

Potable Water System Calculations:

Assumptions:

NFPA 24 - Fire Hydrants are required to be a minimum of a 6" lateral to the water main with a flow rate of 1000 GPM @ sustained 20psi. This water main shall utilize 8" main with 6" laterals

1000 gal/min * 1min/60sec * .1336gal/ft ³ =	2.2267 ft ³ /s x 2 hydrants =	4.4533 ft ³ /s
8" * 1ft/12in =	0.67 ft	
20psi * 144 in ² /1 ft ² =	2880 psf	

8" C900 type pipe SDR 26 with a manning roughness coefficient = 0.012

Typical domestic water demand calculations are based on drought conditions @ 115 gal/capita*d @20 psi

115 gal/capita*d * 1day/86400sec * .1336gal/ft³ = 1.778x10⁻⁴ ft³/s*capita

Gramercy water supply to subdivision available pressure= 60psi

60psi * 144 in²/1 ft² = 8640 psf

The longest run to a hydrant in the subdivision is from the 12" main at Central

Canal to a hydrant located @ N. Montz Ave & East 7th = 1511.5 ft

Difference in elevation between 12" main and the hydrant = -1.97 ft

Calculations:

Considering the entire population of the subdivision under drought conditions with only one 8" connection to the city water system is being used.

Consider water usage of 129 lots with 4 occupants per lot

Use with 2 Fire Hydrants	Use without Fire Hydrant
4.45339 ft ³ /s + (1.778x10 ⁻⁴ ft ³ /s*capita * 516 capita)	(1.778x10 ⁻⁴ ft ³ /s*capita * 516 capita)
Q= 4.545 ft ³ /s	Q= 0.092 ft ³ /s
V= 13.019 ft/s	V= 0.263 ft/s
$h_f = f * L/D * v^2/2g$	
$h_f = 71.669$ ft	$h_f = 0.029202$ ft
$p_1/\gamma + z_1 + v_1^2/2g = p_2/\gamma + z_2 + v_2^2/2g + h_f$	
$p_2 = 8,566.36$ psf > 2880 psf required at hydrant	$p_2 = 8,640.64$ psf
59.49 psi > 20 psi required at hydrant	60.00 psi
$R_e = VD/v$	
$R_e = 521,611.22$ > 10,000 turbulent flow	$R_e = 10,528.9976$ > 10,000

Water Meter connection at property line

1" C900 type pipe SDR 26 with a manning roughness coefficient = 0.012

Typical domestic water demand calculations are based on drought conditions @ 115 gal/capita*d @20 psi

115 gal/capita*d * 1day/86400sec * .1336gal/ft³ = 1.778x10⁻⁴ ft³/s*capita

Each connection to water main for 2 pieces of property and each property has 4 people

Calculations

1.778x10 ⁻⁴ ft ³ /s*capita * 8 capita)
Q= 0.001 ft ³ /s
V= 0.261 ft/s
$h_f = f * L/D * v^2/2g$
$h_f = 0.005$ ft
$p_1/\gamma + z_1 + v_1^2/2g = p_2/\gamma + z_2 + v_2^2/2g + h_f$
$p_2 = 8,640.67$ psf
60.00 psi
$R_e = VD/v$
$R_e = 1,306.03$ < 2,000 laminar flow to meter(s)