



3B-1 Flow Determination

A. Sanitary sewers

1. **Discharge (Q) average daily flow (minimum)**

$$\text{Area} \times \text{Area Density} \times \text{Rate} = \text{Average Daily Flow} \qquad \text{Equation 1}$$

$$\text{Number of Units} \times \text{Unit Density} \times \text{Rate} = \text{Average Daily Flow} \qquad \text{Equation 2}$$

2. **Discharge (Q) peak sewer flow (minimum)**

Average daily flow times ratio of peak to average daily flow (See Figure 1 for ratio). NOTE: Population values shown in Figure 1 are based on the area that discharges into the sewer.

3. **Design density and rate.** See Table 1.

B. Footing drain inflow

If a proposed sewer is to serve an older developed area with existing footing drain inflow, special design information should be obtained from the Jurisdiction. If no information is available, the designer should use a minimum of 1,000 gpcd for footing drain inflow.

C. Area

Gross area should be used in determining design flows and include streets, alleys, school grounds, parks, and similar dedicated open space.

D. Density table

Table 1: Minimum Values

<u>LAND USE</u>	<u>AREA DENSITY</u>	<u>UNIT DENSITY</u>	<u>RATE</u>
Low Density (Single Family) Residential	10 people / AC	3.3 people / unit	100 gpcd*
Medium Density (Multi-Family) Residential	12 to 15 people / AC 6.0 people / duplex	3.3 people / unit	100 gpcd*
High Density (Multi-Family) Residential	20 to 75 people / AC	2.5 people / unit	100 gpcd*
Office & Institutional	5,000 gpd / AC (IDNR)	Special Design Density	
Commercial & Light Industrial	5,000 gpd/AC (IDNR)	Special Design Density	
Industrial	10,000 gpd/AC (IDNR)	Special Design Density	

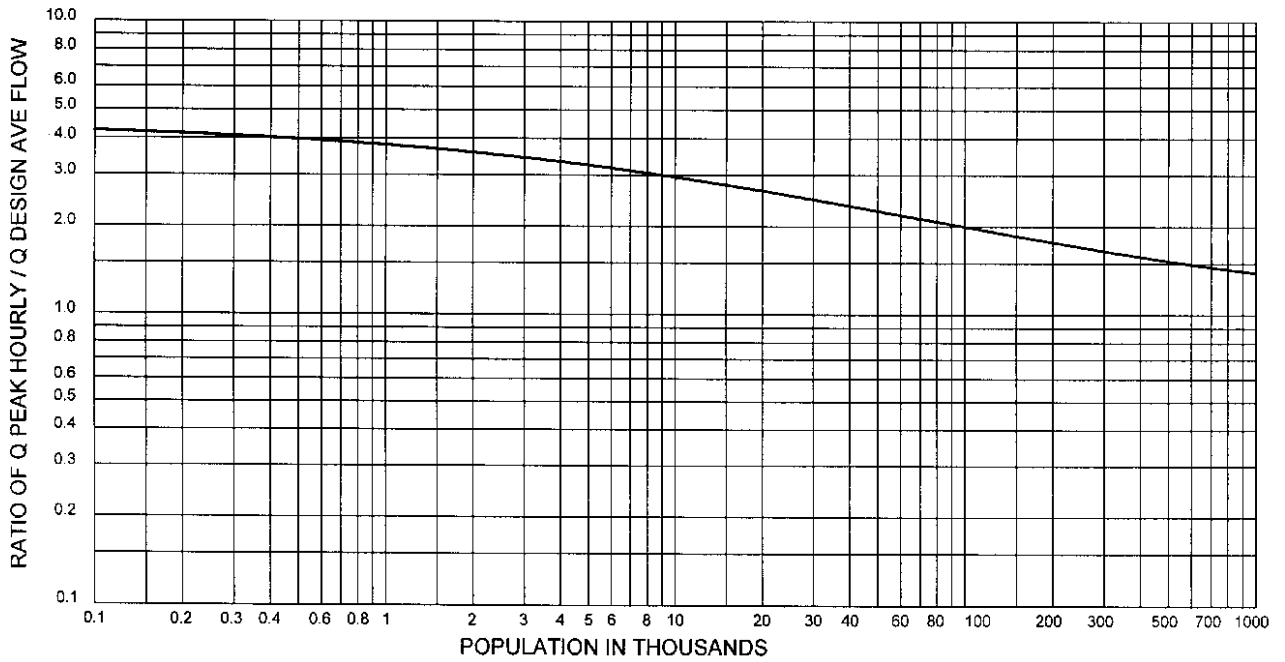
* Iowa Department of Natural Resources (IDNR) - Dry Weather Flow - One hundred gallons per capita per day (gpcd) should be used in design calculations as the minimum average dry weather flow. This 100 gpcd value may, with adequate justification, include maximum allowable infiltration for proposed sewer lines.

Note: If the Project Engineer uses values different from the above table, approval by the Jurisdictional Engineer is required.

E. Special design densities

Special design densities should be subject to approval by the Jurisdiction Engineer based on methodology provided by the Project Engineer.

Figure 1: Ratio of Peak to Average Daily Sewage Flow



Q Peak Hourly: Maximum Rate of Wastewater Flow (Peak Hourly Flow)
 Q Design Ave: Design Average Daily Wastewater Flow

$$\text{Source: } Q \text{ Peak Hourly} / Q \text{ Design Ave} = \frac{18 + \sqrt{P}}{4 + \sqrt{P}}$$

(P = Population in Thousands)

Fair, G.M. and Geyer, J.C. "Water Supply and Wastewater Disposal"
 1st Ed., John Wiley & Sons Inc., New York (1954), p 136