$w_w := 14\ cm$

$h_w := 3\ m$

$h_f := 250\ mm$

$d_f := 850\ mm$

$w_f := 800\ mm$

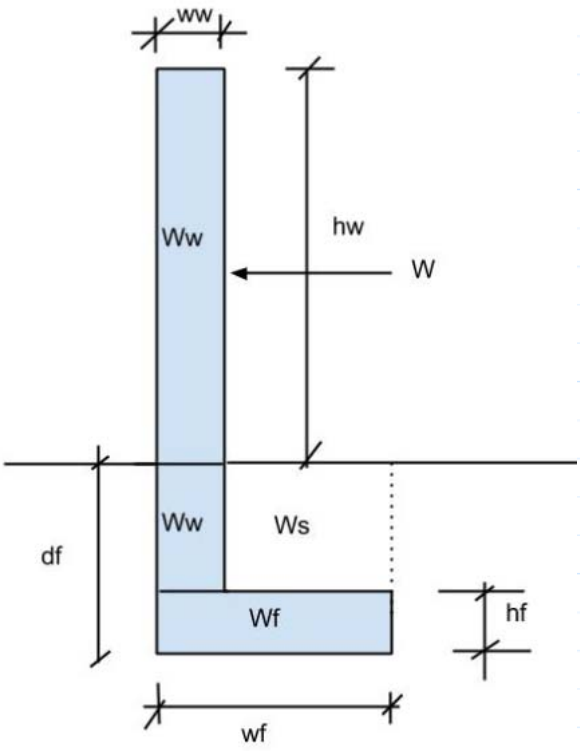
$\rho_b := 60\ psf$

$\rho_s := 80\ pcf$

$\rho_c := 150\ pcf$

$wl := 0.3\ kPa$

$q_s := 1000\ psf$



Loads

$W := wl \cdot h_w = 61.67\ \frac{lbf}{ft}$

$W_w := \rho_b \cdot h_w + \rho_c \cdot w_w \cdot (d_f - h_f) = 726.176\ \frac{lbf}{ft}$

$W_f := \rho_c \cdot h_f \cdot w_f = 322.917\ \frac{lbf}{ft}$

$W_s := \rho_s \cdot (w_f - w_w) \cdot (d_f - h_f) = 341.001\ \frac{lbf}{ft}$

$W_{total} := W_w + W_f + W_s = (1.39 \cdot 10^3)\ \frac{lbf}{ft}$

Sliding Resistance

$F := 0.25 \cdot W_{total} = 347.524\ \frac{lbf}{ft}$

Moment Resistance

$a := h_w \cdot 0.5 + d_f = 92.52\ in$

$a_w := w_w \cdot 0.5 = 2.756\ in$

$a_f := w_f \cdot 0.5 = 15.748\ in$

$a_s := (w_f - w_w) \cdot 0.5 + w_w = 18.504\ in$

Overturning moment

$M_o := a \cdot W = (5.706 \cdot 10^3)\ lbf \cdot \frac{in}{ft}$

Restoring moment

$M_r := W_w \cdot a_w + W_f \cdot a_f + W_s \cdot a_s + W_s \cdot (w_f - a_s) = (1.783 \cdot 10^4)\ lbf \cdot \frac{in}{ft}$

$FS := \frac{M_r}{M_o} = 3.124$ $\text{if}(FS > 1.5, \text{“Pass”}, \text{“Fail”}) = \text{“Pass”}$

Sliding

$p := d_f \cdot 150\ psf$

$S := 0.5 \cdot d_f \cdot p = 583.269\ lbf$

$F + \frac{S}{ft} = 930.793\ \frac{lbf}{ft}$

$\text{if}\left(F + \frac{S}{ft} > W, \text{“Pass”}, \text{“Fail”}\right) = \text{“Pass”}$

Bearing

$$e := \frac{M_o}{W_{total}} = 4.105\ in \qquad r := \frac{w_f}{6} = 5.249\ in$$

$$q_{max} := \text{if}\left(e < \frac{w_f}{6}, \frac{W_{total}}{w_f} + \frac{6 \cdot W_{total} \cdot e}{w_f^{\,2}}, \frac{2 \cdot W_w}{3 \cdot \langle w_f \cdot 0.5 - e \rangle}\right) = 45.187\ kPa$$

$$q_{min} := \text{if}\left(e < \frac{w_f}{6}, \frac{W_{total}}{w_f} - \frac{6 \cdot W_{total} \cdot e}{w_f^{\,2}}, 0\ kPa\right) = 5.531\ kPa$$

$$q_{all} := \frac{4}{3} \cdot q_s = 63.84\ kPa$$

$$\text{if}\left\langle q_{max} < q_{all} \wedge q_{min} > 0\ kPa, \text{“Pass”}, \text{“Fail”}\right\rangle = \text{“Pass”}$$