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DIGITALLY VERIFIED RECORD

CHENNAI METROPOLITAN DEVELOPMENT AUTHORITY
'ThalamuthuNatarajan Building', No.1, Gandhi Irwin Road,
Egmore, Chennai-600 008.

PROFESSIONAL REGISTRATION CERTIFICATE

This is to certify that the **Thiru. M. N. DINESH** has enrolled as **Registered Structural Engineer Grade-I (SE)** with Chennai Metropolitan Development Authority (CMDA) who has the qualification of **M.E.,(Structural Engg.)** and experience in the relevant field for **8 years**.

He has been given the Registration No.**SE/GR-I/2019/03/067** Renewed on **29.03.2024.** He shall be required to comply with the duties and responsibilities prescribed by the Government of Tamil Nadu in Part-V, "Registration of Professionals", Tamil Nadu Combined Development and Building Rules, 2019 approved vide G.O.(Ms) No.18 MAWS (MA1) Dept. dated 04.02.2019.

This Registration is valid upto **28.03.2029**.



(A. MEGANATHAN)
Superintendent

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Structural Engineer (Grade-I), CMDA
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M.N.DINESH B.E (Civil), M.E (Structural), C.Eng (I), M.I.E (IND).
Registered Structural Engineer (CMDA):
Regn No: S.E/GR-I/19/03/067
Registered Structural Engineer (GCC):
Regn No: RSE 100422019
Registered Structural Engineer (DTCP)
Regn No: CGLRGN/SE/GR-I/2020/08/007
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Address: Old No 10 New No 16 Padmanabha Nagar, main road, Choolaimedu, Chennai - 600094.
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dineshiitm5@gmail.com

Date: 20-01-2024

STRUCTURAL STABILITY CERTIFICATE

This is to certify that the Structural design for Proposed Residential Building, Plot No: 165C & 166 (East Park), Vaigai Street, Santhosh Nagar, Porur, Chennai – 600 116, Chennai District had been made by us based on the following is designed for S+3 floors.

1. The minimum grade of concrete is M 20.
2. The minimum grade of steel is Fe 500.
3. The design analysis using the code of practice for loading standards as per IS 875 Part1, 2 & IS 456-2000.

M.N.DINESH

Structural Engineer

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DESIGN BASIS REPORT

1. DESIGN ASSUMPTION

a) STRUCTURAL SYSTEM

The structural design of the proposed residential building S+5. Plot No: 165C & 166 (East Park) Vaigai Street, Santhosh Nagar, Porur Chennai – 600 116.

2. DESIGN LOADS

a) Imposed loads

The imposed loads that are envisaged to act permanently (wherever applicable) are as following:-

Item	Intensity in KN/m^2 of plan area
Floor finish	1.5

The superimposed load or otherwise live load is assessed based on the occupancy classifications as per IS: 875 (Part-2)-1987 and are listed as below.

Name of Structure	Occupancy Classification	UDL (KN/m^2)
Residential Buildings	All rooms, Kitchens, Toilet and Bath Rooms	2.00
Residential Buildings	Corridors, Passages & Staircases	3.00
Residential Buildings	Roof with Access	1.50

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3. DESIGN METHODOLOGY

All structures have been designed according to the Limit State Method as specified inIS: 456-2000. Appropriate loads and its combinations, as per relevant clauses in IS 456:2000 code, for the most unfavorable effects are chosen for design.

4. MATERIALS

The self-weight of the various elements are computed based on the built weight of materials as given below: -

Materials	**Unit Weight in KN/m^3**
Steel	78.50
Plain Concrete	24.00
Reinforced Concrete	25.00
Soil	18.00
Water	10.00
Block(Concrete Blocks)	18.00

5. CONCRETE

All the concrete items for the construction have the following characteristics

Grade of Concrete = M20 for Column, Beams, and Slabs.
M20 for Foundations.

Aggregate = 20mm and down size, mechanically crushed Aggregate.

6. STEEL.

Steel reinforcement shall be of Grade Fe500 conforming to IS: 1786-1985

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7. EXPOSURE CONDITION

Structural elements below Plinth level and Exterior External faces of walls are designedfor Moderate exposure condition and internal faces of walls, floor beams and slabs aredesigned for mild exposure condition as per Table 16 of IS 456-2000.

8. COVER TO REINFORCEMENT

The clear cover to main reinforcement shall be as follows.

Foundations	=	Bottom: 50mm, Sides: 50mm
Slab	=	20mm
Columns	=	40mm for min thk 225, 25mm for min thk 150
Plinth Beams	=	25mm
Floor Beams	=	25mm or diameter of largest bar, whichever is greater.

