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17/20GR03/049
CVE 308

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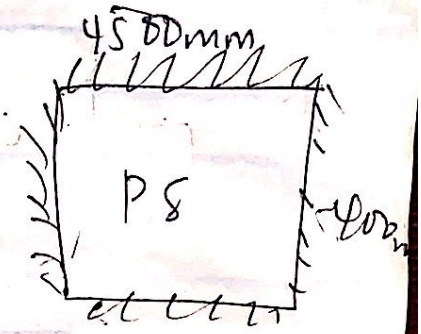
Design for PB



Capital dropping = 1.2m
25-40 N/mm Concrete grade

finishes = 1.2 kN/m²
partitions = 1.0 kN/m²
Slab = 0.25 x 25 = 6 kN/m²
Total = 8.2 kN/m²

Designing for facing = 5.0

Area = 4.5 x 4 = 18m².

D.L for ac = 1.4Gk + 1.6Qk
= (1.4 x 8.2 x 18) + (1.6 x 5 x 18)
= 206.64 + 135
= 341.64

shortspan → middle strip → span
Span = lx - 2/3 h = 4 - 2/3 x 1.2 = 3200mm

moment = 45/100 x 0.071 pL² = 45/100 x 0.071 x 341.64 x 4²
= 45.60 kNm/m

provide y12 @ 200 c/c (A_s = 566 mm)

Support

M_2 = 25% of 0.071FL = $\frac{25}{100} \times 0.071 \times 391.64 \times 9 = 26.85$

W = 2000m = b

$K = \frac{24.25 \times 10^6}{2000 \times 219^2 \times 25} = 0.01$

Span = 5200mm

b = 2000mm

$m = 55\% \times 0.071 f_l = \frac{55}{100} \times 0.071 \times 341.64 \times 4 = 53.36 KNm^2$

$K = \frac{m}{bd^2 f_{cu}} = \frac{53.36 \times 10^6}{2000 \times 219^2 \times 25} = 0.022$

$I_a = 0.5 + \sqrt{0.25 - \frac{0.022}{0.9}} = 0.97 > 0.95 = 0.95$

$z = I_a d = 0.95 \times 219 = 208.05$

$A_s = \frac{53.36 \times 10^6}{0.95 \times 410 \times 208.05} = 658 mm^2$

provide y12 @ 130 c/c (A_s = 754mm)

Column Strip (Support)

$m = \frac{75}{100} \times 0.071 \times 341.64 \times 4 = 72.77$

$K = \frac{72.77 \times 10^6}{2000 \times 219^2 \times 25} = 0.030$

$I_a = 0.5 + \sqrt{0.25 - \frac{0.030}{0.9}} = 0.96 > 0.95 = 0.95$

$z = I_a d = 208.05$

$AS = \frac{72.77 \times 10^6}{0.95 \times 410 \times 208.05} = 898$

provide y12 @ 125 c/c (A_s = 905mm)

$2500 \times 219^2 \times 25$

$\bar{x}_a = 0.5 + \sqrt{0.25 - \frac{0.01}{0.9}} = 0.987 > 0.95 = 0.95$

$Z = 208.05$

$A_s = \frac{79.12 \times 10^6}{0.95 \times 208.05 \times 410} = 606.45$

provide 9 12 @ 175 c/c (A_s . 646 mm^2)

Support

$M = 0.25 \times 0.021 \times 34.64 \times 2.5 = 28.29$

$b = 2500$

$d = 219$

$K = \frac{28.29 \times 10^6}{2500 \times 219^2 \times 25} = 9.19 \times 10^{-3}$

$\bar{x}_a = 0.5 + \sqrt{0.25 - \frac{9.19 \times 10^{-3}}{0.9}} = 0.989 > 0.95 = 0.95$

$Z = \bar{x}_a d = 208.05$

$A_s = \frac{28.29 \times 10^6}{0.95 \times 208.05 \times 410} = 336.26$

provide y12 @ 300 c/c (A_s = 377 mm^2)

Column strip

Span = 3700mm

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

~~Moment = 0.55 × 0.077 × 34.64 × 4.5 = 60.01~~

$K = \frac{60.04 \times 10^6}{2000 \times 219^2 \times 25} = 0.025$

$Z_1 = 0.5 + \sqrt{0.25 - \frac{0.025}{0.9}} = 0.97 > 0.95 = 0.95$

$Z = Z_{ad} = 208.05$

$A_S = \frac{60.04 \times 10^6}{0.95 \times 410 \times 208.05} = 740.91$

provide y12 @ 150 c/c ($A_S = 754mm^2$)

Support

Moment $= 0.75 \times 0.71 \times 391.67 \times 4.5 = 81.87$

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

$Z_1 = 0.5 + \sqrt{0.25 - \frac{0.034}{0.9}} = 0.96 > 0.95 = 0.95$

$Z = Z_{ad} = 208.05$

$A_S = \frac{81.87 \times 10^6}{0.95 \times 410 \times 208.05} = 1010.298$

provide y12 @ 100 c/c ($A_S = 1130mm^2$)

B U U U U B

$A = 4 \times 4.4 = 17.6 m^2$

Slab load

Weight of slab $= 0.15 \times 24 = 3.6 kN/m^2$

Finishes $= 1.2 kN/m^2$

partition $= 1.0 kN/m^2$

$5.8 kN/m^2$

Design Load $= 1.4 G_k + 1.6 Q_k$

$= 1.4 \times 5.8 + 1.6 \times 2.5$

$= 12.12 kN/m^2$

Beam Load

Column load

Slab load = 17.6 x 12.12 = 213.312KN

Beam load = 19.11 x (8.4) = 160.52KN

Total => 463.776KN

2nd floor to 1st floor

Load from above = 463.78KN

column load = 100KN

Slab load = 213.312 KN

Wall and Beam = 160.52KN

Total => 856.61KN

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

$$= 3080.07 mm^2$$

Provide 8y 25 ($A_s = 3930 mm^2$)

$A_{s\,min} = 0.4\% bh = 0.004 \times 225^2 = 202.5 mm^2$.