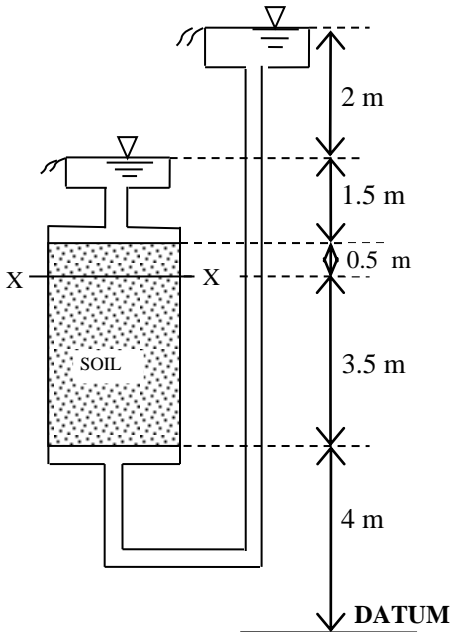


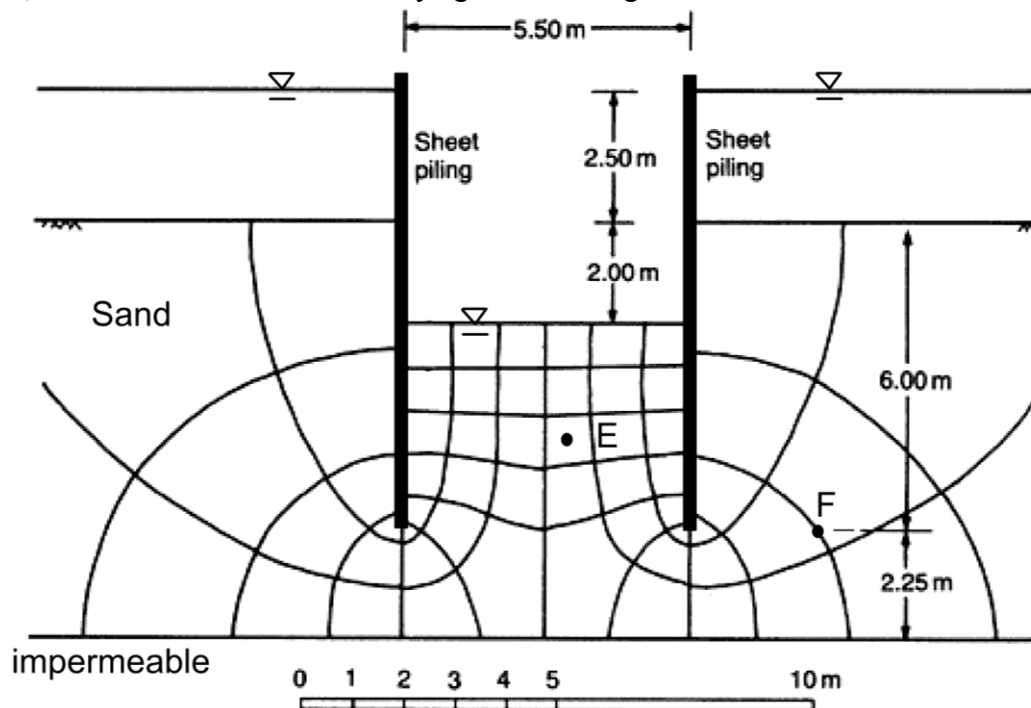
Due 17:30 , 6 April 2015, Monday
Late penalty = 100 pts/sec.

SOIL MECHANICS HOMEWORK 3



- 1) For the 1D seepage conditions given in the figure, find the following quantities: (γ_{sat} of the soil is 20 kN/m^3):
 - a) Elevation head, Pressure head, Total head at plane X-X,
 - b) Hydraulic gradient in this soil,
 - c) Assuming that the upper water level is kept constant by continuously adding water, find the quantity of seepage (in m^3/day) if the hydraulic conductivity of the soil is $2 \times 10^{-3} \text{ cm/s}$ and the diameter of soil specimen is 20 cm.
 - d) Effective stress acting on plane X-X by using total stress and pore pressure method,
 - e) How much higher should the water level on the right side be raised in order to cause boiling or quick condition?

- 2) A long cofferdam is formed by driving two lines of sheet piles into a river bed composed of sand. An excavation is carried out within the cofferdam (in the figure below you can see the flownet of the completed excavation at a scale of 1:150). The water level within the cofferdam is kept at excavation level by pumping. ($\gamma_{\text{sat}} = 19 \text{ kN/m}^3$)
 - a) Calculate the vertical effective stress at E and F.
 - b) Estimate the hydraulic gradient at E and F.
 - c) Calculate the resultant force of all water pressures acting on one wall.
 - d) Determine the factor of safety against 'boiling' at the excavated surface.



3) Below is the cross section of a concrete levee wall. The wall is 80m in the third dimension.

a) Draw a flow net for this two-dimensional flow problem.

b) Calculate the rate of flow (discharge) under the wall