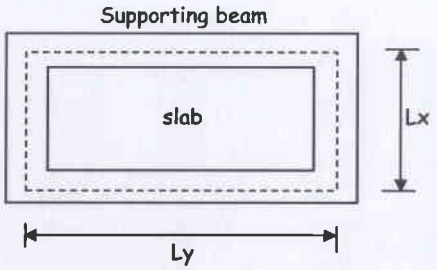
9. FOUNDATION SYSTEM

Foundation systems are based on recommendations given as per soil investigation report provided, by **Geo Engineering Consultants & Services, Chennai.**

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Design of Two way Slab	The values are Displayed in Blue color are the Input values	References

1 Design Datas



1. Eff. Shorter span between c/c support, Lx	=	4.2	m	(Eff. Span,As per IS456:2000, clause 22.2 (b))
2. Eff.Longer span between c/c support, Ly	=	6.75	m	
3. Compressive strength of Concrete, Fck	=	25	N/mm^2	
4. Yield Strength of steel, Fy	=	500	N/mm^2	
5.Diameter of Reinforcement, (Shoter span)	=	10	mm	
6.Diameter of Reinforcement, (Longer span)	=	10	mm	
7. Fire resistance in hours	=	1.5	hrs	(Nominal cover, As per IS456:2000, Table 16A, clauses 21.4 and 26.4.3 and Fig 1
8. Nominal cover to the reinforcement, C	=	20	mm	

2 Assume trial depth of slab

Span/depth, ratio l/d (Basic value)	=	26		(Span/depth ratio,As per IS:456:2000, Clause 23.2.1)
Assume modification factor, M.F	=	1.5		
depth of slab	=	(Span/B.V x M.F)		
	=	(4.2 x 1000) / (26 x 1.5)		
	=	107.69	mm	
Overall depth required, D	=	(d+cc+1/2 dia of bars)		
	=	107.69 + 20+ 10 /2		
	=	132.69	mm	
	=	150	mm	
Eff. Depth,d	=	125	mm	

3 Load Calculations

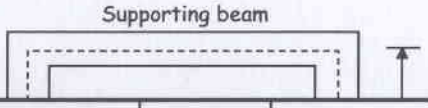
Unit weight of Concrete	=	25	KN/m^3
Dead load of Slab	=	3.75	KN/m^2
Floor finishes	=	2	KN/m^2
Partitions	=	0	KN/m^2
Extra loads due to filling, surki , etc., if any	=	0	KN/m^2
Live Load	=	2	KN/m^2
Total Load	=	7.75	KN/m^2
Design Load	=	11.625	KN/m^2

4 Calculation of Bending Moment

Edge condition of Slab	=	4 4.Two Adjacent edges discontineous		Edge conditions,As per IS456:2000, D-1.1and 24.4.1
Ly/Lx, ratio	=	6.75 / 4.2		
	=	1.6071		
	=	**The slab is Two way Slab**		

Design of Two way Slab | The values are Displayed in Blue color are the Input values | **References**

1 Design Datas



S.No	Direction & Sign	Moment Co-efficients	Moment KN.m	
1	X - Negative	0.083	17.02	(alpha x * wu *lx^2)
2	X - Positive	0.062	12.71	(alpha x * wu *lx^2)
3	Y- Negative	0.045	9.23	(alpha y * wu *lx^2)
4	Y- Positive	0.034	6.97	(alpha y * wu *lx^2)

(B.M co-eff frommAnnex D, clause D.1.1, IS:456:2000)

M,max = 17.02 KN/m

5 Effective depth required

Mu.lim = (0.36 x Fck x (xu.max/d) x (1- 0.42(xu.max/d)) x bd^2

(IS:456:2000, Annex G, clause G.1.1.c)

xu.max/d = 0.46

Mu.lim = 3.34 bd^2

d,reqd = (Mu.lim/Qb)$^{1/2}$

= (17020000 / (3.34 x 1000)) $^{1/2}$

= 71.38 mm

71.38 < 125

O.K

6 Reinforcement Calculations

S. N	Dn & Sign	Mu/bd^2	pt from SP16	pt, min	pt,provided	Ast, mm^2
1	x -ve	1.09	0.264	0.12	0.264	330
2	x +ve	0.81	0.193	0.12	0.193	241.25
3	y -ve	0.59	0.139	0.12	0.139	173.75
4	y +ve	0.45	0.105	0.12	0.12	150

pt = 100Ast/bd

Ast = (pt/100)xbd

(Minimum reinforcement of slab shall be provide as per IS456:2000, clause 26.5.2.1)

