

Design Criteria for Gravity Sanitary Sewer Lines

Boxelder Sanitation District

Version 5.0
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The following list constitutes basic design criteria that must be considered during the design of gravity sanitary sewer lines within the Boxelder Sanitation District (District). These are general criteria and may be altered in view of site specific conditions.

Planning Considerations:

1. **Coordination:** It is desirable that the planners and engineers communicate with the District staff to field verify the locations of existing manholes and lines, and also to discuss infrastructure contemplated for installation in the proposed subdivision.
2. **Planning:** It is advisable that the engineers meet with the District staff for a pre-design meeting and review of conceptual plans for the site, as well as off-site collector line locations.

Flows, Populations:

1. **Residential Per Capita Flows:** A domestic wastewater flow rate of 100 gal/capita/day (CDPHE Policy 96-1), and a residential population of 2.5 persons/dwelling unit (Larimer county information) shall be used for sizing sanitary sewer lines.
2. **Commercial Flows:** The development engineer must consult with the District during the design process to identify anticipated flows from commercial developments.
3. **Peaking Factors:** Peaking factors used for computed wastewater flow shall be in accordance with ASCE MOP 60 (1982) or Wastewater Engineering (Metcalf and Eddy) or other generally accepted engineering references.

Easements:

1. **Permanent Easements:** Permanent easement width of 30 ft. is required for all lines. Exceptions are possible but must be approved by the District.
2. **Access Along Easements:** All easements not within roadways must have a 12-ft wide gravel access roadway installed for District maintenance vehicle access. The access road should be level and be capable of supporting and accommodating a cleaning vehicle with an 18,000 lb axle weight.
3. **Security:** All easements not within roadways must have gates installed at all access points.
4. **Temporary Construction Easement (TCE):** TCEs of at least 50 ft. are advisable for constructability. Location of TCE relative to the permanent easement to be determined based on site conditions. TCEs of up to 100 ft. may be needed depending on conditions.
5. District standard templates are to be used for all easement document preparation.

Sewer Lines:

1. Alignment: Sewer lines, between manholes, must be straight. Curved sewer lines will not be accepted by the District.
2. Slope: Minimum slope in accordance with that recommended in Ten States Standards.
3. Flow Velocity: Minimum average velocity of flow in pipe shall be 2 ft/s.
4. Sewer Line Size: Minimum size of sanitary sewer line main is 8 in.
5. D/d Ratio for Design: In accordance with ASCE MOP 60 (1982), pipes up to 15 in. diameter should be designed as flowing half full ($d/D = 0.5$) at peak design flow. Pipes of a larger size should be designed as flowing $\frac{3}{4}$ full ($d/D = 0.75$) at peak design flow.
6. Cover: Lines should have a minimum cover of 3.5 ft. (BSD standards/specs.)
7. Line Location in Easements: Sewer lines should be centered within the easement(s).

Manholes:

1. Separation: Manholes must be no more than 400 ft. apart, except in some special cases. This is due to limitations of the sewer line cleaning equipment.
2. Manhole Location: The sanitary sewer manholes shall, when possible, be located in the middle of the street, preferably at the crown or reasonably close to it. Under no circumstances shall the sanitary sewer manholes be sited in areas where stormwater may flow into the manhole. Similarly, sides/banks of water courses are areas where location of manholes should be avoided.
3. Minimizing Manholes: Whenever possible, the number of sanitary sewer manholes must be kept to a minimum.
4. Terminal Manholes: Manholes at the end of lines must be designed with the potential to serve adjacent properties which are currently not served by sanitary sewer.
5. Rim Elevations: Manhole covers must be at grade.

Service Lines:

1. Disconnect Valves: The District requires the use of service disconnection valves (e.g., Elder Valves™) to be placed in the service lines.
2. Cleanout: The District requires a cleanout be installed immediately downstream of each Elder Valve.
3. Connections to Manholes: Service connections to manholes should be avoided. If, however, that is not possible, such as in cul de sacs, service connections may be established through manholes, but with the use of A-LOK gaskets cast in place.
4. Tracer Wire: Tracer wires are required to run along the service line to clean out location.

Separation from Other Services and Water Course Crossings:

1. Sanitary sewer lines that cross water courses such as canals, streams, rivers, creeks, ponds and such are required to be in a steel casing or concrete encased. The District Engineer will make the final determination on type of protection to be used at each crossing.

2. Depth: Top of sewer line should, preferably, be at least 1.5 ft. below the bottom of water lines at any crossing.

General Aspects:

1. The gravity sanitary sewer lines shall be constructed in accordance with the District's Construction Standards and Specifications.