

SECTION 5: SANITARY SEWER

1. SEWER DESIGN STANDARDS

- a. All sanitary sewer installation and design shall comply with the Payson City's Wastewater Collection System Master Plan, and R317-3-2.

2. HYDRAULIC DESIGN CRITERIA

- a. Sewer lines shall be designed to maintain a flow velocity of two feet per second (2 fps) during peak flows.
- b. Where design velocities are projected to be greater than fifteen feet per second (15 fps), the sewers and manholes shall be protected against displacement by erosion and impact.
- c. Sanitary sewers shall be designed to carry the peak discharge as specified below:
 - i. Laterals and collector mains: 400 gallons/ capita/ day
 - ii. Interceptor and outfall mains: 250 gallons/ capita/ day
- d. Minimum Manning's "n" value is 0.012.
- e. Buoyance of sewers shall be considered and flotation of the pipe shall be prevented with appropriate construction where high groundwater conditions are anticipated.
- f. Velocity Calculations for gravity sewers:

Manning's Equation (Gravity):

$$V = \frac{1.486}{n} \times (R_H)^{\frac{2}{3}} \times S^{\frac{1}{2}}$$

Where: V = velocity in feet/second
n = coefficient of roughness (Manning), n = 0.013
S = slope of energy grade line, ft/ft
R_H = hydraulic radius, ft
= $\frac{\text{cross-sectional area of flow (ft}^2\text{) or diameter (in.)}}{\text{wetted perimeter} \quad 48}$

g. The evaluation criteria for pipelines varies by pipe size:

A. Pipeline capacity 12 inch in diameter and smaller: Peak flow in the pipe must be less than fifty (50) percent of the full flow pipe capacity.

B. Pipeline capacity 15 inch in diameter and larger: Peak flow in the pipe must be less than seventy five (75) percent of the flow pipe capacity.

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h. Design Peak Hourly Flow is the largest volume of flow to be received during a one hour period expressed as a volume per unit time.

i. Peak Hour Factor must be calculated using the following equation:

$$\text{Peak Hour Flow} = (18 + \sqrt{P}) / (4 + \sqrt{P})$$

In which P equals population in thousands

3. SANITARY SEWER PIPE SIZE AND TYPE

- a. Minimum main line size shall be eight inches (8") in diameter.
- b. Minimum depth of a sewer main, to top of pipe, will be not less than forty-eight (48") below subgrade of roadway.
- c. Sanitary sewers shall be designed of sufficient depth to permit sewer laterals from basements to be connected. Exceptions may be granted in subdivisions or areas in which no basements are to be constructed. A note shall be made on the plat to prohibit basements in these areas.
- d. Allowable sanitary sewer main pipe material for all projects shall be green PVC SDR 35, or High-Density Polyethylene (HDPE).
- e. Horizontal clearance to any culinary water line shall be at least 10 feet (10') edge to edge per R309-550 and R317-3-2.
 - i. Any other utility crossing the sewer main shall do so as close to a right angle as possible.
 - ii. For waterline crossings, the water shall be a minimum of eighteen inches (18") above the sewer.
- f. Unless otherwise accepted and approved by the City Engineer, the minimum slopes shall be the following:
 - i. Eight inch (8") sewer lines: 0.40%
 - ii. Ten inch (10") sewer lines: 0.28%
 - iii. Twelve inch (12") sewer lines: 0.22%
 - iv. Fifteen inch (15") sewer lines: 0.15%
 - v. Eighteen inch (18") sewer lines: 0.12%
 - vi. Twenty-one (21") and larger sewer lines: 0.10%
- g. Sewer main lines shall be located along the centerline of the road.

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