

Problem # 1

A raft foundation 60 m X 40 m carrying a net pressure of 145 kN/m^2 is located at a depth of 4.5 m below the surface in a deposit of dense sandy gravel 22 m deep, the water table is at a depth of 7 m. Below the sandy gravel is a layer of clay 5 m thick which, in turn, is underlain by dense sand. The value of the coefficient of volume change m_v for the clay is $0.22 \text{ m}^2/\text{MN}$.

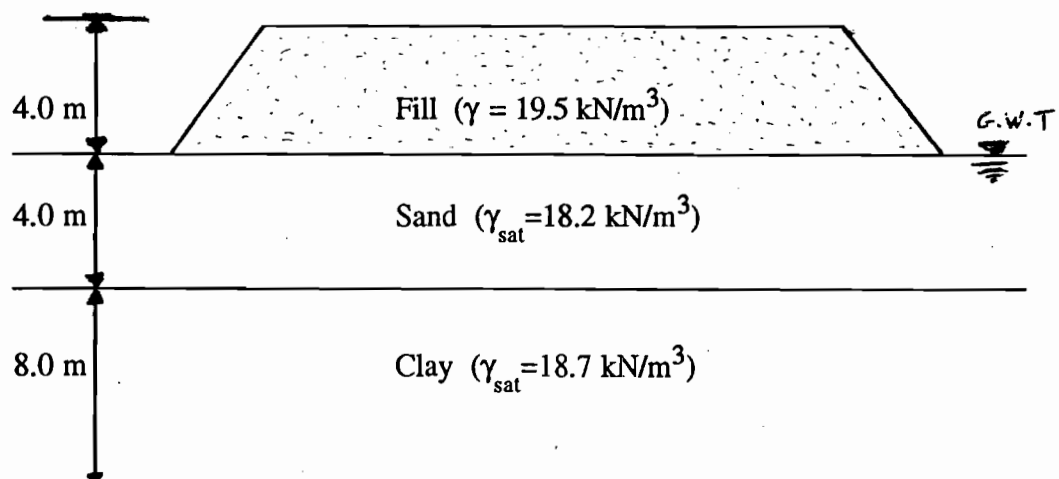
Determine the settlement below the center of the raft, the corner of the raft and the center of each edge of the raft, due to consolidation of the clay.

Problem # 2

The following results were obtained from an oedometer test on a specimen of saturated clay:

Pressure(kPa)	Void ratio
25.0	1.24
50.0	1.22
100.0	1.14
200.0	1.07
400.0	0.99
200.0	1.00
100.0	1.01
50.0	1.03

A 8-m thick layer of this clay is shown in the figure below. Determine the ultimate consolidation settlement due to the influence of the fill. The fill has a unit weight 19.5 kN/m^3 and is placed on the sand layer over an extensive area.



Problem #3

An overconsolidated clay layer (10 m thick) has the following properties:

Preconsolidated pressure	= 260 kPa
Initial void ratio	= 0.84
Existing overburden pressure	= 150 kPa
Compression index	= 0.22
Recompression (swelling) index	= 0.04

Estimate the consolidation settlement of the clay layer if the structure load will increase the existing overburden pressure in the layer by:

- (a) 80 kPa
- (b) 170 kPa

Problem #4

Compute the anticipated total consolidation settlement under the center of the raft (45 m X 30 m) shown in the figure below. The net foundation pressure (assumed to be uniformly distributed) is 125 kN/m^2 . The clay is normally consolidated which has a compression index of 0.36 and initial void ratio of 1.13. Solve the problem, first by taking the clay layer as a single layer, and in the second attempt divide the clay layer into four sublayers. Compare the results obtained from the two solutions.

Note: The moist and saturated unit weights of the sand layer are 16.5 kN/m^3 and 18.6 kN/m^3 , respectively. The saturated unit weight of the clay layer is 19.5 kN/m^3 .

