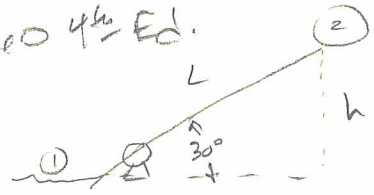
7.60 4th Ed.

~~7.55~~



$$\sin 30° = \frac{h}{L} = 0.5 \Rightarrow L = 2h$$

$$\frac{\Delta P}{\rho} + \frac{\Delta u^2}{2} + g\Delta z + \hat{F} = -\frac{W_s}{\dot{m}}$$

$$\hat{F} = 0.041 L \quad \frac{ft\ lb_f}{lb_m} \qquad (ft)$$

① → surface of lake $\quad u_1 = 0$

② → atmospheric discharge $\quad P_2 = P_1$

$$\frac{u_2^2}{2} + gh + \underbrace{(.041)(2h)}_{\hat{F}\ \frac{ft\ lb_f}{lb_m}} = +\frac{W_s}{\dot{m}} \qquad \text{(4th Ed.)}$$

$\frac{u_2^2}{2} = ?$ need u_2

$\dot{m} = ?$ need $\dot{m}$

$$\dot{V} = (95\ gal/min)\left(\frac{ft^3}{7.4805\ gal}\right)\left(\frac{min}{60\ s}\right) = 0.212\ \frac{ft^3}{s}$$

$$uA = \dot{v}$$

$$A = \pi\frac{d^2}{4} = \left(\pi\frac{(1.049\ in)^2}{4}\right)\left(\frac{ft}{12\ in}\right)^2 = 6\times10^{-3}\ ft^2$$

$$u_2 = \frac{.212\ ft^3/s}{6\times10^{-3}\ ft^2} = 35.3\ ft/s$$

$$\dot{m} = \rho A u_2 = \left(62.4\ \frac{lb_m}{ft^3}\right)\left(6\times10^{-3}\ ft^2\right)\left(35.3\ ft/s\right) = 13.2\ \frac{lb_m}{s}$$

$$\frac{(35.3\ ft/s)^2}{2} + \left(32.2\ \frac{ft}{s^2}\right)h + \left(.082\ h\ \frac{ft\ lb_f}{lb_m}\right)\left(32.2\ \frac{ft\text{-}lb_m}{lb_f\text{-}s^2}\right) = \left(+\frac{\delta\ hp}{13.2\ \frac{lb_m}{s}}\right)\left(\frac{.7376\ \frac{ft\ lb_f}{s}}{1.34\times10^{-3}\ hp}\right)$$

$$623 + 32.2h + 2.64h = 10{,}742$$

$$h = 290\ ft!$$