7 Spacing of reinforcement

Spacing, mm		Spacing provided, mm	Ast provided, mm^2
Actual	Maximun		
237.88	300	150	523.33
325.39	300	150	523.33
451.8	300	150	523.33
523.33	300	150	523.33

Spacing = (ast x 1000)/Ast

where,
ast= C/s area of bar
Ast=Area of reinforcement provided

max distance of tension reinforcement bars 3d or 300mm which ever is less As per IS:456:2000, Clause 26.3.3.b

8 Check for deflection

close

close

lx/d, Actual = 33.6

l/d, Max = B.V x M.F

pt, = 100Ast/bd

= 0.4187

fs = 0.58x fyx(Ast required/Ast provided)

fs = 133.69 N/mm^2

Modification Factor = 2.39 (From Fig 4, IS456:2000)

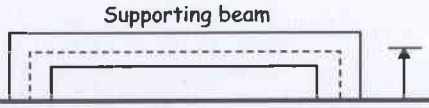
l/d, Max = 2.39 X 26

= 62.14

62.14>33.6

O.K

	Design of Two way Slab	The values are Displayed in Blue color are the Input values	References
1	**Design Datas**		



9 Torsional Reinforcement

As per IS456:2000, ANNEX D, clause D-1.8

		lx		ly	
Size of torsinal reinforcement mesh (lx/5 and ly/5)	=	840	x	1350	mm
Ast required to resist the torsion	=	3/4 times of mid-span Ast			
	=	180.94	mm^2		
dia of torsional reinforcement	=	8	mm		
Spacing required	=	277	mm		
Spacing Provided	=	200	mm		
No of layers	=	4	Nos (Each 2 top and bottom)		

NOTE:

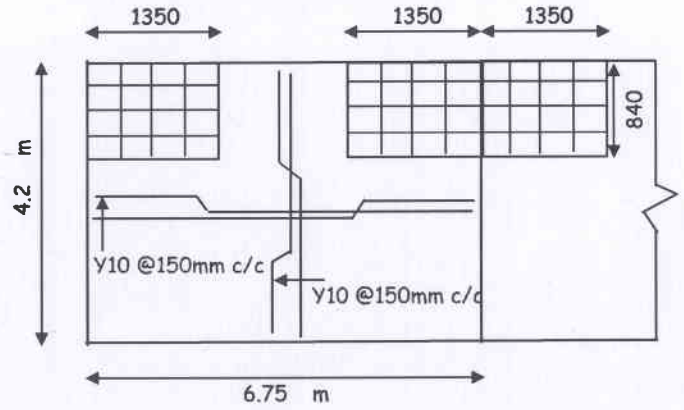
1. Torsion reinforcement shall be provided at any corner where the slab is simply supprted on both edges meeting at that corner

2. Torsion reinforcement equal to half that described above shall be provided a at corner contained by edges over only one of which the slab is continuous

3. Torsion reinforcements need not be provided at any corner contained by edges over both of which the slab is continuous

9 Reinforcement Details

Direction	Reinforcement
X	Y10 @150mm c/c
Y	Y10 @150mm c/c



Design of Rectangular Beam

The values which are Displayed in Red color are the Input values

Beam No = 1 From Staad (Envelope value)

Design Forces From STAAD

From Staad ,

1 Top moment, Mut	=	150	kNm	load case
2 Bottom moment, Mub	=	150	kNm	
3 Shear force, Vu	=	150	kN	

Design data

1. Span	=	5.1	m
2. Size of the beam	=	b x D	
		230 x 450	mm
3. Compressive strength of concrete, fck	=	25	N/mm²
4. Yield strength of concrete, fy	=	500	N/mm²
5. Clear cover, c	=	25	mm
6. Effective depth of the beam, d	=	415	mm
7. d'	=	43	
8. Max Diameter of top Main reinforcement, dbt	=	20	mm
9. Max Diameter of bottom Main reinforcement, dbb	=	20	mm
10. Factor for checking eff depth, F	=	0.133	(Based on steel gra

Check for depth

As per 456:2000

d = √Mu,max/(F*fck*b)

= _/150/0.133x25x230

d = 442.8798 mm > D, Hence not safe

As per 13920:1993

width/depth ratio	=	0.511111	Satisfied
width of the member	=	230	ok
Depth/span ratio	=	0.088235	Satisfied

Design of Top Reinforcement

Mu/b*d²	=	3.787	N/mm²	d'/d	=
R lim	=	3.345		fsc	=
Mu lim	=	132.5013			

Doubly Reinf

Pt lim	=	0.9475			
Pt	=	1.12		Pc	=
Pt (Final)	=	0.95		Ast lim	=
Required Ast1	=	1012.526	mm²	Required Asc2	=

