

- ## 2. Material

- ### 3. Design Load

- #### 4. Section Size

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- Diagram illustrating the cross-section of a rectangular slab with dimensions L_x and L_y . The slab is divided into four regions: B1 (top), B2 (bottom), B3 (left), and B4 (right). The dimensions are given as B1: 200 x 300 / B2: 200 x 300 / B3: 300 x 300 / B4: 200 x 300. A coordinate system (x, y) is shown at the top left corner.

5. Slab Type & Support

- (1) Slab Type : 2-Way Slab
- (2) Support Type : Case-2
- (3) Boundary Beams : B1 : 300 x 300 / B2 : 200 x 300 / B3 : 300 x 300 / B4 : 200 x 300

6. Calculation Summary

- ### (1) Check Thickness of Slab

Category	Value	Criteria	Ratio	Note
Minimum Thickness Required (mm)	125	90.00	0.720	

- (2) Calculate Moment & Shear (X Direction)

Category	Value	Criteria	Ratio	Note
Moment Capacity (Top) (kN·m)	0.877	5.296	0.166	
Moment Capacity (Middle) (kN·m)	0.459	5.296	0.0866	
Moment Capacity (Bottom) (kN·m)	0.877	5.296	0.166	
Rebar Ratio (Top)	0.00252	0.00180	0.713	
Rebar Ratio (Middle)	0.00252	0.00180	0.713	
Rebar Ratio (Bottom)	0.00252	0.00180	0.713	
Shear Capacity (Top) (kN)	2.787	60.88	0.0458	
Shear Capacity (Middle) (kN)	0.000	60.88	0.000	
Shear Capacity (Bottom) (kN)	2.787	60.88	0.0458	

- (3) Calculate Moment & Shear (Y Direction)

Category	Value	Criteria	Ratio	Note
Moment Capacity (Left) (kN·m)	0.742	4.729	0.157	
Moment Capacity (Center) (kN·m)	0.374	4.729	0.0792	
Moment Capacity (Right) (kN·m)	0.742	4.729	0.157	
Rebar Ratio (Left)	0.00252	0.00180	0.713	
Rebar Ratio (Center)	0.00252	0.00180	0.713	
Rebar Ratio (Right)	0.00252	0.00180	0.713	
Shear Capacity (Left) (kN)	2.128	54.45	0.0391	
Shear Capacity (Center) (kN)	0.000	54.45	0.000	
Shear Capacity (Right) (kN)	2.128	54.45	0.0391	

7. Determine the design type of slab

(1) Calculate span ratio [Use clear span]

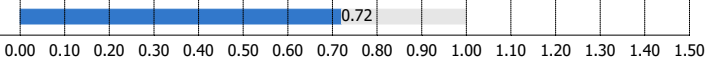
- $L_x = 1.720\text{m}$
- $L_y = 1.890\text{m}$
- Span Ratio (L_x / L_y) = $0.910 \geq 0.5 \rightarrow$ 2-Way Slab

8. Check Load

(1) Calculate factored load

- LCB01 = 2.746KPa (1.4D)
- LCB02 = 5.492KPa (1.2D+1.6L)
- $\omega_u = 5.492\text{KPa}$

9. Check Thickness of Slab*Calculation Summary (Check Thickness of Slab)*

Category	Value	Criteria	Ratio	Note
Minimum Thickness Required (mm)	125	90.00	0.720	
Minimum Thickness Required				

(1) Calculate factors

- $\beta = I_{ny} / I_{nx} = 1.099$
- $\alpha_m = 2.483$ ($\alpha_1 = 2.986$, $\alpha_2 = 2.185$, $\alpha_3 = 2.749$, $\alpha_4 = 2.012$)

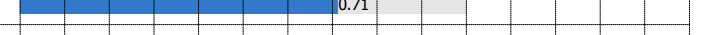
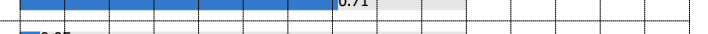
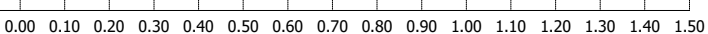
(2) Calculate minimum thickness required

- $h_{req} = \frac{I_n (0.8 + (f_y / 1400))}{36 + 9\beta} = 90.00\text{mm}$
- **$h = 125\text{mm} > h_{req} = 90.00\text{mm} \rightarrow \text{O.K}$**

10. Check Capacity of Slab

(1) Calculate Moment & Shear [Direction X]

Calculation Summary (Calculate Moment & Shear (X Direction))

