound tanks or NBS PS 15-69 Standards for contact molded tanks.

- b. Polyester Resin: Atlac 382.
  - c. Flush, slip resistant bolt down cover with padlock.
  - d. Connections: watertight and suitable for attaching PVC pipe; 4-inch diameter inlet and 1 1/4-inch diameter discharge with plugs or caps.
  - e. Anti-Flotation Anchor: Provide precast, or field cast concrete anchor in accordance with tank manufacturer's recommendations. The tank manufacturer shall provide the design and size of the anchor.
2. Precast Concrete Manhole: Conforming to the requirements of Section 03455.

2.04 ANCILLARY EQUIPMENT

A. Discharge Piping and Fittings:

1. Size: 1 1/4-inch diameter.
2. Material: ASTM D 1785 Schedule 80 manufactured from Class 12454-B Rigid PVC Compounds with a hydrostatic design stress of 13.8 MPa (2000 psi designated as PVC 1120), NPT couplings, pipe and fittings.
3. Material Option: ASTM D 2241, SDR 21.
  - a. Pressure Class 200 psi.
  - b. Pipe Joints: Push-on or compression type, joint performance ASTM D 3139, rubber gasket suitable for domestic sewage service ASTM F 477.

B. Valves: Include a check valve, ball valve and hydraulically sealed discharge flange in pump discharge piping.

1. Provide valves of the same type by the same manufacturer; suitable for the intended service.
2. Markings factory cast on the bonnet or body of each valve indicating manufacturer's name or mark, year of valve casting, size of valve, directional flow arrow and designation of working water pressure.
3. Valve pressure-temperature ratings of not less than the design criteria applicable to system components.
4. Provide extension stems with bronze bushed stem guides where required. Provide a top support and one intermediate support unless the unsupported

stem length exceeds four feet, in which case provide an additional support every two feet of valve stem length.

5. Check Valve: Ball check valve designed for a minimum water working pressure of 150 pounds per square inch and factory tested to double that pressure before shipment. Check valve bodies to provide excess area through the valves to assure full delivery of line capacity.
6. Hydraulically Sealed Discharge Flange: The hydraulically sealed discharge flange shall allow the pump to be removed periodically and shall result in a watertight seal when the pump is replaced. Fittings of threaded style, 150 lb. galvanized malleable iron conforming to ANSI B 16.3.
7. Lifting Accessories
  - a. Provide stainless steel guide rails, supports, chains and shackles for raising and lowering the pumping equipment.

2.04 VALVE PIT ENCLOSURES

- A. Valve pit enclosures shall be constructed of high-density polypropylene located in non-traffic areas. Pits shall be installed to prevent freezing of the pressure force main running through it.
- B. The vault shall be shall a "E-Z Vault" be as manufactured by Mueller Company or approved equal.

2.05 CONTROL PANEL AND CONTROLS

- A. Control Panel
  1. NEMA 4X Fiberglass enclosure, fully enclosed and all panel hardware mounted on a separate inside plate organized to facilitate maintenance and repair. Panel factory equipped with an oxidation inhibitor and wall mounting brackets.
    - a. Provide a circuit breaker for total panel and individual breakers for pumps and alarms so that alarms remain energized when pump breaker is tripped.
  2. Hardware includes start and run capacitors, start relay, circuit breaker (quick-make/quick-break action on manual operation) with bi-metallic ambient compensated overload relay with heaters to protect both start and run windings, a manual on switch and alarm light. Provide individual circuit breaker for control system.



3. Provide terminal strip for float control wires and
- 4 120 volt AC control circuit.
5. Panel so designed to be wall mounted.
6. Enclosure to be lockable, with padlock. Unnecessary punch outs not permitted. Enclosure to contain the following:
  - a. Visible red lights indicating high water level conditions.
7. Provide electrical surge protection device as part of the unit package.

