Section 6
Low-Pressure Sewers

A. General

1. Intention

   The use of low pressure sewers, which are located in public roads or rights-of-way, is intended to provide sewer service to existing properties which cannot be served by conventional gravity type sewers or common pumping stations and force mains.

2. Approvals

   The Authority will approve the use of low-pressure sewers only under special circumstances. Where it is possible to install gravity-type sewers, or where it is feasible to use sewage pumping stations and force mains, the use of low-pressure sewers will not be permitted.

3. Developers

   Developers who wish to provide sewer service by using low-pressure sewers within tracts to be developed, must familiarize themselves with the Authority's "Individual Grinder Pump Management Plan". Grinder pumps will be used in low-pressure sewer systems. The proposed use of grinder pumps and low-pressure sewers will be reviewed on a case-by-case basis.

B. Design Criteria

1. Design

   It is incumbent upon the Applicant to provide full details of the proposed design of low-pressure sewer systems for review by the Authority. Design shall be in accordance with PA DEP *Domestic Wastewater Facilities Manual,* latest edition.

2. Diameter and Slope

   The internal diameter of the pipe shall be a minimum of 1.5 inches. Pipes shall be laid at a constantly increasing grade to each air release manhole or point of discharge. The applicant shall provide sufficient construction control to assure that there are no sags or decrease in slope in the force main which could tend to accumulate and trap air.

3. Depth of Sewers

   A minimum cover of 3.5 feet over the top of the pipe shall be maintained.

4. Location of Sewers

   Refer to Sections 2, 3 and 4 as appropriate for these requirements.

5. Pumps

   Pumping units will be individual on-lot pumps as described and specified in Section 8 – Grinder Pumps and Section 9 – Individual On-lot Sewage Pumps.

6. Cleanout Manholes

   Provide cleanout manholes at all bends of 45 degrees or greater. The maximum distance between cleanout manholes shall be 600 feet.

7. Thrust Restraints and Blocking

   Thrust restraints shall be provided at all tees, crosses, bends, wyes, pipe ends or other locations that have unbalanced pressure forces.

8. Air Release Valves

   The use of air release valves will only be considered if it is demonstrated that they are absolutely necessary and that no alternatives are possible.

9. The pressure sewer shall be color coded using magnetic warning safety tape to distinguish between sanitary sewer (green) and water main (blue) in accordance with PA DEP requirements.

C. Materials and Equipment

1. Ductile Iron Pipe

   Refer to Section 7 – Force Mains for these requirements.

2. Polyvinyl Chloride Pipe

   a. Material

      (1) Main line and lateral applications: PVC pressure pipe sized 1.5 inch through 12 inch shall conform to the requirements of ASTM D2241. All pipe shall have a pressure rating of 200 psi with a dimension ratio of 21 (SDR 21). The pipe shall be PVC 1120 made from PVC compounds Class 12454-A or 12454-B as defined in ASTM D1784. Each pipe length shall be marked with the manufacturer's name or trademark, size, material code and pressure rating.

      (2) Service line applications: PVC Schedule 40 pressure pipe sized 1.5 inch through 3 inch shall be manufactured from a Type I, Grade I polyvinyl

chloride (PVC) compound with a cell classification of 12454 per ASTM D1784. The pipe shall be manufactured in strict compliance with ASTM D1785 and ASTM D2665 (where applicable). All belled-end pipe shall have tapered sockets to create an interference type fit, which meet or exceed the dimensional requirements and the minimum socket length for pressure-type sockets as defined in ASTM D2672 for solvent cement joints on pressure pipe. All PVC Schedule 40 pipe must also meet the requirements of CSA Standard B137.3 rigid PVC pipe for pressure applications. All pipe shall have a minimum pressure rating of 260 psi. Each pipe length shall be marked with the manufacturer's name or trademark, size, material code and pressure rating.

b. Fittings

(1) PVC fittings shall meet the requirements of ASTM D2241 for SDR 21 and ASTM D1785 for Schedule 40 and be of the same (or higher) pressure rating as the pipe line.

(2) The connection between the lateral and service line shall be made with an approved solvent cement (glue) or compression type fitting.

c. Joints

(1) In main line and lateral applications: Pipe joints shall be of the rubber gasket type with a grooved pre-molded coupling bell or sleeve.

(2) In service line applications: Pipe joints shall be solvent welded as recommended by pipe manufacturer and according to ASTM standards.

