53:030 SOIL MECHANICS

Civil & Environmental Engineering

The University of Iowa

FALL SEMESTER, 2001

Homework Assignment # 7, Due Wednesday, 31 October 2001.

1) Consider the flow beneath the retaining structure shown in Figure 1. If the soil's permeability is isotropic such that $k_x = k_z = 10^{-7}$m/sec, draw a flownet for this problem and compute the flow rate beneath the structure per unit width in the out-of-plane direction.

2) Now considering that $k_x = 16 \cdot 10^{-7}$m/sec, $k_z = 10^{-7}$m/sec, draw a modified flownet for this problem and compute the flow rate beneath the structure per unit width in the out-of-plane direction.

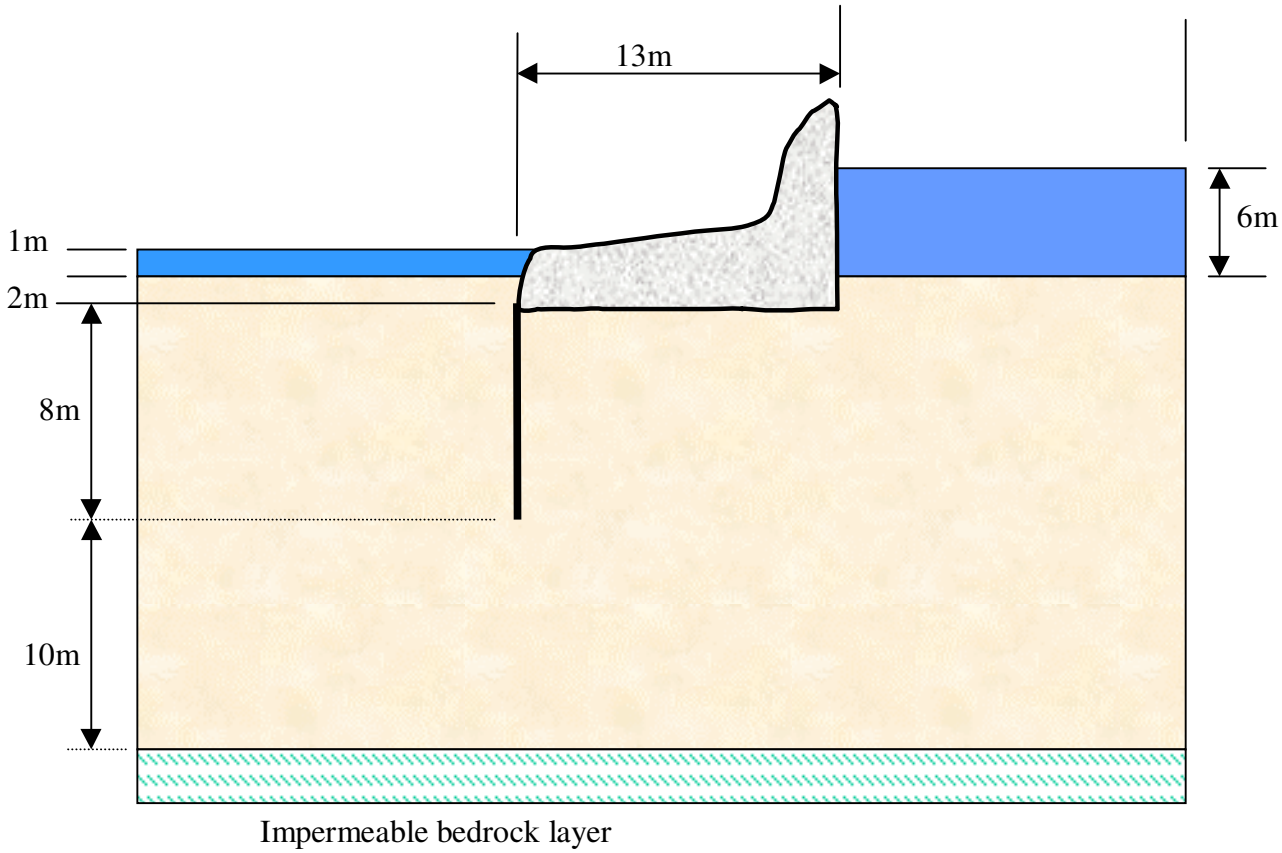

Figure 1. Setup for flow beneath a retaining structure.

3) The results of a laboratory consolidation test on a clay sample are as follows:

Vertical effective stress (kPa)	Void ratio, e
24	1.112
48	1.105
96	1.080
192	0.985
384	0.850
768	0.731

a) Draw an e versus log(σ_v') plot.
b) Estimate the preconsolidation stress $\sigma_v'_c$
c) Estimate the compression index C_c.

4) Consider the soil deposit shown below. Currently, the phreatic surface coincides with the ground surface, but during a different geological era, the surface coincided with the top of the clay layer.
   a) Compute the pre-consolidation stress in the clay layer due to the location of the phreatic surface a long time ago.

   b) If a uniform load of 400 psf is applied to the site, compute the settlement due to primary consolidation of the clay layer.