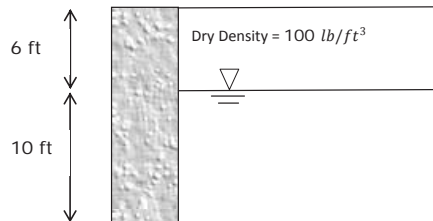


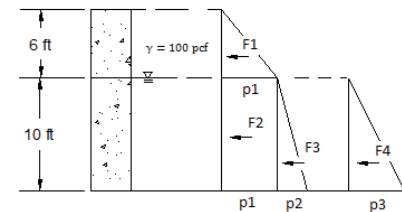
12. A retaining wall is shown below. The wall supports a mass of cohesionless soil with dry density of 100 lb/ft^3 , void ratio of 0.65 and angle of shearing resistance 30° . The top of the wall is level with the horizontal surface of the soil. Not considering wall friction, determine the total earth thrust on the wall (lb).



- a) 8800
- b) 7956
- c) 6347
- d) 12720

**PROBLEM 12 SOLUTION:
GEOTECHNICAL
LATERAL EARTH PRESSURE**

Solution:



$$K_a = \frac{1 - \sin \phi}{1 + \sin \phi} = \frac{1 - \sin 30}{1 + \sin 30} = \frac{1}{3} \quad (\text{don't forget the active earth pressure!})$$

$$P_1 = K_a \gamma H = \frac{1}{3} (100 \text{ lb/ft}^3) (6 \text{ ft}) = 200 \text{ lb/ft}^2$$

$$P_2 = K_a \gamma H = \frac{1}{3} \left(100 \frac{\text{lb}^3}{\text{ft}} - 62.4 \frac{\text{lb}^3}{\text{ft}} \right) (10 \text{ ft}) = 125.32 \text{ lb/ft}^2$$

$$P_3 = \gamma_w H = 62.4 \text{ lb/ft}^3 \times 10 \text{ ft} = 624 \text{ lb/ft}^2$$

Solving for the forces (areas of each),

$$F_1 = \frac{1}{2} (200 \text{ lb/ft}^2) \times 6 \text{ ft} \times 1 \text{ ft} = 600 \text{ lb}$$

$$F_2 = (200 \text{ lb/ft}^2) \times 10 \text{ ft} \times 1 \text{ ft} = 2000 \text{ lb}$$

$$F_3 = \frac{1}{2} (125.32 \text{ lb/ft}^2) \times 10 \text{ ft} \times 1 \text{ ft} = 626.5 \text{ lb}$$

$$F_4 = \frac{1}{2} (624 \text{ lb/ft}^2) \times 10 \text{ ft} \times 1 \text{ ft} = 3120 \text{ lb}$$

$$\text{Total Force} = F_1 + F_2 + F_3 + F_4 = \mathbf{6346.5 \text{ lb (Answer C)}}$$

Note: K_a is the active earth pressure coefficient and is only applied to the soil, not to the water.