

**Section IX**  
**GRAVITY SANITARY SEWER SYSTEM**  
**DESIGN GUIDELINES**

**A. GENERAL**

1. The following sanitary sewer system design guidelines are based on Federal, State and local health requirements and the Hilton Head No. 1 Public Service District engineering design criteria.
2. These design guidelines are applicable to all developments including but not limited to residential, commercial and industrial developments, subdivisions and/or parks requiring sanitary sewer service from the Hilton Head No.1 Public Service District.
3. All design criteria, materials, and construction shall be in accordance with DHEC regulations, AWWA, and ASTM standards.

**B. GRAVITY SEWER SYSTEM DESIGN CRITERIA**

1. For all domestic wastewaters and for industrial wastewaters with solids which are similar in size and nature to solids in domestic wastewater, no gravity sewer line conveying raw sewage shall be less than eight (8) inches in diameter. In cases where the flow and number of taps are limited to less than ten (10) percent of the design capacity of the receiving sewer line, as determined by the Department, and the line cannot be reasonably extended, the Department may consider the use of six (6) inch diameter lines.
2. Service lines:
  - a. Minimum size: 4".
  - b. 6" service line may be provided, but for no more than two residential units and only upon specific approval from the District.
3. Cleanouts:
  - a. Same size diameter as the line in which they are installed.

- b. Maximum size: 6".
  - c. Minimum size: 4".
4. Minimum pipe slope – For all domestic wastewaters and for industrial wastewaters with solids which are similar in size and nature to solids in domestic wastewater, all gravity sewers shall be designed and constructed to give mean velocities, when flowing full, of not less than two (2) feet per second, based on Manning's formula using an "n" value of thirteen thousandths (0.013). Slopes slightly less than those required for the two (2) feet per second velocity, when flowing full, may be permitted. Such decreased slopes shall only be considered where the depth of flow shall be three tenths (0.3) of the diameter or greater for average flows. Whenever such decreased slopes are selected, the design engineer shall furnish with the report design computations of the anticipated flow velocities of average and peak flows. The report shall indicate the actual velocity in the sewer lines at the proposed slope and the actual velocity at the required slope in order to achieve two (2) feet per second, when flowing full. The pipe diameter and slope shall be selected to obtain the greatest practical velocities to minimize settling problems. Oversized sewers shall not be approved to justify using flatter slopes. The operating authority of the sewer system shall give written assurance to the Department that any additional sewer maintenance required by reduced slopes shall be provided.

#### C. CAPACITY DESIGN

- 1. Minimum flow for residential or apartment unit: 300 gallons per day per unit.
- 2. All other flows: comply with the unit contributory loading criteria, Appendix A of the South Carolina Department of Health and Environmental Control Standards for Wastewater Facility Construction: R.61-67.

#### D. INFILTRATION

- 1. All gravity sewers shall be designed and specified such that the leakage outward (exfiltration) or inward (infiltration) shall not exceed two hundred (200) gallons per inch of pipe diameter per mile per day. An air test may be utilized in lieu of an infiltration/exfiltration test, if approved by the Department.

E. SEWER PIPES

1. Straight alignment.
2. Depth adequate to receive wastewater from the lowest service and prevent freezing.
3. Sewers on twenty (20) percent slopes or greater shall be anchored securely with concrete anchors or equal, spaced as follows:
  - a. Not over thirty-six (36) feet center-to-center on grades twenty (20) percent and up to thirty-five (35) percent;
  - b. Not over twenty-four (24) feet center-to-center on grades thirty-five (35) percent and up to fifty (50) percent; and
  - c. Not over sixteen (16) feet center-to-center on grades exceeding fifty (50) percent.
4. Where a smaller sewer joins a larger one, match the crowns of each.
5. Service laterals: Locate five (5) feet from property pin from opposite corner of water service lateral.

F. SEPARATION OF WATER MAINS AND SEWERS

1. Where possible, locate sewer pipe at least ten (10) feet away, horizontally, from water lines.
2. Should ten (10) feet separation not be practical, then the sewer pipe may be located closer provided:
  - a. It is laid in a separate trench.
  - b. It is laid in the same trench with the water main located at one side on a bench of undisturbed earth.
  - c. In either of the above cases, the sewer pipe must be a minimum of 18" below the water pipe measured outside to outside.
3. Where sewer pipes cross over or under water lines, maintain 18" minimum clearance between outside edges of the two pipes.

#### G. COVER

1. Provide suitable cover on all lines. Minimal cover depth as follows:
  - a. Less than 8" diameter: 36".
  - b. 10" and 12" diameter: 36".
  - c. 14" diameter and larger: 48".
  - d. All piping located within the right-of-way of the South Carolina Department of Transportation shall have a cover as indicated above or 36" below the elevation of the road, whichever is greater.
  - e. Special conditions other than those listed above may be approved if requested in writing from the Hilton Head No. 1 Public Service District.

#### H. DUCTILE IRON PIPE LOCATIONS

1. Use ductile iron pipe where sanitary sewer:
  - a. Crosses over a water line.
  - b. Crosses beneath storm drainage pipe with less than three (3) feet of clearance.
  - c. Crosses above a storm drainage or other pipe with less than two (2) feet of clearance.
  - d. Crosses creeks, rivers and other water bodies.
  - e. Installed in casing.
  - f. Cover is less than minimum prescribed in Part G above.

#### I. MANHOLES

1. Manhole top elevations shall be greater than or equal to the fifty (50) year flood elevation, unless watertight covers are provided.

2. Manholes shall be installed: at the end of each line; at all changes in grade, size, or alignment; at all intersections of piping; and at distances not greater than four hundred (400) feet for sewers fifteen (15) inches or less, and five hundred (500) feet for sewers eighteen (18) inches to thirty (30) inches. Distances up to six hundred (600) feet may be approved, for sewers equal to or greater than eight (8) inches in diameter, in cases where adequate cleaning equipment for such spacing is provided. Greater spacing may be permitted in larger sewers. Cleanouts may be used only for special conditions and shall not be substituted for manholes except when installed at the end of laterals not greater than one hundred fifty (150) feet in length. A drop pipe shall be provided for a sewer entering a manhole at an elevation of twenty-four (24) inches or more above the manhole invert. Where the difference in elevation between the incoming sewer and the manhole invert is less than twenty-four (24) inches, the invert shall be filleted to prevent solids deposition. Manholes may not be required on sewer lines transporting special waste (e.g., volatile organic compounds) or effluent wastewater from a treatment facility.