Bar dia	16	25		Bar dia	16
Nos.	3	2		Nos.	2
Provided Ast	=	1585	mm²	Provided Asc	=
Provided Reinf OK				Provided I	

Min As required	=	162.265	mm²	0.85*b*d/fy
Max As	=	4140	mm²	
Provided Asc	=	1987.057	mm²	< Max As, Hence ok

Hence Safe

Design of Bottom Reinforcement

Mu/b*d² = 3.787 N/mm²

Doubly Reinf

Pt	=	1.12		Pc	=
Pt (Final)	=	0.95		Ast lim	=
Required Ast1	=	1012.526	mm²	Required Asc2	=

Bar dia	25	16
Nos.	4	0

Provided Ast = 1963 mm²

Provided Reinf OK

Bar dia	16
Nos.	2

Provided Asc =

Provided I

Min As required	=	162.265	mm²	0.85*b*d/fy
Max As	=	4140	mm²	
Provided Asc	=	2365.619	mm²	< Max As, Hence ok

Hence Safe

Check for Shear

Shear Stress,	τ v	=	Vu/b*d	
	τ v	=	1.57	N/mm²
	ζ	=	100*Ast req/b*d	
			1.060792	

From Table 19, IS 456:2000

	B	=	1.75	
	τ c	=	0.77	N/mm²

From Table 20, IS 456:2000

	τ c,max	=	3.1	N/mm²

Provide shear Reinforcement as per IS 456:2000

Safe in Shear,No need to revise the beam sizes

Design of Vertical Shear Reinforcement

	Vus	=	76360	N
Diameter of Shear reinforcement		=	8	
Number of legged stirrups		=	2	
Area of shear Reinforcement, Asv		=	100.531	mm²
Spacing of Stirrups, Sv		=	0.87*fy*Asv*d/Vus	
		=	238	mm

Spacing of Shear Reinforcement

1	0.75*d	=	311.25	mm	(As per Cl 26.5.1.5 of IS 456:2000
2	300	=	300	mm	

Spacing as per IS 456:2000	=	238	mm
As per 13920:1993			
2*d distance from supports	=	0.83	m
Spacing	=	104	mm

Provide 103.75 mm c/c spacing for 0.83 m from support on either side

Remaining Distance	=	3.44	m
Spacing	=	207.5	mm

Provide 207.5 mm c/c spacing for 3.44 m in mid span

Check for Side face Reinforcement

Not required

Area of reinforcement	=	0	mm²
No of bars	=	4	
Spacing of bars	=	0	mm
Dia of bar	=	12	mm
Area Provided	=	452.3893	mm²

Check for Deflection

l/d provided	=	12.29	mm
(l/d)basic	=	20	mm

As per IS 456:2000 Cl 23.2.

Modification factors

k1	fs	=	149.55	pt	=	0.95	k1	= 1
k2				pc	=	0	k2	= 1
k3							k3	= 1

l/d max	=	20	mm

Safe in deflection

Design of column with Biaxial Moment SHORT COLUMN

The values are Displayed in Blue color are the Input values

Column No = C1, STAAD - 17

1 Design Forces From STAAD

Load Case = 100

1. Axial Load on column	=	3054 KN			
2. Bending moment along x-x, Mux	=	300 KN.m	Load Case	=	111
3. Bending moment along y-y, Muy	=	100 KN.m	Load Case	=	110

2 Design Datas

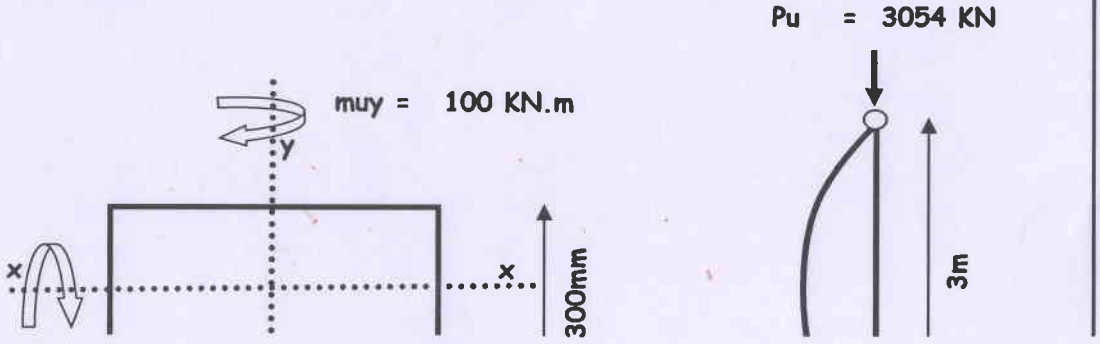
1. Compressive strength of Concrete, Fck	=	25 N/mm^2
2. Yield Strength of steel, Fy	=	500 N/mm^2
3.Diameter of Longitudinal Reinforcement,	=	25 mm
4.Diameter of lateral Reinforcement,	=	8 mm
5. Clear cover to the reinforcement, C	=	40 mm
6. Type of column	=	Rectangular
7. Size of Column	=	b x d
	=	300 x 750 mm
8. Unsupported Length of Column along x-x,L_x	=	3 m
9. Unsupported Length of Column along y-y,Ly	=	3 m
10. Effective length factor,	=	1
11. Effective Length of Column, along x-x, L_x	=	3 m
12. Effective Length of Column, along y-y, Ly	=	3 m

