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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 N. TAMIL VANAN** 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 **8years**.

He has been given the Registration No.**SE/GR-I/2024/02/005** on **18.02.2024**. 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 **17.02.2029**.



(A. MEGANATHAN)
Superintendent

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N.TAMILVANAN M.E (STRUCT.)
CLASS 1 LICENSED SURVEYOUR

181/64, GANDHI ROAD
VELACHERY

STABILITY CERTIFICATE

Date: 04/04/2023

IT IS CERTIFIED THAT **THE PROPOSED RESIDENTIAL BUILDING AT DOOR NO 7/154, KATTABOMMAN STREET, AGRAMTHEN, MADAMBAKKAM POST, CHENNAI – 600 126.** Having STILT+4 floors is building design to resist earthquake. Check has been made and found safe and I hereby certify that.

- Minimum column width is 300mm in stilt floor
- The minimum grade of concrete is M25
- The design analysis using the code of practice for Loading standards followed for design are IS – 875 part- I (DEAD LOAD), IS – 875 part- II (LIVE LOAD), seismic IS-1893 is carried out.

The structure is safe and sound when used for the purpose for which it is designed

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STRUCTURAL DESIGN REPORT

THE PROPOSED RESIDENTIAL BUILDING AT DOOR NO 7/154, KATTABOMMAN STREET, AGRAMTHEN, MADAMBAKKAM POST, CHENNAI – 600 126.

STRUCTURAL CONSULTANT:

B&W STRUCTURAL DESIGN CONSULTANTS

181/64, GANDHI ROAD, (NEAR CENTRAL BANK OF INDIA),

VELACHERY,

CHENNAI-600042.

THE PROPOSED RESIDENTIAL BUILDING AT DOOR NO 7/154, KATTABOMMAN STREET, AGRAMTHEN, MADAMBAKKAM POST, CHENNAI – 600 126.

1. INTRODUCTION

The Structure is a Residential building. It is designed as RCC building supported on Footing at 2**m** depth from Existing Ground Level.

2. STRUCTURAL SYSTEM

The structural system adopted is as below.

- The entire structure is designed as R.C. Framed Beam-Slab Structure with Beams Framing in to Columns.
- The Foundation System considered for the Structure is an footing at 2**m** depth from Existing Ground Level and SBC of soil 196kN/m^2.

3. MATERIAL SPECIFICATIONS

3.1. CONCRETE AND REINFORCEMENT

1. Concrete Grades: **M25**

(Minimum cement content-340kg/m3, water cement ratio – 0.45).

2. TMT High:max **Fe 500**Grade for all R.C. members

Yield Strength Bars (For efficient usage of Rebar (for all rebar) Consumption in Concrete).

4. ENVIRONMENTAL CONDITIONS, CORROSION AND FIRE PROTECTION FOR CONCRETE.

Environment – Severe

Exposure conditions – Concrete exposed to rain

Fire protection – Thickness of the structural elements proportioned to suit

(2hrsFire rating considered in the Design)

Nominal concrete cover to reinforcement – Exposure – severe –45 mm Nominal covers for 2 hr. fire resistance

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Nominal Cover to reinforcement

(As per IS 456:2000 , TABLE 16A) For 2 hr. fire resistance

Beams	-	25 mm
Slabs	-	20 mm
Columns	-	40mm
Foundation	-	50mm
pile and pile cap	-	75mm
RC wall	-	50 mm
waist slab	-	25 mm

5. STRUCTURAL ANALYSIS & DESIGN

- The entire Structure is analyzed using Software STAAD PRO-V8i Structural Analysis Package.
- In the 3D Model, Loads are applied and Analyzed for various Load Combinations. The results of all Load Combinations are reviewed and Members are designed for Maximum Forces arrived.
- The 3D Model Comprises Column-Beam Frame with Slabs contributing loads to the Frame and the effect of Slab stiffness has been ignored in the analysis.

Ultimate load combination

* * * WITH LOAD FACTOR * * *

1. LOAD COMB 1 1.5*DL + 1.5*L.L
2. LOAD COMB 2 1.0*DL + 1.0*L.L

A. Dead loads:

Dead Load shall include weight of all Structural and Architectural components.

