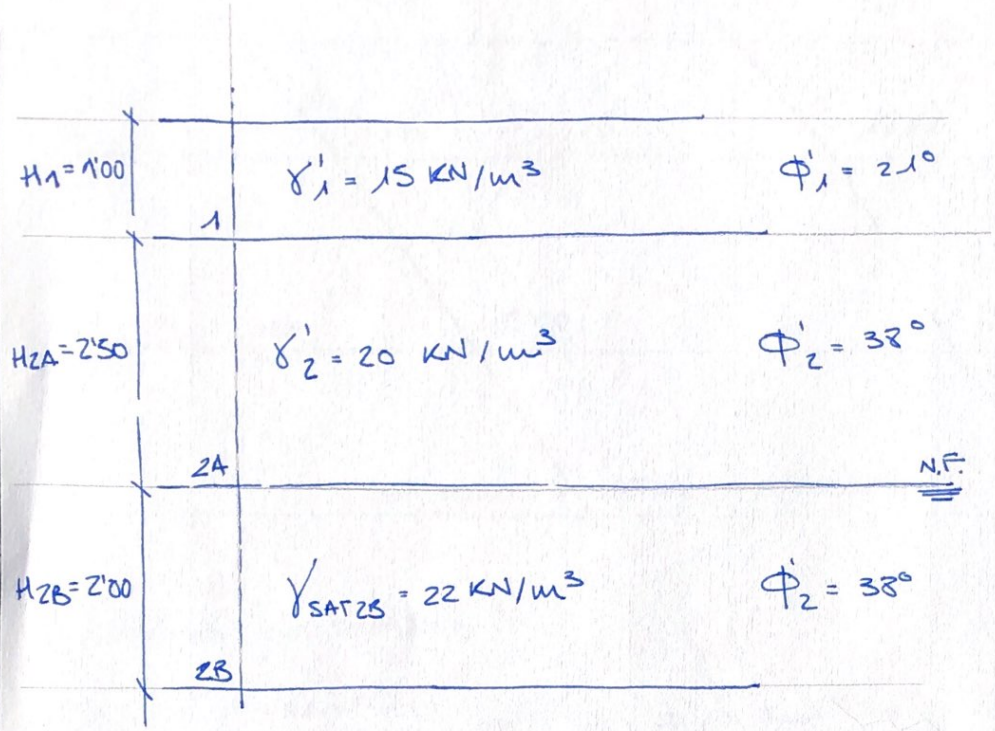
EXAMEN 1



① TENSIONES VERTICALES

$\sigma_{V1} = \gamma'_1 \cdot H_1 = 15\ KN/m^3 \cdot 1'00\ m = \underline{15\ KN/m^2}$

$\sigma'_{V1} = \sigma_{V1} = \underline{15\ KN/m^2}$

$\sigma_{V2A} = \gamma'_2 \cdot H_{2A} + \sigma_{V1} = 15\ KN/m^2 + 20\ KN/m^3 \cdot 2'50\ m$

