

APPENDIX I

DERIVATION OF EQUATION FOR DEPTH OF CRACK d_c IN COHESIVE SOIL

I-1. Definition. By definition, the bottom of the crack will lie at the depth where the net horizontal stress in the soil is zero.

$$P_h = K_1 \gamma d_c - 2K_c c = 0 \quad [I-1]$$

where

$$K_1 = \frac{1 - \tan \phi \cot \alpha}{1 + \tan \phi \tan \alpha} \cdot \frac{\tan \alpha}{\tan \alpha - \tan \beta}$$

$$K_c = \frac{\tan \alpha}{2 \sin \alpha \cos \alpha (1 + \tan \phi \tan \alpha) (\tan \alpha - \tan \beta)}$$

The coefficients K_1 and K_c are derived in Appendix H. Rearranging Equation I-1 and solving for d_c yields:

$$d_c = \frac{2K_c c}{K_1 \gamma} \quad [I-2]$$

Equation I-2 is valid for a sloping soil layer.

I-2. Horizontal top surface. When the top surface is horizontal,

$$K_1 = K_A \text{ (Coulomb)}$$

$$K_c = \sqrt{K_A}$$

and

$$d_c = \frac{2c}{\sqrt{K_A} \gamma}$$