

Birzeit University
Faculty of Engineering
Department of Civil and Environmental Engineering

ENCE 331, Soil Mechanics

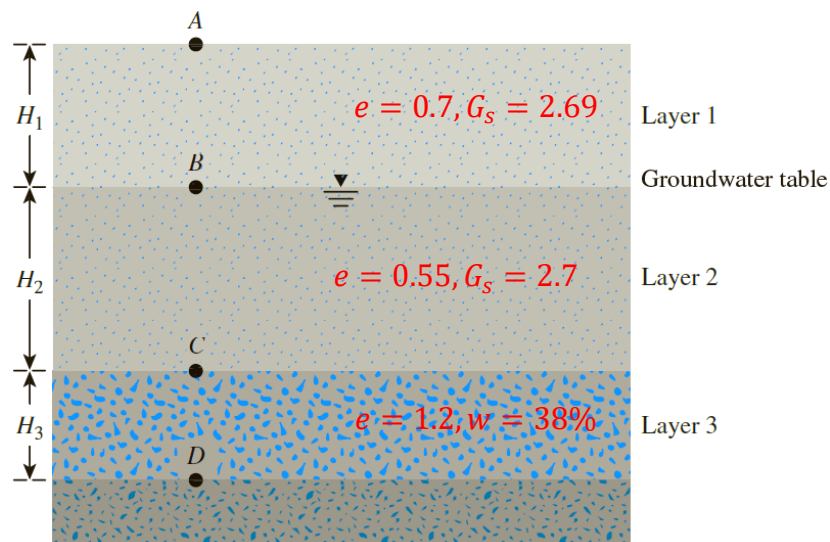
Homework assignment #8

Due on Thursday, Dec. 17th, 2020 @ 11:59 PM.

Problem 1:

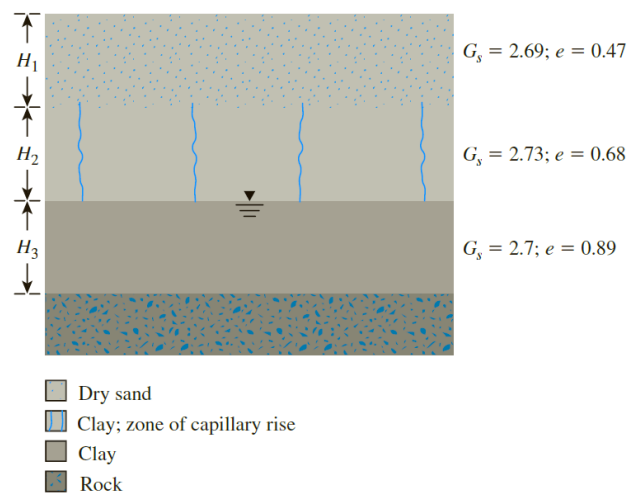
A soil profile consisting of three layers is shown in the figure below. if $H_1=3\text{m}$, $H_2=8\text{m}$, and $H_3=4\text{m}$.

- Calculate the total stress, pore water pressure and effective stress at points A, B, C, and D
- Plot the variations of σ , u , and σ' with depth.



Problem 2:

For the given soil profile below. Given; $H_1 = 5\text{m}$, $H_2 = 1.5\text{m}$, $H_3 = 4.5\text{m}$, and the degree of saturation in the capillary rise zone $S = 60\%$. Calculate and plot the variation of total stress, pore water pressure, and effective stress.



Problem 3:

The single-row sheet pile structure shown in Figure below. If $H_1=7\text{m}$, $H_2=2.16\text{m}$, $H=14.6\text{m}$, and $\gamma_{\text{sat}} = 17 \text{ kN/m}^3$. Determine:

- Total stress, pore water pressure, and effective stress at points **a**, **b**, **c**, and **d**.
- The seepage force per unit volume at points **a** and **d** and its approximate direction?
- Factor of safety against boiling at points **c**, and **d**. compare the two factors at **c**, and **d** and explain why one is higher than the other?
- If a factor of safety against boiling of 2 at point **d** is to be achieved, what is the maximum height of water the sheet pile can retain?

Everything is drawn to scale

