

Birzeit University
Faculty of Engineering
Department of Civil and Environmental Engineering

ENCE 331, Soil Mechanics

Homework assignment #5

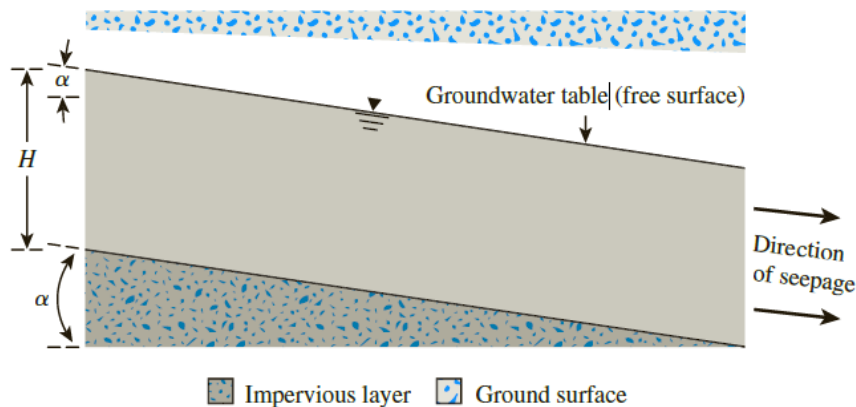
Due on Thursday Nov. 12th, 2020 @ 11:59 PM.

Problem 1:

A permeable soil layer is underlain by an impervious layer as shown below. Knowing that $k = 6 \times 10^{-3}$ cm/sec for the permeable layer. Given $H = 5.4$ m, calculate the rate of seepage through this layer in m^3/hr . if:

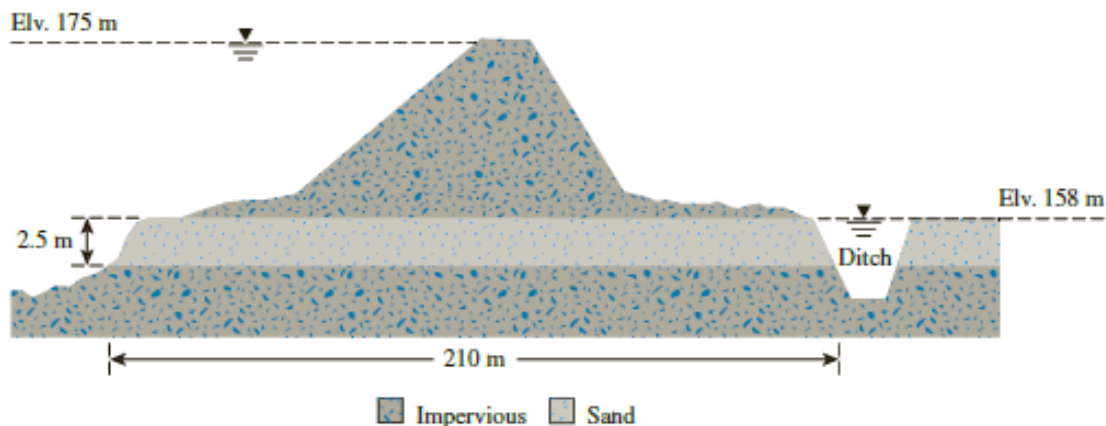
- $\alpha = 5^\circ$
- $\alpha = 7^\circ$
- $\alpha = 9^\circ$
- $\alpha = 12^\circ$

Draw a chart α vs. q (i.e. α on the x-axis, and q on the y-axis) and discuss how the slope angle (α) impact the flow rate and explain the reason for such behavior.



Problem 2:

the cross section of a levee, shown below, which is 650 m long and is underlain by a 2.5-m-thick permeable sand layer. It was observed that the quantity of water flowing through the sand layer into the collection ditch is $13.5 \text{ m}^3/\text{hr}$. What is the hydraulic conductivity of the sand layer?

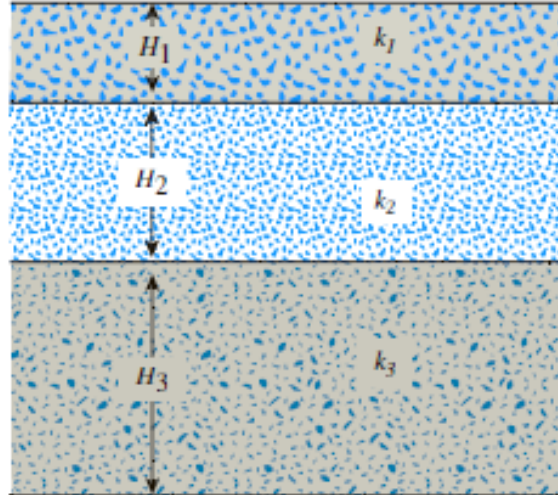


Problem 3:

A layered soil is shown below. Given:

- $H_1 = 1.5 \text{ m}$ $k_1 = 9 \times 10^{-4} \text{ cm/sec}$
- $H_2 = 2.5 \text{ m}$ $k_2 = 7.8 \times 10^{-3} \text{ cm/sec}$
- $H_3 = 3.5 \text{ m}$ $k_3 = 4.5 \times 10^{-5} \text{ cm/sec}$

Estimate the ratio of equivalent permeability, $k_{H(eq)}/k_{V(eq)}$.



Problem 4:

An inclined permeameter tube is filled with layers of soil of different permeability as shown below. Find the total head, elevation head and pore water pressure at points (A-B-C-D) with respect to the given datum, Given: $1.5k_1 = 2k_2 = 3k_3 = k_4$

