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Verified RealEstate™
3/350/2 Mettukuppam,
OMR Thoraipakkam,
Chennai 600 097, India

hello@verified.realestate
+91 9996 12 9996
verified.realestate

DIGITALLY VERIFIED RECORD

B&W STRUCTURAL DESIGN CONSULTANT

9677044466, 044-43237175 bwstructuraldesign@gmail.com

STABILITY CERTIFICATE

(To be furnished while filing application for registration of building)

Date: 05/02/2026

The detailed engineering and structure design of the proposed construction of stilt floor +4 floors +5 floor (part) (height – 18.30m) residential building with 15 dwelling units for affordable housing at plot no. 3 & 4, manikandan street, ayyappa nagar, keelkatalai Chennai-117, comprised in old s.no. 25 1/3 part (Document) T.s no. 93 & 94 block no. 24, ward no. H (patta) of keelkatalai village, Tambaram taluk within the limits of Tambaram municipal corporation. has been done by me/us based on the report of geotechnical investigation (soil test) done by QUALITY CARE CIVIL RESEARCH CENTRE PVT.LTD Report No.2453 Dated 02-12-2023 and considering the functional requirement of the building.

2. It is certified that among other factors, the proposed building has been designed to resist earthquake. I/We have checked various parameters and found that the proposed building would be safe.

3. I/We further certify that:

(i) The minimum grade of concrete is M30

(ii) The design and analysis has been done using the code of practice for plain and reinforced concrete as per IS 456, design loads as per IS Codes No 875-PART-1 & 2. And design of earthquake resistant structure as per IS Code No IS 1893:2006

4. The building will be safe and sound when used for the purpose for which it is designed.

N. TAMILVANAN, M.E.(STRUCT.,)
Registration Structural Engineer GRADE-I (SE)
(CMDA) REG.No.SE/GR-I/2024/02/005
B&W STRUCTURAL DESIGN CONSULTANT
181/64, Gandhi Road, Velachery, Chennai-42.
Ph: 9677044466, 044 - 43237175
bwstructuraldesign@gmail.com

Stamp and Signature

Encl.: Structural Design Calculation

If You Have Any Questions About This Price Quote Please Contact
73580 30505, bwacstr2011@gmail.com
THANK YOU
Looking Forward To Working With You

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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(CMDA) REG.No.SE/GR-I/2024/02/005
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bwstructuraldesign@gmail.com

N.TAMILVANAN M.E (STRUCT.)

STRUCTUAL ENGINEER
CONSULTANT

STRUCTURAL DESIGN REPORT

RESIDENTIAL BUILDING (BASEMENT+STILT+5 FLOORS), PLOT NO.3 & 4, T.S.NO.93 & 94, COMPRISED SURVEY NO.251/3 (PART), MANIKANDAN STREET, AYYAPPA NAGAR, KEELKATTALAI, CHENNAI - 600 117, WARD - H, BLOCK - 24

STRUCTURAL CONSULTANT:

B&W STRUCTURAL DESIGN CONSULTANTS

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

VELACHERY,

CHENNAI-600042.

RESIDENTIAL BUILDING (BASEMENT+STILT+5 FLOORS), PLOT NO.3 & 4, T.S.NO.93 & 94, COMPRISED SURVEY NO.251/3 (PART), MANIKANDAN STREET, AYYAPPA NAGAR, KEELKATTALAI, CHENNAI - 600 117, WARD - H, BLOCK - 24

1. INTRODUCTION

The Structure is a Residential building. It is designed as RCC building supported on Footing at 2.4 **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 2.4 **m** depth from Existing Ground Level and SBC of soil 200kN/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 Fire rating (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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bwstructuraldesign@gmail.com

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 * * *

LOAD COMB 10 1 (DEAD LOAD + LIVE LOAD)
LOAD COMB 11 1 (DL + EPX)
LOAD COMB 12 1 (DL + ENX)
LOAD COMB 13 1 (DL + EPZ)
LOAD COMB 14 1 (DL + ENZ)
LOAD COMB 15 1 (DL + LL + EPX)
LOAD COMB 16 1 (DL + LL +ENX)
LOAD COMB 17 1 (DL + LL +EPZ)
LOAD COMB 18 1 (DL + LL +ENZ)
LOAD COMB 50 1.5 (DEAD LOAD + LIVE LOAD)
LOAD COMB 51 1.5 (DL + EPX)
LOAD COMB 52 1.5 (DL + ENZ)
LOAD COMB 53 1.5 (DL + EPZ)
LOAD COMB 54 1.5 (DL + ENZ)
LOAD COMB 55 1.2 (DL + LL + EPX)
LOAD COMB 56 1.2 (DL + LL +ENX)

