

Enavajunties Atkivims

14 May 2024 17:03

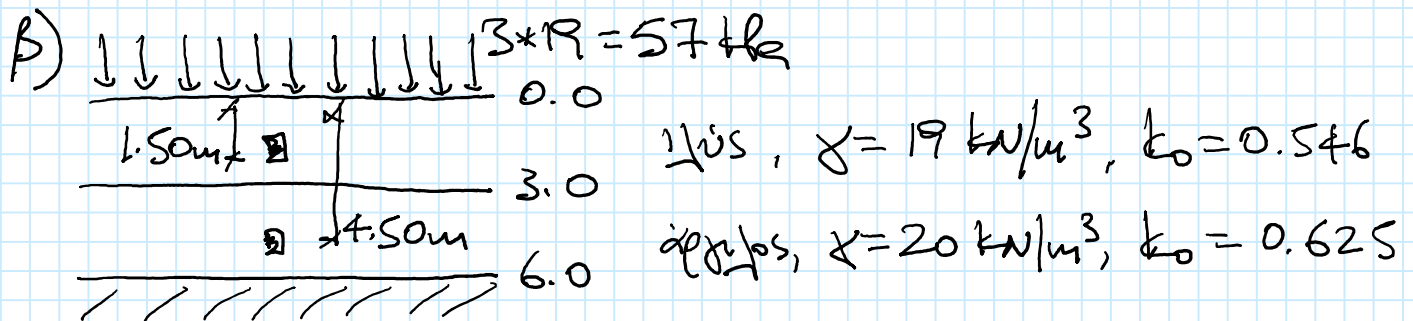
① α) $V_0 = 12000 \text{ m}^3$, $e_0 = 1.0$, $e_f = 0.8$

$$e = \frac{V_v}{V_s} = \frac{V - V_s}{V_s} = \frac{V}{V_s} - 1 \rightarrow V_s = \frac{V}{1+e} = \frac{V_0}{1+e_0} = \frac{V_f}{1+e_f} \rightarrow$$

$$\rightarrow V_f = \frac{1+e_f}{1+e_0} V_0 = \frac{1+0.8}{1+1.0} \times 12000 \rightarrow \underline{V_f = 10800 \text{ m}^3}$$

Arī $V_f = 60 \cdot 60 \cdot h \rightarrow \underline{h = 3 \text{ m}}$

Ļa $S_r = 1.0 \rightarrow \gamma = \gamma_w \cdot \frac{G_s + e}{1+e} = 10 \cdot \frac{2.7 + 0.8}{1 + 0.8} \rightarrow \underline{\gamma = 19.4 \frac{\text{kN}}{\text{m}^3}}$



Ijus: $G_{v,0} = 1.5 \times 19 = 28.5 \text{ kPa}$ $G_v = 28.5 + 57 = 85.5 \text{ kPa}$
 $u = 1.5 \times 10 = 15 \text{ kPa}$ $u = 15 \text{ kPa}$
 $G'_{v,0} = 13.5 \text{ kPa}$ $G'_{v,0} = 70.5 \text{ kPa}$
 $G'_{h,0} = 0.546 \times 13.5 = 7.37 \text{ kPa}$ $G'_h = 0.546 \times 70.5 = 38.5 \text{ kPa}$

Arīps: $G_{v,0} = 3 \times 19 + 1.5 \times 20 = 87 \text{ kPa}$ $G_v = 87 + 57 = 144 \text{ kPa}$
 $u = 4.5 \times 10 = 45 \text{ kPa}$ $u = 45 \text{ kPa}$
 $G'_{v,0} = 42 \text{ kPa}$ $G'_v = 99 \text{ kPa}$
 $G'_h = 0.546 \times 42 = 22.93 \text{ kPa}$ $G'_h = 0.546 \times 99 = 54.05 \text{ kPa}$

$$\left. \begin{aligned} \sigma_{v10} &= 42 \text{ kPa} \\ \sigma'_{h10} &= 0.625 \times 42 = 26.25 \text{ kPa} \end{aligned} \right\} \sigma_v = 77 \text{ kPa} \\ \sigma'_h = 0.625 \times 99 = 61.88 \text{ kPa}$$

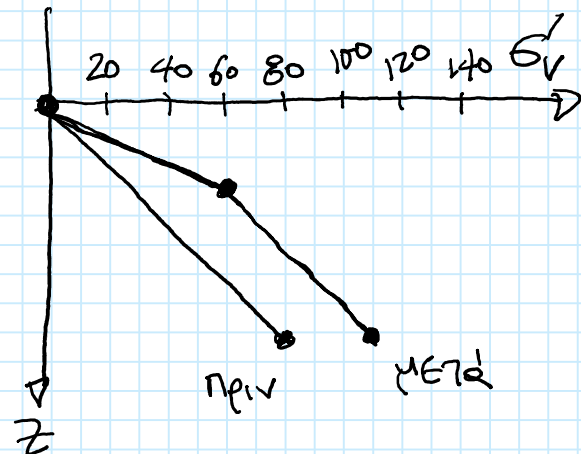
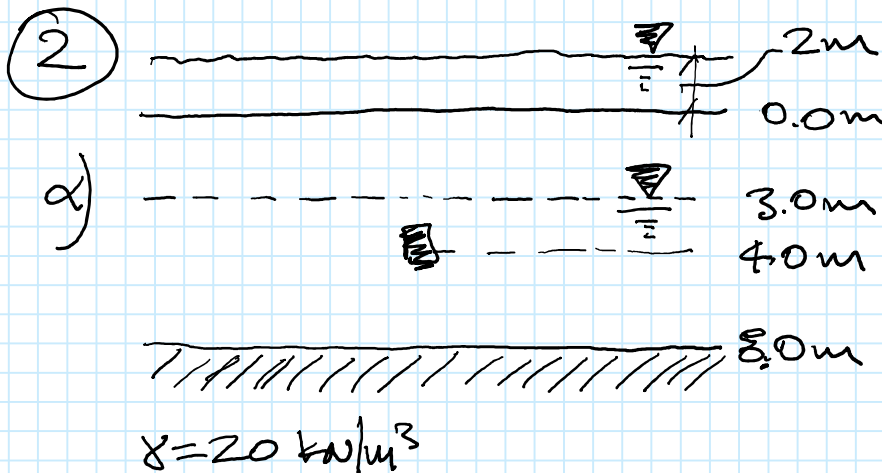
$$s) \quad \rho = \rho_{\text{ijs}} + \rho_{\text{ayes}}$$

$$\rho_{\text{ijs}} = 3.0 \times \frac{0.10}{1+0.85} \log\left(\frac{70.5}{13.5}\right) = 0.116 \text{ m}$$

$$\rho_{\text{ayes}} = 3.0 \times \frac{0.20}{1+1.20} \log\left(\frac{99.0}{42.0}\right) = 0.102 \text{ m}$$

$$\rho = 0.218 \text{ m}$$

$$s) \quad OCR = \frac{\sigma'_{v, \text{max}}}{\sigma'_v} = \frac{99}{42} = 2.4$$



$$u_{piv}: z=0 \text{ m} \quad \sigma_v = 2 \times 10 = 20, \quad u = 2 \times 10 = 20, \quad \sigma'_v = 0 \text{ kPa}$$

$$z=8 \text{ m} \quad \sigma_v = 2 \times 10 + 8 \times 20 = 180, \quad u = 10 \times 10 = 100$$

$$\sigma'_v = 80 \text{ kPa}$$

$$u_{etq}: z=0 \text{ m} \quad - \quad - \quad - \quad -$$

$$\sigma'_v = 0 \text{ kPa}$$

μερ: 2-0m

σ_v = 0 m

$$z=3m: \sigma_v = 3 \times 20 = 60, \quad u = 0$$

$$\sigma'_v = 60 \text{ kPa}$$

$$z=8m: \sigma_v = 8 \times 20 = 160, \quad u = 5 \times 10 = 50, \quad \sigma'_v = 110 \text{ kPa}$$

β) Μέσο της επιφάνειας:

