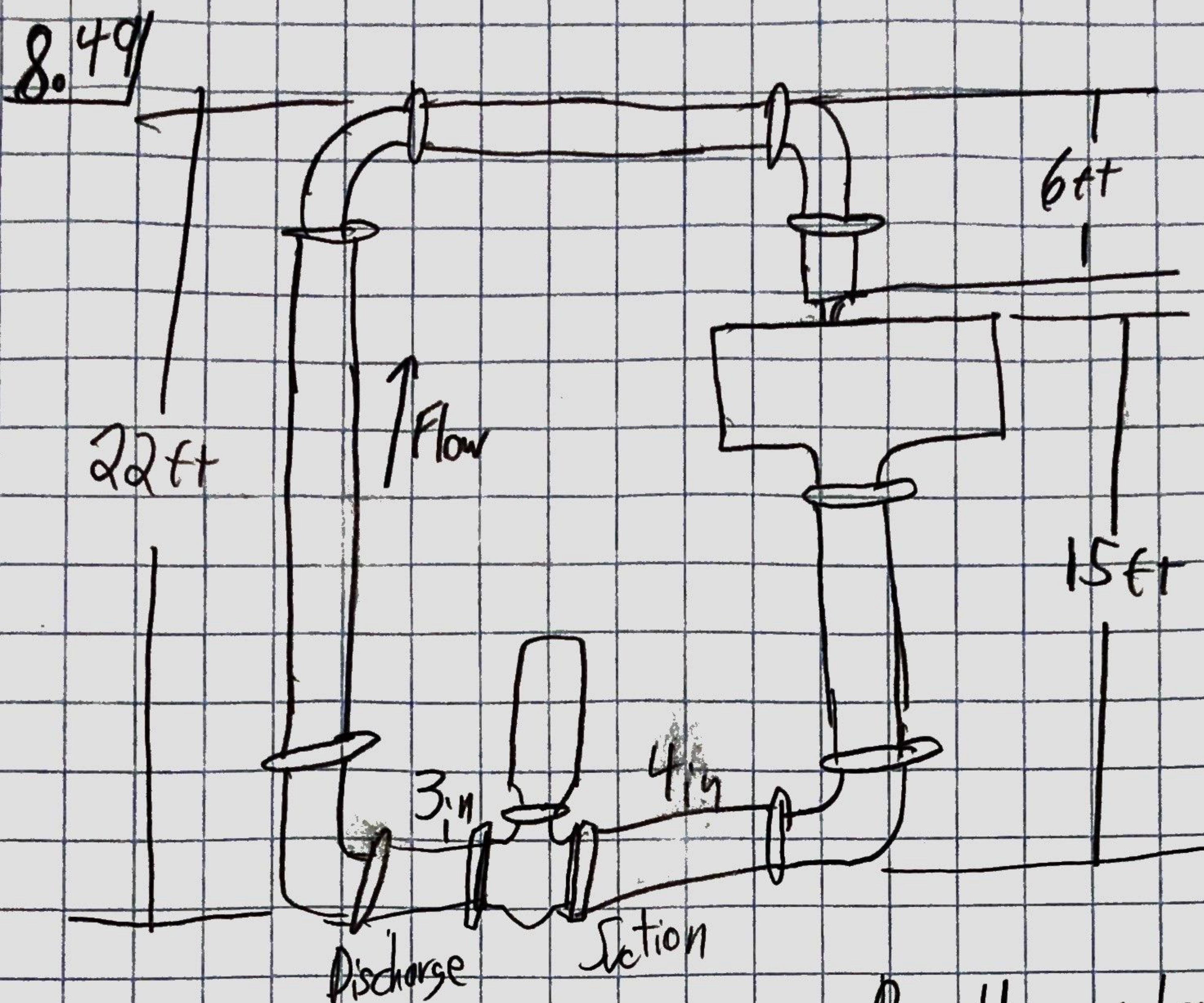




$$Z_2 - Z_1 = 1 \text{ ft}$$

$$L_D = 75 \text{ ft}$$

$$L_S = 25 \text{ ft}$$

$$Q = 300 \text{ gal/min} \\ = 0.6684 \text{ ft}^3/\text{s}$$

$$V_D = \frac{Q}{A} = \frac{0.668}{0.05132} = 13.024 \text{ ft/s}$$

$$V_S = \frac{Q}{A} = \frac{0.668}{0.0884} = 7.56 \text{ ft/s}$$

$$\text{Reynolds number } 10^4 \text{ F } N_R = \frac{vD}{\nu}$$

$$N_{R_D} = \frac{13.024 \times 0.2557}{2.15 \times 10^{-3}}$$

$$= 1548.947 \text{ laminar}$$

$$\text{Friction } f_D = \frac{64}{1548.947} = 0.04132$$

$$N_R = \frac{7.56 \times 0.3355}{2.15 \times 10^{-3}}$$

$$= 1179.711$$

$$f_S = \frac{64}{1179.711} = 0.054$$

$$h_D = f_D \frac{L_D}{D_D} \times \frac{V_D^2}{2g}$$

$$h_D = \frac{0.04132 \times 75 \times 13.024^2}{0.2557 \times 2 \times 32.2}$$

$$= 31.92 \text{ ft}$$

$$h_S = f_S \frac{L_S}{D_S} \times \frac{V_S^2}{2g}$$

$$h_S = \frac{0.054 \times 25 \times 7.56^2}{0.3355 \times 2 \times 32.2}$$

$$= 3.57 \text{ ft}$$

$$h_L = 31.92 + 3.57 = 35.49 \text{ ft}$$

$$\gamma = 0.89 \times 62.4 \\ 55.536 \text{ lb/ft}^3$$

$$h_A = 35.49 + 1 + \frac{13.024^2}{2 \times 32.2}$$

$$= 39.1 \text{ ft}$$

$$P = 55.536 \times 0.6684 \times 39.1 \times \frac{1}{550}$$

$$= 2.64 \text{ hp}$$