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CVG 3109 Fall – 2017
SOIL MECHANICS I
ASSIGNMENT #2
Due on 20 Oct 2017
(18:00)

Seepage and Effective Stress

Q1. Figure 1 below shows three different soils placed adjacent to each other in a tube that has a cross section of 200mm x 200mm. A constant head of water difference equal to 300 mm acts across the soil sample. The coefficient of permeability, *k* for the three soils in the direction of flow is summarized in a Table below. Find the rate of water flow, *q* in cm^3/hr.

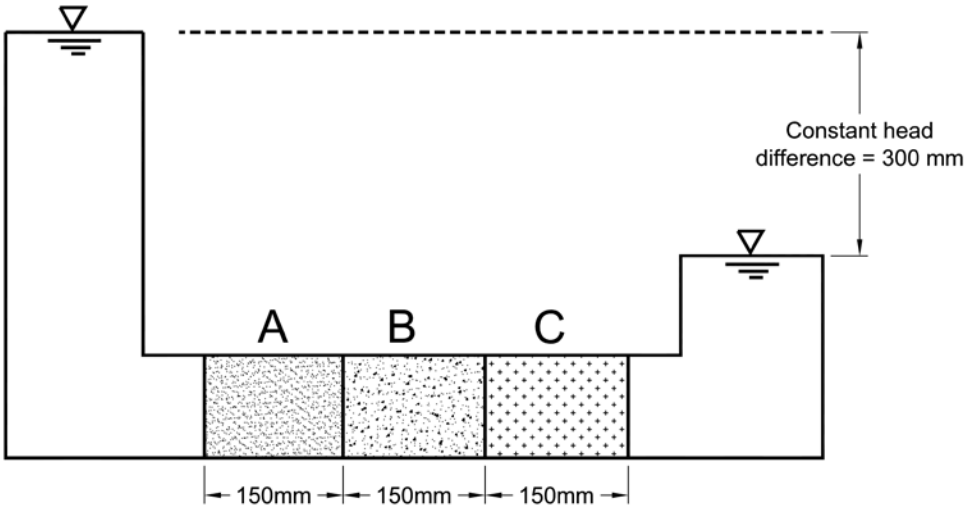


Figure 1

Soil	k (cm/sec)
A	3.0×10^{-2}
B	4.0×10^{-3}
C	8.0×10^{-5}

Q2. A 10-m-thick layer of stiff saturated clay is underlain by a layer of sand as shown in Figure 2. The sand is under artesian pressure. If *H* = 7.5m, what would be the minimum height of water *h* in the cut such that the stability of the saturated clay is not lost?