**B. Floats**

1. The electric power cord to the pump shall be SO type construction suitable for submersion in sewage. The cord is to be sealed by use of a cord grip, with individual conductors additionally sealed into the cord cap assembly with epoxy sealing compound. Seal the cord cap into the motor housing with a Buna-N a-ring, providing a completely watertight electrical connection.
2. Sealed float-type mercury switches shall control sump level and high-level alarm signal. For corrosion and shock resistance the mercury tube switches are factory sealed in a solid polypropylene float, with internal weight. The float power and support wire shall have a heavy Neoprene jacket; provide an intrinsically safe UL approved relay to be wired to each float type mercury switch.
3. Support the float switches by the cord that is connected to the junction box. Provide a junction box to be drilled and tapped for the four - 3/4-inch diameter conduits for wiring to Pump control Panel.
4. Provide three mercury switches one for pump start, one for pump stop, and one to signal high-level sump alarm. On sump level rise, lower mercury switch shall first be energized, then upper level switch shall next energize and start pump. With pump operating, sump level shall lower to low switch turn-off setting and pump shall stop. If level continues to rise when pump is operating, alarm switch shall energize. Level switches adjustable for level setting, from the surface.

**PART 3 EXECUTION**

**3.01 INSPECTION**

- A. Examine units for defects that will adversely affect installation or cause latent defects in completed work. Inform Inspector of defects. Do not proceed with installation until defects have been corrected.

- B. Refer to manufacturer's instruction and installation manual before proceeding with installation of units. Verify other construction work is complete to the extent that substrate on which electrical apparatus is to be installed is ready to receive same.
- C. Verify direction of motor rotation in equipment before making final connections to electrically operated equipment.

3.02 PREPARATION

- A. Field Measurement:
  - 1. The Drawings are generally indicative of the Work, but are not an exact representation of all conditions involved; therefore, set units, piping, etc. to suit actual field measurements.
  - 2. Submit details of proposed departures necessitated by field conditions or other causes to the Authority for approval. Keep pipe and unit interiors cleared of debris as construction progresses.
- B. Keep pipe and unit interiors cleared of debris as construction progresses.
- C. Earthwork
  - 1. Make excavations for units to a nearly vertical plane and not to exceed the nominal dimensions of the concrete anchor outside diameter.
  - 2. If rock excavation is required, take rock out to limits specified previously.
  - 3. If surface pavement of any type is encountered, vehicle or pedestrian ways, cut such pavement to a rectangular shape as opposed to circular shape of unit. Make limits of cut not to exceed one-foot beyond excavation limit as specified previously.

3.03 INSTALLATION

- A. Install units in strict accordance with manufacturer's instruction and installation manual, and at locations and in accordance with Details indicated on the Drawings.
  - 1. Install valve vault between the unit and the main sewer piping in accordance with the Standard Drawings.
- B. Install units on a six inch deep compacted layer of aggregate meeting requirements of ASSHTO No 57 Stone. Install material as backfill up to highest pipe connection.

- C. Anti-Flotation Anchor Installation, Fiberglass Tank: Form and pour concrete anchors in accordance with requirements of Division 3 Concrete. Prefabricated anchors, as qualified previously in this section, are acceptable.
- D. Underground Systems: Install underground electric cable in accordance with Article 300-5 of the NEC, in accordance with previous requirements of this Section, and the following requirements exceeding NEC:
  - 1. Earthwork: Perform earthwork for buried electric cable as specified for piping under Section 02732.
  - 2. Provide two feet minimum cover over cable unless indicated otherwise on the Drawings.
  - 3. Make electrical cable penetrations through the tank absolutely watertight.
- E. Grounding: Perform grounding of electrical systems and metal enclosures in accordance with Article 250 of the NEC.
- F. Control Panel Installation: Fasten control panel and cable to exterior of the building or post (for post mounted) using fasteners suitable for anchoring into the particular type of surface, and fasten in accordance with current accepted trade practices. Only screw-type corrosion-resistant fasteners are acceptable.
  - 1. Install control panel four feet above existing grade, measured to the bottom of the panel.
  - 2. If post mounts installation, provide post of sufficient length to permit three feet of embedment in ground and the four foot clearance requirement stated above.