LOAD COMB 57 1.2 (DL + LL +EPZ)
LOAD COMB 58 1.2 (DL + LL +ENZ)
LOAD COMB 59 0.9 DL + 1.5 EPX
LOAD COMB 60 0.9 DL + 1.5 ENX
LOAD COMB 61 0.9 DL + 1.5 EPZ
LOAD COMB 62 0.9 DL + 1.5 ENZ

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

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	= 14 KN/m
Parapet wall	= 0.9m x 0.23m x 20 KN/ m^3	= 4 KN/m

FOOTING DESIGN CALCULATIONS

Design Code	:	IS Code	
Footing No	:	F1	
Column No	:	C1	(450mm X 300mm)
Analysis No	:	72	
Concrete Grade	:	M25	
Steel Grade	:	Fe500	
Clear Cover	:	40 mm	
Df	:	2.5 M	
Dw	:	1 M	
Density of Soil	=	18	KN/cuM
Soil Bearing Capacity	=	250	KN/sqM
Gross Bearing Capacity	=	295	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	%
Design cross section by	:	Average pressure	
Consider overburden pressure			
Footing Type	:	Pad	
Footing Size (LxBxD)	:	1600mm X 1450mm X 425mm	
Soil Wt. + Footing Wt.	=	106.26	KN

Check For Maximum Soil Pressure:

Critical Analysis Load Combination	=	3
Critical Load Combination	=	[1] : (LOAD 1: DEAD LOAD) +(LOAD 2: LL)
Pcomb	=	528.96 KN

P	=	Pcomb + Soil Wt. + Footing Wt.	
P	=	635.22	KN
Mx	=	-2.63	KNM
My	=	-1.39	KNM
P/A	=	273.8	KN/sqM
Mx/Zx	=	-4.26	KN/sqM
My/Zy	=	-2.48	KN/sqM
Maximum Soil Pressure	=	280.54	KN/sqM
Allowable Soil Pressure	=	1 X 295	KN/sqM
	=	295	KN/sqM

Check For Minimum Soil Pressure:

Critical Analysis Load Combination	=	3	
Critical Load Combination	=	[1] : (LOAD 1: DEAD LOAD) +(LOAD 2: LL)	
Pcomb	=	528.96	KN
P	=	Pcomb + Soil Wt. + Footing Wt.	
P	=	635.22	KN
Mx	=	-2.63	KNM
My	=	-1.39	KNM
P/A	=	273.8	KN/sqM
Mx/Zx	=	-4.26	KN/sqM
My/Zy	=	-2.48	KN/sqM
Minimum Soil Pressure	=	267.06	KN/sqM
	>	0	

Offset Along L (Loff)	=	575	mm
Offset Along B (Boff)	=	575	mm

Design For Bending:

Bottom Steel Along L:

Critical Analysis Load Combination	=	4	
Critical Load Combination	=	[4] : 1.75 (LOAD 1: DEAD LOAD) +1.75 (LOAD 2: LL)	
Pu	=	925.68	KN
Mux	=	-4.61	KNM

Muy	=	-2.44	KNM
P/A	=	399	KN/sqM
Mx/Zx	=	-7.45	KN/sqM
My/Zy	=	-4.35	KN/sqM
Deff	=	377	mm
Beff	=	1450	mm
SPu	=	406.45	KN/sqM
Mu	=	SPu X B X Loff X Loff / 2	
	=	97.43	KNM
Pt	=	0.12	%
Ast Rqd (BM)	=	656	Sqmm
Ast Prv	=	T10 @ 185	
	=	707	Sqmm

Distributed Across Total Width

Top Steel Along L:

D	=	425	mm
	<=	1000	mm, Hence
Ast	=	Min Pt for Top Steel X D X B	
	=	0.02% X 425.00 X 1450	
	=	123	Sqmm
Ast Prv	=	T10 @ 300 c/c	
	=	471	Sqmm

Bottom Steel Along B:

Critical Analysis Load Combination	=	4	
Critical Load Combination	=	[4] : 1.75 (LOAD 1: DEAD LOAD) +1.75 (LOAD 2: LL)	
Pu	=	925.68	KN
Mux	=	-4.61	KNM
Muy	=	-2.44	KNM
P/A	=	399	KN/sqM
Mx/Zx	=	-7.45	KN/sqM
My/Zy	=	-4.35	KN/sqM
Deff	=	361	mm
Leff	=	1600	mm
SPu	=	403.35	KN/sqM