Category	Value	Criteria	Ratio	Note
Moment Capacity (Top) (kN·m)	0.877	5.296	0.166	
Moment Capacity (Middle) (kN·m)	0.459	5.296	0.0866	
Moment Capacity (Bottom) (kN·m)	0.877	5.296	0.166	
Rebar Ratio (Top)	0.00252	0.00180	0.713	
Rebar Ratio (Middle)	0.00252	0.00180	0.713	
Rebar Ratio (Bottom)	0.00252	0.00180	0.713	
Shear Capacity (Top) (kN)	2.787	60.88	0.0458	
Shear Capacity (Middle) (kN)	0.000	60.88	0.000	
Shear Capacity (Bottom) (kN)	2.787	60.88	0.0458	
Moment Capacity (Top)				
Moment Capacity (Middle)				
Moment Capacity (Bottom)				
Rebar Ratio (Top)				
Rebar Ratio (Middle)				
Rebar Ratio (Bottom)				
Shear Capacity (Top)				
Shear Capacity (Middle)				
Shear Capacity (Bottom)				

Check Items	TOP	MIDDLE	BOTTOM
Bar-1	#3@450	#3@450	#3@450

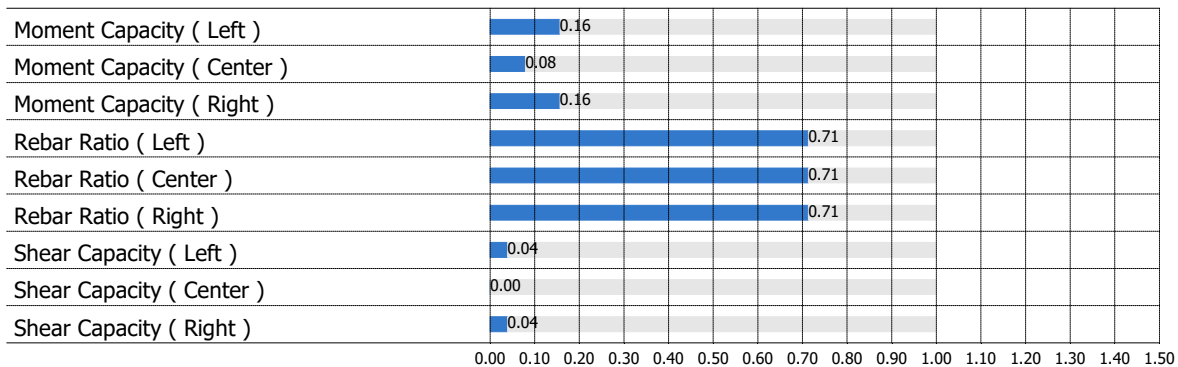
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Bar-2	#3@450	#3@450	#3@450
Bar-3	-	-	-
Moment Coefficient (DL)	0.000	0.0216	0.000
Moment Coefficient (LL)	0.000	0.0332	0.000
Moment Coefficient (FL)	0.0540	0.000	0.0540
Shear Coefficient	0.590	0.000	0.590
M _u (kN·m/m)	0.877	0.459	0.877
V _u (kN/m)	2.787	0.000	2.787
øM _n (kN·m/m)	5.296	5.296	5.296
øV _n (kN/m)	60.88	60.88	60.88
M _u / øM _n	0.166	0.0866	0.166
V _u / øV _n	0.0458	0.000	0.0458
ρ _{min} / ρ	0.713	0.713	0.713

(2) Calculate Moment & Shear [Direction Y]

Calculation Summary (Calculate Moment & Shear (Y Direction))

Category	Value	Criteria	Ratio	Note
Moment Capacity (Left) (kN·m)	0.742	4.729	0.157	
Moment Capacity (Center) (kN·m)	0.374	4.729	0.0792	
Moment Capacity (Right) (kN·m)	0.742	4.729	0.157	
Rebar Ratio (Left)	0.00252	0.00180	0.713	
Rebar Ratio (Center)	0.00252	0.00180	0.713	
Rebar Ratio (Right)	0.00252	0.00180	0.713	
Shear Capacity (Left) (kN)	2.128	54.45	0.0391	
Shear Capacity (Center) (kN)	0.000	54.45	0.000	
Shear Capacity (Right) (kN)	2.128	54.45	0.0391	



Check Items	LEFT	CENTER	RIGHT
Bar-1	#3@450	#3@450	#3@450
Bar-2	#3@450	#3@450	#3@450
Bar-3	-	-	-
Moment Coefficient (DL)	0.000	0.0144	0.000
Moment Coefficient (LL)	0.000	0.0226	0.000
Moment Coefficient (FL)	0.0378	0.000	0.0378
Shear Coefficient	0.410	0.000	0.410
M _u (kN·m/m)	0.742	0.374	0.742
V _u (kN/m)	2.128	0.000	2.128
øM _n (kN·m/m)	4.729	4.729	4.729
øV _n (kN/m)	54.45	54.45	54.45
M _u / øM _n	0.157	0.0792	0.157

MEMBER NAME : S07

$V_u / \phi V_n$	0.0391	0.000	0.0391
ρ_{min} / ρ	0.713	0.713	0.713