7.1

$$\frac{0.8\,\ell}{h}\left|\frac{3.5\times10^{4}\,kJ}{\ell}\right|\frac{0.25\,kJ\,work}{kJ\,heat}\left|\frac{h}{3600\,s}\right|\frac{1\,kW}{1\,kJ/s}\ ★ = 1.94\,kW$$

7.1 (a)

$$\frac{1.94\,kW}{}\left|\frac{10^{3}\,W}{kW}\right|\frac{1.341\times10^{-3}\,hp}{1\,W}\ ★ = 2.60\,hp$$

7.1 (b)

7.2 All kinetic energy dissipated by friction

$$E_k = \frac{mv^2}{2} = \frac{5500\,lb_m}{2}\left|\frac{(55\,mi)^2}{h^2}\right|\frac{h^2}{(3600\,s)^2}\left|\frac{(5280\,ft)^2}{mi^2}\right| \cdots$$

$$\cdots \frac{9.486\times10^{-4}\,Btu}{0.7376\,ft\cdot lbf}\ ★\left|\frac{lbf\,s^2}{32.174\,lb\,ft}\ ★\right. = 715\,Btu$$

7.2 (a)

$$\frac{10^{8}\,Braking}{day}\left|\frac{715\,Btu}{braking}\right|\frac{day}{24\,h}\left|\frac{h}{3600\,s}\right|\frac{W\cdot s}{9.486\times10^{-4}\,Btu}\ ★\left| \cdots\right.$$

$$\cdots \frac{MW}{10^{6}\,W} = 87\,MW$$

7.2 (b)

7.3 $\dot{m} = \rho\bar{V}A = \rho Q$

Mass flow Rate:

$$\dot{m} = \frac{3\,gal}{min}\left|\frac{1\,ft^3}{7.4805\,gal}\ ★\right|\frac{62.37\,lb}{ft^3}\ (\rho_{H_2O}\ ★)\left|\frac{1\,min}{60\,s}\right. =$$

$$0.4169\,lb/s$$

7.3 (a)

Velocity

$$\bar{V} = \frac{3\,gal}{min}\left|\frac{1728\,in^3}{7.405\,gal}\right|\frac{}{\pi(0.5\,in)^2}\left|\frac{1\,ft}{12\,in}\right| \cdots$$

(use $\pi D^2/4$ not πR^2)

$$\cdots \frac{1\,min}{60\,s} = 1.225\,ft/s$$

7.3 (b)