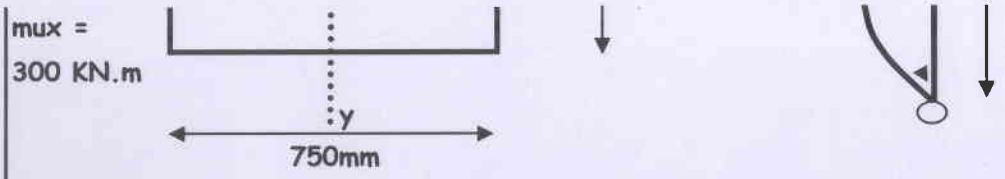
2 Check for leff/D

Effective length,lex/Lateral dimensions = L_{ex} / D
= 4
= 4< 12
= Short Column

Effective length,ley/Lateral dimensions = L_{ex} / b
= 10
= 10< 12
= Short Column

3 Section Geometry





4 **Check for Minimum Eccentricity**

As

Applied eccentricties

$ex = Mux/Pu$
$= 300/3054$
$= 98.232$ mm

$ey = Muy/Pu$
$= 100/3054$
$= 32.744$ mm

Minimum eccenticity

$e_{xx} = (lex/500)+(D/30)$
$= (3000/500) + (750/30)$
$= 31$ mm or 20 mm
$= 31$ mm

$e_{yy} = (ley/500)+(D/30)$
$= (3000/500) + (300/30)$
$= 16$ mm or 20 mm
$= 20$ mm

5 **Moment due to Eccentricity**

$m_{uex} = Pu \times e_{xx}$
$= (3054x31)/1000$
$= 94.67$ KN.m

$m_{uey} = Pu \times e_{yy}$
$= (3054x16)/1000$
$= 61.08$ KN.m

6 **Design Moment**

$mux = Mux$ or muex
$= 300$ KN.m

$muy = Mux$ or muey
$= 100$ KN.m

7 **Calculation of Longitudinal reinforcement**

Assume percentage of reinforcement = 3 %

Asc, required = 3/100x 300x750

	=	6750 mm^2	
No of bars	=	14 Nos	
Asc, Provided	=	6869 mm^2	
pt, provided	=	3.053 %	

Moment Capacity Along x Direction

(Pu/fck b D)	=	(3054000/25 x 300 x 750)	
	=	0.54	
p/fck	=	3.053/25	
	=	0.12	
d'/D	=	40/750	
	=	0.05	

From interaction chart, SP16 [chart 48]

Mux1/fck b D^2	=	0.1	
Mux1	=	0.1 x 300x750x750x25	
	=	421.88 KN.m	

Moment Capacity Along y Direction

(Pu/fck b D)	=	(3054000/25 x 300 x 750)	
	=	0.54	
p/fck	=	3.053/25	
	=	0.1221	
b'/D	=	40/300	
	=	0.13	

From interaction chart, SP16 [chart 50]

Muy1/fck b D^2	=	0.1	
Muy1	=	0.1 x 300x750x300x25	
	=	168.75 KN.m	

8 **Check for Moment Capcity**

$$(Mux/Mux1)^{an} + (Muy/Muy1)^{an} < 1$$

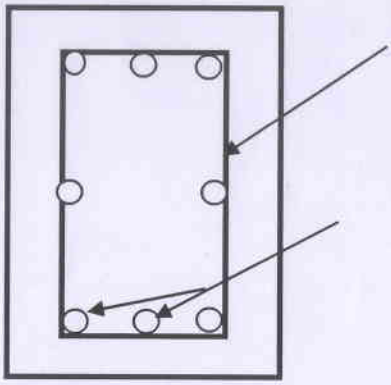
Puz	=	(0.45 fck.Ac) +(0.75 fy -0.45fck)Asc	
Ac	=	225000 mm^2	
Puz	=	5029.8488 KN	For
Pu/Puz	=	0.607	an v
an	=	1.6783	
$(Mux/Mux1)^{an} + (Muy/Muy1)^{an}$	=	0.98	
		0.98< 1	
		O.K	

