(1)

10

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| B | B | B | B | B |

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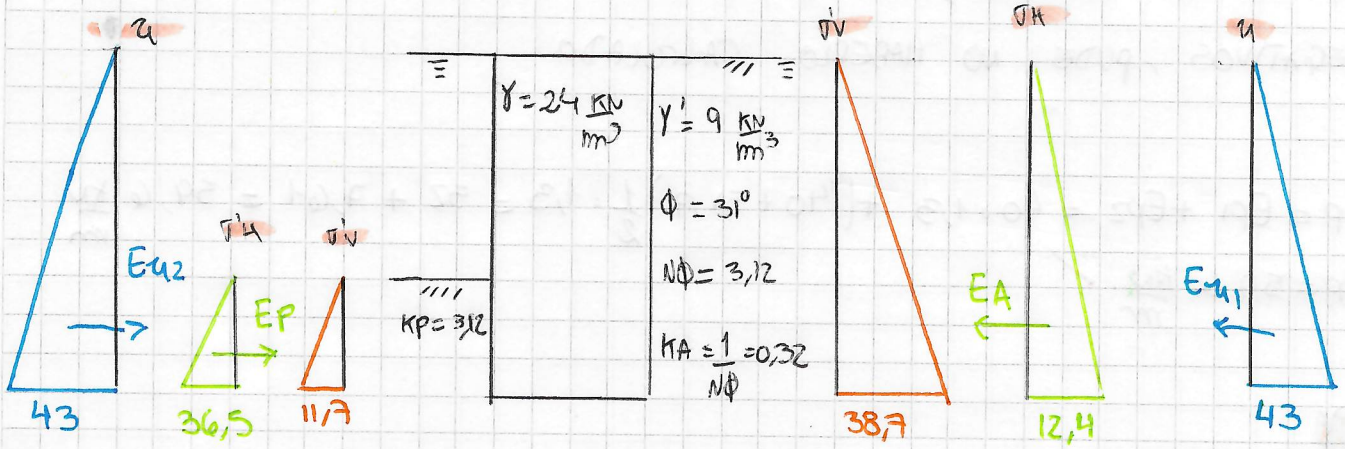
1) $H = 4{,}3\ m$ $\quad D = 1{,}3\ m$ $\quad B = 2m$ $\quad Su = 20\ \frac{kN}{m^2}$

LARGO PLAZO



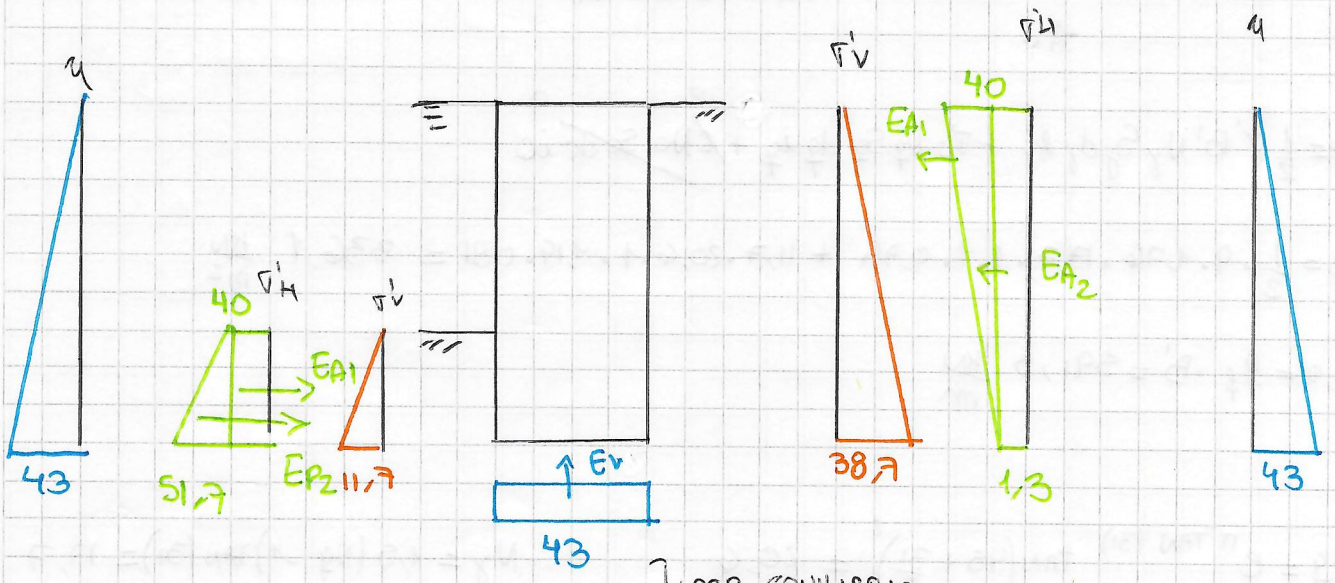

$\sigma'_{H_A} = \sigma'_v - 2Su$ $\qquad \sigma'_{H_P} = \sigma'_v + 2Su$ → CORTO PLAZO

$\sigma'_{H_A} = \sigma'_v K_A - 2c\sqrt{K_A}$ (c = 0) $\qquad \sigma'_{H_P} = \sigma'_v K_P + 2c\sqrt{K_P}$ (c = 0) → LARGO PLAZO

$$E_A = \frac{1}{2}\sigma'_{H_A} \cdot 4{,}3 = \frac{1}{2} \cdot 12{,}4 \cdot 4{,}3 = 26{,}66\ \frac{kN}{m} \rightsquigarrow E_A = 26{,}66\ \frac{kN}{m}$$

$$E_P = \frac{1}{2}\sigma'_{H_P} \cdot 1{,}3 = \frac{1}{2} \cdot 36{,}5 \cdot 1{,}3 = 23{,}7\ \frac{kN}{m} \rightsquigarrow E_P = 23{,}7\ \frac{kN}{m}$$

CORTO PLAZO




↳ POR EQUILIBRIO

SE INTEGRA TODO EL DIAGRAMA DE EMPUJES ACTIVOS

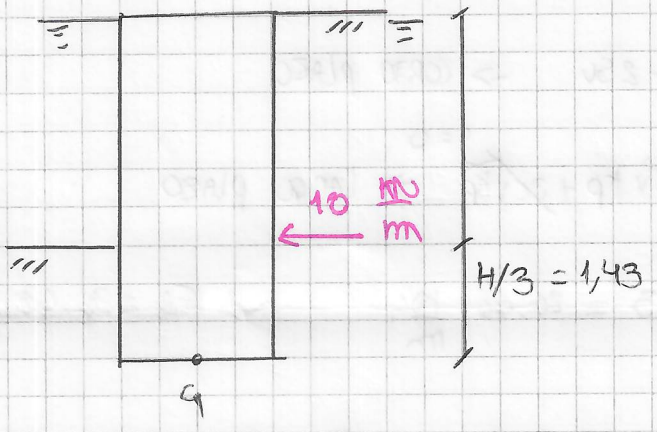
$E_A = E_{A1} + E_{A2} = -4,3 \cdot \frac{1}{2} \cdot (40 - 1,3) - 1,3 \cdot 4,3 \cdot = -83,2 - 5,59 = -88,79 \frac{kN}{m}$

SE INFORMA $E_A = 0$ / YA QUE NO PUEDEN "EXISTIR" EMPUJES ACTIVOS NEGATIVOS, PUDE NO HABERLO CALCULADO

$E_P = E_{P1} + E_{P2} = 40 \cdot 1,3 + (40 + 51,7)\frac{1}{2} \cdot 1,3 = 52 + 7,61 = 59,6 \frac{kN}{m}$

$E_P = 59,6 \frac{kN}{m}$ /

2)




$FOS = \frac{Q_u}{N} = \frac{591,5}{120,6} = 4,9 > 3$ ✓

CALCULO LA e ~> $B' = B - 2e$

$B' = 2 - 2 \cdot 0,11 = 1,76 m$ /

$\circ e = \frac{M}{N} = \frac{10 \cdot 1,43}{120,4} = 0,12 m$

$\circ N = W - E_V = 120,4$

$\circ E_V = 43 \cdot 2 = 86$

$\circ W = 2 \cdot 4,3 \cdot 24 = 206,4$

$q_f = \frac{1}{2} \gamma' B' N_\gamma S_\gamma d_\gamma i_\gamma + \bar{\sigma}_o N_q S_q d_q i_q + \cancel{c N_c s_c d_c i_c}$

$q_f = \frac{1}{2} \cdot 9 \cdot 1,76 \cdot 17,7 \cdot 1 \cdot 1 \cdot 0,74 + 11,7 \cdot 20,6 \cdot 1 \cdot 1,19 \cdot 0,81 = 336,1 \frac{kN}{m^2}$

$Q_u = q_f \cdot B' = 591,5 \frac{kN}{m}$

$\circ N_q = e^{\pi \tan(31)} \tan\left(45 + \frac{31}{2}\right)^2 = 20,6$

$\circ N_\gamma = 1,5 (N_q - 1) \tan(31) = 17,7$

$\circ D = 1,3$

$\circ \gamma' = 9 \frac{kN}{m^3}$

$\circ i_\gamma = 1$

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$$\circ S\gamma = 1 - \frac{1}{2}\left(0{,}2 + \tan^6[31]\right)\frac{B'}{L'} = 1 \qquad \circ Sq = 1 - \frac{1-1}{Nq} = 1$$

$$\circ Sc = 1 + \left(0{,}2 + \tan^6[31]\right)\frac{B'}{L'} = 1$$

$$\circ dc = 1 + \frac{0{,}35}{\frac{1{,}76}{1{,}3} + \frac{0{,}6}{1+7\tan^4[31]}} = 1{,}21 \qquad \circ dq = dc - \frac{dc-1}{Nq} = 1{,}19$$

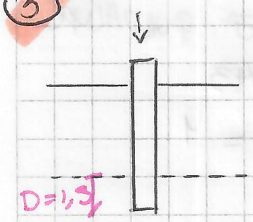
$$\circ i\gamma = \left(1 - \frac{0{,}7 \cdot 10}{120{,}4 + A' \cdot C\,\cot[\phi]}\right)^5 = 0{,}74$$

(112 11 / ∞ 0)

$$\circ iq = 0{,}81$$

$$\tau o = 13.9 = 11{,}7$$

③




CALCULO LA $Q_4$ PUNTA CON BRINCH-HANSEN

COMO LA PUNTA SE ENCUENTRA EN UNA ARENA $Q_4$ PUNTA A CORTO PLAZO SERÁ IGUAL A $Q_{PUNTA}$ A LARGO PLAZO

$$q_4 = (\cancel{c' N_c} + \bar{\sigma}'_o N_q)\, S_c\, d_c = 98{,}5 \cdot 23{,}18 \cdot 1{,}26 \cdot 1{,}52 = 4372\ \frac{kN}{m^2}$$

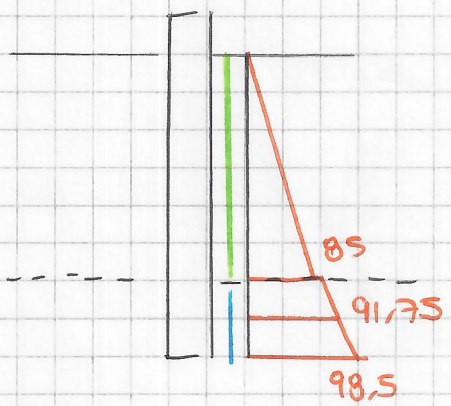
- $\bar{\sigma}'_o = 1{,}5 \cdot 9\ \frac{kN}{m^3} + 10 \cdot 8{,}5\ \frac{kN}{m^3} = 98{,}5\ \frac{kN}{m^2}$
- CALCULO $B'$ $\rightsquigarrow$ $\frac{\pi D^2}{4} = B'B'$ $\rightsquigarrow$ $B' = \sqrt{\frac{\pi D^2}{4}} = \sqrt{\frac{\pi \cdot 0{,}65^2}{4}} = 0{,}58\ m$

