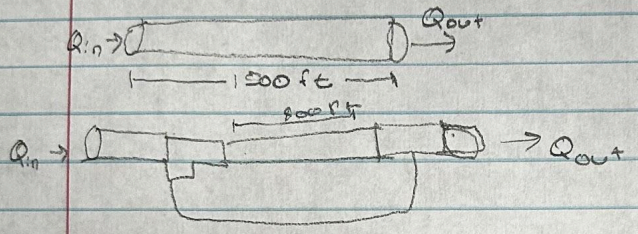
Synzere Bullin 04/9/24

3id Test Submission

2)

A) Drawing



Purpose: What is the expected increase flow rate through the system for the same pressure in original pipe?

Design C.: Water passing through the pipe at 65 gpm flow rate.

Variable: Horizontally laid 2 inch standard steel tubing is 1500 ft long pipe is modified adding loop of 1 1/2 inch standard steel tubing that is 600 ft long.

Procedure: $h_L = K \frac{V^2}{2g}$ (minor losses), $\frac{\Delta P}{\rho} = \left(2 k_{reg} + \left(\frac{L_4}{\sqrt{D_4}}\right)\left(\frac{16 Q_1^2}{\pi^2 D_4^4}\right) + \left(k_{tee} + 2 c_{16} + \frac{1}{2} + k_{reg}\right)\right)$

$h_L = f \frac{L}{D} \frac{V^2}{2g}$, $\frac{\Delta P}{\gamma} = h_{L\,AB}$, $Q' = Q_1 + Q_2$, % diff $\frac{f_{old} - f_{new}}{f_{old}} \times 100$

Solution: $h_L = \frac{1500}{400} \frac{65}{2(9.8)} = 5.53$ $\frac{5.53 - 4.97}{5.53} \times 100 = 10.13\%$

$h_L = \frac{1500}{600} \frac{65}{2(9.8)} = 4.97$