Self-weight of the materials shall be calculated on the basis of unit weights given in IS: 875 PART I-1987.

1. Unit weight of concrete - 25 kN /m^3
2. Unit weight of steel - 78.5 kN /m^3
3. Floor finish considered - 1.5kN /m^2
5. Unit weight of Solid block -20kN/m

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B. Live loads:

Following Live Loads are considered while designing the Structural Elements

Apart from the Dead Loads as per codes.

1. Living, Kitchen and bed room floor slab	:	3KN / Sq. m
2. Toilet	:	2 KN / Sq. m
3. Corridor, staircase and passage	:	3 KN/ Sq.m

C. Additional Floor Provision & Equipment Load

In the Design intent, Loads arising due to Provision for additional Floors to be built in Future has not been considered. If any equipment has been proposed to be mounted on terrace, then the load details based on vendor inputs will be considered.

7. LOADING INTENSITIES ON SLABS:

1. REDENTIAL BUILDING FLOOR SLAB:

Self-wt. of the slab = 0.15m x 25 KN/m3	= 3.75 KN/m^2
Floor finishes	= 1 KN/m^2
False ceiling	= 0.5 KN/m^2
Total load	= 5.25 KN/m^2

2. RESIDENTIAL BUILDING TOILET FLOOR SLAB:

Self-wt. of the slab = 0.15m x 25 KN/m3	= 3.75 KN/m^2
Soil filling = 0.23*18	= 4.14 KN/m^2
Total load	= 7.89 KN/m^2

3. Member load:

Grade beam	= (4.8m -0.38m) x 0.23m x 20 KN/ m^3	= 20 KN/m
Ground floor beam	= (3.5m -0.38m) x 0.23m x 20 KN/ m^3	
Parapet wall	= 0.9m x 0.23m x 20 KN/ m^3	

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FOOTING DESIGN CALCULATIONS

Design Code : IS Code

Footing No	:	F1	
Column No	:	C1	(230mm X 450mm)
Analysis No	:	42	
Concrete Grade	:	M25	
Steel Grade	:	Fe500	
Clear Cover	:	40 mm	
Df	:	2.1M	
Dw	:	4 M	
Density of Soil	=	18	KN/cuM
Soil Bearing Capacity	=	180	KN/sqM
Permissible SBC Increse for EQ	=	25	%
Permissible SBC Increse for Wind	=	25	%
Live Load Reduction	=	50	%
Permissible area of loss of contact	=	0	%

Cross Section designed by : Maximum pressure

Consider overburden pressure

Surcharge Load = 2 KN/sqM

Footing Type : Pad

Footing Size (LxBxD) : 4925 X1795mm X 450mm

Soil Wt. + Footing Wt. + Surcharge Load	=	170.72+4.80	KN
	=	175.52	KN

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Check For Maximum Soil Pressure:

Critical Analysis Load Combination	=	3
Critical Load Combination	=	[1] : (LOAD 1: DEAD LOAD) +(LOAD 2: LIVE LOAD)

Pcomb	=	4068.30	KN
P	=	Pcomb + Soil Wt. + Footing Wt. + Surcharge Load	
P	=	550	KN
Mx	=	0	KNM
My	=	0	KNM
P/A	=	199.09	KN/sqM
Mx/Zx	=	0	KN/sqM
My/Zy	=	0	KN/sqM
Maximum Soil Pressure	=	199.09	KN/sqM
Allowable Soil Pressure	=	1x200	KN/sqM
	=	200	KN/sqM

Check For Minimum Soil Pressure:

Critical Analysis Load Combination	=	3	
Critical Load Combination	=	[1] : (LOAD 1: DEAD LOAD) +(LOAD 2: LIVE LOAD)	
Pcomb	=	468.3	KN
P	=	Pcomb + Soil Wt. + Footing Wt. + Surcharge Load	
P	=	550	KN
Mx	=	0	KNM
My	=	0	KNM
P/A	=	199.09	KN/sqM
Mx/Zx	=	0	KN/sqM
My/Zy	=	0	KN/sqM
Minimum Soil Pressure	=	199.09	KN/sqM
	>	0	
Offset Along L (Loff)	=	610	mm
Offset Along B (Boff)	=	600	mm

