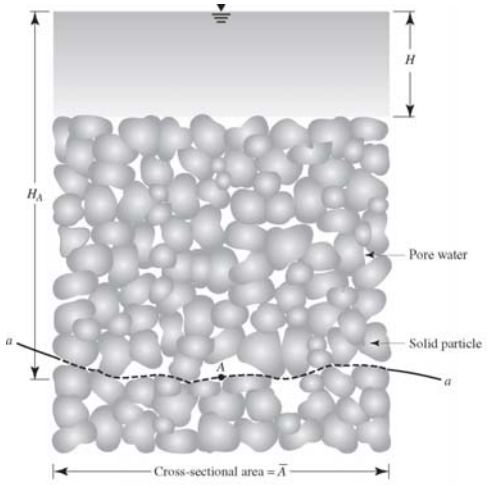
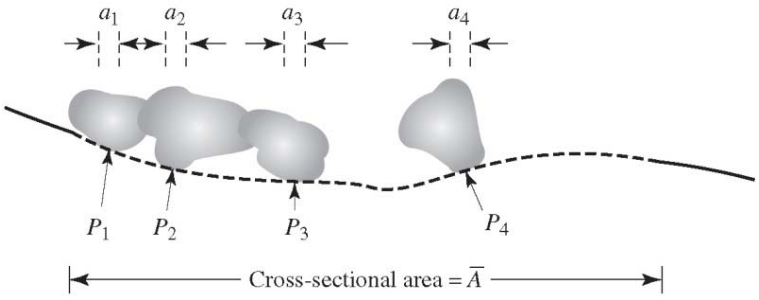
Effective Stress

Chapter 8

Effective Stress

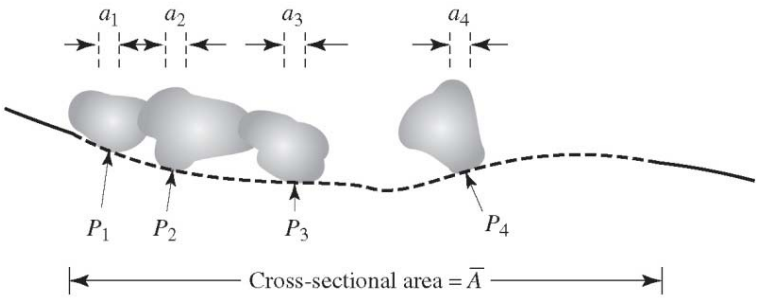


Effective Stress



$$\sigma' = \frac{P_{1(v)} + P_{2(v)} + P_{3(v)} + \cdots + P_{n(v)}}{\bar{A}}$$

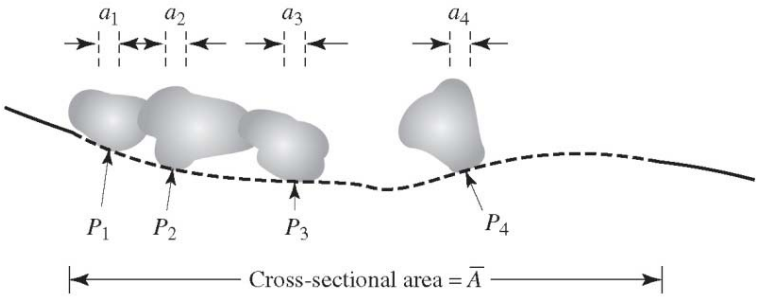
Effective Stress



$$neutral\ stress = \frac{u(\bar{A} - \sum a_i)}{\bar{A}} = \frac{u(\bar{A})}{\bar{A}} = u$$

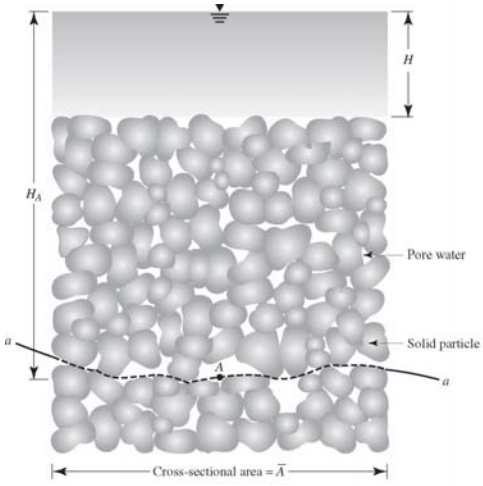
($\sum a_i \to 0$)

