

**Design Criteria Checklist for Gravity Sewer Collection Systems**

	Design Plans - General Information
	<u>DESIGN NOTE:</u> <i>Unless explicitly authorized by FUD, Gravity Sewer deeper than eight (8) feet will not be accepted, and Low Pressure Sewer will be required.</i>
	Vicinity Map
	Key Map, for linear or large projects
	Clear depiction of future phases of Development
	Location of Sewer Lines & manholes relative to bridge, structures, and identifiable objects
	Location of proposed force main lines, valves, air release valves, fittings, and appurtenances
	Location of existing and proposed utilities (water, sewer, gas, power, communication, etc.)
	Plan View shall include: <ul style="list-style-type: none"> <li>• Horizontal separation with other utilities, particularly Water</li> <li>• Manhole deflection angles for entering and exiting lines</li> <li>• Stub-out location(s) and elevation(s) for future phase(s)</li> </ul>
	Profile of proposed Sewer Main(s), including: existing and proposed Utility and Storm crossings, and existing and proposed ground surfaces.
	Profile shall include: <ul style="list-style-type: none"> <li>• Alignment stationing at manholes.</li> <li>• Invert elevations for incoming and outgoing lines.</li> <li>• Top elevation of manhole cover.</li> <li>• Existing and proposed ground surfaces.</li> <li>• Existing and proposed Utility and Storm crossings, including vertical clearance with Sewer line. (When vertical clearance is less than 18-inches, the lower utility line shall be installed with a stone envelope to the invert of the upper utility line.)</li> <li>• Identification of Stream Crossings, including “normal” and 100-yr Storm (FEMA FIRM or hydraulic modeling, as appropriate) water levels.</li> </ul>
	Service Line Information shall include: <ul style="list-style-type: none"> <li>• Depth of cover at property line</li> <li>• Verification, by Engineer, that the collection system is sufficiently deep to service each proposed lot.</li> </ul>
	Garbage Dumpster pads shall be covered to prevent intrusion of rainwater to sewer system.
	Stream Crossing details, including construction methods and materials used.
	Locations of permanent Utility Easement(s) and temporary Construction Easement(s).
	Include Grading Plan indicating existing and proposed contours (2’ max interval), including finished floor elevation(s) of structure(s) being served.
	For projects requiring work in State or County Right-of-Ways, provide stamped Traffic Control Plans for FUD’s use in making Utility ROW Permit Application.
	Sealed by a TN-Licensed Professional Engineer.
	Design Report
	Summarize population served, average flows, peak flows, corresponding velocities, etc.
	Identify future phases of development. Verify initial design is adequate to serve future growth.
	Design basis for wastewater flow and loadings shall be based on TDEC’s <i>Design Criteria for Sewage Works</i> – Appendix 2A, peer reviewed literature values, or from comparable regional data. Peaking flow shall be determined based on (1) the hours of operation and (2) peaking

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	factor based on the population served by the Development, as referenced in TDEC’s <i>Design Criteria for Sewage Works</i> – Chapter 2.
	Sealed by a TN-Licensed Professional Engineer.
	Environmental / Permitting
	Stream crossings of Gravity or Force Main Sewer shall be permitted and approved by TDEC Division of Water Resources.
	Material & Construction Requirements
	<p>Manholes – Specification 33 05 13</p> <ul style="list-style-type: none"> <li>• Public sewer mains shall be terminated with a manhole meeting FUD Specifications.</li> <li>• Max spacing not to exceed 400-ft</li> <li>• Internal drop connections require a 5-ft diameter manhole</li> <li>• Slope &gt;5% require ZLOK gasket and min drop of 0.2-ft.</li> <li>• Manhole slope should generally be the average slope of the lines in and out.</li> </ul>
	<p>Gravity Main Line – Size and Material (Specification 33 05 01 and related sections)</p> <ul style="list-style-type: none"> <li>• 8” min. diameter.</li> <li>• Bedding, and backfill per FUD Specifications and TDEC Criteria.</li> <li>• Clearance with other underground utilities: <ul style="list-style-type: none"> <li>• Water – 10-ft horizontal, 18-in vertical</li> <li>• Other underground – 3-ft horizontal, 12-in vertical</li> </ul> </li> <li>• Slope – minimum slope of 0.85%.</li> <li>• Cover <ul style="list-style-type: none"> <li>• Per TDEC <i>Design Criteria for Sewage Works</i>, latest version.</li> <li>• Under pavement, lines with less than 4-ft of cover shall be ductile iron with ceramic epoxy coating. Minimum cover under pavement is 30-inches.</li> <li>• Lines with greater than 12-Ft of cover (typically not allowed) shall be ductile iron with ceramic epoxy coating.</li> </ul> </li> <li>• Aerial sewer crossings are not allowed unless no practical alternative exists. If an aerial crossing is approved by FUD for construction, the Engineer of Record will be responsible for coordinating with TDEC Division of Water Resources to obtain permits, provide hydrologic / hydraulic calculations, and comply with ancillary requirements.</li> </ul>
	<p>Service Lines &amp; Cleanouts</p> <ul style="list-style-type: none"> <li>• Refer to Specification Section 33 05 01.12 for product and execution requirements.</li> <li>• For single-family residential, each Lot shall be provided by a service line and cleanout.</li> <li>• Cleanouts shall typically be set near the center of the front property line.</li> <li>• Set top of cleanout at four to six inches (4” – 6”) above top of curb elevation.</li> <li>• For apartments, each building shall be connected to a manhole.</li> <li>• Dumpsters must be covered if connected to sewer.</li> <li>• Easements are required on service lines that cross private property to service another lot. (This practice will typically not be accepted by FUD.)</li> <li>• Consult with FUD about material requirements if services are made on a DIP main.</li> </ul>

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Pump Stations	
	Public Sewer Pump stations shall be owned by FUD and located on fee simple property under FUD ownership.
	Pump stations shall be designed and constructed per FUD's Standard Specifications and Drawings.
	FUD reserves right to provide input on pump station capacity.

Easements & Property	
	15-ft Utility Easement (o.c.) is required for all public sewer mains. Plans to reference Instrument #200908100011396 at Knox County Register of Deeds Office.
	Property for Sewer Pump Station shall be deeded to FUD. Depending on location, FUD may require a dedicated 20-ft wide access easement to pump station.
	Utility Easements or subdivision plats must be recorded before the system will be accepted by FUD.