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Check For Bouyancy:

Critical Analysis Load Combination	=	3
Critical Load Combination	=	[1] : (LOAD 1: DEAD LOAD) +(LOAD 2: LIVE LOAD)

Factor of safety	=	1.4	
Depth of Founding Layer	=	2.1	M
Ground Water Level	=	4	M
Water Pressure	=	22	KN/sqM
Upward force	=	Water Pressure X L X B	
	=	53	KN
Downward force	=	321.81	KN
Factor of safety available	=	Downward Force / Upward Force	
	=	6.09	
		>	1.4

Check For Sliding:

Critical Analysis Load Combination	=	3	
Critical Load Combination	=	[1] : (LOAD 1: DEAD LOAD) +(LOAD 2: LIVE LOAD)	
Coefficient Of Friction	=	0.4	
Factor of safety	=	1.2	
Shear Vx	=	0.24	KN
shear Vy	=	1.30	KN
Resultant sliding force	=	1.32	KN
Downward force	=	321.81	KN
Upward water pressure	=	52.80	KN
Net downward force	=	269.01	KN
Force resisting sliding	=	Friction Coeff X Net Downward Force	
	=	107.60	KN
Factor of safety available	=	Resisting Force / Sliding Force	
	=	81.68	
	>	1.2	

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Design For Bending:

Bottom Steel Along L:

Critical Analysis Load Combination	=	4
Critical Load	=	[4] : 1.5 (LOAD 1: DEAD LOAD) +1.5

Combination		(LOAD 2: LIVE LOAD)	
Pu	=	550	KN
Mux	=	0	KNM
Muy	=	0	KNM
P/A	=	188.94	KN/sqM
Mx/Zx	=	0	KN/sqM
My/Zy	=	0	KN/sqM
Deff	=	277	mm
Beff	=	1500	mm
SPu	=	188.94	KN/sqM
Mu	=	SPu X B X Loff X Loff / 2	
	=	52.73	KNM
Pt	=	0.141	%
Ast Rqd (BM)	=	585	Sqmm
Ast Prv	=	T10 @ 150	
	=	628	Sqmm

Distributed Across Total Width

Bottom Steel Along B:

Critical Analysis Load Combination	=	4	
Critical Load Combination	=	[4] : 1.5 (LOAD 1: DEAD LOAD) +1.5 (LOAD 2: LIVE LOAD)	
Pu	=	550	KN
Mux	=	0	KNM
Muy	=	0	KNM
P/A	=	188.94	KN/sqM
Mx/Zx	=	0	KN/sqM
My/Zy	=	0	KN/sqM
Deff	=	261	mm
Leff	=	1600	mm
SPu	=	188.94	KN/sqM
Mu	=	SPu X L X Boff X Boff / 2	
	=	54.41	KNM
Pt	=	0.149	%
Ast Rqd (BM)	=	624	Sqmm
Ast Prv	=	T10 @ 150	
	=	628	Sqmm

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Distributed Across Total Length

Design For Shear:

One Way Shear Along L:

Critical Section @ d from Column Face

	=	277	mm
Critical Analysis Load Combination	=	4	
Critical Load Combination	=	[4] : 1.5 (LOAD 1: DEAD LOAD) +1.5 (LOAD 2: LIVE LOAD)	
Pu	=	453.46	KN
Mux	=	0	KNM
Muy	=	0	KNM
P/A	=	188.94	KN/sqM
Mx/Zx	=	0	KN/sqM
My/Zy	=	0	KN/sqM
Deff	=	277	mm
Beff	=	1500	mm
SPu	=	188.94	KN/sqM
Vu	=	SPu X (Loff - d) X B	
	=	94.38	KN
Tv	=	Vu / (Beff X Deff)	
	=	0.23	N/Sqmm
Tc	=	0.29	N/Sqmm
Tv	<	Tc	

One Way Shear Along B:

Critical Section @ d from Column Face

	=	261	mm
Critical Analysis Load Combination	=	4	
Critical Load Combination	=	[4] : 1.5 (LOAD 1: DEAD LOAD) +1.5 (LOAD 2: LIVE LOAD)	
Pu	=	453.46	KN
Mux	=	0	KNM
Muy	=	0	KNM

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P/A	=	188.94	KN/sqM
Mx/Zx	=	0	KN/sqM
My/Zy	=	0	KN/sqM
Deff	=	261	mm
Leff	=	1600	mm
SPu	=	188.94	KN/sqM
Vu	=	SPu X (Boff - d) X L	
	=	102.48	KN
Tv	=	Vu / (Leff X Deff)	
	=	0.25	N/Sqmm
Tc	=	0.29	N/Sqmm
Tv	<	Tc	

Design For Punching Shear:

Critical Section @ d/2 from Column Face

	=	134	mm
Critical Analysis Load Combination	=	4	
Critical Load Combination	=	[4] : 1.5 (LOAD 1: DEAD LOAD) +1.5 (LOAD 2: LIVE LOAD)	
Pu	=	453.46	KN
Mux	=	0	KNM
Muy	=	0	KNM
P/A	=	188.94	KN/sqM
Mx/Zx	=	0	KN/sqM
My/Zy	=	0	KN/sqM
Deff	=	269	mm
Leff	=	649	mm
Beff	=	569	mm
SPu	=	Max Pressure	
	=	188.94	KN/sqM
Vu	=	SPu X ((L X B)-(Leff X Beff)	
	=	383.69	KN
Tv	=	Vu / (2 X (Leff + Beff) X Deff))	
	=	0.586	N/Sqmm
Tc	=	1.25	N/Sqmm

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Tv	<	Tc	

Load Transfer Check For Load Transfer From Column To Footing

Critical Analysis Load Combination	=	4	
Critical Load Combination	=	[4] : 1.5 (LOAD 1: DEAD LOAD) +1.5 (LOAD 2: LIVE LOAD)	
Pu	=	453.46	KN
A2	=	0.11	sqM
A1	=	2.69	sqM
Base Area	=	2.4	sqM
A1	>	Base Area	
Thus, A1	=	2.4	
Modification Factor	=	SquareRoot(A1/A2) < = 2	
SquareRoot(A1/A2)	=	4.671	
Thus, Modification Factor	=	2	
Concrete Bearing Capacity	=	0.45 X Fck X Modication Factor X Column Area	
	=	2565	KN
Concrete Bearing Capacity	>	Pu, Hence Safe.	

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COLUMN DESIGN CALCULATIONS

General Data

Column No. : C1

Level	:	0m To 1.8m	
Design Code	=	IS Code	
Grade Of Concrete	=	M25	N/Sqmm
Grade Of Steel	=	Fe500	N/Sqmm
Column B	=	230	MM
Column D	=	450	MM
Clear Cover	=	40	MM
Clear Floor Height @ B	=	3000	MM
Clear Floor Height @ D	=	3000	MM
No Of Floors	=	1	
No Of Columns In Group	=	1	
Column Type	:	UnBraced	
Minimum eccentricity check	:	One Axis at a Time	

Load Data

Analysis Reference No.	=	47	
Critical Analysis Load Combination	:	4	
Load Combination	=	[2] : 1.5 (LOAD 1: DL) +1.5 (LOAD 2: LL)	
Critical Location	=	Top Joint	
Pu	=	550	KN
Mux	=	-30.31	KNM
Muy	=	-10.07	KNM
Vux	=	-8.55	KN
Vuy	=	15.6	KN

Minimum Eccentricity Check

Since Axial Force is compressive, Min. Eccentricity check to be carried out.

Most critical case is with Min. Eccentricity check in Y-direction

Minimum Eccentricity Along B :

Minimum Eccentricity	=	Unsupported Length / 500 + B / 30	
	=	14.32	MM
Mminy	=	Pu x Minimum Eccentricity	
	=	34.83	KNM

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Slenderness Check

Max Slenderness Ratio(L/B)	=	6	
	<	60	(Hence Ok)

Column Is Unbraced Along D

Slenderness Check Along D:

Effective Length Factor	=	1.2	
Slenderness Ratio	=	Effective Length / D	
	=	2.7, Column not Slender Along D	

Column Is Unbraced Along B

Slenderness Check Along B:

Effective Length Factor	=	1.2	
Slenderness Ratio	=	Effective Length / B	
	=	7.2, Column not Slender Along B	

Calculation of Design Moment

Direction	Manalysis	Mmin	Mdesign	Mslndx	Mdesign-final
	A	B	C	E	F
Major Axis - Mux	30.31	---	30.31	0	30.31
Minor Axis - Muy	10.07	34.83	34.83	0	34.83

Where

A = Moments directly from analysis

B = Moments due to minimum eccentricity

C = Maximum of analysis moment and min. eccentricity = Max (A,B)

E = Moment due to slenderness effect

F = Final design Moment = Max(C- Top Bottom , D- Top Bottom) + E

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Final Critical Design Forces

Critical Case - Axial Load & BiAxial Bending

Pu	=	550	KN
Mux	=	30.31	KNM
Muy	=	34.83	KNM

Biaxial Bending Check

Pt Calculated	=	2.07	
Steel Provided	=	4-T16 +2-T12	
Mux1	=	306.98	KNM
Muy1	=	154.32	KNM
Puz	=	0.45 x Fck x Ac + 0.75 x Fy x Asc	
	=	3378.02	KN
Pu/Puz	=	0.52	
Alpha	=	1.53	
Interaction Ratio	=	(Mux / Mux1)^Alpha + (Muy / Muy1)^Alpha)	
	=	0.13 < 1	

Design Of Shear

Design for shear along D

Critical Analysis Load Combination	:	4	
Critical Load Combination	=	[2] : 1.5 (LOAD 1: DL) +1.5 (LOAD 2: LL)	KN
Design shear force, Vuy	=	15.5958	KN
Pu	=	1741.62	
Design shear stress, Tvy	=	Vuy / (B x Deff)	N/Sqmm
	=	0.0945	N/Sqmm
Design shear strength, Tc	=	0.6493	N/Sqmm
Shear Strength Enhancement Factor	=	1 + 3 x Pu / (B x D x Fck)	
	=	2.1611	
Shear Strength Enhancement Factor (max)	=	1.5	
Shear Strength Enhancement Factor	=	1.5	
Enhanced shear strength, Tc-e	=	0.9739	
Design shear check	=	Tvy < Tc x Enhancement factor	

Link for Shear Design along D are not required

Design for shear along B

Critical Analysis Load Combination	:	4

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Critical Load Combination	=	[2] : 1.5 (LOAD 1: DL) +1.5 (LOAD 2: LL)	KN
Design shear force, Vux	=	-8.5535	kN
Pu	=	550	kN
Design shear stress, Tvx	=	Vux / (D x Beff)	N/Sqmm
	=	0.057	N/Sqmm
Design shear strength, Tc	=	0.6493	
Shear Strength Enhancement Factor	=	1 + 3 x Pu / (B x D x Fck)	
	=	2.1611	
Shear Strength Enhancement Factor (max)	=	1.5	
Shear Strength Enhancement Factor	=	1.5	
Enhanced shear strength, Tc-e	=	0.9739	N/Sqmm
Design shear check	=	Tvx < Tc x Enhancement factor	

Link for Shear Design along B are not required

Design Of Links

Links in the zone where special confining links are not required

Normal Links

Diameter of link = 8 mm

> Max. longitudinal bar dia / 4

= 5 mm

Criterion for spacing of normal links

Min. Longitudinal Bar dia X 16 = 256 mm

Min. dimension of column = 230 mm

Max. 300 mm = 300 mm

Maximum B/2 = 150

Provided spacing = 150

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Table For Links

	Required			Provided	
	Normal Design	Shear Design	Ductile Design	Normal Zone	Ductile Zone
Link Dia.	8	---	---	8	---
Spacing	150	---	---	150	---

