

CALCULO DE MURO DE CONTENCION DE SOTANO

Muro Muro de Contencion

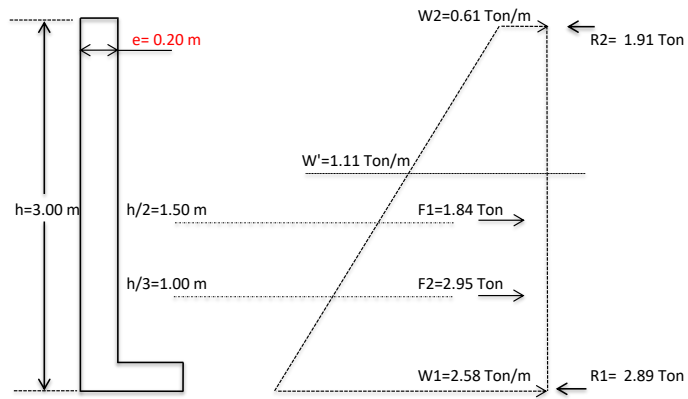
$\phi = 32.0^\circ$

$\gamma = 2. \text{ Ton/m}^3$

$h = 3. \text{ m}$

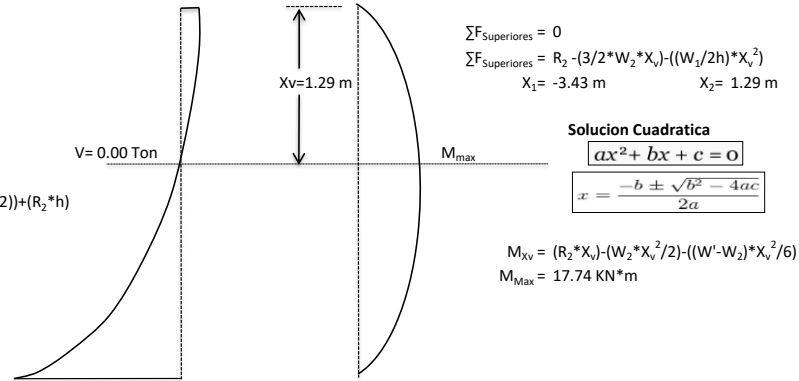
$K_a = 0.31$

Empuje= 1.84 Ton/m³



$$\sum F = R_1 + R_2 - F_1 - F_2$$

$$\sum M_1 = (-F_2 \cdot (h/3)) - (F_1 \cdot (h/2)) + (R_2 \cdot h)$$



$$\sum F_{\text{Superiores}} = 0$$

$$\sum F_{\text{Superiores}} = R_2 - (3/2 \cdot W_2 \cdot X_v) - ((W_1/2h) \cdot X_v^2)$$

$$X_1 = -3.43 \text{ m} \quad X_2 = 1.29 \text{ m}$$

Solucion Cuadratica

$$ax^2 + bx + c = 0$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$M_{X_v} = (R_2 \cdot X_v) - (W_2 \cdot X_v^2/2) - ((W_1 - W_2) \cdot X_v^2/6)$$

$$M_{\text{Max}} = 17.74 \text{ KN} \cdot \text{m}$$

Diseño A Flexion

Momento Maximo Se Presenta En X= 1.29 m

$$M_u = 17.74 \text{ KN} \cdot \text{m}$$

$$d = 0.17 \text{ m}$$

$$\alpha = 0.9$$

$$F_y = 420 \text{ Mpa}$$

$$F'_c = 28 \text{ Mpa}$$

$$b = 1.00 \text{ m}$$

C.14.3.2 Cuantias Minimas

$$\rho_{\text{Min}} = 0.0015$$

$$A_{S_{\text{Min}}} = 2.55 \text{ cm}^2$$

$$S_{\text{Max}} = 0.45 \text{ m}$$

Cuadratica

$$A_s = 2.80 \text{ cm}^2/\text{m}$$

Refuerzo

$$\#3 @ 25.34 \text{ cm}$$

$$\#4 @ 46.04 \text{ cm}$$

$$\#5 @ 71.02 \text{ cm}$$

$$\#6 @ 101.35 \text{ cm}$$

$$\#7 @ 138.11 \text{ cm}$$

Diseño A Cortante

$$V_u = 28.33 \text{ KN}$$

$$\alpha = 0.75$$

$$\lambda = 1.00$$

C.14.3.2 Cuantias Minimas

$$\rho_{\text{Min}} = 0.0025$$

$$A_{S_{\text{Min}}} = 4.25 \text{ cm}^2$$

$$S_{\text{Max}} = 0.45 \text{ m}$$

$$\phi V_u \geq V_u$$

$$V_u = V_c + V_s$$

$$V_c = 0.17 \lambda \sqrt{f'_c} b_n d$$

Calculos

$$V_c = 152.92 \text{ KN}$$

$$-V_s = 115.15 \text{ KN}$$

$$A_v = 4.25 \text{ cm}^2/\text{m}$$

Refuerzo

$$\#4 @ 30.35 \text{ cm}$$

$$\#5 @ 46.82 \text{ cm}$$

$$\#6 @ 66.82 \text{ cm}$$

$$\#7 @ 91.06 \text{ cm}$$

$$\#3 @ 16.71 \text{ cm}$$