9 **Calculation of Lateral Reinforcement**

Spacing of ties

1. Least Lateral Dimensions of column	=	300 mm
2. Sixteen times the least dia of Longi bar	=	400 mm
3. 300mm	=	300 mm
Adopt Spacing	=	**300** mm

10 **Details**



No of bars = **25mm** **14** Nos

Design of Rectangular Beam

The values which are Displayed in Red color are the Input values

Beam No = 1 From Staad (Envelope value)

Design Forces From STAAD

From Staad ,

1 Top moment, Mut	=	2000	kNm	load case
2 Bottom moment, Mub	=	2000	kNm	
3 Shear force, Vu	=	1620	kN	

Design data

1. Span	=	6.75	m
2. Size of the beam	=	b x	D
		600	1000
3. Compressive strength of concrete, fck	=	25	N/mm²
4. Yield strength of concrete, fy	=	500	N/mm²
5. Clear cover, c	=	25	mm
6. Effective depth of the beam, d	=	965	mm
7. d'	=	43	
8. Max Diameter of top Main reinforcement, dbt	=	20	mm
9. Max Diameter of bottom Main reinforcement, dbb	=	20	mm
10. Factor for checking eff depth, F	=	0.133	(Based on ste

Check for depth

As per 456:2000

d = √Mu,max/(F*fck*b)

= √2000/0.133x25x600

d = 1001.25235 mm > D, Hence not saf

As per 13920:1993

width/depth ratio	=	0.6	Satisfied
width of the member	=	600	ok
Depth/span ratio	=	0.14814815	Satisfied

Design of Top Reinforcement

Mu/b*d²	=	3.58	N/mm²	d'/d
R lim	=	3.345		fsc
Mu lim	=	1868.96858		

Doubly Reinf

Pt lim	=	0.9475		
Pt	=	1.04		Pc
Pt (Final)	=	0.95		Ast lim
Required Ast1	=	5812.72963	mm²	Required Asc2

Bar dia	25	32		Bar dia
Nos.	5	5		Nos.
Provided Ast	=	6476	mm²	Provided Asc

Provided Reinf OK

Min As required	=	984.3	mm²	0.85*b*d/fy
Max As	=	24000	mm²	
Provided Asc	=	#VALUE!	mm²	#VALUE!

#VALUE!

Design of Bottom Reinforcement

Mu/b*d²	=	3.58	N/mm²	

Doubly Reinf

Pt	=	1.04		Pc
Pt (Final)	=	0.95		Ast lim
Required Ast1	=	5812.72963	mm²	Required Asc2

Bar dia	25	32	Bar dia
Nos.	5	5	Nos.

Provided Ast	=	6476	mm²	Provided Asc

Provided Reinf OK

Min As required	=	984.3	mm²	0.85*b*d/fy
Max As	=	24000	mm²	
Provided Asc	=	#VALUE!	mm²	######

#VALUE!

Check for Shear

Shear Stress,	τ v	=	Vu/b*d	
	τ v	=	2.80	N/mm²
	ζ	=	100*Ast req/b*d	
			1.00392567	

From Table 19, IS 456:2000

B	=	2.60	
τ c	=	0.67	N/mm²

From Table 20, IS 456:2000

τ c,max	=	3.1	N/mm²

Provide shear Reinforcement as per IS 456:2000

Safe in Shear,No need to revise the beam sizes

Design of Vertical Shear Reinforcement

Vus	=	1233270	N	
Diameter of Shear reinforcement	=	12		
Number of legged stirrups	=	4		
Area of shear Reinforcement, Asv	=	452.389342	mm²	
Spacing of Stirrups, Sv	=	0.87*fy*Asv*d/Vus		
	=	154	mm	

Spacing of Shear Reinforcement

1	0.75*d	=	723.75	mm	(As per Cl 26.5.1.5 of IS 456:
2	300	=	300	mm	

Spacing as per IS 456:2000	=	154	mm
As per 13920:1993			
2*d distance from supports	=	1.93	m
Spacing	=	154	mm

Provide 154 mm c/c spacing for 1.93 m from support on either side

Remaining Distance	=	2.89	m
Spacing	=	154	mm

Provide 154 mm c/c spacing for 2.89 m in mid span

Check for Side face Reinforcement

Side face reinforcement required

Area of reinforcement	=	600	mm²
No of bars	=	4	
Spacing of bars	=	300	mm
Dia of bar	=	12	mm
Area Provided	=	452.389342	mm²

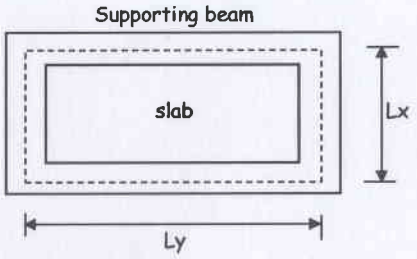
Check for Deflection

l/d provided				=	6.99	mm		
(l/d)basic				=	20	mm	As per IS 456:2000 Cl	
Modification factors								
k1	fs	=	260.31	pt	=	0.95	k1	= 1
k2				pc	=	#####	k2	= 1
k3							k3	= 1
l/d max				=	20	mm		

Safe in deflection

	Design of Two way Slab	The values are Displayed in Blue color are the Input values	References

1 Design Datas



1. Eff. Shorter span between c/c support, Lx	=	4.2 m	(Eff. Span,As per IS456:2000, clause 22.2 (b))
2. Eff.Longer span between c/c support, Ly	=	6.75 m	
3. Compressive strength of Concrete, Fck	=	25 N/mm^2	
4. Yield Strength of steel, Fy	=	500 N/mm^2	
5.Diameter of Reinforcement, (Shoter span)	=	10 mm	
6.Diameter of Reinforcement, (Longer span)	=	10 mm	
7. Fire resistance in hours	=	1.5 hrs	(Nominal cover, As per IS456:2000, Table 16A, clauses 21.4 and 26.4.3 and Fig 1
8. Nominal cover to the reinforcement, C	=	20 mm	

2 Assume trial depth of slab

Span/depth, ratio l/d (Basic value)	=	26	(Span/depth ratio,As per IS:456;2000, Clause 23.2.1)
Assume modification factor, M.F	=	1.5	
depth of slab	=	(Span/B.V x M.F)	
	=	(4.2 x 1000) / (26 x 1.5)	
	=	107.69 mm	
Overall depth required, D	=	(d+cc+1/2 dia of bars)	
	=	107.69 + 20+ 10 /2	
	=	132.69 mm	
	=	**150 mm**	
Eff. Depth,d	=	125 mm	

3 Load Calculations

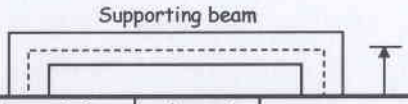
Unit weight of Concrete	=	25 KN/m^3	
Dead load of Slab	=	3.75 KN/m^2	
Floor finishes	=	2 KN/m^2	
Partitions	=	0 KN/m^2	
Extra loads due to filling, surki , etc., if any	=	0 KN/m^2	
Live Load	=	2 KN/m^2	
Total Load	=	7.75 KN/m^2	
Design Load	=	11.625 KN/m^2	

4 Calculation of Bending Moment

Edge condition of Slab	=	4 4.Two Adjacent edges discontineous	Edge conditions,As per IS456:2000, D-1.1and 24.4.1
Ly/Lx, ratio	=	6.75 / 4.2	
	=	1.6071	
	=	**The slab is Two way Slab**	

	Design of Two way Slab	The values are Displayed in Blue color are the Input values	References

1 Design Datas



S.No	Direction & Sign	Moment Co-efficients	Moment KN.m	
1	X - Negative	0.083	17.02	(alpha x * wu *lx^2)
2	X - Positive	0.062	12.71	(alpha x * wu *lx^2)
3	Y- Negative	0.045	9.23	(alpha y * wu *lx^2)
4	Y- Positive	0.034	6.97	(alpha y * wu *lx^2)

(B.M co-eff frommAnnex. D, clause D.1.1, IS:456:2000)

M,max = 17.02 KN/m

5 Effective depth required

Mu.lim = (0.36 x Fck x (xu.max/d) x (1- 0.42(xu.max/d)) x bd^2

xu.max/d = 0.46

Mu.lim = 3.34 bd^2

d,reqd = (Mu.lim/Qb)$^{1/2}$

= (17020000 / (3.34 x 1000)) $^{1/2}$

= 71.38 mm

71.38 < 125

O.K

(IS:456:2000, Annex G, clause G.1.1.c)

6 Reinforcement Calculations

S. N	Dn & Sign	Mu/bd^2	pt from SP16	pt, min	pt,provided	Ast, mm^2
1	x -ve	1.09	0.264	0.12	0.264	330
2	x +ve	0.81	0.193	0.12	0.193	241.25
3	y -ve	0.59	0.139	0.12	0.139	173.75
4	y +ve	0.45	0.105	0.12	0.12	150

pt = 100Ast/bd

Ast = (pt/100)xbd

(Minimum reinforcement of slab shall be provide as per IS456:2000, clause 26.5.2.1)