$$\pi_{\text{ερ}}: \sigma_v = 2 \times 10 + 4 \times 20 = 100 \text{ kPa}$$

$$u = (2+4) \times 10 = 60 \text{ kPa}$$

$$\sigma'_v = 40 \text{ kPa}$$

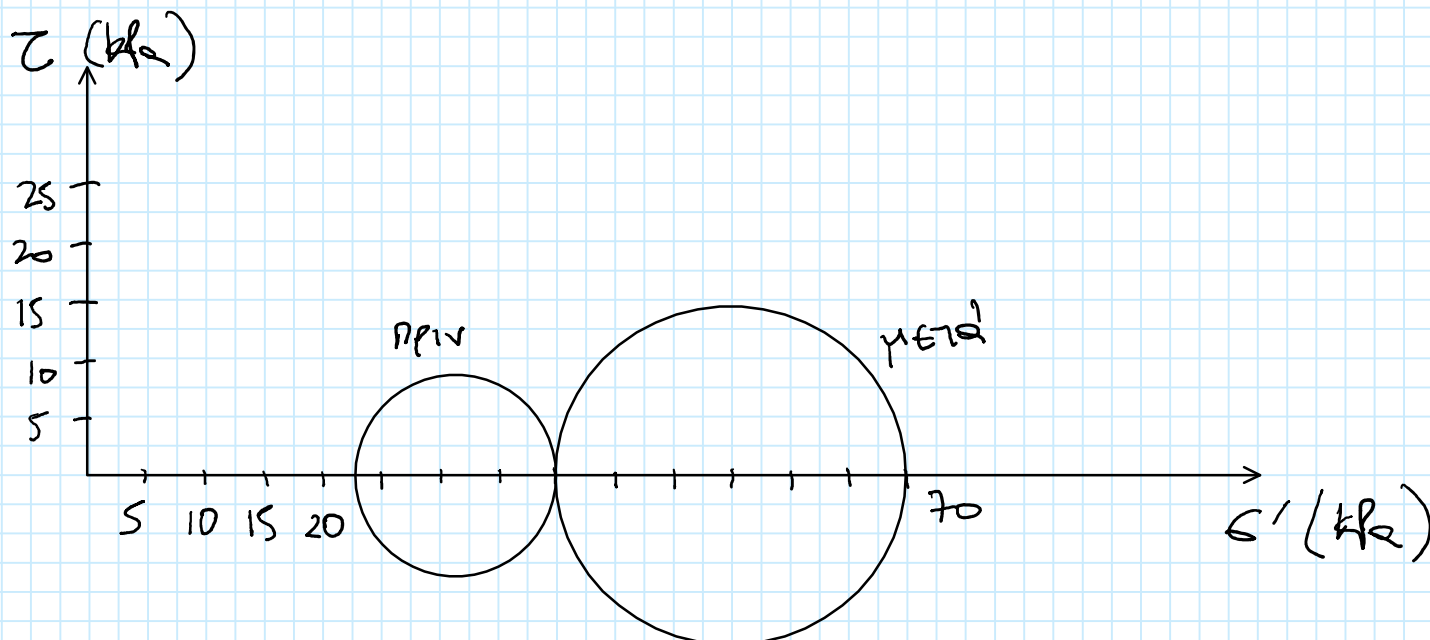
$$\sigma'_h = 0.562 \times 40 = 22.5 \text{ kPa}$$

$$\mu_{\text{ερ}}: \sigma_v = 4 \times 20 = 80 \text{ kPa}$$

$$u = 1 \times 10 = 10 \text{ kPa}$$

$$\sigma'_v = 70 \text{ kPa}$$

$$\sigma'_h = 0.562 \times 70 = 39.3 \text{ kPa}$$



$$\gamma) \rho = 8 \times \frac{0.12}{1+0.90} \log\left(\frac{70}{40}\right) = 0.123 \text{ m}$$