$\sigma_{V2A} = 15\ KN/m^2 + 50\ KN/m^2 = \underline{65\ KN/m^2}$

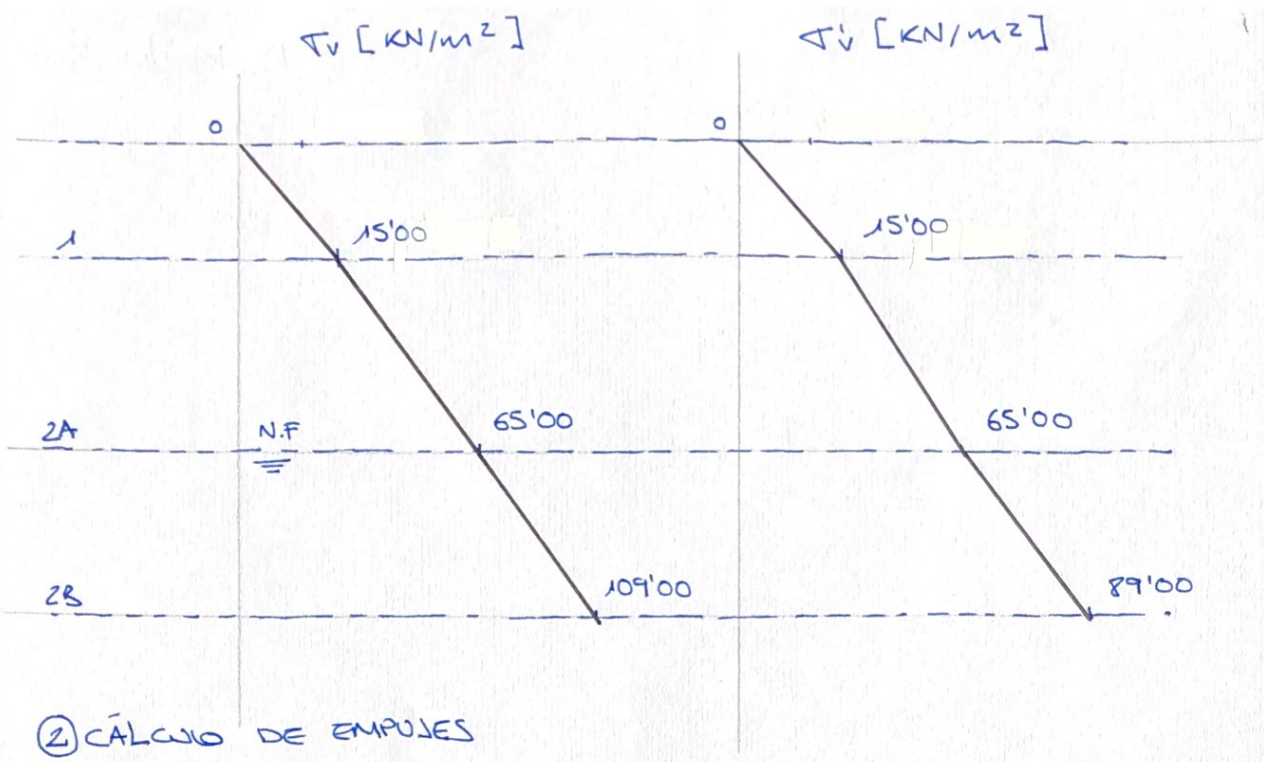
$\sigma'_{V2A} = \sigma_{V2A} = \underline{65\ KN/m^2}$

$\sigma_{V2B} = \sigma_{V2A} + \gamma_{SAT2B} \cdot H_{2B} = 65\ KN/m^2 + 22\ KN/m^3 \cdot 2'00\ m$

$\sigma_{V2B} = 65\ KN/m^2 + 44\ KN/m^2 = \underline{109\ KN/m^2}$

$\sigma'_{V2B} = \sigma'_{V2A} + \gamma_{SUM} \cdot H_{2B} = \sigma'_{V2A} + (\gamma_{SAT2B} - \gamma_W) \cdot H_{2B}$

$\sigma'_{V2B} = 65\ KN/m^2 + (22-10)\ KN/m^3 \cdot 2'00\ m = \underline{89\ KN/m^2}$



② CÁLCULO DE EMPUJES

$$K_{A1} = \frac{1 - \operatorname{sen} \phi'_1}{1 + \operatorname{sen} \phi'_1} \qquad \operatorname{sen} \phi'_1 = \operatorname{sen} 21° = 0'358$$

$$K_{A1} = \frac{1 - 0'358}{1 + 0'358} = \underline{\underline{0'472}}$$

$$K_{A2} = \frac{1 - \operatorname{sen} \phi'_2}{1 + \operatorname{sen} \phi'_2} \qquad \operatorname{sen} \phi'_2 = \operatorname{sen} 38° = 0'616$$

$$K_{A2} = \frac{1 - 0'616}{1 + 0'616} = \underline{\underline{0'238}}$$

$e_{a1} = \sigma'_{v1} \cdot K_{A1} = 15 \text{ KN/m}^2 \cdot 0'472 = \underline{7'08 \text{ KN/m}^2}$

