4ft = 1.2192 m

θ = 90°

4ft 1.2192 m

2ft = 0.6096 m

1) $h_{cg} = 2ft + \frac{4ft}{2} = 4ft = 1.2192\,m$

$F_{CG} = P_{CG}\cdot A$

$F_{CG} = (h_{CG}\cdot\gamma_w)\cdot(L\cdot H)$

$F_{CG} = (1.2192\,m \cdot 9.8\,\frac{kN}{m^3})(1.25\,m\cdot 1.2192\,m)$

$\boxed{F_{CG} = 17.5\,kN}$

2) Posición del centro de presión (CP)

Para un rectángulo $I_{xy} = 0$

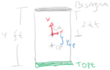
$\Rightarrow \boxed{x_{cp} = 0}$

$I_{xx} = \frac{ab^3}{12}$

$$\Rightarrow y_{cp} = -\gamma_w \sin\theta \,\frac{\frac{ab^3}{12}}{F_{CG}}$$

$$y_{cp} = -\left(9.8\left[\frac{kN}{m^3}\right]\cdot\sin(90)\right)\cdot\frac{\frac{(1.25)(1.2193)^3}{12}[m^4]}{17.5\,[kN]}$$

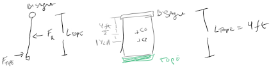
$$\boxed{y_{cp} = -0.106\,m}$$



VISTA LATERAL

Para calcular la fuerza sobre el tope debemos hacer balance de momentum angular

$$\sum M_{BISAGRA} = \tau_{TOPE} - \tau_R = 0$$
$$= F_{TOPE}\cdot L_{TOPE} - F_R\cdot L_R$$



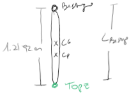
$$0 = F_{TOPE}\cdot(4ft) - 17.5\,kN\left(\frac{4}{2}ft + |-0.106|\right)$$

$$0 = F_{TOPE}(4ft) - 17.5\,kN\,(2ft + 0.106\,m)$$

$$F_{TOPE} = \frac{17.5\,kN\left(\frac{1.2192}{2}m + 0.106\,m\right)}{1.2192\,m}$$

$$\boxed{F_{TOPE} = 10.3\,kN}$$

FUERZA EN LA BISAGRA

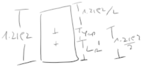


$$\sum M_{TOPE} = 0$$

$$0 = \tau_{BISAGRA} - \tau_R$$

$$0 = F_{Bisagra}\cdot L_{BISAGRA} - F_R\,L_R'$$

$L_{Bisagra} = 1.2192$



$$L_R' = \frac{1.2192}{2} - |y_{cp}|$$

$$L_R' = \frac{1.2192}{2} - 0.106\,[m]$$

$$F_{BISAGRA} = \frac{F_R\cdot L_R'}{L_{BISAGRA}} = \frac{17.5[kN]\left(\frac{1.2192}{2} - 0.106\right)[m]}{1.2192\,[m]}$$

$$\boxed{F_{BISAGRA} = 7.2\,[kN]}$$