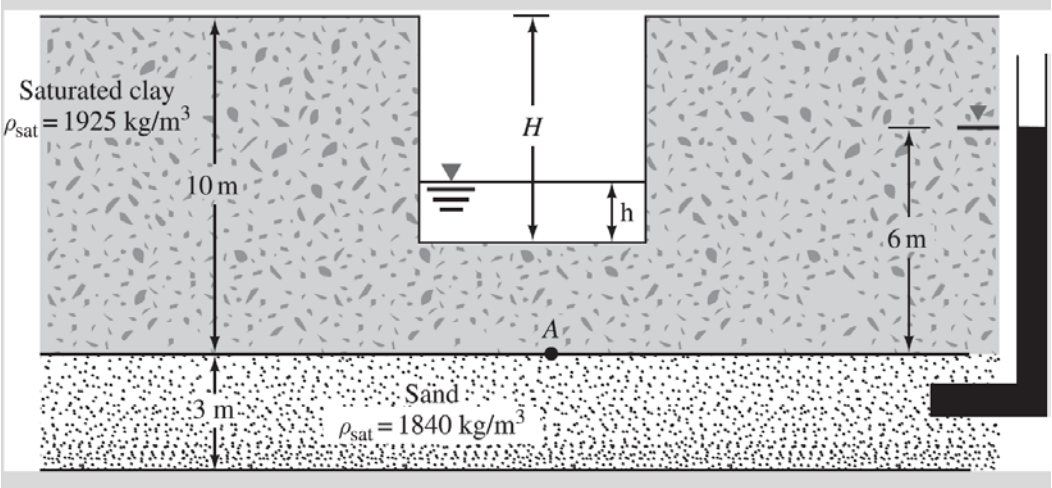
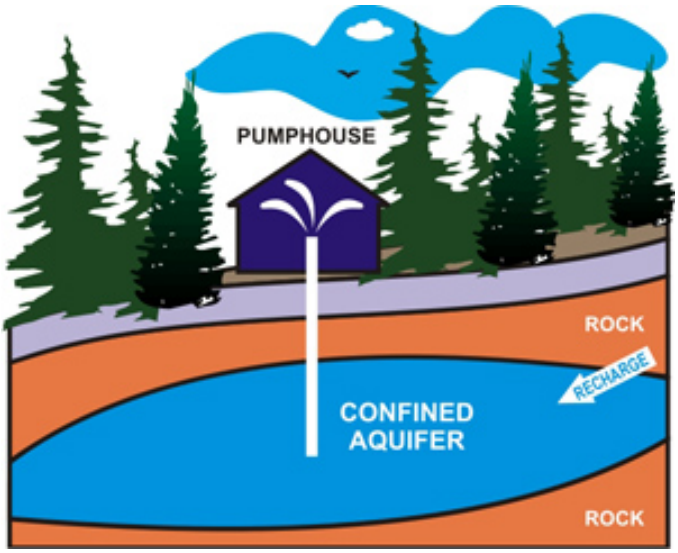


Figure 2

FYI: Artesian water is ground water confined under pressure between layers of relatively impermeable, underground rock-called a confined aquifer. Artesian water rises to the top of the aquifer and sometimes above land when a well taps the confined aquifer.



http://www.nicoletwater.com/

Q3. A borehole at a site reveals the soil profile shown in Figure 3 below. Plot the distribution of vertical total and effective stresses with depth. Assume G_s of all soils as 2.7.

