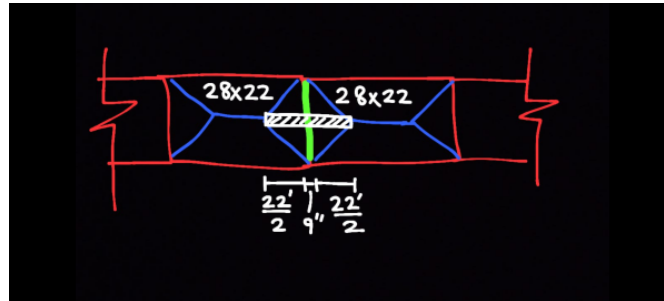


DESIGN OF CONTINUOUS FOOTING



This is a double storey building. Allowable bearing capacity is 0.65 T/sft and minimum depth of footing is 4 feet.

LOAD CALCULATION

- 9" Masonry Wall Load

$$9/12 \times (12+12) \times 120/1000 = 2.16 \text{ k/ft} \text{ ---- (1)}$$

- 9" Masonry Wall Load in F&P

$$9/12 \times (5) \times 120/1000 = 0.45 \text{ k/ft} \text{ ---- (2)}$$

- Plinth Beam Load

$$9/12 \times 12/12 \times 150/1000 = 0.113 \text{ k/ft} \text{ ---- (3)}$$

UNIFORM LOADS

First Floor Slab 63 psf

FF Finishes Load 65 psf

FF Live Load 40 psf

Ground Floor Slab 63 psf

GF DL+Finishes Load 65 psf

GF Live Load 60 psf

Total Uniform Dead Load = 256 psf

Total Uniform Live Load = 100 psf

TRIBUTARY AREA

$[(\text{Left Room Shorter Dimension}/2) + \text{Wall Thickness} + (\text{Right Room Shorter Dimension}/2)] \times 1$

$$A = (22/2 + 9/12 + 22/2) \times 1$$

$$A = 22.75 \text{ sft}$$

$$DL = \text{Total Uniform Dead Load} \times A$$

$$DL = 256 \times 22.75 / 1000 = 5.82 \text{ k/ft} \text{ ---- (4)}$$

$$LL = \text{Total Uniform Live Load} \times A$$

$$LL = 100 \times 22.75 / 1000 = 2.28 \text{ k/ft} \text{ ---- (5)}$$

$$\bullet \text{ Total Unfactored Dead Load} = 2.16 + 0.45 + 0.113 + 5.82 = 8.55 \text{ k/ft}$$

$$\bullet \text{ Total Unfactored Live Load} = 2.28 \text{ k/ft}$$

ALLOWABLE BEARING CAPACITY

$$0.65 \times 2.2045 = 1.433 \text{ k/sft}$$

DEPTH OF FOOTING

$D_f = 4$ feet

EFFECTIVE BEARING CAPACITY

Density of soil (assumed) = 125 lbs/cft

$Q_e = 1.433 \times 1000 - 125 \times 4 = 933$ psf

ULTIMATE LOADS

Combination 1 (1.2D+1.6L): $1.2 \times 8.55 + 1.6 \times 2.28 = 13.90$ k/ft

Combination 2 (1.4D): $1.4 \times 8.55 = 11.97$ k/ft

REQUIRED WIDTH

$W_{req} = (8.55 + 2.28) / (933 / 1000)$

$W_{req} \geq 11.60$ feet

WIDTH SELECTED

To find minimum width at which ultimate bearing capacity shall remain less than allowable bearing capacity, maximum ultimate load is to be divided by $Q_{allowable}$:

$W_{minimum} = \text{Max Load} / Q_{allowable}$

$$W_{\text{minimum}} = 13.90 / 1.43$$

$$W_{\text{minimum}} \geq 9.72 \text{ feet}$$

10 feet width is selected.

ULTIMATE BEARING CAPACITY

$$Q_{\text{ult}} = 13.9 / 10 = 1.39 \text{ k/sft (less than } Q_{\text{allowable}} 1.433 \text{ k/sft)}$$