Pat Student
Assignment #6 – Part 2

The volume of a concrete cylinder mold $V_{cylinder}$ (in.^{3}) is computed as

$$V_{cylinder} = \frac{\pi D^2 h}{4} \tag{1}$$

where D is the diameter of the cylinder (in.) and h is the height of the cylinder (in.).

The total volume of concrete $V_{concrete}$ (in.^{3}) required for m cylinders is given as

$$V_{concrete} = mV_{cylinder} \times MSYHE \tag{2}$$

where $MSYHE$ is the "make sure you have enough" factor (typically 2). The total weight of concrete required $W_{concrete}$ (lb.) is given by

$$W_{concrete} = \frac{V_{concrete}}{1{,}728 \ \text{in.}^3/\text{ft.}^3} \times \gamma_{concrete} \tag{3}$$

where $\gamma_{concrete}$ is the unit weight of concrete (typically 150 lb./ft.^{3}).

To determine the weight of each component in a concrete mix, compute the fraction of each component in the mix ratio to the sum of the components in the mix ratio. For example, a x:y:z mix implies that there are x parts cement to y parts fine aggregate to z parts coarse aggregate. The weight (lb.) of each component in a concrete mix can be determined from the mix ratio by the following

$$W_{cement} = \frac{x}{x+y+z} \times W_{concrete} \tag{4}$$

$$W_{fine\ aggregate} = \frac{y}{x+y+z} \times W_{concrete} \tag{5}$$

$$W_{coarse\ aggregate} = \frac{z}{x+y+z} \times W_{concrete} \tag{6}$$

where W_{cement}, $W_{fine\ aggregate}$, and $W_{coarse\ aggregate}$ are the weights (lb.) of cement, fine aggregate, and coarse aggregate, respectively.

The required weight of water W_{water} (lb.) for a given mix is given by

$$W_{water} = w/c\left(W_{cement}\right) \tag{7}$$

where w/c is the water-to-cement ratio.