Mu	=	SPu X L X Boff X Boff / 2	
	=	106.69	KNM
Pt	=	0.121	%
Ast Rqd (BM)	=	696	Sqmm
Ast Prv	=	T10 @ 200	
	=	707	Sqmm

Distributed Across Total Length

Top Steel Along B:

D	=	425	mm
	<=	1000	mm, Hence
Ast	=	Min Pt for Top Steel X D X L	
	=	0.02% X 425.00 X 1600	
	=	136	Sqmm
Ast Prv	=	T10 @ 300 c/c	
	=	550	Sqmm

Design For Shear:

One Way Shear Along L:

Critical Section @ d from Column Face

	=	377	mm
Critical Analysis Load Combination	=	4	
Critical Load Combination	=	[4] : 1.75 (LOAD 1: DEAD LOAD) +1.75 (LOAD 2: LL)	
Pu	=	925.68	KN
Mux	=	-4.61	KNM
Muy	=	-2.44	KNM
P/A	=	399	KN/sqM
Mx/Zx	=	-7.45	KN/sqM
My/Zy	=	-4.35	KN/sqM
Deff	=	377	mm
Beff	=	1450	mm
SPu	=	406.45	KN/sqM
Vu	=	SPu X (Loff - d) X B	
	=	116.69	KN
Tv	=	Vu / (Beff X Deff)	
	=	0.21	N/Sqmm

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Tc	=	0.27	N/Sqmm
Tv	<	Tc	

One Way Shear Along B:

Critical Section @ d from Column Face

	=	361	mm
Critical Analysis Load Combination	=	4	
Critical Load Combination	=	[4] : 1.75 (LOAD 1: DEAD LOAD) +1.75 (LOAD 2: LL)	
Pu	=	925.68	KN
Mux	=	-4.61	KNM
Muy	=	-2.44	KNM
P/A	=	399	KN/sqM
Mx/Zx	=	-7.45	KN/sqM
My/Zy	=	-4.35	KN/sqM
Deff	=	361	mm
Leff	=	1600	mm
SPu	=	403.35	KN/sqM
Vu	=	SPu X (Boff - d) X L	
	=	138.11	KN
Tv	=	Vu / (Leff X Deff)	
	=	0.24	N/Sqmm
Tc	=	0.27	N/Sqmm
Tv	<	Tc	

Design For Punching Shear:

Critical Section @ d/2 from Column Face

	=	184	mm
Critical Analysis Load Combination	=	4	
Critical Load Combination	=	[4] : 1.75 (LOAD 1: DEAD LOAD) +1.75 (LOAD 2: LL)	
Pu	=	925.68	KN
Mux	=	-4.61	KNM
Muy	=	-2.44	KNM

P/A	=	399	KN/sqM
Mx/Zx	=	-7.45	KN/sqM
My/Zy	=	-4.35	KN/sqM
Deff	=	369	mm
Leff	=	819	mm
Beff	=	669	mm
SPu	=	Average Pressure	
	=	399	KN/sqM
Vu	=	SPu X ((L X B)-(Leff X Beff)	
	=	707.06	KN
Tv	=	Vu / (2 X (Leff + Beff) X Deff))	
	=	0.644	N/Sqmm
Tc	=	1.25	N/Sqmm
Tv	<	Tc	

Load Transfer Check For Load Transfer From Column To Footing

Critical Analysis Load Combination	=	4	
Critical Load Combination	=	[4] : 1.75 (LOAD 1: DEAD LOAD) +1.75 (LOAD 2: LL)	
Pu	=	925.68	KN
A2	=	0.14	sqM
A1	=	4.3	sqM
Base Area	=	2.32	sqM
A1	>	Base Area	
Thus, A1	=	2.32	
Modification Factor	=	SquareRoot(A1/A2) < = 2	
SquareRoot(A1/A2)	=	4.0708	
Thus, Modification Factor	=	2	
Concrete Bearing Capacity	=	0.45 X Fck X Modication Factor X Column Area	
	=	3037.5	KN
Concrete Bearing Capacity	>	Pu, Hence Safe.	

