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2/(1) Design a combined footing for two column 500 mm x 500 mm each. 5m apart centre to centre of column carrying a load of 1600 KN each. the width restriction is 2.4m. the safe bearing capacity is 200 kn/m². Use M25 - concrete and Fe 415 steel.

Given Size of Column = 500 mm x 500 mm each
Distance bt^n two column l = 5m
W = 1600 KN (each)
width restriction = 2.4m
q_0 = 200 KN/m²
f_{ck} = 25 N/mm²
f_y = 415 N/mm²

Find - Design combined footing

Calculate Area of footing

(i) Total Column load = 2x1600 = 3200 kN
(ii) Assuming Self weight of footing as 10% of total weight = 320 kN
(iii) Total load W = 3520 kN
Area of footing required = W/q_0 = 3520/200
= 17.6 m²
(iv) Available width of footing = 2.4m
length of footing = 17.6/2.4 = 7.33m
Hence adopting a length of 7.5 m such that the C.G of the load system coincides with the C.G of the footing as shown in fig.
(v) Upword soil pressure = Total load / Area of footing
= 1600 x 2 / 7.5 x 2.4 = 177.8 kN/m²

(vii) factored soil pressure $= 1.5 \times 177.8 = 266.67$

(viii) upward soil pressure per unit length

$= 266.67 \times 2.4 = 640 \text{ kN/m}$