Effective Stress



$$\sigma' = \sigma - u$$

Effective Stress



$$\sigma = H\gamma_w + (H_A - H)\gamma_{sat}$$

$$u = H_A\gamma_w$$

$$\sigma' = \sigma - u$$

$$= H\gamma_w + (H_A - H)\gamma_{sat} - H_A\gamma_w$$

$$= (H_A - H)(\gamma_{sat} - \gamma_w)$$

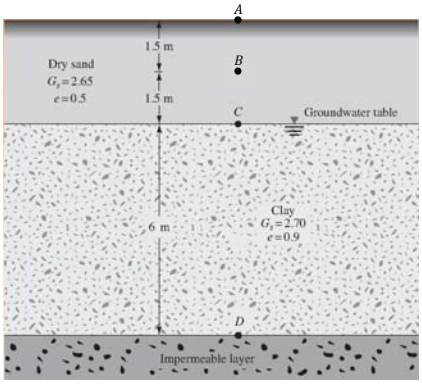
$$= (H_A - H)\gamma'$$

γ' = submerged unit weight

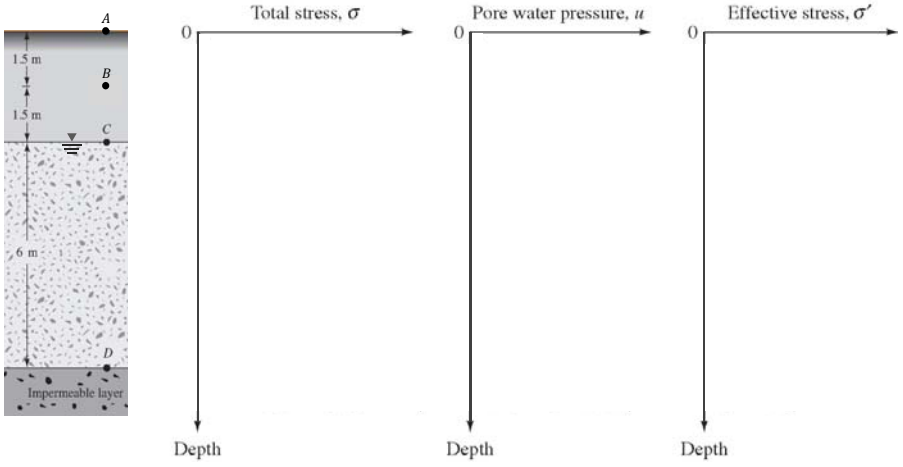
Example

Example 8.1

A soil profile is shown in Figure 8.2. Calculate the total stress, pore water pressure, and effective stress at points *A*, *B*, *C*, and *D*.

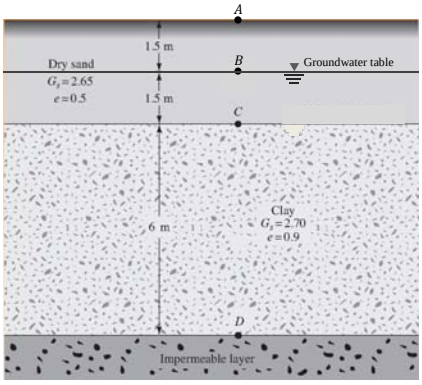


Example

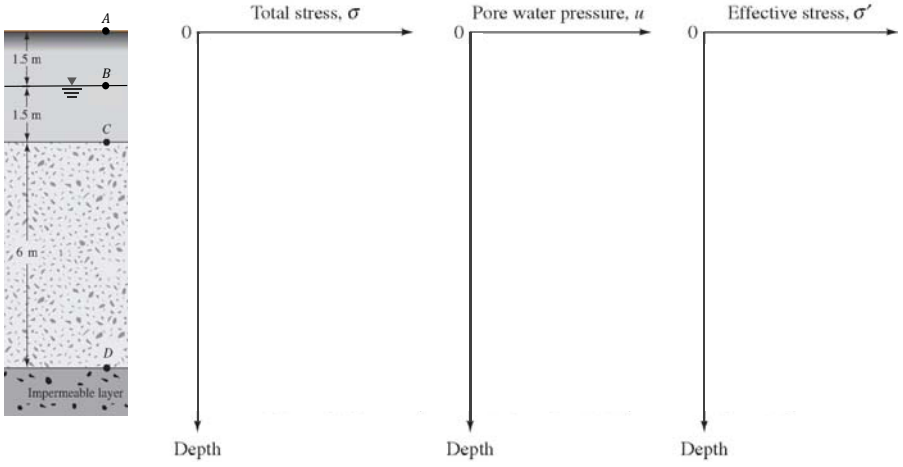


Example

How will the stress values in the previous problem change if the water table rises to Point B?

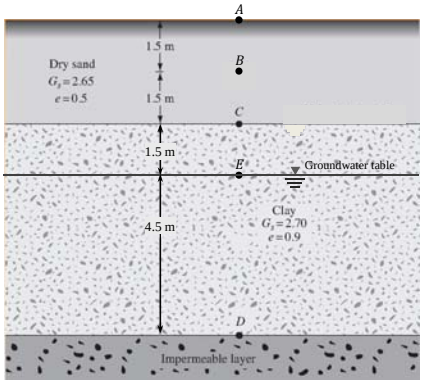


Example



Example

How will the stress values in the previous problem change if the water table drops to Point E? Assume the moist unit weight of the clay above the water table is 16.26 kN/m^3



Example