COLUMN DESIGN CALCULATIONS

General Data

Column No.	:	C1	
Level	:	-2.4m To 0m	
Design Code	=	IS Code	
Grade Of Concrete	=	M25	N/Sqmm
Grade Of Steel	=	Fe500	N/Sqmm
Column B	=	300	MM
Column D	=	450	MM
Clear Cover	=	40	MM
Clear Floor Height @ B	=	1950	MM
Clear Floor Height @ D	=	1950	MM
No Of Floors	=	1	
No Of Columns In Group	=	1	
Column Type	:	Braced	
Minimum eccentricity check	:	Simultaneously (Both Axis)	

Load Data

Analysis Reference No.	=	72	
Critical Analysis Load Combination	:	4	
Load Combination	=	[2] : 1.75 (LOAD 1: DEAD LOAD) +1.75 (LOAD 2: LL)	
Critical Location	=	Bottom Joint	
Put (top joint)	=	970.94	KN
Muxt (top joint)	=	-4.76	KNM
Muyt (top joint)	=	-0.74	KNM
Vuxt (top joint)	=	-0.98	KN
Vuyt (top joint)	=	0.21	KN
Pub (bottom joint)	=	984.3	KN
Muxb (bottom joint)	=	-5.27	KNM
Muyb (bottom joint)	=	-3.09	KNM
Vuxb (bottom joint)	=	-0.98	KN
Vuyb (bottom joint)	=	0.21	KN

Minimum Eccentricity Check

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

Minimum Eccentricity Along D :

Minimum Eccentricity	=	Unsupported Length / 500 + D / 30	
	=	19.68	MM
Mminx (top)	=	Pu x Minimum Eccentricity	
	=	19.42	KNM
Mminx (bottom)	=	Pu x Minimum Eccentricity	
	=	19.69	KNM

Minimum Eccentricity Along B :

Minimum Eccentricity	=	Unsupported Length / 500 + B / 30	
	=	14.68	MM
MminY (top)	=	Pu x Minimum Eccentricity	
	=	19.42	KNM
MminY (bottom)	=	Pu x Minimum Eccentricity	
	=	19.69	KNM

Slenderness Check

Max Slenderness Ratio(L/B)	=	6.5	
	<	60	(Hence Ok)

Column Is Braced Along D

Slenderness Check Along D:

Effective Length Factor	=	1.2	
Slenderness Ratio	=	Effective Length / D	
	=	5.2, Column not Slender Along D	

Column Is Braced Along B

Slenderness Check Along B:

Effective Length Factor	=	1.2	
Slenderness Ratio	=	Effective Length / B	
	=	7.8, Column not Slender Along B	

Calculation of Design Moment

Direction	Manalysis	Mmin	Mdesign	Minit	Mslndx	Mdesign-final
	A	B	C	D	E	F
Major Axis Mux (top)	4.76	19.42	19.42	---	0	19.42
Major Axis Mux (bottom)	5.27	19.69	19.69	---	0	19.69
Minor Axis Muy (top)	0.74	19.42	19.42	---	0	19.42
Minor Axis Muy (bottom)	3.09	19.69	19.69	---	0	19.69

Wher e

A = Moments directly from analysis
B = Moments due to minimum eccentricity
C = Maximum of analysis moment and min. eccentricity = Max (A,B)
D = Initial moment = 0.4 x Min (top, bottom) + 0.6 x Max (top, bottom)
E = Moment due to slenderness effect
F = Final design Moment = Max(C- Top Bottom , D- Top Bottom) + E

Final Critical Design Forces

Critical Case - Axial Load & BiAxial Bending

Pu	=	984.3	KN
Mux	=	19.69	KNM
Muy	=	19.69	KNM

Biaxial Bending Check

Pt Calculated	=	0.84	
Steel Provided	=	10-T20 + 2-T16	
Mux1	=	121.8	KNM
Muy1	=	80.07	KNM
Puz	=	0.45 x Fck x Ac + 0.75 x Fy x Asc	
	=	1930.14	KN
Pu/Puz	=	0.51	
Alpha	=	1.52	

Interaction Ratio	=	(Mux / Mux1)^Alpha + (Muy / Muy1)^Alpha)	
	=	0.18 < 1	

Design Of Shear

Design for shear along D

Critical Analysis Load Combination	:	4	
Critical Load Combination	=	[2] : 1.75 (LOAD 1: DEAD LOAD) +1.75 (LOAD 2: LL)	KN
Design shear force, Vuy	=	0.214	KN
Pu	=	970.94	
Design shear stress, Tvy	=	Vuy / (B x Deff)	N/Sqmm
	=	0.0018	N/Sqmm
Design shear strength, Tc	=	0.4544	N/Sqmm
Shear Strength Enhancement Factor	=	1 + 3 x Pu / (B x D x Fck)	
	=	1.8631	
Shear Strength Enhancement Factor (max)	=	1.5	
Shear Strength Enhancement Factor	=	1.5	
Enhanced shear strength, Tc-e	=	0.6817	N/Sqmm
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	
Critical Load Combination	=	[2] : 1.75 (LOAD 1: DEAD LOAD) +1.75 (LOAD 2: LL)	KN
Design shear force, Vux	=	-0.9776	kN
Pu	=	970.94	
Design shear stress, Tvx	=	Vux / (D x Beff)	kN
	=	0.0086	N/Sqmm
Design shear strength, Tc	=	0.4544	N/Sqmm
Shear Strength Enhancement Factor	=	1 + 3 x Pu / (B x D x Fck)	
	=	1.8631	

