



PRELIMINARY WATER & SANITARY SEWER DEMAND

JEFFERSON RIDGE
BENICIA, CALIFORNIA 94510

Preparation for:
Rogal Projects
1025 Kaiser Road
Napa, CA 94559



Project #4121004.0

November 18, 2021

City of Benicia Planning Division
Received November 22, 2021

PRELIMINARY ESTIMATED WATER DEMAND

Domestic Water (Average Daily Flow):

345 Residents x 70 gallons per resident = 24,150 gal

5 Employees x 12 gallons per employee = 60 gal

Total = 24,210 gal

Fire Water Flow:

Maximum Building Size (Block C): 56,723 sf

Assumed Construction Type = Type V-B

Fire Flow per CFC Table B105.1(2) = 6,500 gpm

Minimum Fire Flow with 50% Reduction for Automatic Fire Sprinklers per CFC Table B105.1(1) = 3,250 gpm, for 1 hour flow duration at 20 psi residual pressure

PRELIMINARY ESTIMATED SANITARY SEWER DEMAND

Average Daily Flow:

345 Residents x 60 gallons per resident = 20,700 gal

5 Employees x 10 gallons per employee = 50 gal

Total Q = 20,750 gpd = 0.02 MGD

Peaking Factor: $3.5 - 1.8 * Q^{0.05} = 2.00$

Total $Q_{peak} = 20,750 \text{ gpd} \times 2.00 = 41,500 \text{ gpd}$

Infiltration: $500 \text{ gpd/AC} \times 7.9 \text{ AC} = 3,950 \text{ gpd}$

Total New Flow, $Q_{peak + infiltration} = 41,500 \text{ gpd} + 3,950 \text{ gpd} = 45,450 \text{ gpd} = 0.07 \text{ cfs}$

Assumed Existing Flow (50% of Q_{cap} , see next page) = 1.48 cfs

Total Estimated Flow, $Q_{demand} = 0.07 \text{ cfs} + 1.48 \text{ cfs} = 1.55 \text{ cfs}$

PRELIMINARY ESTIMATED SANITARY SEWER CAPACITY

Pipe capacity using Manning's Equation:

$$Q_{\text{capacity}} = A \times (1.486/n) \times R_h^{2/3} \times S^{1/2}$$

Where: $A = \pi r^2 = \pi(0.33 \text{ ft})^2 = 0.349 \text{ ft}^2$ for existing 8" pipe per City of Benicia Utility Map
 $n = 0.013$
 $R_h = A / P_w = \pi r^2 / 2\pi r = r/2 = 0.33/2 \text{ ft} = 0.165 \text{ ft}$ for 8" pipe
 $S = 0.061 \text{ ft/ft}$ slope per topographic survey

$$Q_{\text{capacity}} = A \times (1.486/n) \times R_h^{2/3} \times S^{1/2} = (0.349) \times (1.486/0.013) \times (0.165)^{2/3} \times (0.061)^{1/2} = 2.96 \text{ cfs}$$

Therefore $Q_{\text{capacity}} = 2.96 > Q_{\text{demand}} = 1.55 \text{ cfs}$ ✓