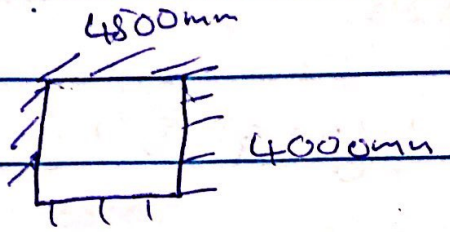
Name: [illegible]

17CEA1603035

Designing B8



Carpal / Flooring = 1.2m

25 - 415N mm Concrete grade

Slab Thickness = 250mm

Finishes - 1.2 kn/m²

Partition - 1.0 kn/m²

Slab = 0.25 × 25 = 6 kn/m

Total - 8.2 kn/m²

Designing For = 5.0

Area = 4.5 × 4 = 18m²

D.L for area = Light (1.6 Qk)

= (1.4 × 8.2 × 18) + (1.6 × 5 × 18)

206.64 + 135

341.64

Short span ⇒ middle strip —

Span = $l_x - \frac{2}{3}h = 4 - \frac{2}{3} \times 1.2 = 3200$ mm

Moment = $\frac{4.5\%}{100} \times 0.071 \times Rl = \frac{4.5}{100} \times 0.071 \times 341.6 \times 4$

= 43.684 kn/m

width = $b = \frac{l_x}{2} = \frac{4}{2} = 2 = 2000\,mm$

$d = h - \text{Cover} - \frac{1}{2} = 250 - 25 - 6 = 219\,mm$

$k = \frac{m}{bdf_{cu}} = \frac{43.66 \times 10^6}{2000 \times 219 \times 25} = 0.018$

$P_c = 0.5 + \sqrt{0.25 - \frac{k}{0.9}} = 0.5 + \sqrt{0.25 - \frac{0.018}{0.9}} = 0.949208$

0.95

$z = 2a\,d = 0.95 \times 219 = 208.05$

$A_s = m$

$0.95 f_y z = 43.66 \times 10^6$

$0.95 \times 410 \times 208.05 = 538.8$

Provided 4 k at 200 (As = 566mm)

Support

$M = \frac{28\% \times 0.07 f_{ck}}{100} = 28 \times 0.07 \times 36.64 \times 4 = 24.25$

$W = 2000m = b$

$k = \frac{24.25 \times 10^6}{2000 \times 219 \times 25} = 0.01$

$P_a = 0.5 + \sqrt{0.25 - \frac{0.01}{0.9}} = 0.989 > 0.95 = 0.95$

$Z = Ca \cdot d \quad 0.95 \times 219 = 208.05$

As $\frac{24.25 \times 10^6}{0.95 \times 208.05 \times 460} = 299.25$

Provide 4/m @ 300 c/c ($A_s = 377 mm^2$)

Column Strip (span)

Span = 3200mm

b = 2000mm

$M = 55\% \cdot 0.07 f_{ck} = \frac{55}{100} \times 0.07 \times 36.64 \times 4 =$

$= 53.36 kNm$

$k = \frac{M}{b d^2 f_{ck}} = \frac{53.36 \times 10^6}{2000 \times 219^2 \times 25} = 0.022$

$R_a = 0.5 + \sqrt{0.25 - \frac{0.402}{0.9}} = 0.927 > 0.95 = 0.95$

Z = Paid $0.95 \times 219 = 208.05$

$A_s = \frac{53.36 \times 10^6}{0.95 \times 410 \times 208.05} = 688.4$

Provide 4 #12 @ 150 ($A_s = 754\ mm$)

(Edge Strip Support)

$$M = \frac{75}{100} \times 0.071 \times 364.64 \times 4 = 72.77$$

$$k = \frac{78.72 \times 10^6}{f_{ck} \times 219^2 \times 25} = 0.030$$

$$l_{eff} = 0.5 + \sqrt{0.25 - \frac{0.032}{0.9}} = 0.96 > 0.95 = 0.95$$

$$z = 105 - 05$$

$$A_s = \frac{72.07 \times 10^6}{208.05 \times 410 \times 0.95} = 898$$

Provide 4 12 @ ($A_s = 905$)