7 Spacing of reinforcement

Spacing, mm		Spacing provided, mm	Ast provided, mm^2
Actual	Maximun		
237.88	300	150	523.33
325.39	300	150	523.33
451.8	300	150	523.33
523.33	300	150	523.33

Spacing = (ast x 1000)/Ast

where,
ast= C/s area of bar
Ast=Area of reinforcement provided

max distance of tension reinforcement bars 3d or 300mm which ever is less As per IS:456:2000, Clause 26.3.3.b

8 Check for deflection

close

close

lx/d, Actual = 33.6

l/d, Max = B.V x M.F

pt, = 100Ast/bd

= 0.4187

fs = 0.58x fyx(Ast required/Ast provided)

fs = 133.69 N/mm^2

Modification Factor = 2.39

l/d, Max = 2.39 X 26

= 62.14

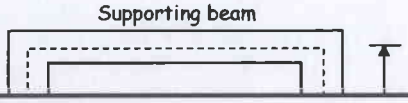
62.14>33.6

O.K

From Fig 4, IS456:2000

	Design of Two way Slab	The values are Displayed in Blue color are the Input values	References
1	**Design Datas**		

Supporting beam



9	**Torsional Reinforcement**						As per IS456:2000, ANNEX D, clause D-1.8
				lx		ly	
	Size of torsinal reinforcement mesh (lx/5 and ly/5)	=	840	x	1350	mm	
	Ast required to resist the torsion	=	3/4 times of mid-span Ast				
		=	180.94	mm^2			
	dia of torsional reinforcement	=	8	mm			
	Spacing required	=	277	mm			
	Spacing Provided	=	200	mm			
	No of layers	=	4	Nos (Each 2 top and bottom)			

NOTE:

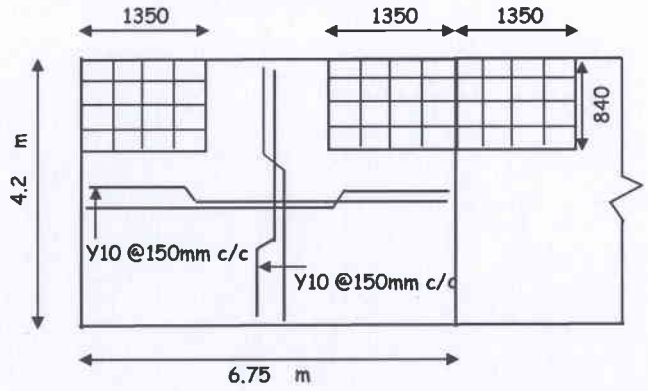
1. Torsion reinforcement shall be provided at any corner where the slab is simply supprted on both edges meeting at that corner

2. Torsion reinforcement equal to half that described above shall be provided a at corner contained by edges over only one of which the slab is continuous

3. Torsion reinforcements need not be provided at any corner contained by edges over both of which the slab is continuous

9 Reinforcement Details

Direction	Reinforcement
X	Y10 @150mm c/c
Y	Y10 @150mm c/c



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Eight ways to know a piece of land before you pay for it.

This report covers one part of the picture. These cover the rest, drawn from the same government records, for any property in Tamil Nadu.

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Ask anything about a property and get an answer grounded in live government records, with the sources shown.
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Verify My Land
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An advocate's written opinion on the title, built on the records we pull for it.
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Every layer on one map: the parcel, its boundary, zoning, water bodies and what sits around it.
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PriceMap
What land actually changed hands for around this plot, taken from the registered deeds.
/landlens/pricemap

Build Scope
What you are allowed to build here: floor space, height, coverage and setbacks.
/landlens/build-scope

Property Tracker
Watch a property and hear about it when something new is registered against it.
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Run the transaction in one place: documents, stamping, signatures and the parties.
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- Patta and Chitta
- Field Measurement Sketch
- EC Analyzer
- Bank charge check
- Court case search
- Seller background check
- Approval check by survey

Value and duty

What it is worth and what it costs to register.

- Guideline value by street
- Guideline value by survey
- Stamp duty and registration fees
- Capital gains
- Floor space index
- Area unit converter

Zoning and land use

What the plan says can happen on this land.

- Land use zone finder
- CMDA land use check
- Coastal regulation zone
- Master plan check
- Water bodies finder
- Airport height clearance

Registers and directories

Who holds it, and which office keeps the record.

- Find your registering office
- Temple property check
- Waqf property check
- RERA register

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