

Min project-1

Steps in the Design of a Sanitary Sewer System

1. Estimate the wastewater flow rates for the design period and any local conditions that may affect the hydraulic operation of the system.

- Design for the expected peak flows (peak hourly flows from residential, commercial, institutional and industrial sources from the entire service area and add the peak infiltration and inflow allowance for the entire service area).

materials and minimum sizes, minimum and maximum velocities, slopes, and covers.

1. Manning's n of 0.013 recommended when analyzing well constructed new sewers and 0.015 for most older existing sewers. This value is based on the use of individual pipe sections (not less than 1.5 m, 5 ft long) with true and smooth inside surfaces, and on the assumption that only first-class construction procedures are used.

- Minimum allowable velocity = 2 ft/sec (0.6 m/sec) at one-half full or full depth. If access for cleaning is difficult, the minimum velocity should be 3 ft/sec (1 m/sec).

- Maximum allowable velocity = 8 to 10 ft/sec (2.5 to 3.0 m/sec) to prevent damage to the sewer.

ASCE guidance specifies that sanitary sewers up to 375

mm (15 in) be designed to flow half full at the design flow rate, with larger sewers designed to flow threequarters full. These guidelines reflect that small wastewater flows are much more uncertain than larger flows.

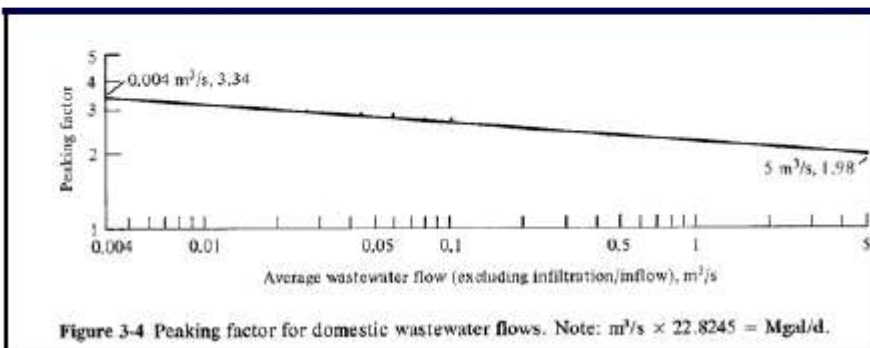
3. Minimum sanitary sewer pipe sizes are usually specified as 205 mm (8 in), laid on a 1% slope. Service connections are usually 150 mm (6 in) or 205 mm

Information for Sanitary Sewer Design Example-1

• Given:

- Wastewater saturation densities and wastewater flows for the area.
- Average wastewater flow from industrial areas = 30 m³/ha-day (3200 gal/ac-day)
- Peaking factor for wastewater flow from industrial areas = 2.1
- Average wastewater flow from commercial areas = 20 m³/ha-day (2100 gal/ac-day)
- Peaking factor for wastewater flow from commercial areas = 1.8
- Average wastewater flow from the school = 75 L/student-day (20 • Peaking factor for wastewater flow from the school = 4.0
- Anticipated population of the school = 2000 students
- Average waste Water Flow from commercial areas = 20m³/ha.day
- Peaking Factor for waste water flow from commercial area=1.8
- Average waste water flow from school=75l/student/day
- Peaking factor for waste water from school = 4.0
- School population=2000 students

Zoning	Type of development	Saturation population density		Wastewater flows	
		Persons/ha	Persons/ac	L/capita-day	Gal/capita-day
Resid.	Single-family houses	38	15	300	80
Resid.	Duplexes	60	24	280	75
Resid.	Low-rise apartments	124	50	225	60



Calculate:

- Pipe slope
- Pipe size
- Pipe alignment