Geotechnical Design Home Work # 7

Problem 1)

Given

1. A strip of wall footing 3.5 ft wide is supported in a uniform deposit of stiff clay (see Fig. 7-10).
2. Unconfined compressive strength of this soil (q_u) = 2.8 kips/ft^2.
3. Unit weight of the soil (γ) = 130 lb/ft^3.

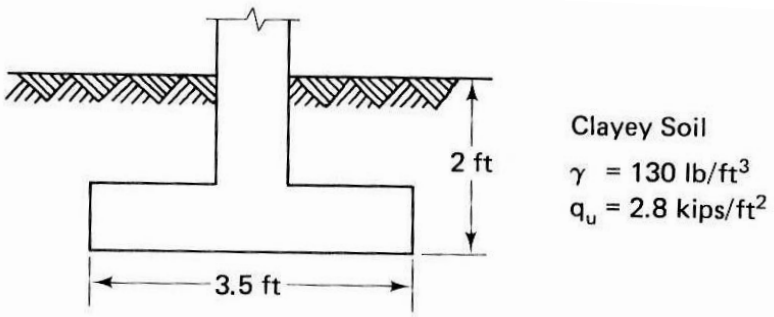

FIGURE 7-10

4. Groundwater was not encountered during subsurface soil exploration.
5. Depth of wall footing (D_f) = 2 ft.

Required

1. Ultimate bearing capacity of this footing.
2. Allowable wall load, using a factor of safety of 3.

Problem 2)

Given

1. A square footing with 5-ft sides is located 4 ft below the ground surface (see Fig. 7-11).
2. The groundwater table is at great depth and its effect may be ignored.
3. Subsoil consists of a thick deposit of stiff cohesive soil, with unconfined compressive strength (q_u) equal to 3000 lb/ft^2.
4. Unit weight (γ) of soil is 120 lb/ft^3.

Required

Allowable bearing capacity using a factor of safety of 3.0.

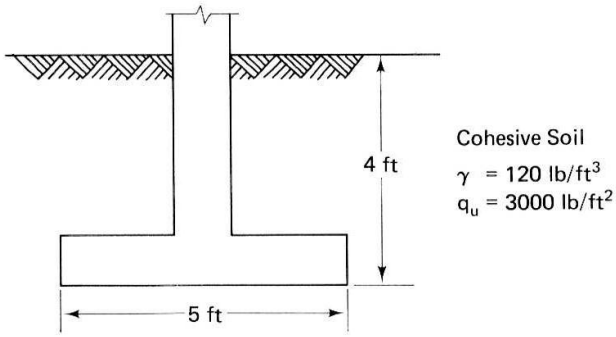

FIGURE 7-11

Problem 3)

Given

1. A circular footing with a 1.52-m diameter is to be constructed 1.22 m below the ground surface (see Fig. 7-12).
2. Subsoil consists of a uniform deposit of dense soil having the following strength parameters:

$$\text{Angle of internal friction} = 25^\circ$$

$$\text{Cohesion} = 48.0\ \text{kN/m}^2$$

3. The groundwater table is at great depth, and its effect can be ignored.

Required

The total allowable load (including column load and weight of footing and soil surcharge) the footing can carry, using a factor of safety of 3.

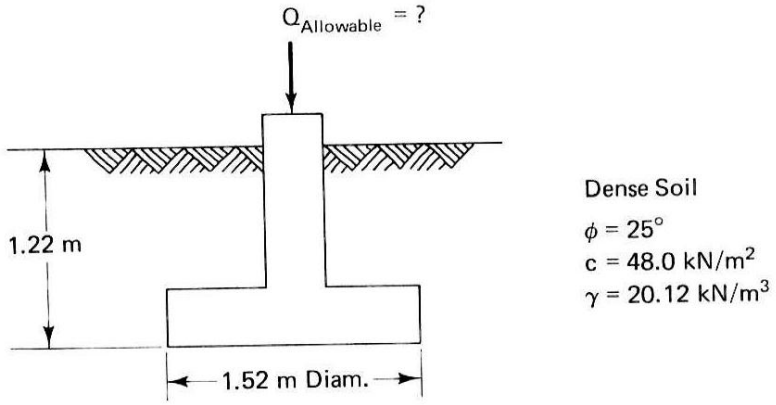

FIGURE 7-12