

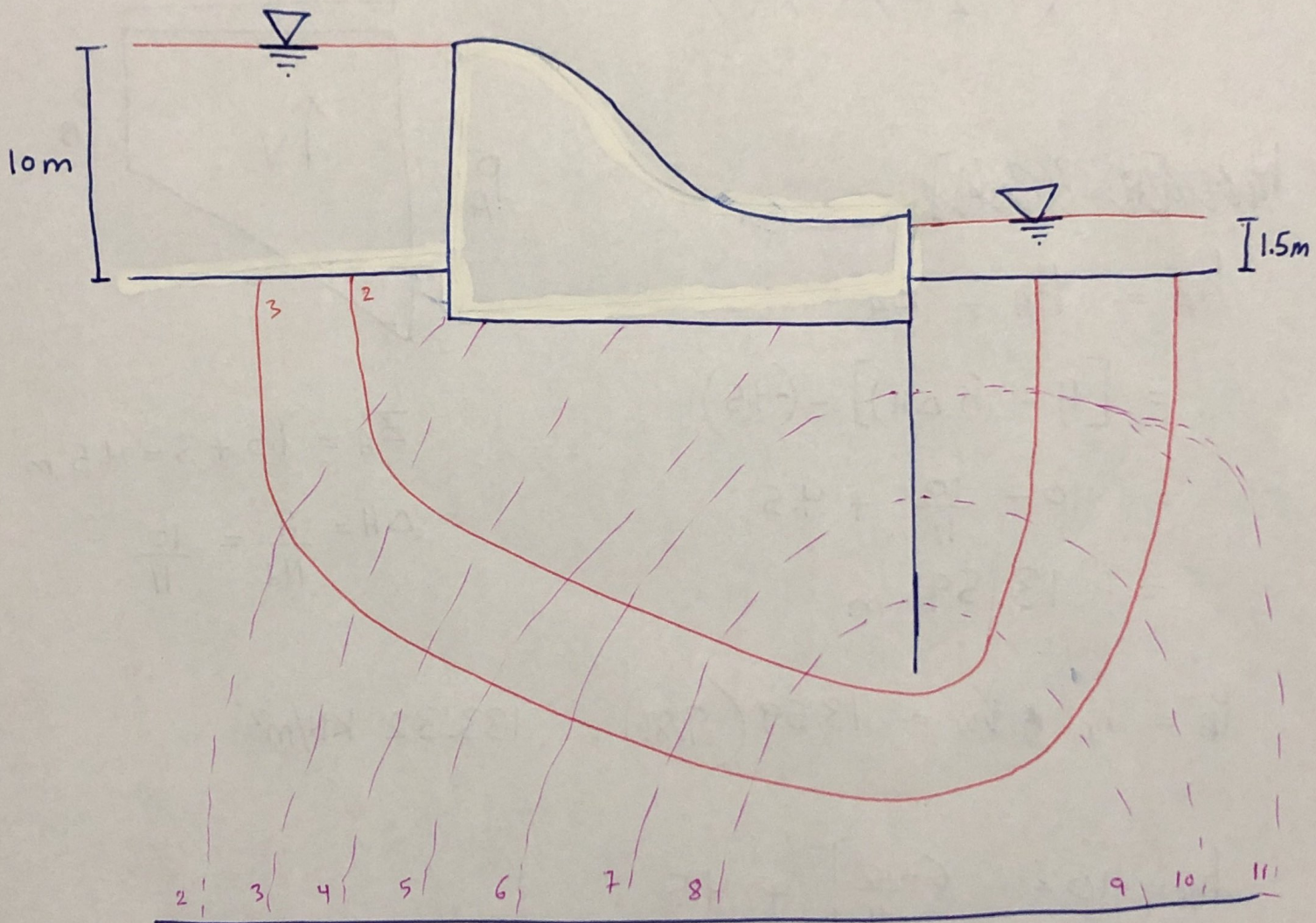
Soil Mechanics

HW #7

Name: Mohammad Al-Swaity

ID: 1181136

Problem ①: ① $L = 50 \text{ m}$, $K = 10^{-3} \text{ cm/sec}$



$$N_p = 3$$

$$N_D = 11$$

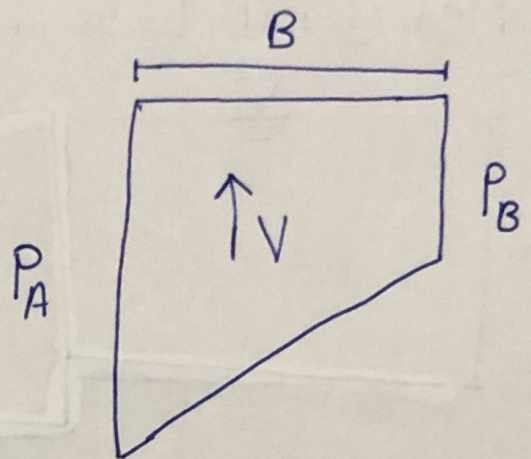
$$\textcircled{2} \Delta H = 10 - 1.5 = 8.5 \text{ m}$$

$$q = \left(K \Delta H \frac{N_p}{N_d} \right) * L = \frac{10^{-3}}{100} (8.5) \left(\frac{3}{11} \right) (50) \\ = 1.159 * 10^{-3} \text{ m}^3/\text{sec}$$

$$\textcircled{3} V = \left(\frac{P_A + P_B}{2} \right) (B) (L)$$

~~h_A = H - (n ΔH)~~

$$h_A = H_A - Z_A \\ = [H - (n \Delta H)] - (-4.5) \\ = 10 - \frac{10}{11} + 4.5 \\ = 13.59 \text{ m}$$



$$Z_A = 1.5 + 3 = 4.5 \text{ m} \\ \Delta H = \frac{H}{N_d} = \frac{10}{11}$$

$$P_A = h_A * \gamma_w = 13.59 (9.81) = 133.32 \text{ kN/m}^2$$

$$h_B = \left[10 - \frac{6 * \frac{10}{11}}{11} \right] + 4.5 \\ = 9.05 \text{ m}$$

