

DESIGN OF RETAINING WALLS

QUESTION 1

For the cantilever retaining wall shown in the figure below.

Calculate the factor of safety with respect to:

- i) Overturning
- ii) Sliding
- iii) Bearing capacity

Use Rankine's theory for calculating the lateral earth pressures.

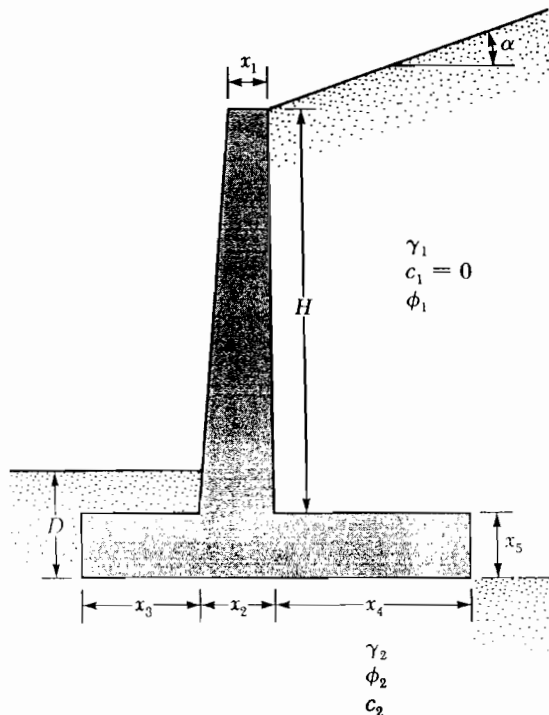
Given:

Wall dimensions:

$$x_1 = 0.4 \text{ m}, x_2 = 0.6 \text{ m}, x_3 = 1.5 \text{ m}, x_4 = 3.5 \text{ m}, x_5 = 0.96 \text{ m},$$
$$D = 1.75 \text{ m}, H = 8 \text{ m}, \alpha = 10^\circ, \gamma_c = 23.58 \text{ kN/m}^3$$

Soil properties:

$$\gamma_1 = 16.8 \text{ kN/m}^3, \phi_1 = 32^\circ, \gamma_2 = 17.6 \text{ kN/m}^3, \phi_2 = 28^\circ, c_2 = 30 \text{ kN/m}^2$$



QUESTION 2

For the gravity retaining wall shown in the figure below.

Calculate the factor of safety with respect to:

- i) Overturning
- ii) Sliding
- iii) Bearing capacity

Use Coulomb's theory for calculating the lateral earth pressures ($\delta = \frac{2}{3} \phi$).

Given:

Wall dimensions:

$$x_1 = 0.6 \text{ m}, x_2 = 0.2 \text{ m}, x_3 = 2 \text{ m}, x_4 = 0.5 \text{ m}, x_5 = 0.75 \text{ m}, \\ x_6 = 0.8 \text{ m}, D = 1.5 \text{ m}, H = 6 \text{ m}, \gamma_c = 23.58 \text{ kN/m}^3$$

Soil properties:

$$\gamma_1 = 16.5 \text{ kN/m}^3, \phi_1 = 32^\circ, \gamma_2 = 18 \text{ kN/m}^3, \phi_2 = 22^\circ, c_2 = 40 \text{ kN/m}^2$$