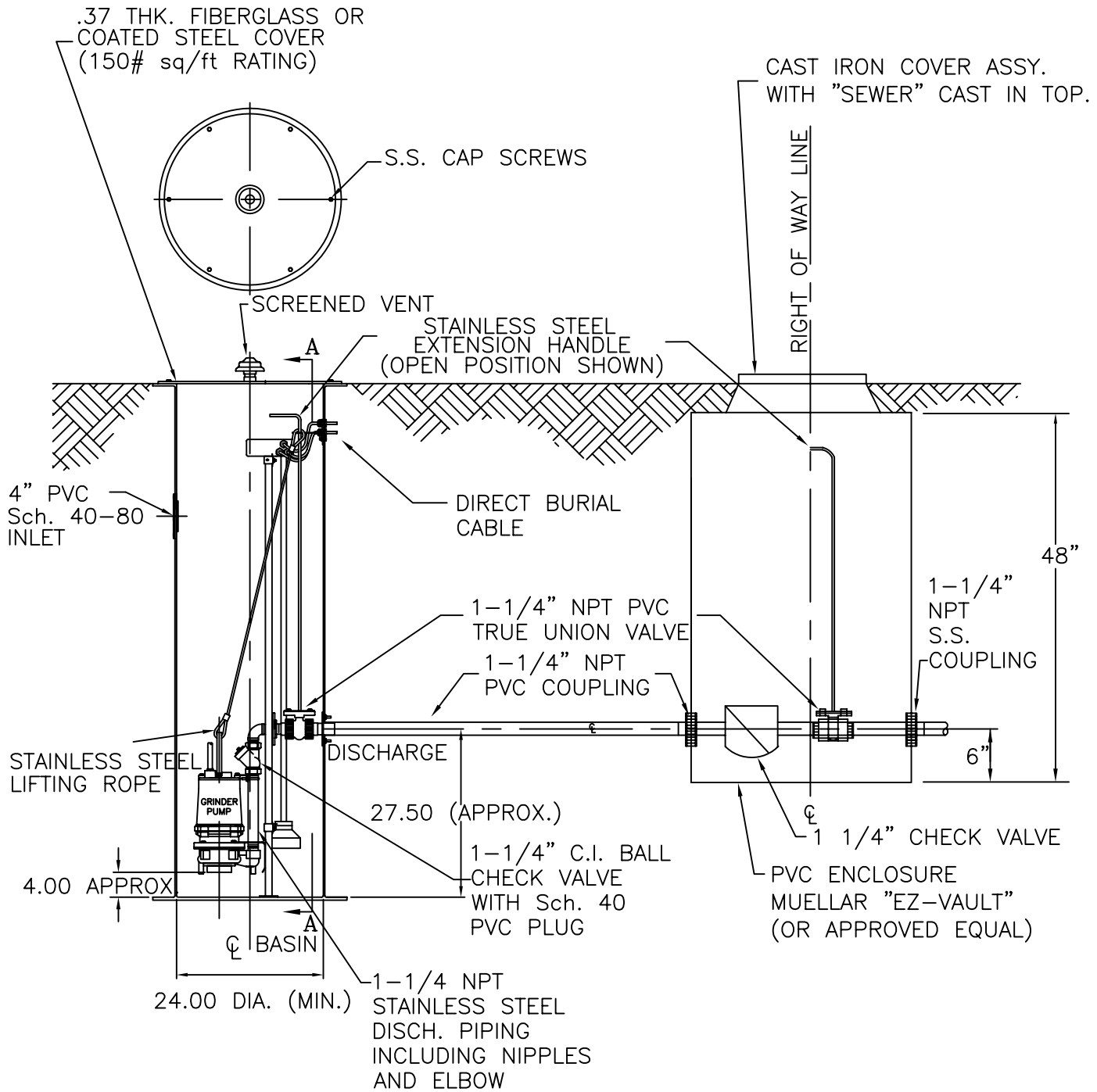
3.05 FIELD QUALITY CONTROL

- A. General: Upon completion of installation of the grinder pump units, including but not limited to control panel mounting, electrical work installation and connections, pressure service lateral installation, and unit backfilling, each being performed in a manner satisfactory to the Authority, advise the unit manufacturer that the units have been installed and are ready to be inspected and tested.
  - 1. In cooperation with the unit manufacturer, determine a mutually acceptable schedule for inspection and testing of installed units.
  - 2. Conduct the Performance Test specified herein prior to the property owner's electrical wiring and plumbing connections to the grinder pump units.