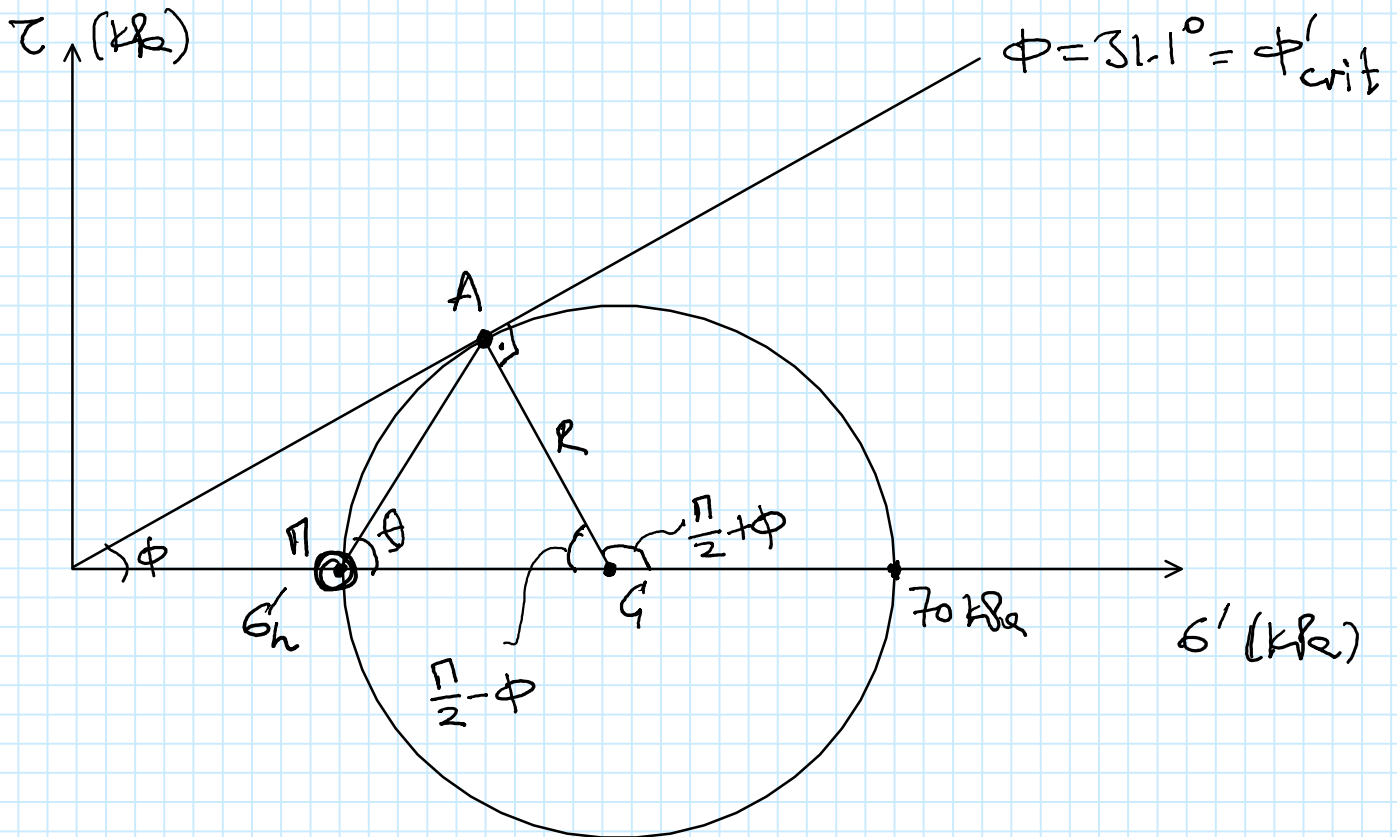
③

$$\alpha) \quad \left. \begin{aligned} \phi_1 &= \arctan \frac{60.10}{100} = 31.0^\circ \\ \phi_2 &= \arctan \frac{121.12}{200} = 31.2^\circ \\ \phi_3 &= \arctan \frac{180.97}{300} = 31.1^\circ \end{aligned} \right\} \underline{\underline{\phi'_{crit} = 31.1^\circ}}$$

$$\beta) \quad G_v = 10 \times 17 = 170 \text{ kPa}$$

$$u = 10 \times 10 = 100 \text{ kPa}$$

$$G'_v = \quad = 70 \text{ kPa}$$



$$\sin \phi = \frac{\frac{1}{2}(G'_v - G'_h)}{\frac{1}{2}(G'_v + G'_h)} \rightarrow G'_h = \frac{1 - \sin \phi}{1 + \sin \phi} G'_v = \frac{1 - \sin 31.1^\circ}{1 + \sin 31.1^\circ} \times 70 \rightarrow$$

$$\rightarrow \underline{\underline{G'_h = 22.3 \text{ kPa}}}$$

8) κλίση τριβέσου αβροχίας : θ

$$\text{Από το σχήμα, } \theta = \frac{1}{2} \left(\frac{\pi}{2} + \phi \right) = \frac{\pi}{4} + \frac{\phi}{2} \rightarrow$$

$$\rightarrow \theta = 45 + \frac{31.1}{2} \rightarrow \underline{\underline{\theta = 60.6^\circ}}$$

Οι (επιγής) τάσεις στο τριβέσο αβροχίας είναι οι συντεταγμένες του σημείου A :

$$\tau = R \sin \left(\frac{\pi}{2} - \phi \right) = R \cos \phi$$

$$\sigma' = \sigma - R \cos \left(\frac{\pi}{2} - \phi \right) = \sigma - R \sin \phi$$

$$\text{Από } \sigma = \frac{1}{2} (\sigma_v' + \sigma_h') = \frac{1}{2} (70 + 22.3) = 46.15 \text{ kPa}$$

$$R = \frac{1}{2} (\sigma_v' - \sigma_h') = \frac{1}{2} (70 - 22.3) = 23.85 \text{ kPa}$$

$$\text{Οπότε: } \tau = 23.85 + \cos 31.1^\circ \rightarrow$$

$$\underline{\underline{\tau = 20.4 \text{ kPa}}}$$

$$\sigma' = 46.15 - 23.85 \sin 31.1^\circ \rightarrow$$

$$\underline{\underline{\sigma' = 33.8 \text{ kPa}}}$$