Department of Civil Engineering
Katihar Engineering College, Katihar

Subject : Design of Concrete Structure-I
Topic : Design of Slab
Lecture : 03
Course Instructor : Prof. Rashid Mustafa

(5) Slab.

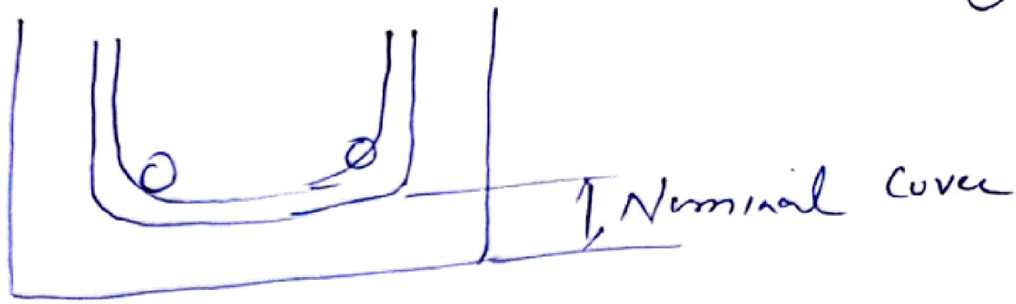
(a) Minimum reinforcement
= 0.12 % of BD
when HYSD / TMT bars.

= 0.15 % of BD
when Mild steel reinforcement
are used.

(6) Maximum Diameter of bar
= $\frac{1}{8}$ of total thickness.

of 100 mm thick slab.
Max^m diameter = $\frac{100}{8}$ = 12.5 mm
12 mm may be used.

(7) Nominal Cover:
Minimum design depth of Concrete
Cover to all type of steel reinforcement including
Links.

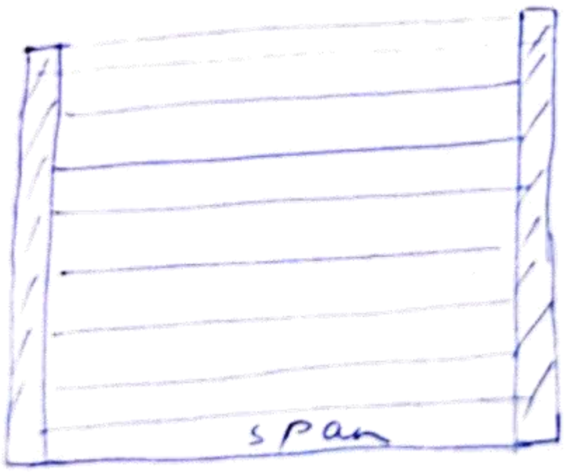


Exposure Condition	Minm Nominal Cover (mm)	Minm grade of Concrete	
1. MILD	20 mm	M20	→ Prevented from weather / Rain
2. MODERATE	30 mm	M25	→ Sheltered from (i) Severe rain (ii) Exposed to rain (iii) Concrete continuously kept at water.
3. SEVERE	45 mm	M30	→ (i) Alternate wetting & Drying (ii) Completely immersed in sea water
4. VERY SEVERE	50 mm	M35	→ Exposed to (i) Sea water (ii) Severe freezing
5. EXTREME	75 mm	M40	→ (i) Member subjected to Chemicals (ii) Member in tidal zone

⇒ Minimum Clear Cover (Nominal Cover) for different members

	MILD	SEVERE	VERY SEVERE
(1) Slab	20 mm	45 mm	50 mm
(2) Beam	25 mm	45 mm	50 mm
(3) Column	40 mm	45 mm	50 mm
(4) Foundation or footing	50 mm	50 mm	50 mm

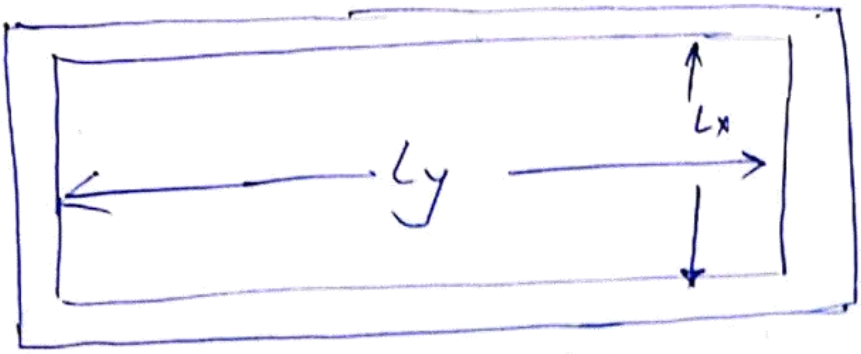
⇒ Design of One way slab



If a slab is supported over two opposite supports. It is always a one way slab

(2) If $\frac{L_y}{L_x} = \frac{\text{longer span}}{\text{shorter span}} > 2$,

One way slab



→ If $\frac{L_y}{L_x} > 2$ (One way slab)

→ If $\frac{L_y}{L_x} \leq 2$ (two way slab.

Design steps for One way slab:

Step 1 Load Calculation.

(1) Live load (LL) = $W_L \times 1 \times 1 = W_1$

(2) Floor finishing
$= t_f \times 1 \times 1 \times 24 = W_2$

(3) Self weight of slab
$= t_s \times 1 \times 1 \times 25 = W_3$.

Total load (W) = $W_1 + W_2 + W_3$.
factored load = $1.5W$

Step 2 Effective span

For Simply supported

$L_{eff} = \left.\begin{matrix} L_c + d \\ L_c + w \end{matrix}\right\}$ whichever is less.

Step 3. Max^m Bending Moment

Step 4. Depth required (d)

$$d = \sqrt{\frac{BM_u}{Q \cdot B}}$$

Where $B = 1000$ mm

Step 5. Area of steel (A_{st})

LSM, $A_{st} = \dfrac{BM_u}{0.87 f_y \cdot J \cdot d}$

WSM. $A_{st} = \dfrac{BM}{\sigma_{st} \cdot J \cdot d}$

Where. $J = (1 - 0.42K)$

K = Neutral axis factor.

K = 0.53 → Fe 250

= 0.48 → Fe 415

= 0.46 → Fe 500

Step 6. Distribution of bars

= (0.12% of BD or 0.15% of BD)

Step 7 Check for shear

τ_v = Nominal shear stress $= \dfrac{V_u}{Bd}$ $(< \tau_{c\,max})$

If $\tau_v > \tau_{c\,max}$

Increase the depth of slab

Step 8. Check for Bond

$$\tau_{bd} = \frac{V}{\Sigma o \cdot J \cdot d}$$

Step 9. check (+ve) moment tension Reinforcement

$$L_d \leq 1.3\frac{M_1}{V} + L_o$$

HAPPY LEARNING