Shear Strength Enhancement Factor (max)	=	1.5	
Shear Strength Enhancement Factor	=	1.5	
Enhanced shear strength, Tc-e	=	0.6817	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	
	=	3	mm

Criterion for spacing of normal links

Min. Longitudinal Bar dia X 16	=	192	mm
Min. dimension of column	=	300	mm
Max. 300 mm	=	300	mm
Maximum B/2	=	150	
Provided spacing	=	175	mm

Table For Links

	Required			Provided	
	Normal Design	**Shear Design**	**Ductile Design**	**Normal Zone**	**Ductile Zone**
Link Dia.	8	---	---	8	---
Spacing	175	---	---	175	---

BEAM DESIGN CALCULATION

Group	: G1
Beam No	: B1
Analysis Reference (Member)	4.11m : 99,143
Beam Length	: 4929.99 mm
Breadth (B)	: 300 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	51	50	52	52	50	51
Critical L/C - RCDC	11	10	12	12	10	11
Mu (KNm)	24.27	69.16	18.45	67.89	0	94.44
Tu (KNm)	4.35	5.56	2.09	4.19	5.56	2.59
MTu (KNm)	6.4	8.18	3.07	6.16	8.18	3.81
Mud (KNm)	30.67	77.34	21.52	74.05	8.18	98.26
MuLim (KNm)	156	156	156	156	156	156
R	0.655	1.652	0.46	1.582	0.175	2.099
Ptmin (%)	0.2	0.2	0.2	0.2	0.2	0.2
Ptclc (%)	0.2	0.414	0.2	0.395	0.2	0.541
Pcclc (%)	0	0	0	0	0.04	0
PtPrv (%)	0.509	0.509	0.509	0.509	0.286	0.795
AstCalc (Sqmm)	237	491	237	468.15	237	641.67

AstPrv (Sqmm)	603.18	603.18	603.18	603.18	339.3	942.48
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	50	51	50
Critical L/C - RCDC	10	11	10
Vu (KN)	77.56	63.51	99.95
Tu (KNm)	5.56	2.59	3
VTu (KN)	29.66	13.82	15.99
Vut (KN)	107.22	77.33	115.94
Tv (N/Sqmm)	0.9	0.65	0.98
Tc (N/Sqmm)	0.49	0.49	0.59
Vc (KN)	58.36	58.36	69.68
Vus=Vut-Vc (KN)	48.86	18.97	46.26
Asv Torsion (Sqmm)	425.511	280.687	417.399
Asv Reqd (Sqmm)	342.65	332.364	332.364
Legs	2	2	2
Stirrup Dia	8	8	8
SvCalc (mm)	165	165	165
SvPrv (mm)	165	165	165
Asv Torsion Prv (Sqmm)	609.33	609.33	609.33
Asv Total Prv (Sqmm)	609.33	609.33	609.33

Maximum Spacing Criteria

Basic

Spc1 =0.75d =296 mm

Spc2 =300 mm

ForTorsion

(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.

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

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

N. TAMILVANAN, M.E.(STRUCT.)
Registration Structural Engineer GRADE-I (SE)
(CMDA) REG.No.SE/GR-I/2024/02/005
B&W STRUCTURAL DESIGN CONSULTANT
181/64, Gandhi Road, Velachery, Chennai-42.
Ph: 9677044466, 044 - 43237175
bwstructuraldesign@gmail.com

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
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

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

N. TAMILVANAN, M.E.(STRUCT.,)
Registration Structural Engineer GRADE-I (SE)
(CMDA) REG.No.SE/GR-I/2024/02/005
B&W STRUCTURAL DESIGN CONSULTANT
181/64, Gandhi Road, Velachery, Chennai-42.
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bwstructuraldesign@gmail.com

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

Verified RealEstate
3/350/2 Mettukuppam,
OMR Thoraipakkam,
Chennai 600 097, India
hello@verified.realestate
+91 9996 12 9996

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.