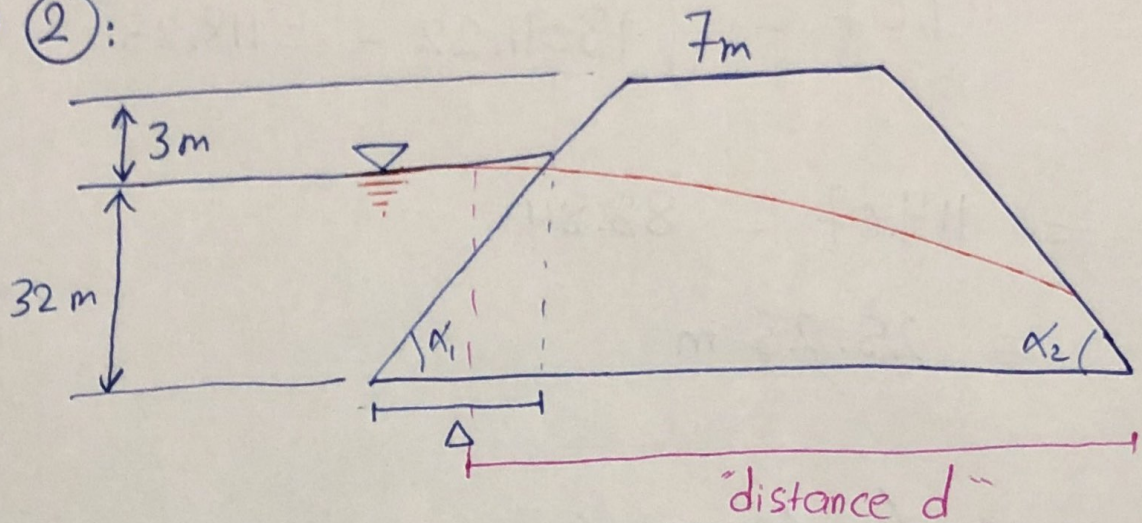
$$P_B = h_B * \gamma_w = 88.78 \text{ kN/m}^2$$

$$V = \frac{(133.32 + 88.78)}{2} (37) (50) = 205442.5 \text{ kN}$$

$$\textcircled{4} \quad i_{ex} = \frac{\Delta H}{\Delta L} = \left(\frac{10}{11}\right)/3$$

$$\rightarrow i_{ex} = 0.303$$

Problem ②:



$$\alpha_1 = \alpha_2 = \alpha$$

$$* \tan \alpha = \frac{1}{2} \rightarrow \alpha = 26.57^\circ$$

$$* \Delta = \frac{32}{\tan(26.57^\circ)} = 64 \text{ m}$$

$$* d = \frac{35}{\tan(26.57^\circ)} + 7 + \frac{(35-32)}{\tan(26.57^\circ)} + 0.3(64)$$

$$= 102.02 \text{ m}$$

$$\begin{aligned}
 * a &= \frac{d}{\cos \alpha} - \sqrt{\frac{d^2}{\cos^2 \alpha} - \frac{H^2}{\sin^2 \alpha}} \\
 &= \frac{102.02}{\cos 26.57^\circ} - \sqrt{\frac{(102.02)^2}{(\cos 26.57^\circ)^2} - \frac{(32)^2}{(\sin 26.57^\circ)^2}} \\
 &= 114.07 - \sqrt{13011.22 - 5118.23} \\
 &= 114.07 - 88.84 \\
 &= 25.23 \text{ m}
 \end{aligned}$$

$$\begin{aligned}
 * q &= Ka (\sin 26.57^\circ) (\tan 26.57^\circ) \\
 &= 10^{-5} (25.23) (0.224) \\
 &= 5.65 \times 10^{-5} \text{ m}^2/\text{sec} = 0.2034 \text{ m}^2/\text{min}
 \end{aligned}$$

Schaffernak's sol.

* Casagrande's sol:-

$$q = Ka \sin^2 \alpha$$

$$\begin{aligned}
 * a &= \sqrt{H^2 + d^2} - \sqrt{d^2 - H^2 \cot^2 \alpha} = 106.92 - 79.45 \\
 &\rightarrow a = 27.47 \text{ m}
 \end{aligned}$$

$$\begin{aligned}
 \rightarrow q &= 10^{-5} (27.47) (\sin 26.57^\circ)^2 = 5.50 \times 10^{-5} \text{ m}^2/\text{sec} \\
 &= 0.198 \text{ m}^2/\text{min} \quad \sqrt{4}
 \end{aligned}$$