

Student ID = 13639

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Module = 6th semester

Subj. = Foundation & Pavement

Submitted to = Engrs - Furqan Wali

Exam =  
Mid  
Term  
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Foundation & Pavement

Prob #1

Given Data:

$$D.L = 500 \text{ KN/m}$$

$$L.L = 300 \text{ KN/m}$$

$$D = 0.7 \text{ m}$$

$$c = 0$$

$$\phi = 40$$

$$N_q = 81.3, \quad N_\gamma = 100.4$$

$$F.O.S = 3.0$$

$$\gamma = 17 \text{ KN/m}^3$$

$$\gamma_{\text{sat}} = 20 \text{ KN/m}^3$$

— x — x

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Sol

$$FOS = q_u / q_{app}$$

$$q_u = F.O.S \times q_{app}$$

$$3 \times 800 / B = 2400 / B$$

For  $\phi = 40^\circ$  the Terzaghi BC factors are

$$N_q = 81.3, N_\gamma = 100.4$$

$$q_u = C N_c + \gamma D N_q + \frac{1}{2} \gamma B N_\gamma$$

use bulk unit weight ( $17 \text{ kN/m}^3$ ) in 2nd term  
and submerged unit weight ( $\gamma = \gamma_{sat} - \gamma_w$ )

$$\gamma = 20 - 9.8 = 10.2 \text{ kN/m}^3 \text{ in 3rd term}$$

of BC equation

$$q_u = 0 + (17 \times 0.7 \times 81.3) + (0.5 \times 10.2 \times B \times 100.4)$$

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$$q_u = 967.47 + 512B$$

$$\frac{2400}{B} = 967.47 + 512B$$

$$2400 = 512B^2 + 967.5B$$

$$512B^2 + 967.5B - 2400 = 0$$

By Quadratic equation

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$a = 512$$

$$b = 967.5$$

$$c = -2400$$

$$x = \frac{-967.5 \pm \sqrt{(967.5)^2 - 4(512)(-2400)}}{2(512)}$$

$$= \frac{-967.5 \pm \sqrt{936056.25 + 4915200}}{1024}$$

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$$x = \frac{-967.5 \pm 2418.93}{1024}$$

$$x = \frac{-967.5 + 2418.93}{1024}$$

OR

$$x = \frac{-967.5 - 2418.93}{1024}$$

$$x = \frac{1451.43}{1024} \quad \text{OR} \quad x = \frac{-3386.43}{1024}$$

$$x = 1.42 \quad \text{OR} \quad x = -3.3$$

Ans  $B = 1.42 \text{ m}$