(3) Within valve and blow-off chambers: Pipe joints shall be solvent welded as recommended by pipe manufacturer and according to ASTM standards.

(4) Adequate pipe restraint shall be provided at all changes of direction along main lines and laterals and as needed for fittings and within valve and blow-off chambers. The minimum number of restrained joints required for resisting forces at fittings and changes in direction of pipe shall be determined from the length of restrained pipe on each side of fittings and changes in direction necessary to develop adequate resisting friction with the soil. Restraining glands for PVC pipe shall conform to AWWA C111 and be (“Megalug”) as manufactured by EBAA Iron Inc. of Texas.

3. Polyethylene Pipe

   a. Material

      Polyethylene pipe shall conform to ASTM D-1248 and D-3350 for Type III Grade P34, Category 5, and Plastic Pipe Institute Material Designation PE-3408. Pipe shall be SDR-11 or approved equal.

   b. Joints

      Pipes shall be jointed by thermal butt-fusion in accordance with ASTM D-2657 and pipe manufacturer's recommendations. Termination to pump basins, valves and fittings shall be flange assemblies. The pipe adjacent to these joints must be rigidly supported for a distance of one foot beyond the flange assembly.

4. Air Release Valves

   Air release valves shall be located at all high points along a low-pressure sewer alignment. Air release valves shall be used as a last resort if high points in the line cannot be avoided. Air release valves and valve chamber shall be as specified in Section 7 – Force Mains.

5. Valve and Cleanout Manholes

   a. Cleanouts

      Cleanouts shall be constructed of PVC, Schedule 80 material and shall be provided with an isolation valve on either side of the cleanout on the low-pressure main. The outlet shall have a threaded end with screwed removable cap. The transition from iron fittings to PVC material, if required, shall be made by use of approved methods recommended by the manufacturers of the products.

   b. Valves

      Ball or plug valves shall be installed on services, low pressure and force main lines. Valves installed in valve/cleanout pits shall be actuated with a quarter turn type hand lever. Buried valves shall be actuated with an underground actuator through a valve box. Valves shall have the same or greater pressure rating as the attached pipe.

6. Valve Boxes

   Valve boxes shall be 6" PVC pipe installed over all buried valves and service line cleanouts in accordance with AWWA C500-80. Valve boxes shall not be located in roadways or driveways.

7. Detectable Warning Tape

   Detectable warning tape shall be polyethylene film encasing a metallic core, minimum 6 inches wide and 4 mils thick, color-coded green for sewer, bearing in black letters – CAUTION: SEWER LINE BELOW.

D. Installation

1. Excavation

   Refer to Section 2 – Gravity Sewers for these requirements.

2. Bedding

   Refer to Section 2 – Gravity Sewers for these requirements.

3. Laying Pipe

   During the installation of a low-pressure sewer, the pipe shall be laid at a constantly increasing grade to each high point, air release manhole or point of discharge. The Contractor shall provide sufficient construction control to assure that there are no sags or loss in grade in the force main which could tend to accumulate air.

   Refer to Section 2 – Gravity Sewers for other requirements.

4. Backfilling

   Refer to Section 2 – Gravity Sewers for these requirements.

5. Surface Restoration

   Refer to Section 2 – Gravity Sewers for these requirements.

E. Testing and Inspection

1. Notification

   It is incumbent upon the Applicant to notify the Authority a minimum of 24 hours in advance of when the work will be ready for inspection.

2. Inspection

   Pipelines shall be visually inspected, prior to commencement of backfilling, for alignment, depth, slope and for fittings and pipe material used.

3. Pressure Test

   After the pipe has been laid and backfilled as specified, all newly laid pipe shall be subjected to a hydrostatic pressure of 50 pounds per square inch (psi), or 150% of the normal working pressure, whichever is greater, for 30 minutes in accordance with AWWA C-600. If the pressure does not drop within the 30-minute test period, the test shall be deemed successful.

F. Detail Drawings

Relevant detail drawings are:

1 Right-of-Way Restoration

2 Pavement Restoration

3 Concrete Encasement

18 Force Main Connection to Manhole

20 Low-Pressure Sewer Valve and Cleanout Manhole

21 Low-Pressure Sewer Terminal Cleanout Manhole

22 Air Release Valve and Chamber

23 Thrust Blocks for Horizontal Bends and Lower Vertical Bends

24 Restrained DI Pipe Length

END OF SECTION