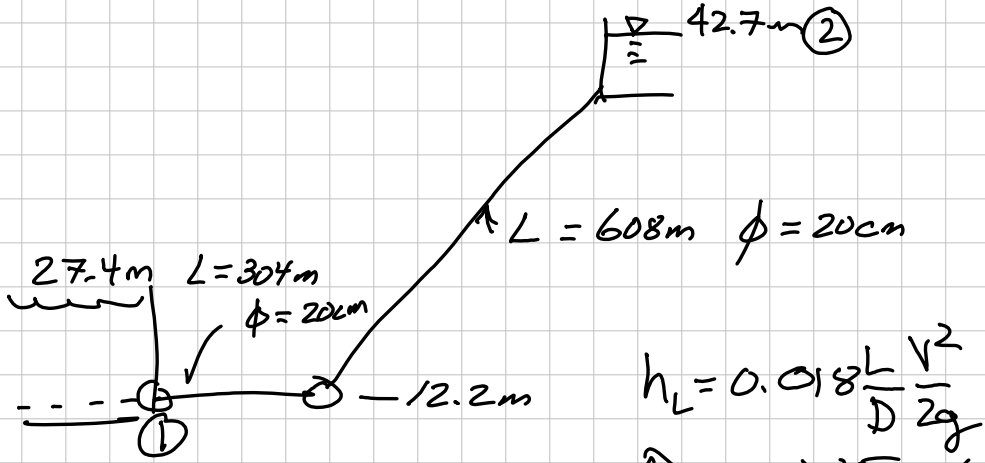
SKETCH



$$h_L = 0.018 \frac{L}{D} \frac{V^2}{2g}$$

$$Q = 0.085\ m^3/s$$

KNOWN

POOL ELEV.; PIPE LENGTHS; Q

DIAMETERS; HEAD LOSS;

UNKNOWN

PUMP HEAD

GOV. EQN

NO TURBINES

$$\frac{P_1}{\gamma} + \frac{V_1^2}{2g} + z_1 + h_p = \frac{P_2}{\gamma} + \frac{V_2^2}{2g} + z_2 + \cancel{h_T} + h_L$$

$\frac{P_1}{\gamma}$: $27.4 - 12.2$; z_1: $12.2\ m$

$\frac{P_2}{\gamma} + \frac{V_2^2}{2g} + z_2$: TOTAL HEAD @ ②

$= 42.7$

SOLUTION

$$\frac{P_1}{\gamma} + \frac{V_1^2}{2g} + z_1 + h_p = \frac{P_2}{\gamma} + \frac{V_2^2}{2g} + z_2 + h_L$$

P_1/γ: $27.4 - 12.2$ m; z_1: 12.2 m

TOTAL HEAD @ ②

$= 42.7$

SUBSTITUTIONS

$$15.2\text{m} + \frac{V^2}{2g} + h_p = 42.7 + h_L$$

$$V = \frac{0.085\text{m}^3/\text{s}}{\frac{\pi (0.20\text{m})^2}{4}} = 2.705\text{m/s}$$

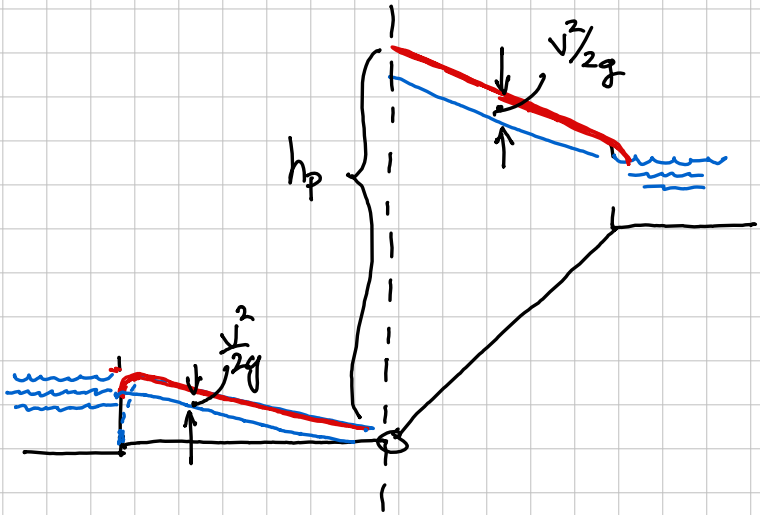
$$h_p = 42.7 - 15.2 - \frac{V^2}{2g} + h_L$$

$$= 27.1 + 0.018 \frac{(304+608)(2.705)^2}{(0.20)(2)(9.8)}$$

$$= 57.7\text{ m}$$

DISCUSSION

ENERGY EQUATION APPLICATION. USE TOTAL HEADS TO REDUCE WORKLOAD



EGL (red); HGL (blue)