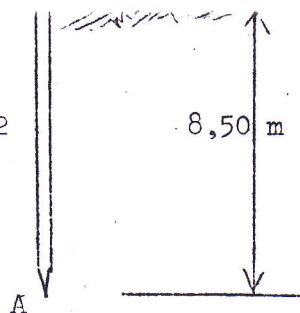
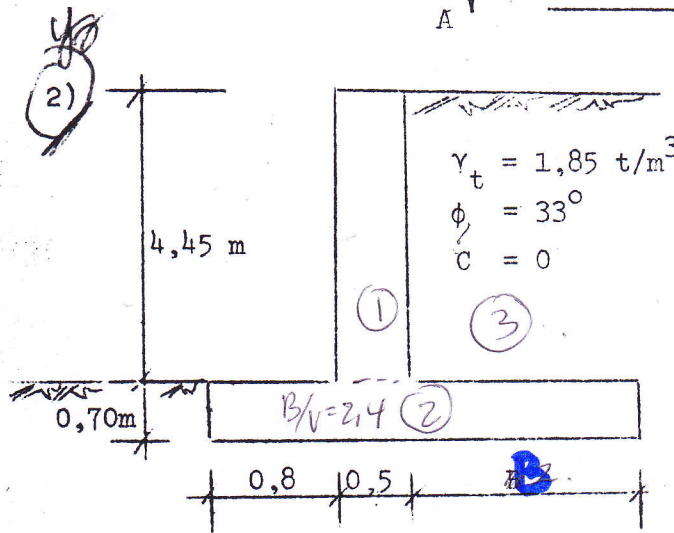


$$\begin{aligned}\gamma_{t_2} &= 1,55 \text{ t/m}^3 \\ \phi_2 &= 10^\circ \\ C_2 &= 0,07 \text{ kg/cm}^2\end{aligned}$$



Buktikan jawaban Saudara !

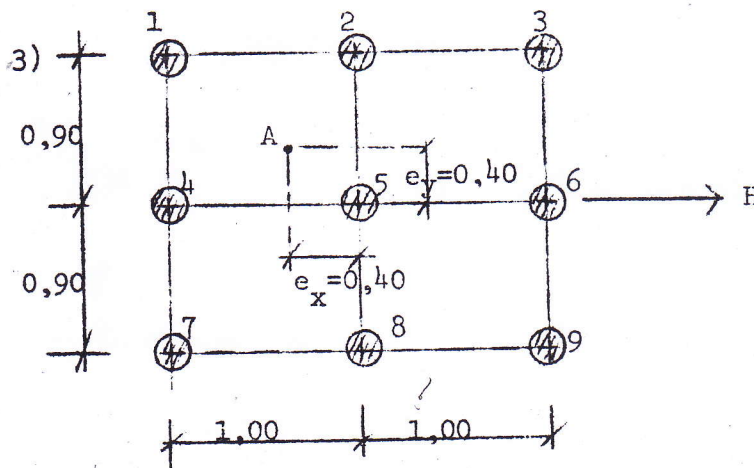
Petunjuk : Pakai $\Sigma M_A = 0$



Sebuah tembok penahan tanah dengan ukuran seperti pada gambar samping.

Koefisien geser $f = \tan \phi$ dan $B/V_{\text{beton}} = 2,4 \text{ t/m}^3$

Bila angka keamanan guling = 2,5 dan geser = 2,00 Tentukan lebar B. (tidak usah ditinjau terhadap $\bar{\sigma}_t$).



Sebuah kolom dengan 9 batang tiang pancang menahan beban vertikal $V = 200 \text{ t}$ (termasuk berat poer) di titik A dengan $e_x = 0,40$ dan $e_y = 0,40 \text{ m}$.

Tiang nomor 3, 6, 9 dibuat miring 1 : 5 ($\alpha = 11,31^\circ$) untuk menahan gaya horizontal.

Ditanyakan : a) Berapa besarnya gaya H yang dapat diterima oleh ketiga tiang pancang tersebut.

b) Berapa beban axial yang diterima oleh masing-masing tiang.

