

3. Selection of Pipe Material (Gravity Sewers).

a. General.

- 1) The Section discusses pipe material for gravity sewers and SHCs, for force mains, see Part Two, Section 24 (Force Mains) and for pressure sewer systems, see Part Two, Section 25 (Grinder Pump, Pressure Sewer Systems).
- 2) When pipelines are to be designed near or within Maryland Transit Administration (MTA) Rail Lines, see Part Three, Section 3 (Pipeline Crossings and Clearances) and Part Three, Section 26 (Tunnels Design Criteria).
- 3) The amount of allowable cover is determined using the highest profile grade/ground line shown on the profile.
- 4) Do not change the type or class of pipeline material between manhole sections.
- 5) Indicate in the General Notes the following:
 - a) Size and type of the gravity sewer pipeline.
 - b) For RCP, DIP or PVC AWWA C900/C905, indicate the pipe class designation on the profile defining the limits of pipe class designation and the limits of each type of pipe material.
 - c) For DIP and fittings, specify polyethylene encasement, see Part One, Section 2 (Pipe Materials and Fittings) and special interior lining in accordance with the Specifications.
 - d) For PVC AWWA C900 with ductile iron fittings, specify polyethylene encasement, see Part One, Section 2 (Pipe Materials and Fittings) and special interior lining following the Specifications.
- 6) When designing RCP, use Wall C dimensions for determining pipe OD.
- 7) When DIP or PVC AWWA C900/C905 is required, verify the pipe diameter and capacity.
 - a) DIP or PVC AWWA C900/C905 is not available in the same pipe sizes as RCP and PVC sewer pipe.

b. Selection of Pipe Material.

- 1) Sewer House Connections (SHC), 4-inch or 6-inch diameter.
 - a) Polyvinyl Chloride Pipe (PVC) meeting ASTM D3034, SDR 35 or SDR 26.
- 2) Mainline Gravity Sewers.
 - a) Polyvinyl Chloride Pipe (PVC), 8-inch through 15-inch diameter, meeting ASTM D3034, SDR 35 and 18-inch through 27-inch diameter meeting ASTM F679, thickness T-1.
 - b) Polyvinyl Chloride Pipe (PVC AWWA C900), 12-inch and smaller diameter, meeting AWWA C900. Use PVC AWWA C900 for the following conditions:
 - (1) For sewer pipelines on steep slopes, see Part Two, Section 16 (Pipe Slope and Manhole



- Distance) and Standard Detail S/3.03.
- (2) For sewer pipelines when the cover is over twenty-two (22) feet, see requirements on Standard Detail W/6.1.
 - (3) When horizontal and vertical separation between the water and sewer pipelines as stated in Part Three, Section 3 (Pipeline Crossing and Clearances) cannot be obtained.
- c) Polyvinyl Chloride Pipe (PVC AWWA C905), larger than 12-inch in diameter, see Part One, Section 4 (Selection of Pipe Material) and AWWA C905. Use PVC AWWA C905 for the following conditions:
- (1) For sewer pipelines on steep slopes, see Part Two, Section 15 (Pipe Slope and Manhole Distance) and Standard Detail S/3.03, except special designs and details must be provided; see Part Three, Section 6 (Modifications to Specifications and Standard Details).
 - (2) When horizontal and vertical separation between the water and sewer pipelines as stated in Part Three, Section 3 (Pipeline Crossing and Clearances) cannot be obtained.
- d) Closed Profile Polyvinyl Chloride Pipe (PVC), 21-inch through 48-inch diameter, meeting ASTM F1803.
- e) Open Profile Polyvinyl Chloride Pipe (PVC), 18-inch through 30-inch diameter, meeting ASTM F794.
- f) Reinforced Concrete Pipe (RCP), 21-inch and larger, meeting ASTM C76. Use RCP for the following conditions:
- (1) Stream crossings of sewer pipelines; see Part Two, Section 8 (Vertical Alignment (Profiles)).
 - (2) Horizontal alignment requires the sewer pipeline to have a curved alignment, see Part Two, Section 6 (Curved Horizontal Alignment).
- g) Ductile Iron Pipe (DIP), see Part One, Section 4 (Selection of Pipe Material).
- (1) For sewer pipelines on steep slopes, see Part Two, Section 15 (Pipe Slope and Manhole Distance) and Standard Detail S/3.03, except special designs and details must be provided; see Part Three, Section 6 (Modifications to Specifications and Standard Details).
 - (2) When horizontal and vertical separation between the water and sewer pipelines as stated in Part Three, Section 3 (Pipeline Crossing and Clearances) cannot be obtained.
 - (3) Stream crossings of sewer pipelines; see Part Two, Section 8 (Vertical Alignment (Profiles)).
 - (4) For sewer pipelines when the cover is over twenty-two (22) feet.
- h) Special Materials.
- (1) For special projects or conditions, the use of pipe manufactured to industry standards other than those listed in the Specifications can be specified, examples are:
 - (a) Flow under highly surcharged conditions or groundwater levels are excessive, reinforced concrete low-head pressure pipe might be considered.



- (b) Areas where hydrogen sulfide may create corrosion problems, such as downstream from a pumping station or pressure sewer discharge, might require investigation of polyethylene-lined or fiberglass-lined DIP, T-Lock RCP, RCP with extra "sacrificial" concrete or other special protective linings.

c. Selection of Pipe Class and Wall Thickness.

1) Polyvinyl Chloride Pipe (PVC).

- a) PVC sewer pipe meeting ASTM D3034, ASTM F679, ASTM F1083 or ASTM F794 as specified in the Specifications.
- b) For backfill requirements see the Specifications and Standard Detail M/8.1c.
- c) Maximum cover over the pipe in accordance with Standard Detail M/8.1c is twenty two (22) feet, based on procedures for flexible pipe in Uni-Bell's Handbook of PVC Pipe.

2) Polyvinyl Chloride Pipe (PVC AWWA C900 or C905).

- a) Selection of pipe class/wall thickness for PVC AWWA C900 or C905 sewer pipelines is the same procedure as indicated for PVC water pipelines; see Part One, Section 4 (Selection of Pipe Materials).
- b) Maximum cover over the pipe will depend on bedding and backfill requirements see Standard Detail W/6.1 for Dimension Ratio (DR) and allowable cover.

3) Ductile Iron Pipe (DIP). Selection of pipe class/wall thickness for DIP sewer pipelines is the same procedure as indicated for DIP water pipelines; see Part One, Section 4 (Selection of Pipe Materials).

4) Reinforced Concrete Pipe (RCP).

- a) RCP meeting ASTM C76.
- b) For the class of pipe for various depths of cover, see Standard Detail S/8.0.
- c) For special conditions that differ from the conditions/criteria in the Specifications and Standard Details (for example, trench width exceeding the standard, depth of cover exceeding the standard, etc.) special analysis/calculations must be performed to arrive at the appropriate combination of pipe class/bedding. Generally, the design calculations follow the procedures in the American Concrete Pipe Association's Concrete Pipe Handbook and Concrete Pipe Design Manual.