Long span → middle strip → (Span)

span $l_y - \frac{2}{3} h = 4.5 - \frac{2}{3} \times 1.2 = 3.70m$

Moment $= 0.45 \times 0.071 \times 364.64 \times 4.5 = 49.12$

Width $= b = l_y - \frac{l_x}{2}$ $4.5 - 2 = 2.5 = 2500$

$$k = \frac{27.2 \times 10^6}{2500 \times 219^2 \times 25}$$

$$z = 05 + \sqrt{0.25 - \frac{0.09}{0.9}} = 0.48 > 0.95 = 095$$

$z = 208.05$

$A_s = \frac{84.13 \times 10^6}{0.85 \times 208.05 \times 440} = 606.45$

Provide 4 #22 @ 175 c/c $A_s = 646 mm^2$

Support

$M = 0.28 \times 0.07(\times 341.64 \times 4.5 = 29.21$

$b = 2500$

$d = 249$

$k = \frac{2.98 \times 10^6}{2500 \times 219^2 \times 28} \quad 9.10 \times 10^{-3}$

$Pa = 0.5 \times \sqrt{0.25 - \frac{10 \times 10^3}{0.9}} = 0.989 > 0.98 = 098$

$z = Pa \quad d = 0\ 8.05$

$As = \frac{28.89 \times 10^6}{0.95 \times 208.05 \times 10} = 336.86$

Provide Y12 3004 As - C377mm²)

Colan Stn's

Span = 3700mm

$width = \frac{DC}{2} = 2000mm$

moment $= 0.55 \times 0.07(\times 341.67 \times 4.5 = 60.0$

$k = \frac{60.04 \times 10^6}{2.000 \times 219^2 \times 28} = 0.028$

$du = 0.5 * \sqrt{0.28 - \frac{0.07}{0.9}} \quad 0.9220us$

$= 0.95$

$z = 208.05$

$$A_S = \frac{60.04 \times 10^6}{1.15 \times 410 \times 208.05} = 740.41$$

Provide 12 @ 150 c/c ($A_S = 754$)

Support

Moment $= 0.75 \times 0.071 \times 34167.45 = 81.87$

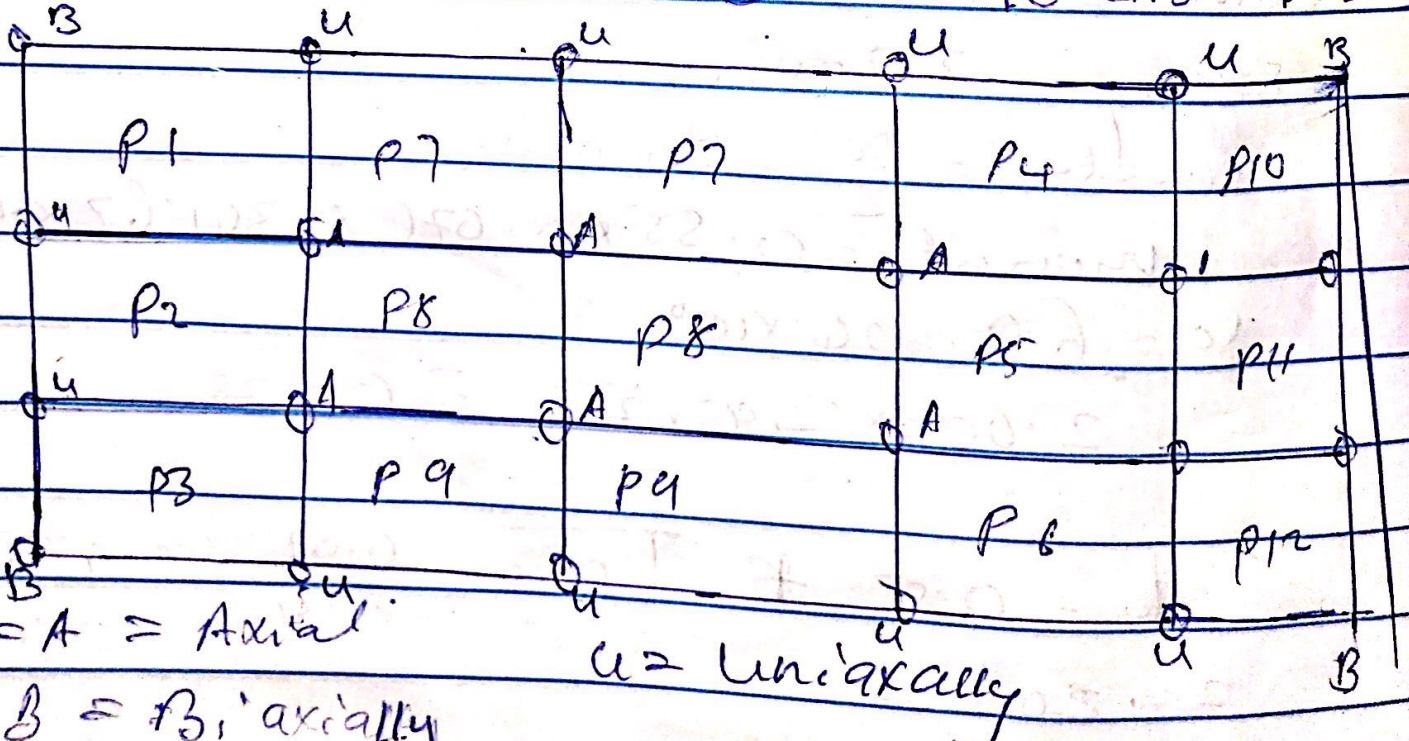
$$k = \frac{81.87 \times 10^6}{2000 \times 219^2 \times 25} = 0.034$$

