

Solved Example:

Given:

$$\gamma = 112 \text{ pcf}$$

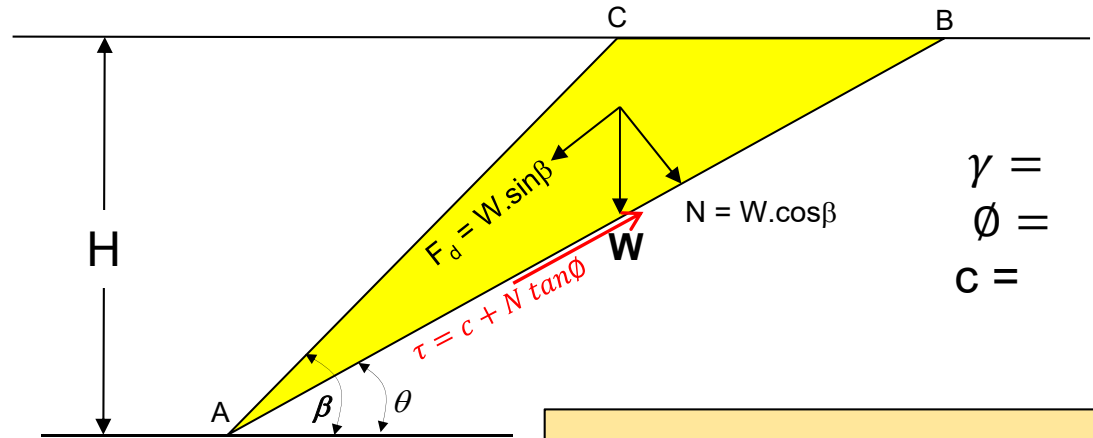
$$\beta = 55^\circ$$

$$\phi = 26^\circ$$

$$\theta = 35^\circ$$

$$c = 520 \text{ psf}$$

$$H = 8'$$



$$\gamma =$$

$$\phi =$$

$$c =$$

Find:

$$F.S. = ?????$$

Solution 2:

Since we don't know the F.S of the slope ($F.S_c = F.S_\phi$), then

1- First Trial

$$\text{Assume } F.S_\phi = 1 \dots \phi_d = \tan^{-1} \left(\frac{\tan \phi}{F.S} \right) = \tan^{-1} \left(\frac{\tan 26}{1} \right) = 26^\circ$$

2- Find $F.S_c$

$$c_d = \frac{\gamma H}{2} \left[\frac{\sin(\beta - \theta)(\sin \theta - \cos \theta \tan \phi_d)}{\sin \beta} \right] = \frac{112 \times 8}{2} \left[\frac{\sin(55 - 35)(\sin 35 - \cos 35 \tan 26)}{\sin 55} \right] =$$

$$c_d = \frac{c}{F.S_c} \rightarrow \rightarrow \rightarrow \rightarrow F.S_c = \frac{520}{18.68} = 27.8$$

3- Second Trial

$$\text{Assume } F.S_\phi = 2 \dots \phi_d = \tan^{-1} \left(\frac{\tan \phi}{F.S} \right) = \tan^{-1} \left(\frac{\tan 26}{2} \right) = 13.7^\circ$$

$$H_{cr} = \frac{2c}{\gamma} \left[\frac{\sin \beta}{\sin(\beta - \theta)(\sin \theta - \cos \theta \tan \phi)} \right]$$

$$H_{des} = \frac{2c_d}{\gamma} \left[\frac{\sin \beta}{\sin(\beta - \theta)(\sin \theta - \cos \theta \tan \phi_d)} \right]$$

$$c_d = \frac{\gamma H}{2} \left[\frac{\sin(\beta - \theta)(\sin \theta - \cos \theta \tan \phi_d)}{\sin \beta} \right]$$

$$c_d = \frac{\gamma H}{2} \left[\frac{\sin(\beta - \theta)(\sin\theta - \cos\theta \tan\phi_d)}{\sin\beta} \right]$$

$$c_d = \frac{112 \times 8}{2} \left[\frac{\sin(55 - 35)(\sin 35 - \cos 35 \tan 13.7)}{\sin 55} \right] =$$

$$c_d = \frac{c}{F.S_c} \rightarrow \rightarrow \rightarrow \rightarrow F.S_c = \frac{520}{18.68} =$$

If $F.S_c \neq 2 \rightarrow \rightarrow \rightarrow \rightarrow$ Assume another value for $F.S_\phi$

Trial 3

After 3 or 4 trials, draw the relationship between Assumed $F.S_\phi$ and Calculated $F.S_c$

<u>Assumed $F.S_\phi$</u>	<u>Calculated $F.S_c$</u>
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1.0

2.5

2

XX

3

XX

