

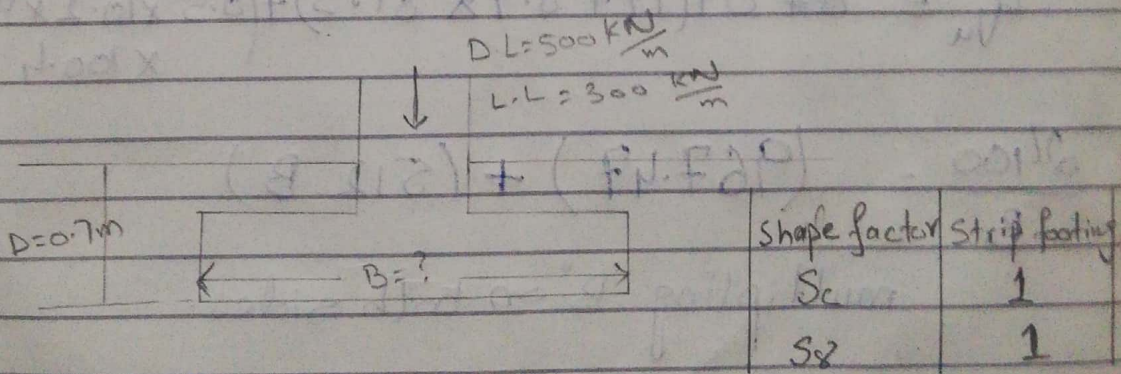
Student ID :- 13727 - Program :- B.tech (civil).

Module :- 6th Semester - Subject :- Foundation & pavement.

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Q. No⁽⁰¹⁾ :- A strip footing is to be design for the proposed 2 story building in swat which support the dead load of $500 \frac{KN}{m}$ and Live load $300 \frac{KN}{m}$ ----- ?

Note :- For $\phi = 40^\circ$ The terzaghi BC factor are $N_q = 81.3$ and $N_\gamma = 100.4$.



$c = 0$, $\phi = 40^\circ$, F.S. 3

Solⁿ :- Given data :- $D.L = 500 \frac{KN}{m}$
 $L.L = 300 \frac{KN}{m}$

$D = 0.7m$

$c = 0$

$\phi = 40^\circ$

F.O.S = 3

$\gamma = 17 \frac{KN}{m^3}$

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

Sol: $F.O.S = \frac{q_u}{q_{app}}$

$$q_u = \frac{F.O.S}{1} \times q_{app} = 3 \times \frac{800}{B} = \frac{2400}{B}$$

$$q_u = \frac{2400}{B}$$

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

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

$$q_u = cN_c + \gamma DN_q + \frac{1}{2} \gamma B N_\gamma$$

Use bulk unit weight ($17 \frac{KN}{m^3}$) in 2nd term and submerged unit weight ($\gamma = \gamma_{sat} - \gamma_w = 20 - 9.8 = 10.2 \frac{KN}{m^3}$) in 3rd term of BC equation.

$$q_u = 0 + (17 + 0.7 \times 81.3) + \left(\frac{0.5 \times 10.2 \times B}{1} \times 100.4 \right)$$

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

multiplying "B" on both sides.

$$B \times \frac{2400}{B} = B(512B + 967.47)$$

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

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

$$512B^2 + 9675B - 2400 = 0$$

By a quadratic equation

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

$$a = 512, b = 967.5, c = -2400$$

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

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

$$B = \frac{-967.5 \pm 2418.937}{1024}$$

Either

$$B = \frac{-967.5 + 2418.937}{1024} \quad \text{OR} \quad B = \frac{-967.5 - 2418.937}{1024}$$

$$B = \frac{1451.43}{1024}$$

$$B = \frac{-3386.43}{1024}$$

$$B = 1.417$$

$$B = -3.3$$

$$B = 1.42$$

So width is in a positive ~~value~~

$$\text{width} = B = 1.42 \text{ m}$$

Ans

(The End)