$D = 0{,}65\ m$

- $N_q = e^{\pi \tan(32^\circ)} \tan\left(45 + \frac{32}{2}\right)^2 = 23{,}18$
- $S_c = 1 + \left(0{,}2 + \tan^6(32)\right) \frac{B'}{\cancel{L}^{1}} = 1{,}26$
- $d_c = 1 + \dfrac{0{,}35}{\frac{0{,}58}{1{,}5} + \frac{0{,}6}{1 + 7\tan^4(32)}} = 1{,}52$

$Q_{4\,PUNTA} = q_{4\,PUNTA} \cdot A' = 4372 \cdot 0{,}58 \cdot 0{,}58 = 1471\ kN$

CALCULO $Q_{FUSTE}$ PARA CASO NO DRENADO




- $Fs_{CL} = \alpha\, S_u = 6 \rightsquigarrow Q_{CL} = \pi D \cdot L \cdot Fs_{CL} = 122{,}5\ kN$

$\alpha = 0{,}21 + \frac{36}{S_u} = 4{,}54 > 1 \rightsquigarrow$ ADOPTO 1

- $Fs_{SP} = \bar{\sigma}'_V K \operatorname{tg}\left(\frac{2}{3}\phi\right) = 91{,}75 \cdot 1 \operatorname{tg}\left(\frac{2}{3} \cdot 32\right) = 35{,}8$

COMO ES PERFORADO $\rightsquigarrow$ IN SITU $\rightsquigarrow$ $K = 1$

(3)

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$Q_{FL} = \pi D \cdot L \cdot f_{s\,CL} = 109{,}8$ KN

$Q_u = Q_{u\ PUNT} + Q_{u\ FUSTE} = 1471 + 122{,}5 + 109{,}8 = 1703$ KN

$W = \gamma' \cdot 11{,}5 \cdot \frac{\pi D^2}{4} = 53{,}4$ KN

$\gamma' = \gamma - \gamma_w$

$Q_{SERV} = \frac{Q_u}{3} - W = 514{,}4$ KN ⇝ SI CONSIDERO EL PESO DEL PILOTE

RTA: $Q_{SERV} = \frac{Q_u}{3} = 567{,}8$ KN ⇝ SIN CONSIDERAR EL PESO DEL PILOTE

4) A LARGO PLAZO $Q_{u\ PUNTA} = Q_{PUNTA\ CORTO\ PLAZO} = 1471$ KN

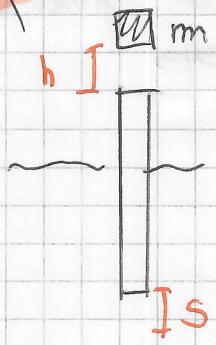

- $f_{s\,sp} = \bar{\sigma}'_v \cdot K \cdot tg\left(\frac{2}{3}\phi\right) = 35{,}8\ \frac{KN}{m^2}$
- $Q_{sp} = \pi D \cdot L \cdot f_{s\,sp} = 109{,}8$ KN
- $f_{s\,CL} = \bar{\sigma}'_v \cdot K \cdot tg\left(\frac{2}{3}\phi\right) = 42{,}5 \cdot 1 \cdot tg\left(\frac{2}{3} \cdot 30\right)^\circ = 15{,}5\ \frac{KN}{m^2}$
- $Q_{CL} = \pi D \cdot L \cdot f_{s\,CL} = 315{,}9$ KN

$Q_u = Q_{PUNTA} + Q_{FUSTE} = 1471 + 315{,}9 + 109{,}4 = 1896$ KN

$Q_{SER} = \frac{Q_u}{3} - W = 578{,}7$

RTA: $Q_{SERV} = \frac{Q_u}{3} = 632$ KN ⇝ SIN CONSIDERAR EL PESO DEL PILOTE

5)




$m.h = Qu.S$

$S = \frac{m.h}{Qu} = \frac{10.0,7}{1703} = 4,11.10^{-3}\ m$

↳ NO DRENADO

$S_{10} = S.10 = 0,041\ m$