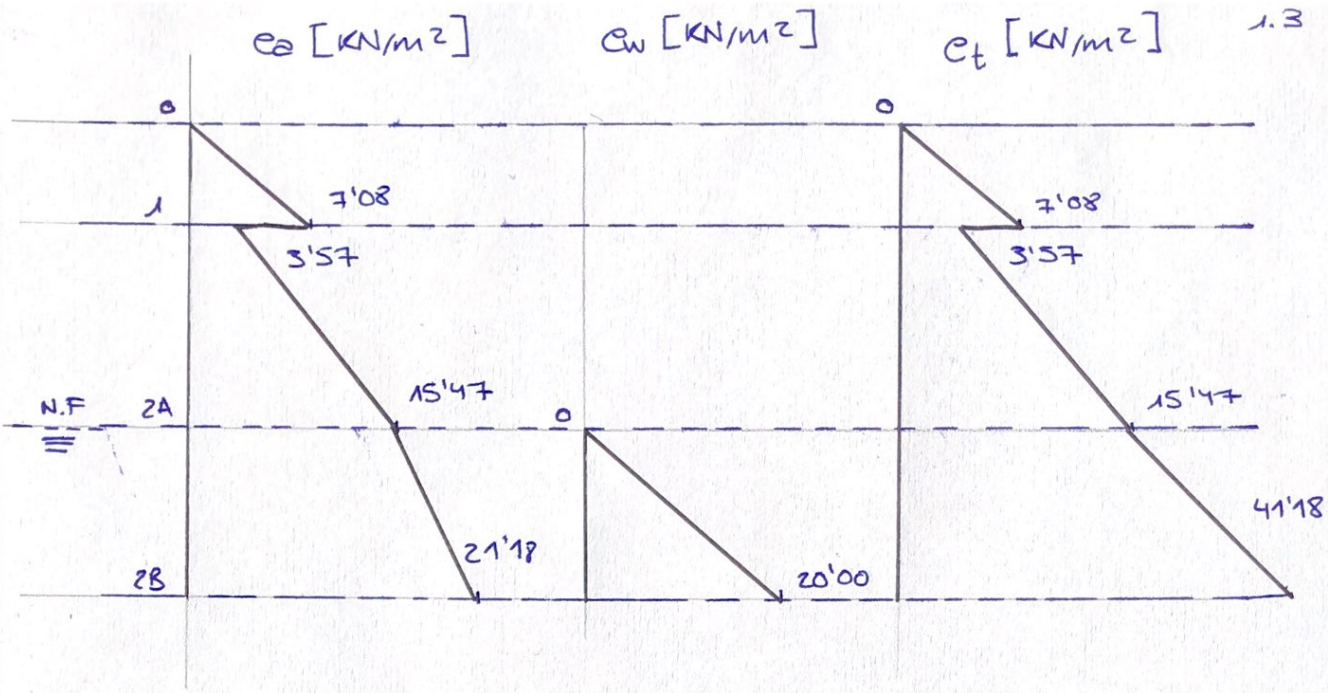
$e_{a1'} = \sigma'_{v1} \cdot K_{A2} = 15 \text{ KN/m}^2 \cdot 0'238 = \underline{3'57 \text{ KN/m}^2}$

$e_{a2A} = \sigma'_{v2A} \cdot K_{A2} = 65 \text{ KN/m}^2 \cdot 0'238 = \underline{15'47 \text{ KN/m}^2}$

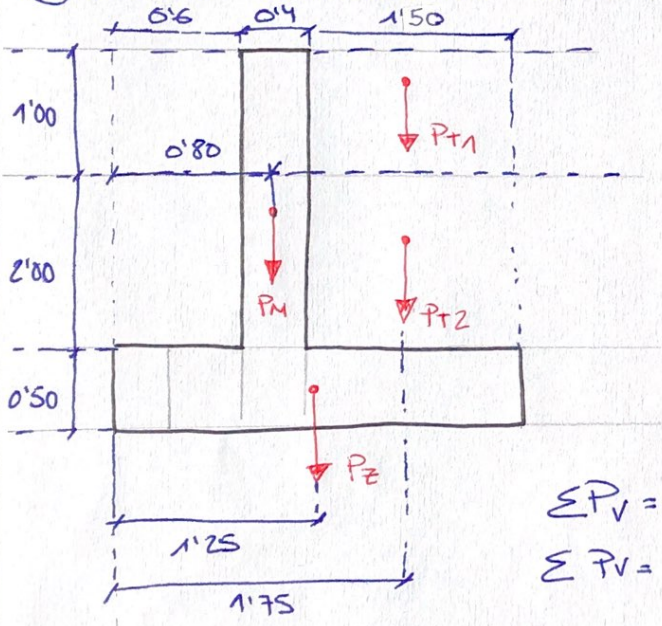
$e_{a2B} = \sigma'_{v2B} \cdot K_{A2} = 89 \text{ KN/m}^2 \cdot 0'238 = \underline{21'18 \text{ KN/m}^2}$

$U_{2B} = H_{2B} \cdot \gamma_w = 2'00 \text{ m} \cdot 10 \text{ KN/m}^3 = \underline{20 \text{ KN/m}^2}$

$e_{T2B} = e_{a2B} + U_{2B} = 21'18 \text{ KN/m}^2 + 20 \text{ KN/m}^2 = \underline{41'18 \text{ KN/m}^2}$