====selamat bekerja====

Jawab:

$$a) n_{guling} = \frac{\bar{Z}(G, x)}{\bar{Z}(P_a, y_a)}$$

$$\text{ut } B = 2$$

$$G = G_1 + G_2 + G_3$$

$$\bar{Z}(G, x) = G_1 x_1 + G_2 x_2 + G_3 x_3$$

$$G_1 = 0,5 \times (4,45 - 0,7) \times (2,4) = 4,5 \text{ t}$$

$$x_1 = 0,8 + \frac{0,5}{2} = 1,05 \text{ m}$$

$$G_2 = (0,7) (0,8 + 0,5 + 2) 2,4 = 5,544 \text{ t}$$

$$x_2 = \frac{1}{2} (0,8 + 0,5 + 2) = 1,65$$

$$G_3 = 2 (4,45 - 0,7) 1,85 = 13,875$$

$$x_3 = 0,8 + 0,5 + \frac{2}{2} = 2,3$$

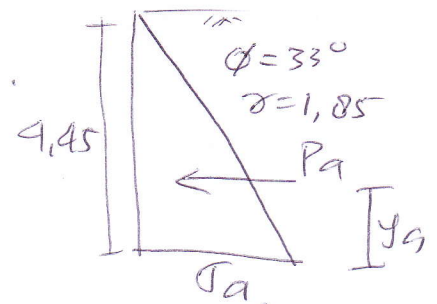
$$\bar{Z}(G, x) = G_1 x_1 + G_2 x_2 + G_3 x_3 = 45,7851$$

$$P_a = \frac{1}{2} \sigma_a (4,45) = 5,39996$$

$$\sigma_a = k_a \gamma 4,45 = 2,4269$$

$$k_a = \tan^2 \left(45 - \frac{33}{2} \right) = 0,2948$$

$$k_p = \tan^2 \left(45 + \frac{33}{2} \right) = 3,3912$$

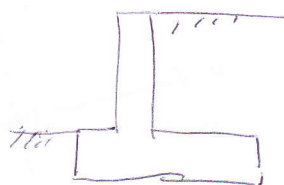


$$y_a = \frac{1}{3} 4,45 = 1,4833$$

$$n_{guling} = \frac{45,7851}{5,39996 (1,4833)} = 5,71603 > 2,5$$

Jadi Dinding Penahan tanah stabil thd.

Penggulingan



b. Kontrol geser.

$$n_{\text{geser}} = \frac{(\sum G) \tan \delta + P_p}{P_a}$$

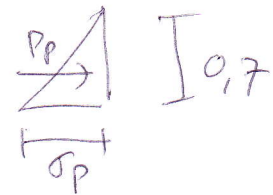
$$\sum G = G_1 + G_2 + G_3 = 23,919 \text{ ton}$$

$$\tan \delta = \tan \left(\frac{2}{3} \phi \right) = \tan \left(\frac{2}{3} \cdot 33 \right) = \tan(22) = 0,404026$$

$$P_p = \frac{1}{2} \cdot 0,7 \cdot \sigma_p = 1,5375$$

$$\sigma_p = k_p \cdot \gamma^{1,85} = 4,392795$$

$$k_p = \tan^2 3,3912$$



$$n_{\text{geser}} = \frac{23,919 (0,404026) + 1,5375}{5,39996} = 2,0743 > 2$$

↳ karena $n_{\text{geser}} = 2,07 > 2$ maka DPT stabil terhadap geser

Kesimpulan: Pinding Penahan tanah stabil terhadap geser dan guling ut B = 2 m.

2)

$$\sum(G_i x_i) = 4,309 B^2 + 11,203 B - 13,88$$

$$n_{guling} = \frac{\sum(G_i x_i)}{\sum(P_a \cdot y_a)} = 2,5 = \frac{4,309 B^2 + 11,203 B - 13,880}{8,01}$$

$$20,025 = 4,309 B^2 + 11,203 B - 13,880$$

$$4,309 B^2 + 11,203 B - 33,905 = 0$$

dari Rumus a, b, c.

$$B_{1,2} = \frac{-11,203}{2(4,309)} \pm \frac{\sqrt{(11,203)^2 - 4(4,309)(-33,905)}}{2(4,309)}$$

$$B_1 = -4,3916$$

$$B_2 = 1,7916 \approx 1,8 \text{ m}$$

Jadi dg $B = 1,8 \text{ m}$ Dinding Penahan tanah stabil terhadap guling.

b) Kontrol Geser.

$$n_{geser} = \frac{(\sum G) \tan \delta + P_p}{P_a}$$

$$\sum G = 8,6175 B + 6,684$$

$$\tan \delta = \tan \left(\frac{2}{3} \phi \right) = \tan \left(\frac{2}{3} \cdot 33 \right) = 0,404026$$

$$P_a = 5,39996 \text{ t} \quad P_p = 1,5375 \text{ t}$$

$$2 = \frac{(8,6175 B + 6,684) 0,404026 + 1,5375}{5,39996}$$

$$(8,6175 B + 6,684) 0,404026 + 1,5375 - 2(5,39996) = 0$$

$$3,481696 B - 6,56191 = 0$$

$$B = 1,8849 \text{ m} \approx 1,9 \text{ m}$$

Kebutuhan	Guling	Geser
1		

→ dipakai terbesar $B = 1,9$