## **Design of Simply supported Circular slab**

The basic concept of the design is that reinforcement provided in the slab is the isotropic that means the moment capacity of the slab at any direction and position is same.



Fig. 11.19 Circular slabs, simply supported and isotropically reinforced

Moment in radial direction

$$M_r = \frac{w}{16} [(3+\vartheta)(a^2 - r^2)]$$

Moment in circumferential direction

$$M_{\theta} = \frac{w}{16} [a^2(3+\vartheta) - r^2(1+3\vartheta)]$$

Where

$$a = radius$$
 of circular slab

r = where the moment is determined

$$\vartheta = \text{Poisson's ratio} = 0.2$$

Maximum moment at the center,

$$M_{r,max} = \frac{3wa^2}{16}$$

Reference: Reinforced concrete design by Pillai and Menon

## Design of Circular slab

Date: 1/31/2023

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-0.9 3.919 5.248

Stru	cture:												
Drav	wing refer to:			Checked by:								Approved by	
FIEL	Percention			Symbol Value Unit								Approved by	
	Design parameters				Value	Offic							
	Grade of Concrete				M20		~ 7.00	0					
	Characteristic Strength of C	Characteristic Strength of Concrete Grade of Steel for main bar Grade of steel for shear reinforcement		f <sub>ck</sub>	20	) N/mm <sup>2</sup>	E 6.00	0					
	Grade of Steel for main bar			fv	415	N/mm <sup>2</sup>	¥ 5.00	0					
	Grade of steel for shear rei			fvs	250	N/mm <sup>2</sup>	$nm^2 \qquad \stackrel{\text{\tiny C}}{=} 4000$						
	Types of bars				Deformed		e 4.00	0					
	Clear Cover			dc	20	mm	6 3.00	0					
	Modulus of Elasticity of Steel			Es	200000	N/mm <sup>2</sup>	E 2.00	0					
	Diameter of slab			D	3.10	m	.⊑ 1.00	0				h.4	
	Types of slab		Sin	nply supported	1	PL	-				IVIr		
	Thickness of slab			d	150	mm	0.00 g	0	15			Mo	
	Serviceability limit state						-1.00	0 -2	-1.5	Distance	(m)	-0.5	
	Thickness of slab				103.33 mm				Distance(m)				
	Provided thickness of slab				150	mm			B	lending mo	ment dia	gram	
	Design												
Α.	Load calculation												
	Dead load												
	Self weight				3.75	kN/m <sup>2</sup>							
	Floor finish, plaster etc				1	kN/m <sup>2</sup>							
	Total dead load			DL	4.75	kN/m <sup>2</sup>							
	Live load			LL	4	kN/m <sup>2</sup>							
	Total factored load			13.125	kN/m <sup>2</sup>								
B.	Moment calculation												
	Distance		r	0	-0.1	-0.2	-0.3	-0.4	-0.5	-0,6	-0.7	-0.8	
	Radial		Mr	5,912	5,888	5.814	5.691	5.519	5.297	5.026	4,707	4.337	
	Circumferencial		M.	5.912	5 904	5 880	5 839	5 781	5 707	5 617	5 510	5 387	
	Maximum moments	Positive	Negative	0.012	0.004	0.000	0.000	0.701	0.101	0.017	0.010	0.001	
	Radial	5 912	Togative	-									
	Circumferencial	5 912		-									

C.	Reinforcement design							
C.1	1 Radial							
	Location	Center	Edges	Unit				
	Moments	5.912	0.000	kNm				
	Area required	256.024	0.000	mm <sup>2</sup>				
	Diameter of bar	10	10	mm				
	Spacing	200	200	mm				
	Area provided	392.699	392.699	mm <sup>2</sup>				
C.2	Circumferencial							
	Location	Center	Edges	Unit				
	Moments	5.912	0.000	kNm				
	Area required	256.024	256.024	mm <sup>2</sup>				
	Diameter of bar	10	10	mm				
	Spacing	200	200	mm				
	Area provided	392.699	392.699	mm <sup>2</sup>				

Project: