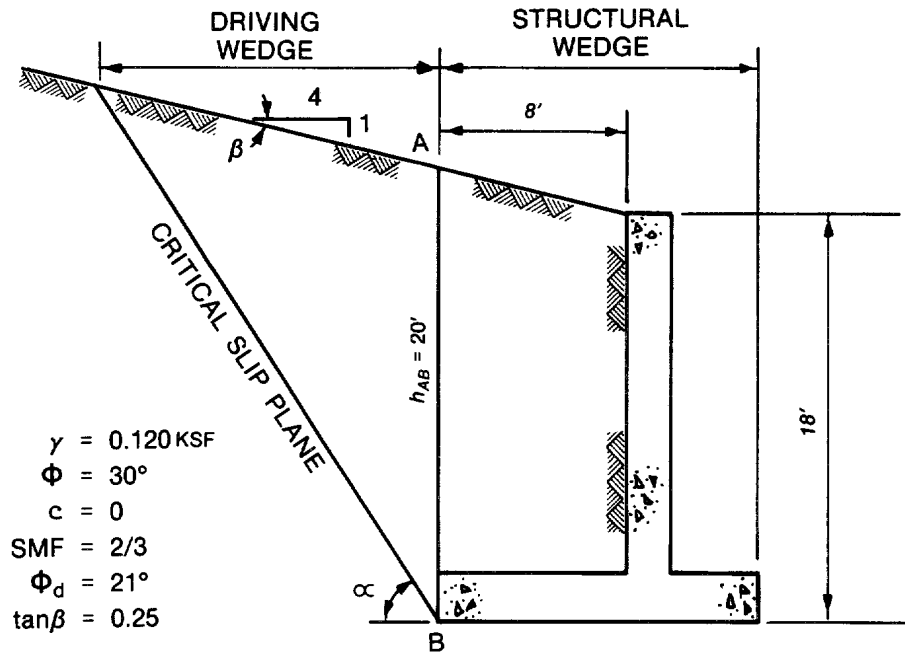


M-2. EXAMPLE 2. Find the lateral earth force and pressure distribution acting on Surface AB.



a. Calculate α .

$$c_1 = 2 \tan \phi_d = 2(0.383864) = 0.767728 \quad [3-26]$$

$$c_2 = 1 - \tan \phi_d \tan \beta - \frac{\tan \beta}{\tan \phi_d} \quad [3-27]$$

$$c_2 = 1 - 0.383864(0.25) - \frac{0.25}{0.383864} = 0.252762$$

$$\alpha = \tan^{-1} \left(\frac{c_1 + \sqrt{c_1^2 + 4c_2}}{2} \right) = 45.466^\circ \quad [3-25]$$

b. Lateral earth pressure coefficient (see Appendix H). From the equations contained in Appendix H:

$$K_1 = \left(\frac{1 - \tan \phi_d \cot \alpha}{1 + \tan \phi_d \tan \alpha} \right) \left(\frac{\tan \alpha}{\tan \alpha - \tan \beta} \right)$$

$$K_1 = \left(\frac{1 - 0.383864 \times 0.983864}{1 + 0.383864 \times 1.016400} \right) \left(\frac{1.016400}{0.766400} \right) = 0.5937$$

Alternatively K_1 may be calculated using Equation 3-14:

$$K_1 = \frac{\cos^2 \phi_d}{\left[1 + \sqrt{\frac{\sin \phi_d \sin (\phi_d - \beta)}{\cos \beta}} \right]^2}$$

$$\beta = \tan^{-1} (0.25) = 14.0362^\circ, \quad \phi_d - \beta = 6.9638^\circ$$

$$K_1 = \frac{(0.933580)^2}{\left[1 + \sqrt{\frac{0.358368(0.121242)}{0.970143}} \right]^2} = 0.5937$$

c. Lateral force and pressure distribution. The lateral force and pressure distribution are shown in the figure below:

