



CAIRO UNIVERSITY  
FACULTY OF ENGINEERING  
Soil Mechanics and Foundation Engineering Division

FOUNDATIONS

4<sup>th</sup> Year Civil

EXERCISE (6)

2016-2017

RETAINING WALLS

- 1) a- Mention four practical uses of retaining walls.  
b- For the gravity type retaining wall shown in Figure (1), check the overall and structural stability. The soil formation is:
- c- $\phi$  soil :  $c = 0.2 \text{ kg/cm}^2$ ,  $\phi = 20^\circ$ , and  $\gamma_d = 1.7 \text{ t/m}^3$   
Sand :  $\phi = 35^\circ$  and  $\gamma_{\text{sat}} = 1.9 \text{ t/m}^3$

- 2) a- Differentiate between gravity-type retaining walls and cantilever retaining walls with respect to material, stability, and dimensions.  
b- A gravity-type concrete retaining wall with a 6.0 m high vertical back is shown in Fig. (2).

Data:

**Layer I**

Unit weight =  $1.6 \text{ t/m}^3$ ,  $\phi = 30^\circ$ ,  $c = 0$

**Layer II**

Unit weight =  $1.9 \text{ t/m}^3$ ,  $\phi = 10^\circ$ ,  $c = 0.32 \text{ kg/cm}^2$

**Layer III**

Dry unit weight =  $1.6 \text{ t/m}^3$  ,

Saturated unit weight =  $1.85 \text{ t/m}^3$ ,  $\phi = 33^\circ$ ,  $c = 0$ ,  $q_{\text{all}} = 2 \text{ kg/cm}^2$ ,  $\mu = 0.4$

It is required to check the stability of the wall.

- 3) a- Mention, using clear sketches, four practical solutions to avoid unsatisfactory stability against sliding in case of cantilever retaining walls.
- b- Make a complete design for the cantilever retaining wall shown in Fig. (3).
- 4) a- Discuss the effect of the following on the stability of cantilever retaining walls:
- i- Existence of toe in front of the wall.
  - ii- Increasing the heel length behind the wall.
- b- For the retaining wall designed in Problem 3(b), if on the top of the ground runs a double railway line that can be substituted by a uniform surcharge of  $5 \text{ t/m}^2$ , check the overall stability of the retaining wall in that case.

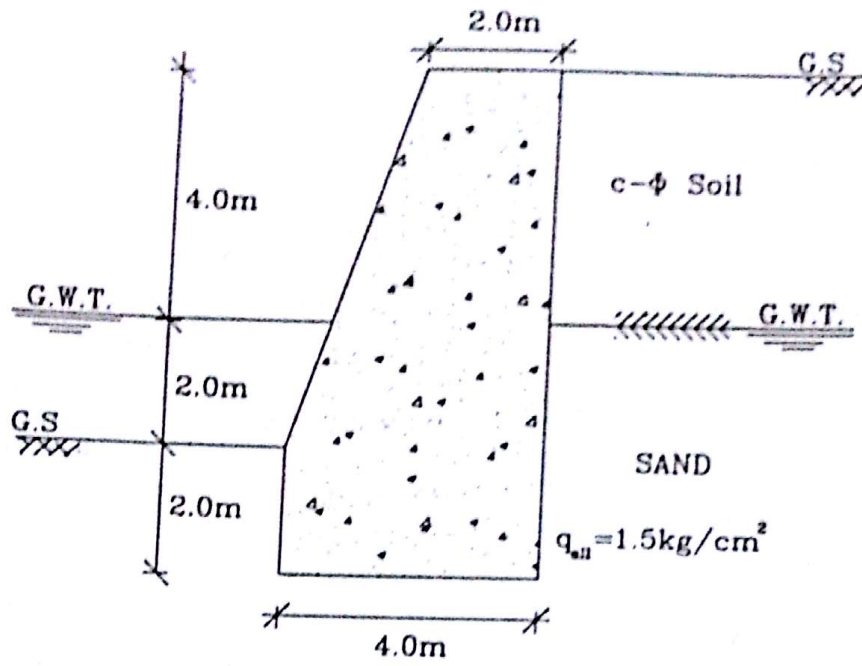


Figure (1)