3. Conduct tests as specified herein so that each unit installed in the Project is tested to the unit manufacturer's and Authority's satisfaction. Provide the Owner with documentation of such manufacturer's acceptance test in the form of a letter to the Owner attesting to this test requirement.
  4. Provide tools, materials, water, temporary power, apparatus, and instruments necessary for unit testing. Conduct the specified tests in the presence of and to the satisfaction of the unit manufacturer and the Authority.
- B. Performance Test: Demonstrate (with the Personnel of the Owner observing), to the satisfaction of the Authority and manufacturer, the mechanical performance of each unit when operated in accordance with the design intent indicated by the Drawings and described in this Section of the Specifications.
1. Connect 120V temporary power source to the alarm circuit at the control panel.
  2. Fill the tank with sufficient water to test the high level audible and visual alarms at the control panel.
  3. Connect 240V temporary power source to the power circuit at the control panel and run the unit through a minimum of three operation cycles to check pump operation and shut-off.
  4. If the demonstrations are satisfactory to the Authority, the test will be considered concluded. If deficiencies are found, they shall be corrected as follows and the test repeated until the Authority determines that the unit has performed satisfactorily.
    - a. Unit manufacturer to correct pump, internal piping and control panel deficiencies.
    - b. Installer shall correct installation deficiencies.
- C. Watertightness Test, Fiberglass Tank:
1. Fill the completely installed units above the highest tank wall penetration (including electrical) with clear water. Allow a one hour stabilization period and then commence a one hour exfiltration test.
  2. Measure and record the water level, with the Authority observing, both at the beginning and end of the test period.
  3. An acceptable exfiltration test will be when no water leakage in the closed unit is detectable by the measurements.

- E. Electrical Systems Test: Unless waived in writing by the Authority, perform tests and trials in the presence of a duly authorized representative of the Authority. When the presence of such representative is so waived, furnish to the Authority sworn statements, in duplicate, of the tests made and the results thereof.
1. Inspection: Have the work inspected by an authorized inspection agency, and such other agencies having jurisdiction, for compliance with National Electrical Code and obtain certificates of approval, acceptance, and compliance with code regulations. Work shall not be deemed complete until such certifications have been delivered to the Owner.
  2. Testing; Test materials, supplies and parts and assemblies thereof, entering into the Work, in conformity with the best currently approved method for the particular type and class of work.
    - a. Render the entire installation free from short circuits and improper grounds. Test feeders cable disconnected from the power source. Then test the entire power circuit and the panel with the pumping equipment operating. In no case, shall the insulation resistance be less than one hundred thousand ohms.
    - b. Perform initial electrical system tests using meggers, ammeters, voltmeters, insulation resistance testers, and high-pot testers prior to placing electrical systems into complete operation.
      - 1) Use meggers with an adjustable 2.5/5.0 KV range which will permit reading of 0.05 to 100,000 Megohms. The minimum testing voltage obtained by adding 1000 volts to twice the rated voltage of the cable, device, apparatus or equipment. In no case shall the insulation resistance be less than one Megohm. However, the recommended insulation resistance measurements of each test shall conform to IEEE and ANSI Standards.
    - c. Correct failures in a manner satisfactory to the Authority or his authorized representative.

**END OF SECTION**



**NOTE:**  
 CONTROLS SHOWN WITH SENSING BELL.  
 CONTRACTOR MAY SUBSTITUTE FLOAT  
 CONTROLS AT HIS DISCRETION.