



CMCE 2415

Concrete Slabs

One Way Slabs (Singly Reinforced)

- Support on two sides only
- Bending occurs in only one direction(perpendicular to the support sides)
- Reinforcement is placed in short direction

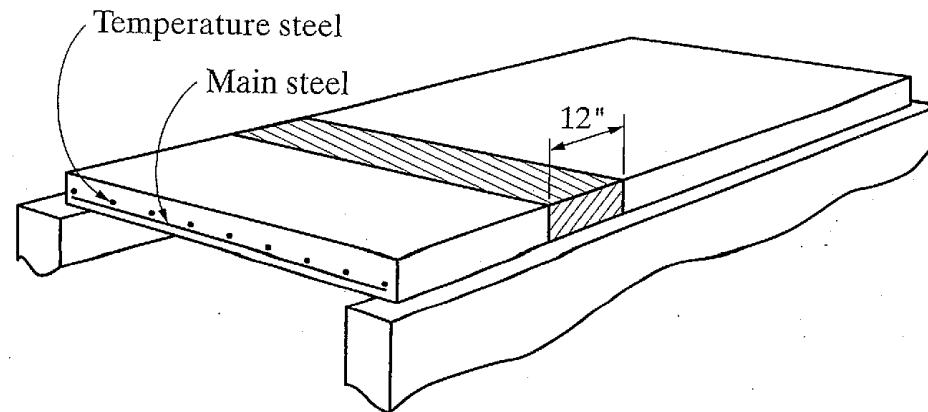


FIGURE 2-17 One-way slab.

Two Way Slabs (Doubly Reinforced)

- Support on all four sides
- Bending occurs in both directions
- If ratio of lengths is >2 , slab is assumed to act like a one way slab.

Types of Two Way Slabs

- Flat Slab Construction

- Slab is reinforced in both directions
- Beams and girders are not utilized

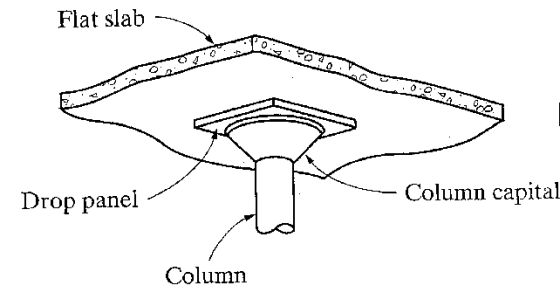
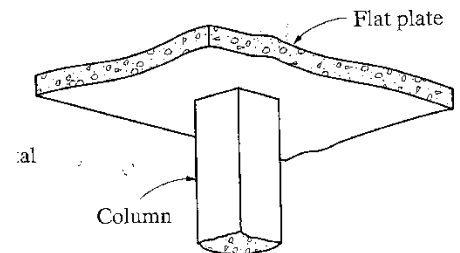


FIGURE 2-16¹ Reinforced concrete slabs.

- Flat Plate Construction

- Uniform slab and column thickness
- Used for light loads and smaller spans



Rebar Selection and Effective Depth, d

- Rebar selection
 - Use Table A-4 to determine the area per 12” width of slab.
- Shrinkage/Temperature Min Reinforcement Ratio, ρ_{\min}
 - $\rho_{\min} = 0.0020$ for Grades 40 & 50
 - $\rho_{\min} = 0.0018$ for Grade 60
- Effective depth, d
 - $D = h - \text{cover} - 1/2d_{\text{rebar}}$
 - $D = h - 1.5''$

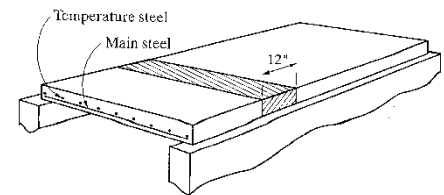


FIGURE 2-17 One-way slab.

Spacing requirements ACI 7 6.5

- Main reinforcement
 - $S_{\text{main}} < 3h$ or 18"
- Shrinkage and Temperature Steel
 - $S_{S/T} < 5h$ or 18"

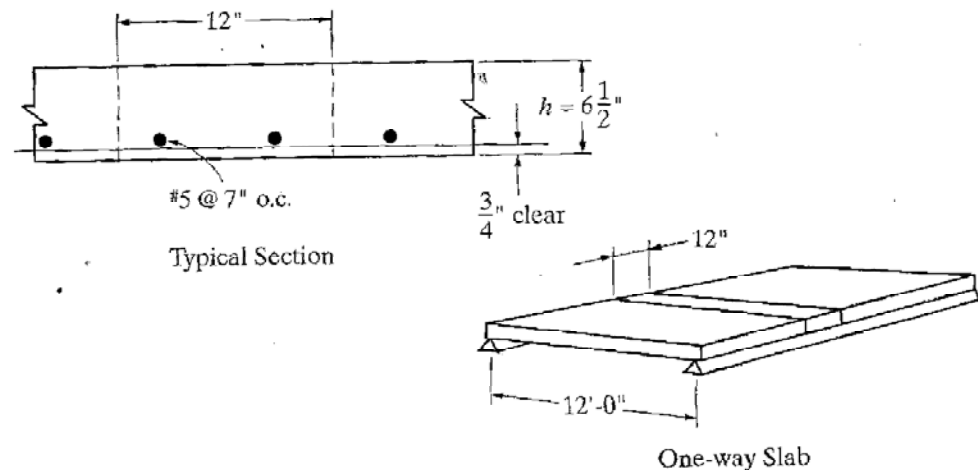


FIGURE 2-18 Sketch for Example 2-4.

Cover Requirements ACI 7.7.1

Cast –In-Place	Minimum Cover
Concrete against earth	3"
Concrete exposed to earth and weather #6 to #18 bars <#5, W31, D31	2" 1 1/2"
Interior Concrete Slabs, Walls, Joints #14 to #18 <#11	1 1/2" 3/4"
Beams and Columns Primary rebar	1 1/2"

Minimum Thickness of Beams ACI 9.5

TABLE 9.5(a)—MINIMUM THICKNESS OF NONPRESTRESSED BEAMS OR ONE-WAY SLABS UNLESS DEFLECTIONS ARE COMPUTED

Member	Minimum thickness, h			
	Simply supported	One end continuous	Both ends continuous	Cantilever
Member	Members not supporting or attached to partitions or other construction likely to be damaged by large deflections.			
Solid one-way slabs	$l/20$	$l/24$	$l/28$	$l/10$
Beams or ribbed one-way slabs	$l/16$	$l/18.5$	$l/21$	$l/8$

Notes:

- 1) Span length l is in inches.
- 2) Values given shall be used directly for members with normalweight concrete ($w_c = 145 \text{ lb/ft}^3$) and Grade 60 reinforcement. For other conditions, the values shall be modified as follows:
 - a) For structural lightweight concrete having unit weight in the range 90-120 lb/ft^3 , the values shall be multiplied by $(1.65 - 0.005w_c)$ but not less than 1.09, where w_c is the unit weight in lb/ft^3 .
 - b) For f_y other than 60,000 psi, the values shall be multiplied by $(0.4 + f_y/100,000)$.