BEAM DESIGN CALCULATION

Group		**: G1**
Beam No		**: B1**
Analysis Reference (Member)	4.2m	: 125
Beam Length		: 3800 mm
Breadth (B)		: 230 mm
Depth (D)		: 450 mm
Effective Depth (d)		: 395 mm
Design Code		: IS Code
Beam Type		: Regular Beam
Grade Of Concrete		: M25
Grade Of Steel		: Fe500
Clear Cover (Cmin)		: 25 mm
Es		: 2x10^5 N/Sqmm

Flexure Design

	Beam Bottom			Beam Top		
	Left	**Mid**	**Right**	**Left**	**Mid**	**Right**
Critical L/C - Analysis	4	4	4	4	4	4
Critical L/C - RCDC	2	2	2	2	2	2
Mu (KNm)	4.56	23.9	1.77	48.43	0	54.01
Tu (KNm)	3.39	3.39	3.39	3.39	3.39	3.39
M_{Tu} (KNm)	4.99	4.99	4.99	4.99	4.99	4.99
Mud (KNm)	9.55	28.88	6.76	53.41	4.99	59
MuLim (KNm)	156	156	156	156	156	156
R	0.204	0.617	0.144	1.141	0.107	1.26

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Ptmin (%)	0.2	0.2	0.2	0.2	0.2	0.2
Ptclc (%)	0.2	0.2	0.2	0.278	0.2	0.309
Pcclc (%)	0.002	0	0.016	0	0.025	0
PtPrv (%)	0.679	0.679	0.679	0.87	0.679	0.87
AstCalc (Sqmm)	237	237	237	329.24	237	366.11
AstPrv (Sqmm)	804.24	804.24	804.24	1030.44	804.24	1030.44
Reinforcement	3-T12 2-T12	3-T12 2-T12	3-T12 2-T12	3-T12 2-T12	3-T12 2-T12	3-T12 2-T12

Shear Design			
	Left	**Mid**	**Right**
Critical L/C - Analysis	4	4	4
Critical L/C - RCDC	2	2	2
Vu (KN)	69.77	32.17	72.73
Tu (KNm)	3.39	3.39	3.39
V_{Tu} (KN)	18.08	18.08	18.08
Vut (KN)	87.85	50.25	90.81
Tv (N/Sqmm)	0.74	0.42	0.77
Tc (N/Sqmm)	0.61	0.55	0.61
Vc (KN)	72.1	65.5	72.1
Vus=Vut-Vc (KN)	15.75	0	18.71
Asv Torsion (Sqmm)	327.085	213.898	388.589
Asv Reqd (Sqmm)	332.364	332.364	332.364
Legs	2	2	2
Stirrup Dia	8	8	8
SvCalc (mm)	165	175	165

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SvPrv (mm)	165	175	165
Asv Torsion Prv (Sqmm)	609.33	574.51	609.33
Asv Total Prv (Sqmm)	609.33	574.51	609.33

Maximum Spacing Criteria

Basic

Spc1 =0.75d = 296 mm

Spc2 = 300 mm

For Torsion

(X1 = 260, Y1 = 410)

Spc3 = X1 = 260 mm

Spc4=(X1+Y1)/4 = 167.5 mm

SFR Design

Beam Width =300 mm

Beam Depth =450 mm

Web Depth =450 <= 750 mm

Side Face Reinforcement
Not Required.

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SLAB DESIGN CALCULATIONS

Level = 4.2m

Design Code = IS Code

Grade Of Concrete	=	M25	N/Sqmm
Grade Of Steel	=	Fe500	N/Sqmm
Clear Cover	=	20.000	mm
Long Span, Ly	=	4.195	M
Short Span, Lx	=	3.765	M
Imposed Load	=	1.000	KN/Sqm
Live Load	=	2.000	KN/Sqm
Slab Thickness	=	150.000	mm
Effective Depth Along LX, Deffx	=	125.000	mm
Effective Depth Along LY, Deffy	=	125.000	mm
Self Weight	=	5.000	KN/Sqm
Total Load, TL	=	14.000	KN/Sqm
Span	=	2-Way	
Panel Type	=	Two Adjacent Edge continuous	

Design Moments:

Short Span Positive Moment At Midspan -

Moment Coefficient	=	0.043	
BM	=	20.382	KNM
Mu = 1.5 X BM	=	30.573	KNM
Area Of Steel Required (Mu)	=	422.079	Sqmm/M
Steel Provided	=	**T8 @ 150 c/c**	
	=	931.000	Sqmm/M

Short Span Negative Moment At Continuous Support -

Moment Coefficient	=	0.058	
BM	=	27.176	KNM
Mu = 1.5 X BM	=	40.764	KNM
Area Of Steel Required (Mu)	=	573.231	Sqmm/M
Steel Provided	=	**T10@ 150 c/c**	
	=	931.000	Sqmm/M

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Long Span Positive Moment At Midspan -

Moment Coefficient	=	0.028	
BM	=	12.951	KNM

Mu = 1.5 X BM	=	19.427	KNM
Area Of Steel Required (Mu)	=	280.233	Sqmm/M
Steel Provided	=	**T10@ 150 c/c**	
	=	1131.000	Sqmm/M

Long Span Negative Moment At Continuous Support -

Moment Coefficient	=	0.037	
BM	=	17.269	KNM
Mu = 1.5 X BM	=	25.903	KNM
Area Of Steel Required (Mu)	=	378.325	Sqmm/M
Steel Provided	=	**T10@ 150 c/c**	
	=	1131.000	Sqmm/M

Distribution Steel @ 0.12% -

Area Of Steel Required	=	210.000	Sqmm
Steel Provided	=	**T10@ 150 c/c**	
	=	931.000	Sqmm/M

Shear Check :

Along Short Span

Shear Coefficient(Lx), SF1	=	0.447	
V = SF1 x TL x Lx	=	36.316	KN
Vu = 1.5 X V	=	54.474	KN
Shear Stress, Tv	=	0.311	N/Sqmm
Nominal Shear Stress, Tc	=	0.410	N/Sqmm
Modification Factor 'K'	=	1.200	
K x Tc	=	0.492	
	>	0.311	Slab Is Safe In Shear

Along Long Span

Shear Coefficient(Ly), SF2	=	0.360	
V = SF2 x TL x Lx	=	29.232	KN
Vu = 1.5 X V	=	43.848	KN

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Shear Stress, Tv	=	0.266	N/Sqmm
Nominal Shear Stress, Tc	=	0.342	N/Sqmm
Modification Factor 'K'	=	1.200	
K x Tc	=	0.411	
	>	0.266	Slab Is Safe In Shear

Deflection Check:

Basic Span To Depth Ratio	=	26	
Span Correction Factor	=	1.000	
Tensile Steel Factor	=	2.198	
Compression Steel Factor	=	1.000	
Flange Correction Factor	=	1.000	
Max Span To Depth Ratio	=	26.00 x 1.00 x 2.20 x 1.00 x 1.00	
	=	57.142	
Lx/d	=	33.143	
	<	57.142	Slab Is Safe In Deflection

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THE LANDLENS SUITE

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.

LandLens One
Ask anything about a property and get an answer grounded in live government records, with the sources shown.
/landlens/one

Verify My Land
Every record check run on one property and returned as a single report.
/landlens/verify-my-land

Legal Opinion
An advocate's written opinion on the title, built on the records we pull for it.
/landlens

One Map
Every layer on one map: the parcel, its boundary, zoning, water bodies and what sits around it.
/landlens/one/map

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.
/landlens/property-tracker

Deal Room
Run the transaction in one place: documents, stamping, signatures and the parties.
/landlens/deal-room

FREE TOOLS · NO ACCOUNT NEEDED

Twenty-four checks you can run yourself, at no cost.

Records and verification

The registers themselves, read for you.

- Encumbrance Certificate
- 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

Every free tool
/tools

Services we run for you
/services

The LandLens suite
/landlens/one

Verified RealEstate™

Every claim in this document traces back to a government record.

- Legal opinions, due diligence and title verification
- Building plan, layout and sub-division approvals
- Completion and occupancy certificates, regularisation
- Escrow, negotiation and NRI property management
- Land survey, soil testing, architecture and construction

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Prepared from the registers named on the page each finding sits on. Where a register could not be read, this document says so in its place rather than leaving the gap to be read as a clean result.