$$P_a = 0.5 + \sqrt{0.25 - \frac{0.02}{0.9}} = 0.96 > 0.95$$

$$z = 208.05$$

$$A_S = \frac{81.87 \times 10^6}{0.95 \times 410 \times 208.05} = 1010.98$$

Provide 12 @ 100 c/c ($A_S = 1130$)

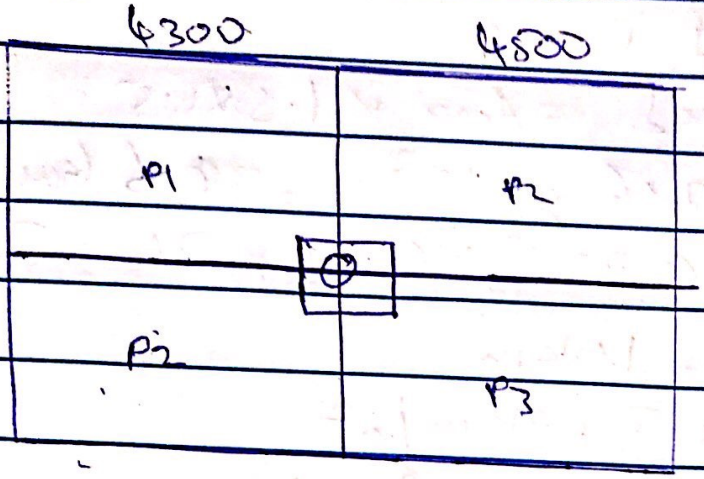


key = A = Axial

B = Bi'axially

U = Uni'axally

Designing for Column B1



A = 4 x 4.2 = 17.6 m²

Slab load

Weight of slab = 0.15 x 24 = 3.6 kN/m²

Finishes = 1.2 kN

Partition 1.0 kN/m²

5.8 kN/m²

Design load = 1.4 GK + 1.6 QK

1.4 x 5.8 + 1.6 x 2.5

= 12.12 kN/m²

Beam load

beam w = 0.225 x 0.6 x 24 = 3.24 kN/m²

wall load = 3.42 x 3 = 10.4 kN/m

= 13.65 kN

DL = 1.4 x 13.65 = 19.11 kN/m²

Design

∴ Roof - 3rd floor

Roof load = Area × 1.5 × 1.5

= 17.6 × 1.5² = 39.6 kN

Roof beam 0.225 × 0.45 × 24 = 2.43 kN/m

Finishes = 1.0 kN

= 3.43 kN/m²

Roof beam = 3.43 (4.6) n+6

Column load = 10 kN

Total load = 89.94 kN

3rd floor → 2nd floor

load ∴ above = 89.94 kN

Column load = 10 kN

Slab load = 17.6 × 12.12 = 213.12 kN

Beam load = 19.11 × (8.4) = 160.52 kN

Total = 463.76 kN

2nd floor to 1st floor

load from above = 463.78 kN

Column load = 10 kN

Slab = 213.312 kN

Wall load = 160.52 kN

Total ⇒ 856.6 kN

Last Floor to ground Floor

Load from above = 865.6 kN

Column Load = 10 kN

Slab = 213 - 312 kN

wall beam = 160.52

= 1244.68 ≈ 1300 kN

As = $\frac{M = 0.35 f_{ck} b_b}{0.7 f_y - 0.35 f_{ck}}$

M = 1300 kN

f_{ck} = 25

f_y = 410

b_b = 25

As = $\frac{1300 \times 10^6 - 0.35 \times 225 \times 225^2}{0.7 \times 410 - 0.35 \times 25}$

= 3080.07 mm²)

Provide 8y25 (As = 3930 mm)

A.Smin = $0.4\% b_b = 0.004 \times 225^2$ = ~~705~~

= 202.5 m