

Bearing capacity of soil

- 1- A strip footing (wall footing) 2 m wide is to be placed 3 m below ground surface on sandy clay soil having: $\gamma = 1.8 \text{ t/m}^3$, $\phi = 30^\circ$, and $c = 0.3 \text{ kg/cm}^2$. Find the ultimate bearing capacity, safe bearing capacity, and net safe bearing capacity using Terzaghi and Meyerhof equations (Take $L=20 \text{ m}$)?
- 2- A square footing is constructed at depth of 2 m below the ground surface on sandy clay soil which having: $\gamma = 1.7 \text{ t/m}^3$, $\phi = 10^\circ$, and $c = 0.4 \text{ kg/cm}^2$. Determine the width of the footing if the factor of safety is 3 and the footing is to be designed to carry a load 120 t by using Terzaghi bearing capacity equation?
- 3- A square footing 2 x 2 m carries a net load of 160 t. Depth of footing is 3 m below the ground surface. The soil is stiff clay with $\gamma = 1.7 \text{ t/m}^3$, and shear strength = 1.5 kg/cm^2 . Find the factor of safety?
- 4- A total load of 100 t should be carried by a square footing at 2.5 m below the ground surface on clayey soil with $c = 0.5 \text{ kg/cm}^2$, and $\gamma = 1.7 \text{ t/m}^3$. Calculate the dimension of the footing by Terzaghi and Skempton theories?
- 5- A footing 1.5 x 15 m is placed at 1m depth on soil having: $\gamma = 1.85 \text{ t/m}^3$, $\phi = 20^\circ$, and $c = 0.5 \text{ kg/cm}^2$. Find the ultimate bearing capacity by Terzaghi theory for the following cases:
 - a) The water table is 5 m below ground surface.
 - b) The water table is at the ground surface.

6- A footing 2 x 4 m is to be constructed at a depth of 1.5 m below G.S. on medium dense sand soil has: $\phi = 34^\circ$, $\gamma = 18.8 \text{ kN/m}^3$. The G.W.L is at 3 m below G.S. Find the net safe bearing capacity using Terzaghi, Meyerhof, and Hansen equations?

7- Calculate the net safe bearing capacity of a square footing 3x3 m (Fig. 1) at:

- ❖ Case (1): footing is resting on sand at level (-1.50m)
 - ❖ Case (2): footing is resting on clay at level (-4.00m)
- In case (1) check the stress at the surface of clay layer.

Data:

For sand: $\gamma = 1.8 \text{ t/m}^3$, $\phi = 25^\circ$, and $c = 0$

For clay: $\gamma = 1.9 \text{ t/m}^3$, $\phi = 10^\circ$, and $c = 0.4 \text{ kg/cm}^2$

Terzaghi bearing capacity factors:

$\phi = 10^\circ$: $N_c = 9.6$ $N_q = 2.7$ $N_\gamma = 1.2$

$\phi = 25^\circ$: $N_c = 25.1$ $N_q = 12.7$ $N_\gamma = 9.7$

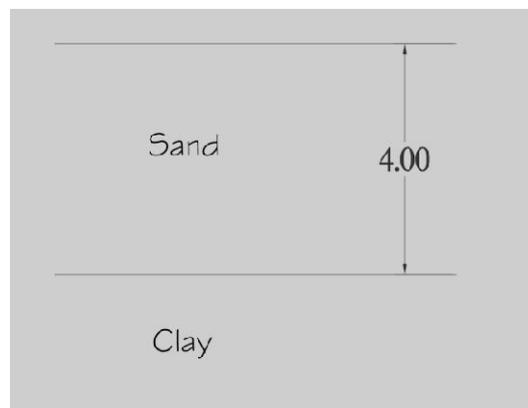


Fig. 1