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 tope 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