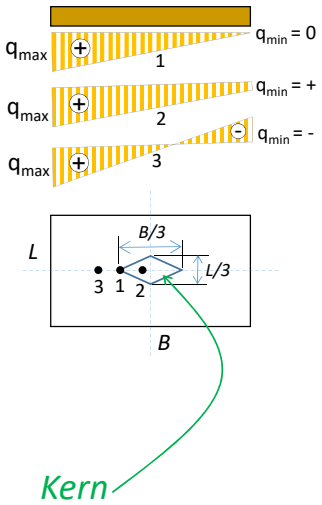
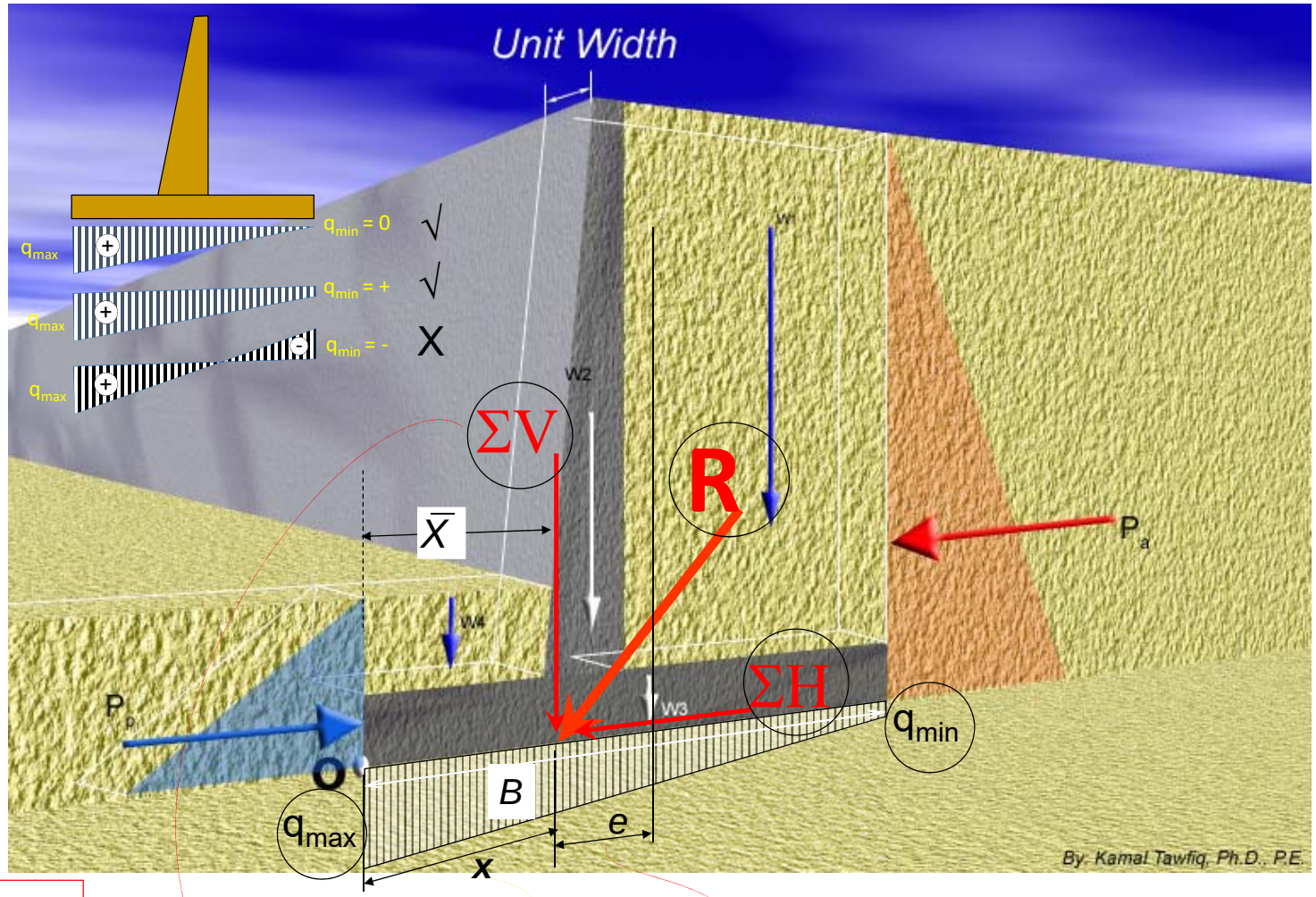
3- Check for Bearing Capacity Failure