③ CÁLCULO ESTABILIDAD MUROS



$P_T = P_{T1} + P_{T2}$

$P_T = (1'50 \cdot 1'00)\,15 + (1'50 \times 2'00)\,20$

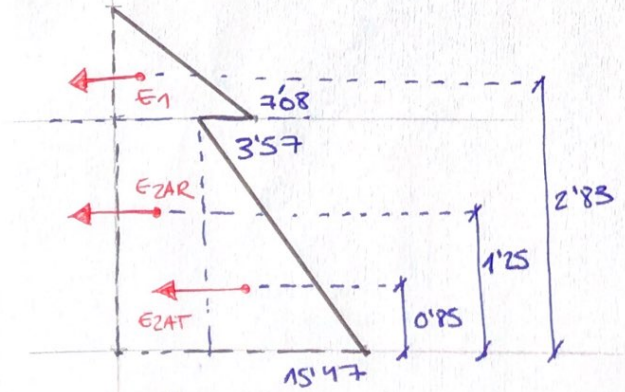
$P_T = 22'50 + 60 = \underline{\underline{82'50}}$ KN/M

$P_Z = 0'50 \times 2'50 \times 25 = \underline{\underline{31'50}}$ KN/M

$P_M = 0'40 \times 3'00 \times 25 = \underline{\underline{30'00}}$ KN/M

$\Sigma P_V = P_T + P_Z + P_M$

$\Sigma P_V = 82'50 + 31'50 + 30'00 = \underline{\underline{144'00}}$ KN/M



$E_1 = 7'08 \cdot 1/2 \cdot 1 = \underline{\underline{3'54}}$ KN/M

$E_{2AR} = 3'57 \cdot 2'50 = \underline{\underline{8'93}}$ KN/M

$E_{2AT} = (15'47 - 3'57) \cdot 2'5/2 = \underline{\underline{14'88}}$ KN/M

$\Sigma E_{FH} = 3'54 + 8'93 + 14'88 = \underline{\underline{27'35}}$ KN/M

$\delta'_2 = \frac{2\phi'_2}{3} = 2/3\,38° = 25'33°$ $\quad tg\,\underline{\underline{\delta'_2 = 0'473}}$

$$F_D = \frac{\Sigma P_V \cdot tg\,\delta'}{\Sigma F_H} = \frac{144 \cdot 0'473}{27'35} = 2'49$$

$F_D = 2'49 \geq 1'50 \Rightarrow$ CUMPLE SEGURIDAD DESLIZAMIENTO

CÁLCULO DE VUELCO

$\Sigma M_D = 14'88 \cdot 0'83 + 8'93 \cdot 1'25 + 3'54 \cdot 2'83 =$

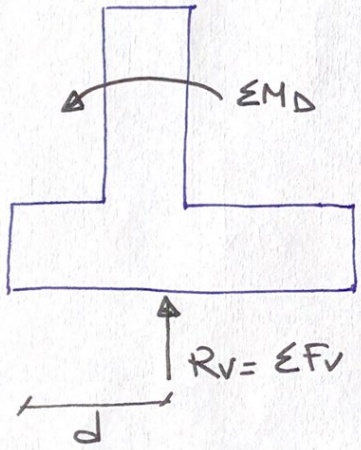
$= 12'35 + 11'16 + 10'02 = 33'53$ KN m/m

$\Sigma M_E = 30 \cdot 0'8 + 31'50 \cdot 1'25 + 82'50 \cdot 1'75$

$= 24 + 39'38 + 144'38 = 207'76$ KN·m/m

$$F_V = \frac{\Sigma M_E}{\Sigma M_D} = \frac{207'76}{33'53}$$

$F_V = 6'20 \geq 1'50 \Rightarrow$ NO HAY VUELCO



$R_V \cdot d + M_D = M_E$

$$d = \frac{M_E - M_D}{R_V} = \frac{207'76 - 33'53}{144}$$

$$d = \frac{174'23}{144} = 1'209 \text{ m}$$

$d = 1'209$ m $\rightarrow e = 0'049$ m

TENSIONES DEL TERRENO

$$\sigma_{MAX} = \frac{2R_V}{B}$$

$$\sigma_{máx} = \frac{\Sigma F_V}{B}\left(1 + \frac{6 \cdot 0'041}{2'50}\right) = \frac{144}{2'50}\left(1 + \frac{6 \cdot 0'041}{2'50}\right)$$

$$\sigma_{máx} = 57'6 \cdot \left(1 + \frac{0'246}{2'50}\right) = 63'27 \text{ KN/m}^2$$

$$\sigma_{mín} = 57'6 \left(1 - \frac{0'246}{2'50}\right) = 51'93 \text{ KN/m}^2$$