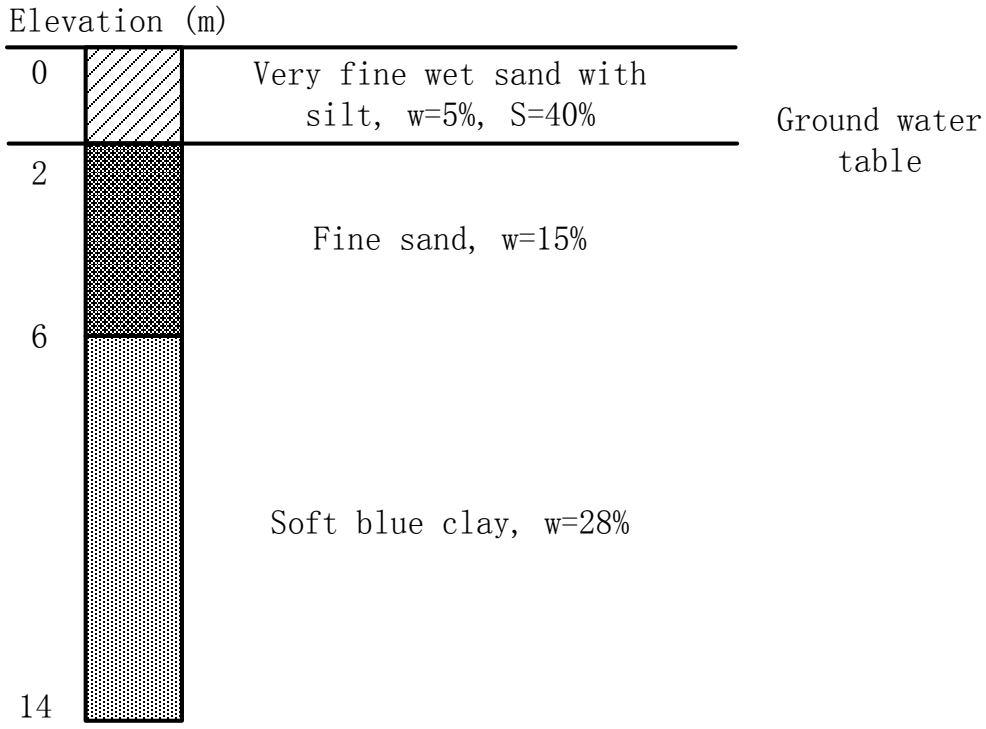


Figure 3

Q4. For the sheet piling as shown in Figure 4 below, calculate the factor of safety (FS) for seepage force. Comment whether or not the soil adjacent to the sheet piling is subjected to heave problem. Assume the water content is 27% and G_s is 2.7.

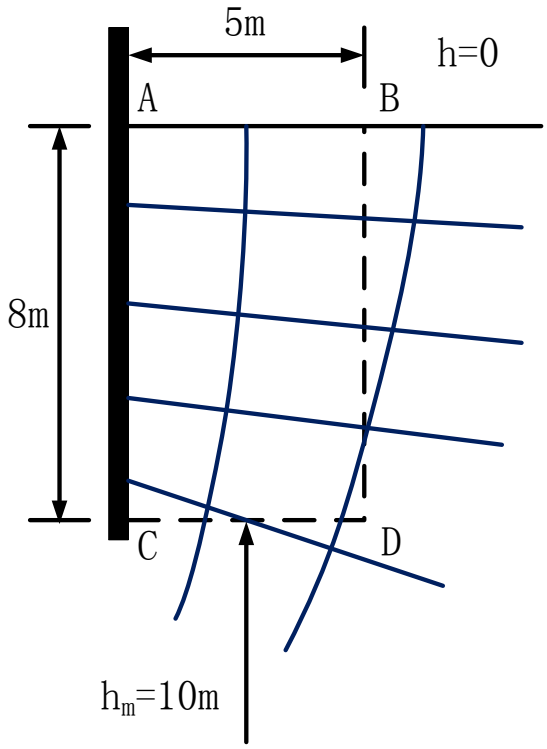


Figure 4

Q5. The properties of two different soils used in a seepage test apparatus shown in Figure 5 below are: soil 1, k_1=2×10^{-1}cm/sec, G_{s1}=2.72, e_1=0.85; soil 2, k_2 = 1×10^{-1}cm/sec, G_{s2}=2.72, e_2=0.8, the section area of soil =200cm^2. Determine the unit flow q when water level in both the left and right tubes is constant. If the water level in the right tube is constant and the water level in the left tube keeps increasing, determine the water level difference between left and right tube when liquefaction arises in the soil in the right tube.

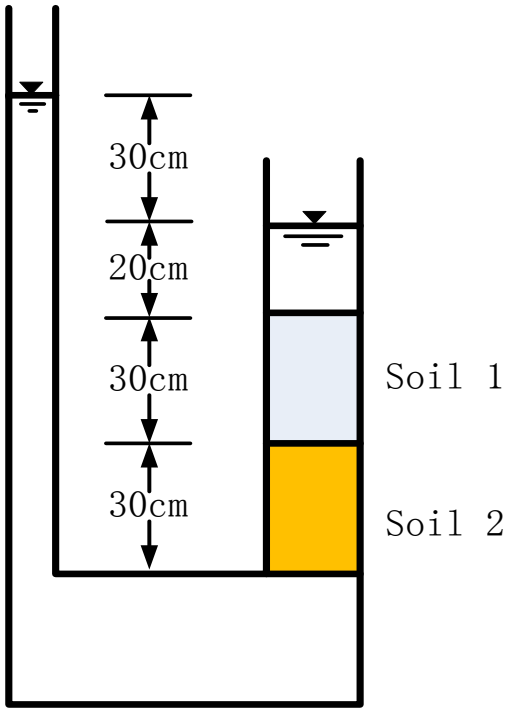


Figure 5