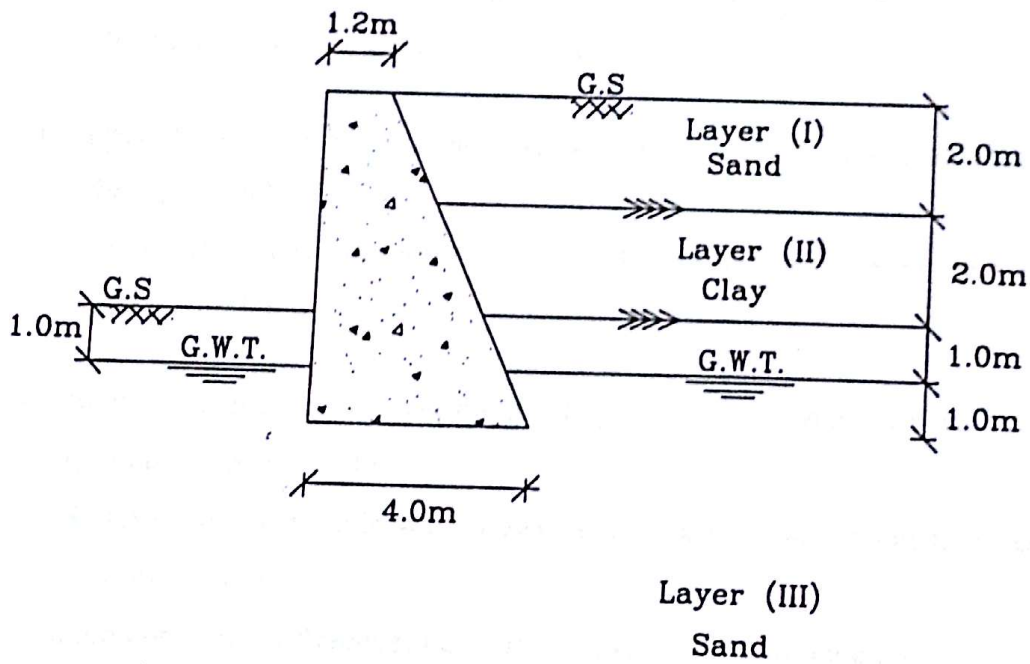


Figure (2)

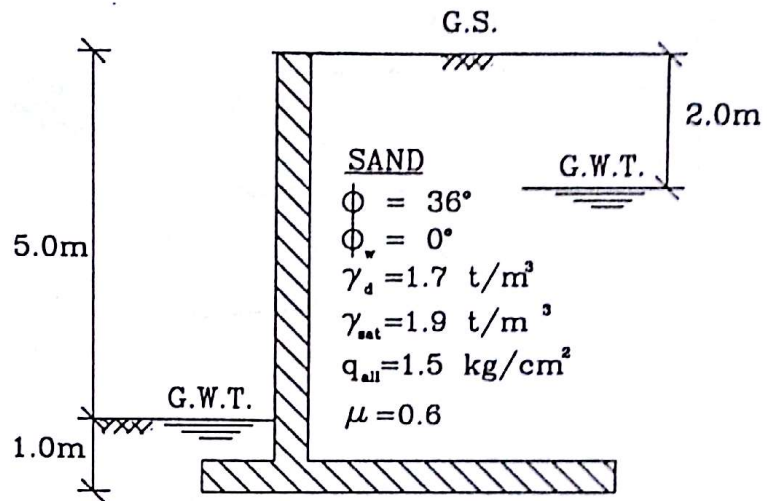


Figure (3)