Factor of Safety Against Bearing Capacity Failure = $\frac{q_{all}}{q_{max}}$





$\sum V$ = Sum of all vertical forces

$\sum H$ = Sum of all horizontal forces

$$R = \sqrt{\left(\sum V\right)^2 + \left(\sum H\right)^2}$$

$$M_{net} = \sum M_{Resisting} - \sum M_{Driving}$$

$$\sum V \; \bar{x} = M_{net}$$

$$e = \frac{B}{2} - \bar{x}$$

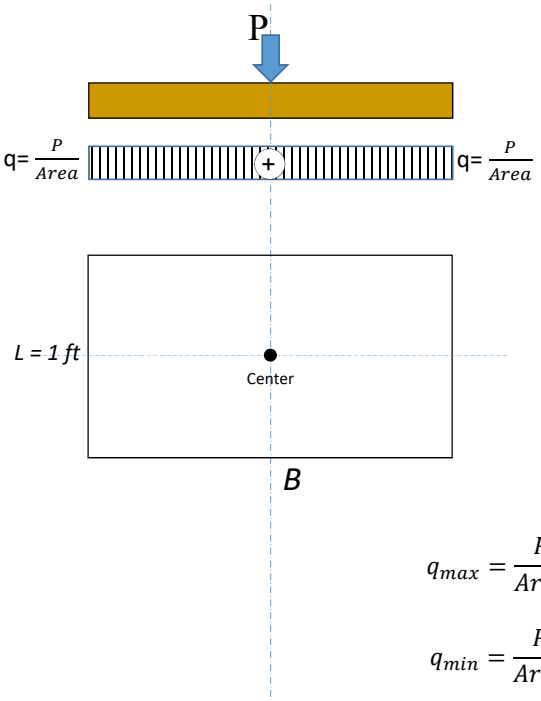
$$q_{\substack{max \\ min}} = \frac{\sum V}{A} \pm \frac{M_{net} \cdot y}{I}$$

$$q_{\substack{max \\ min}} = \frac{\sum V}{B}\left(1 \pm \frac{6\,e}{B}\right)$$

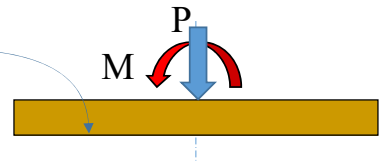
By: Kamal Tawfiq, Ph.D., P.E., F.ASCE

Only Normal Force at the Center

$M = P \times e$



Area



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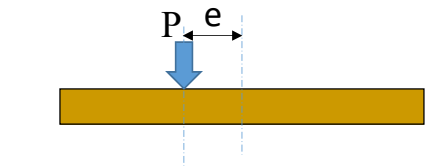
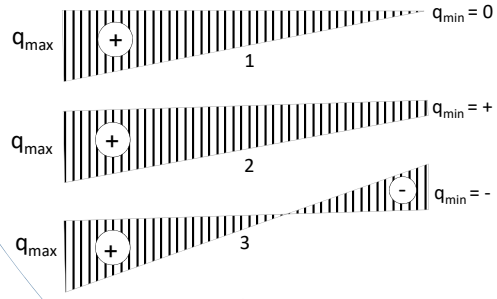
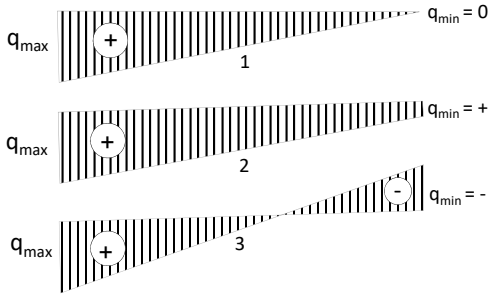






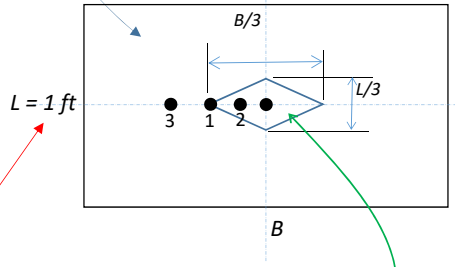
$$q_{max} = \frac{P}{Area} + \frac{M\,c}{I}$$

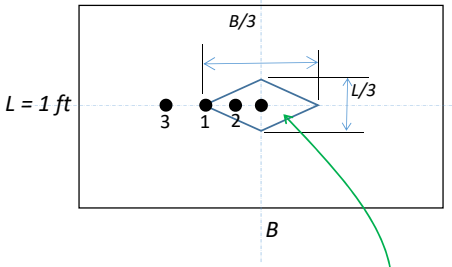
$$q_{min} = \frac{P}{Area} - \frac{M\,c}{I}$$

$$c = \frac{B}{2}$$

=1

$$I = \frac{L\,x\,B^3}{12}$$





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