Verified RealEstate™

RE REGULATORY RECORD

RERA Document

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DESIGNAGE
CONSULTANTS PRIVATE LIMITED

DATE-02-09-2026

STRUCTURAL STABILITY CERTIFICATE

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

1. The detailed engineering and structure design of the proposed building comprising of TOWER A TO H & TOWER J, K & CLUB HOUSE CONSISTING OF TOWER – A, B, F, G & H: GROUND FLOOR + 14 FLOORS + 15 FLOOR (PART) (EACH 119 UNITS), TOWER C, D, E, J & K: GROUND FLOOR + 14 FLOORS +15 FLOOR (PART) (EACH 88 UNITS), (TOTALLY: 1,035 DWELLING UNITS)AND CLUB HOUSE (GROUND + 2 FLOORS + 3RD PARTIAL FLOOR) WITHSWIMMING POOL AT GROUND LEVEL floors at AT S. NO. 131/2A, 2B, 4, 5A,5C, 5D, 6, 132/1B, 1C1A, 3, 148/1, 2A, 2B, 2C, 3A, 3B, 4, 5A, 5B, 5C, 149/1,2,3,4,153/2, 5, 160/4, 164 PART, 165/2, 3, 4, 5, 6, 7A, 7B, 7C, 166, T.S. NO.30,134,135 OF BLOCK NO. 19, T.S. NO. 96/3, 98-120, 122-129, 134, 135, 139 OF BLOCK NO.21 ,WARD C OF ZAMIN PALLAVARAM VILLAGE, PALLAVARAM TALUK, CHENGLEPET DISTRICT, WITHIN THE JURISDICTION OF TAMBARAM CITY CORPORATION. has been done by me/us based on the report of geotechnical investigation (soil test) done by K. RAMALINGAM Report No. GECS-JC-GT-2270-2024-2025 Dated 03-12-2024 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.

E2-607,Purva Windermore. Pallikaranai, Chennai-600100
mail2pradeeppari@gmail.com,tp.designage@gmail.com,

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 code No IS 875

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

P.PRADEEP , B.E., M.TECH.(Struct)
Structural Engineer (Grade -1), CMDA,
Reg. No. SE/GR-I/19/07/184 ,
E2-607,Purva Windermore. Pallikaranai,
Chennai-600100, Ph : 9500702114

Stamp and signature

End of structural calculation

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

PROFESSIONAL REGISTRATION CERTIFICATE

This is to certify that the **Thiru. P. PRADEEP** has enrolled as **Registered Structural Engineer Grade-I (SE)** with Chennai Metropolitan Development Authority (CMDA) who has the qualification of **M.Tech., (Structural Engg.)** and experience in the relevant field for **5 years**.

He has been given the Registration No.**SE/GR-I/2019/07/184 Renewed** on **30.07.2024.** 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 **29.07.2029.**



5/8/2024

(A. MEGANATHAN)
Superintendent

STRUCTURAL DESIGN BASIS REPORT

FOR TOWER A OF

PROPOSED CONSTRUCTION OF 2 BASEMENT FLOOR + GROUND FLOOR + 15 FLOORS RESIDENTIAL BUILDING AT PALLAVARAM TOWN AND TALUK, CHENGALPATTU DISTRICT, 200 FEET PALLAVARAM THORAIPAKKAM RADIAL ROAD, TAMBARAM MUNICIPAL CORPORATION, CHENNAI.

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M/S EMERALD HAVEN REALITY LTD

ARCHITECT-
KAPADIA ASSOCIATES DESIGN LLP

GEOTECHNICAL CONSULTANTS
PRASAD ARMSTRONG YEN GEC (P) LTD

DESIGNAGE CONSULTING STRUCTURAL ENGINEERS

R0–11. DECEMBER. 2025

Designage Consultants Pvt. Ltd.

1. INTRODUCTION

2. DESIGN LOADS
   - 2.1 Material Dead Loads
   - 2.2 Weight of Walls
   - 2.3 Dead Loads
   - 2.4 Wind Loads
   - 2.5 Earthquake Load

3. CHECK FOR LATERAL SWAY

4. CHECK FOR LATERAL SWAY (STOREY DRIFT)

5. BASIC LOAD CASES

6. BASIC LOADS AND LOAD COMBINATIONS

7. ANALYSIS METHOD

8. DESIGN METHODOLOGY

9. CONSTRUCTION DETAILS

10. REINFORCEMENT

11. EXPOSURE CONDITION

12. COVER TO REINFORCEMENT

13. FOUNDATION SYSTEM

14. FIRE RATING

15. CODES AND STANDARDS

DESIGNAGE CONSULTING STRUCTURAL ENGINEERS

Designage Consultants Pvt. Ltd.

1. INTRODUCTION

The proposed development consists 10 towers of 2 **Basement + Ground Floor + 15 Floors+ Terrace.** Tower C is mean for use as residential building. The basement Floors are to be used as Parking Area & for Services. The 1st to 15th floor to be used for residential purposes. Lift machine rooms are above the terrace level.

The building is essentially a RCC framed structure with Mivan Technology (Shear walls, Slabs, Beams). The slab transfers horizontal & vertical loads to beams & shear walls. The vertical & horizontal loads are transferred to the foundation through walls.

The floor-to-floor height of respective floors is as shown below.

Floor level	Floor to Floor Ht (m)
Basement floor 2	3.60
Basement floor 1	5.35
Ground Floor	2.95
1st Floor to 15th Floor	2.95

The total height of building up to Terrace level is 47.65 meter (excluding parapet) from Ground level.

2. DESIGN LOADS

2.1 Material Dead Loads as per IS875 (part-1) :

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

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

Density of Reinforced Cement Concrete	=	25 kN/m^3
Density of Plain Cement Concrete	=	24 kN/m^3
Density of Steel	=	78.5 kN/m^3
Density of Soil	=	18 kN/m^3
Density of Saturated Soil	=	20 kN/m^3
Density of Water	=	10 kN/m^3
Density of light weight Masonry	=	10 kN/m^3
Density of Plum Concrete	=	24 kN/m^3

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2.2 Weight of Walls:

200mm thk R.C. wall (structural wall) = 5.0 kN/m^2

160mm thk R.C. wall (structural wall) = 4.0 kN/m^2

100mm thk R.C. wall (Non-structural wall) = 2.5 kN/m^2

Typical calculations for wall load :

200mm thk R.C. wall (structural wall)

Concrete wall Density = 25 kN/ cu. meter

Wall Load = (0.2x25)=5.0 KN/m^2

160mm thk R.C. wall (structural wall)

Concrete wall Density = 25 kN/ cu. meter

Wall Load = (0.160x25) =4.00KN/m^2

100mm thk R.C. wall (Non-structural wall)

Concrete wall Density = 25 kN/ cu. meter

Wall Load = (0.10x25) =3.00 KN/m^2

Note: For localized design of slabs, wall loading shall be applied as per actual layout.

2.3 DEAD& LIVE LOADS:

The construction load, super imposed dead load that are envisaged to act permanently (wherever applicable) as per IS:875(part-1)–1987 & Live loads for each occupancy category as per IS:875(part-2)–1987 and Live load reduction is considered as per IS:875(part-2) CL.3.2.

2.3.1 BASEMENT FLOOR-PARKING AREA

Description		**KN/m^2**
Dead Load	Slab & beam	Self-weight
Superimposed Dead Load	Floor Finishes including screed (50mm Thk Tremix)	1.0
	Services	1
Live Load	Parking Area	3.0

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2.3.2 1ST TO 15TH (TYPICAL)FLOOR

Description		KN/m²
Dead Load	Slab & Beam	Self-weight
Superimposed Dead Load	Floor Finishes	1
	Toilet Sunk 65 mm (Light weight filling)	1.3
	Balcony Sunk 100 mm (Light weight filling)	2.0
	Utility Sunk 150 mm (Light weight filling	3.0
Live Load	Room	2
	Toilet	2
	Balconies	3
	Corridors, Passages, including fire escapes, Lift lobbies Staircase	3

2.3.4TERRACE LEVEL

Description		
Dead Load	Slab & Beam	Self-weight
	Water proofing & Floor Finishes including screed (150mm)	3 KN/m²
Live Load	Live	1.50 KN/m²

Description		
	Lift Machine Room	600KN per lift (as per architectural drawings)
	Head Room	200KN (Including Self Weight)

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2.4 WIND LOADS

The wind pressure is calculated on the basis of data furnished below and other provisions laid in IS875 (Part-3) – 2015

Basic Wind Speed V_b = 50 m/sec

Risk Coefficient K_1 = 1 (Based on 50 years return period)

Terrain, Height Factor K_2 = 1.16
(as per Table 2 of IS: 875 (Part 3) – 2015)

Terrain Category = II

K_3 = 1

K_4 = 1

Design Wind Speed (V_z)

$V_z = V_b \times K_1 \times K_2 \times K_3 \times K_4$

Where,

V_b =Basic Wind Speed

K_1 = Risk Co-efficient for different classes of structures in different wind speed zones.

K_2 = Terrain roughness & height factor.

K_3 = Topography factor.

K_4 = Importance factor for cyclonic region.

Design Wind Pressure

$Pz = 0.6Vz^2$

2.4.1 GUST FACTOR

Gust factor method is used as per clause No. 10.0 IS 875 (part 3) - 2015.

Wind Pressure Table in kN/m2								
Story Lable	Along+X	Across+X	Along-X	Across-X	Along+Y	Across+Y	Along-Y	Across-Y
Terrace	2.377	1.797	2.377	1.797	2.389	1.832	2.389	1.832
15th Floor	2.319	1.685	2.319	1.685	2.330	1.718	2.330	1.718
14th Floor	2.258	1.574	2.258	1.574	2.269	1.605	2.269	1.605
13th Floor	2.192	1.463	2.192	1.463	2.203	1.492	2.203	1.492
12th Floor	2.123	1.352	2.123	1.352	2.133	1.378	2.133	1.378
11th Floor	2.049	1.240	2.049	1.240	2.059	1.265	2.059	1.265
10th Floor	1.969	1.129	1.969	1.129	1.979	1.151	1.979	1.151
9th Floor	1.884	1.018	1.884	1.018	1.893	1.038	1.893	1.038
8th Floor	1.791	0.907	1.791	0.907	1.800	0.925	1.800	0.925
7th Floor	1.690	0.796	1.690	0.796	1.699	0.811	1.699	0.811
6th Floor	1.578	0.684	1.578	0.684	1.586	0.698	1.586	0.698
5th Floor	1.452	0.573	1.452	0.573	1.460	0.584	1.460	0.584
4th Floor	1.307	0.462	1.307	0.462	1.314	0.471	1.314	0.471
3rd Floor	1.135	0.351	1.135	0.351	1.140	0.358	1.140	0.358
2nd Floor	0.918	0.239	0.918	0.239	0.922	0.244	0.922	0.244
1st Floor	0.614	0.128	0.614	0.128	0.617	0.131	0.617	0.131
Ground Floor	0.188	0.016	0.188	0.016	0.189	0.017	0.189	0.017

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Wind Pressure Table in kN/m2								
Story Lable	Along+X	Across+X	Along-X	Across-X	Along+Y	Across+Y	Along-Y	Across-Y
Terrace	2.377	1.797	2.377	1.797	2.389	1.832	2.389	1.832
15th Floor	2.319	1.685	2.319	1.685	2.330	1.718	2.330	1.718
14th Floor	2.258	1.574	2.258	1.574	2.269	1.605	2.269	1.605
13th Floor	2.192	1.463	2.192	1.463	2.203	1.492	2.203	1.492
12th Floor	2.123	1.352	2.123	1.352	2.133	1.378	2.133	1.378
11th Floor	2.049	1.240	2.049	1.240	2.059	1.265	2.059	1.265
10th Floor	1.969	1.129	1.969	1.129	1.979	1.151	1.979	1.151
9th Floor	1.884	1.018	1.884	1.018	1.893	1.038	1.893	1.038
8th Floor	1.791	0.907	1.791	0.907	1.800	0.925	1.800	0.925
7th Floor	1.690	0.796	1.690	0.796	1.699	0.811	1.699	0.811
6th Floor	1.578	0.684	1.578	0.684	1.586	0.698	1.586	0.698
5th Floor	1.452	0.573	1.452	0.573	1.460	0.584	1.460	0.584
4th Floor	1.307	0.462	1.307	0.462	1.314	0.471	1.314	0.471
3rd Floor	1.135	0.351	1.135	0.351	1.140	0.358	1.140	0.358
2nd Floor	0.918	0.239	0.918	0.239	0.922	0.244	0.922	0.244
1st Floor	0.614	0.128	0.614	0.128	0.617	0.131	0.617	0.131
Ground Floor	0.188	0.016	0.188	0.016	0.189	0.017	0.189	0.017

DESIGNAGE CONSULTING



3. CHECK FOR LATERAL SWAY AS PER IS 456-2000 & IS 1893-2016

It is generally recognized that absolute sway is not a perceivable parameter; however, limiting sway is used to provide a reasonable level of stiffness and in order to limit damage to non-structural elements as well as limit size of curtain wall joints, etc.

Generally tall building lateral load resisting systems are sized on the basis of limiting overall lateral sways to limits of approximately Overall Height/500 under the 50 year return period wind loads, Overall Height/400 under the 20 year return period wind loads and Overall Height/250 under seismic loads.

4. CHECK FOR LATERAL SWAY (STOREY DRIFT) AS PER IS- 1893-2016

The allowable lateral sway (storey drift) due to earthquake force should not exceed L/250, Where L is the storey height

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5. BASIC LOAD CASES

The various loads are combined in accordance with the stipulations in IS: 875 (Part 5)-1987. Wherever imposed load is combined with earthquake load the appropriate part of the imposed

Load as specified in IS: 1893-2016 is adopted both for evaluating earthquake effect and for combined load effects, used in such combination.

5.1 Basic Load Cases

Load Case Type	Mark	Description
Primary	DL	SELF WEIGHT OF STRUCTURAL MEMBER
Primary	SDL	SUPERIMPOSED DEAD LOAD
Primary	LL1	LIVE LOAD =<3 kN/m^2 (Live 1)
Primary	LL2	LIVE LOAD > 3 kN/m^2 (Live 2)
Primary	LL3	NON REDUCIBLE LIVE LOAD
Primary	EQX	SEISMIC LOAD IN X DIRECTION
Primary	EQY	SEISMIC LOAD IN Y DIRECTION
Primary	WLX	WIND LOAD IN X DIRECTION
Primary	WLY	WIND LOAD IN Y DIRECTION
Primary	SLX	SEISMIC LOAD IN X DIRECTION
Primary	SLY	SEISMIC LOAD IN Y DIRECTION

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6. BASIC LOADS AND LOAD COMBINATIONS

The various loads are combined in accordance with the stipulations in IS: 875 (Part 5)-1987. Wherever imposed load is combined with earthquake load the appropriate part of the imposed load as specified in IS: 1893-2016 is adopted both for evaluating earthquake effect and for combined load effects, used in such combination.

Description of Load Combination	Load Factor for Primary Load Cases				
	Dead Load	Live Load	Wind Load	Seismic Load	Temp Load
Dead load	1.5	0.0	0.0	0.0	0.0
Dead load + Live load	1.5	1.5	0.0	0.0	0.0
Dead load+Wind load	1.5	0.0	±1.5	0.0	0.0
Dead load+Seismic load	1.5	0.0	0.0	±1.5	0.0
Dead load+Live load+Wind	1.2	1.2	±1.2	0.0	0.0
Dead load+Live load+Seismic	1.2	1.2	0	±1.2	0.0
Dead Load + Wind Load	0.9	0.0	±1.5	0.0	0.0
Dead Load + Seismic Load	0.9	0.0	0.0	±1.5	0.0

7. ANALYSIS METHOD

The structure is analyzed for Static loads (both dead and live loads) and Lateral loads due to Earthquake/Wind loads and its combinations. Software used is E-Tabs version 20.0.0 & for foundation safe version 16.0.2.

The structure will be modeled as 3D space frame. Floor slabs shall be modeled as shell thin with property modifiers.

8. DESIGN METHODOLOGY

All structural members will be designed according to the Limit State Method as specified in IS: 456-2000. Appropriate loads and its combinations, as per relevant clauses in Code IS 456:2000 Code IS 875 (Part-5) 1987, for the most unfavorable effects are chosen for design.

Limit state method is adopted for design of overhead water tanks by using IS-3370(2009)

9. CONSTRUCTION DETAILS

1. Foundation -M:35
2. Water Tanks -M:40
3. Columns/Walls -M:50- up to 10th floor
   M:40- above 10th floor
4. Beams & Slabs -M: 40

DESIGN OF CONSULTING STRUCTURAL ENGINEERS

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10. REINFORCEMENT

Steel reinforcement shall be of Grade Fe 550 conforming to IS: 1786-1985.

11. EXPOSURE CONDITION

Structural elements below ground level and Exterior External faces of walls are designed for severe exposure condition and internal faces of walls, floor beams and slabs are designed for Mild exposure conditions per Table 16 of IS 456-2000.

12. COVER TO REINFORCEMENT

As per Table 16A-IS: 456-2000.

Member	Clear Cover (mm)
Footing	75 mm
Column	40 mm
Shear Walls	40 mm
Beams	40 mm
Slabs	20 mm
Staircase waist slab	30 mm
Water Tanks	40 mm

13. FOUNDATION SYSTEM

The building has been supported on Isolated column footing & Combined Raft footing as per soil investigation report provided by PRASAD AMSTRONG YEN GEC (P) LTD

14. FIRE RATING

Fire rating of 2 hours is considered for columns and 1.5 hours for beam and slabs.

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15. CODES AND STANDARDS

All the designs are conforming to the relevant Indian Standards. Some of the relevant Indian Standard Codes, which have been followed for the structural designs, are given below.

Code	Description
IS:875 (Part-1)-1987	Code of Practice for Design Loads (Other than Earthquake) for Building and Structures-Unit Weights of Buildings Materials and Stored Material.
IS:875 (Part-2)-1987	Code of Practice for Design Loads (Other than Earthquake) for Building and Structures-Imposed loads
IS:875 (Part-3)-2015	Code of Practice for Design Loads (Other than Earthquake) for Buildings and Structures - Wind Load.
IS:875 (Part-5)-1987	Code of Practice for Design Loads (Other than Earthquake) for Buildings and Structures - Special Loads and Load Combinations
IS:456-2000	Code of Practice for Plain and Reinforced Concrete
IS:1893 (Part-1)-2016	Indian Standard Criteria for Earthquake Resistant Design of Structures
IS:432 (Part-1)-1982	Specification of Mild Steel and Medium Tensile Steel bars and Hard drawn Steel Wire for concrete reinforcement -Mild Steel and Medium Tensile Steel Bars
IS:432 (Part-2)-1982	Specification of Mild Steel and Medium Tensile Steel bars and Hard drawn Steel Wire for concrete reinforcement -Hard drawn Steel Wire.
IS:1786-1985	Specification for High Strength Deformed Steel Bars and Wires for Concrete Reinforcement
IS:13920-2016	Ductile Detailing of reinforced concrete structures subjected to seismic forces - code of practice.
IS:1904	Indian Standard Code of practice for Design & Construction foundations in Soil: General Requirements.
IS:1642-1989	Indian Standard Code of practice for Fire Safety of Buildings (General): Details of Construction.
IS:3370-2009	Indian Standard Code of practice for Concrete Structures for Storage of Liquids.
IS:1343-1980	Indian Standard Code of practice for Pre-stressed Concrete.

DESIGNAGE CONSULTING STRUCTURAL ENGINEERS

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Chennai-600100, Ph : 9500702114

For Designage Consultants Pvt Ltd.

STRUCTURAL DESIGN BASIS REPORT

FOR TOWER B OF

PROPOSED CONSTRUCTION OF 2 BASEMENT FLOOR + GROUND FLOOR + 15 FLOORS RESIDENTIAL BUILDING AT PALLAVARAM TOWN AND TALUK, CHENGALPATTU DISTRICT, 200 FEET PALLAVARAM THORAIPAKKAM RADIAL ROAD, TAMBARAM MUNICIPAL CORPORATION, CHENNAI.

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R1–06. AUGUST. 2025

DESIGNAGE CONSULTING STRUCTURAL ENGINEERS

1. INTRODUCTION

2. DESIGN LOADS
   - 2.1 Material Dead Loads
   - 2.2 Weight of Walls
   - 2.3 Dead Loads
   - 2.4 Wind Loads
   - 2.5 Earthquake Load

3. CHECK FOR LATERAL SWAY

4. CHECK FOR LATERAL SWAY (STOREY DRIFT)

5. BASIC LOAD CASES

6. BASIC LOADS AND LOAD COMBINATIONS

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DESIGNAGE CONSULTING STRUCTURAL ENGINEERS

Designage Consultants Pvt. Ltd.

1. INTRODUCTION

The proposed development consists 10 towers of 2 **Basement + Ground Floor + 15 Floors+ Terrace.** Tower B is mean for use as residential building. The basement Floors are to be used as Parking Area & for Services. The 1st to 15th floor to be used for residential purposes. Lift machine rooms are above the terrace level.

The building is essentially a RCC framed structure with Mivan Technology (Shear walls, Slabs, Beams). The slab transfers horizontal & vertical loads to beams & shear walls. The vertical & horizontal loads are transferred to the foundation through walls.

The floor-to-floor height of respective floors is as shown below.

Floor level	Floor to Floor Ht (m)
Basement floor 2	3.60
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Ground Floor	2.95
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The total height of building up to Terrace level is 47.65 meter (excluding parapet) from Ground level.

2. DESIGN LOADS

2.1 Material Dead Loads as per IS875 (part-1) :

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

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

Density of Reinforced Cement Concrete	=	25 kN/m^3
Density of Plain Cement Concrete	=	24 kN/m^3
Density of Steel	=	78.5 kN/m^3
Density of Soil	=	18 kN/m^3
Density of Saturated Soil	=	20 kN/m^3
Density of Water	=	10 kN/m^3
Density of light weight Masonry	=	10 kN/m^3
Density of Plum Concrete	=	24 kN/m^3

DESIGNAGE CONSULTING STRUCTURAL ENGINEERS

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2.2 Weight of Walls:

200mm thk R.C. wall (structural wall) = 5.0 kN/m^2

160mm thk R.C. wall (structural wall) = 4.0 kN/m^2

100mm thk R.C. wall (Non-structural wall) = 2.5 kN/m^2

Typical calculations for wall load :

200mm thk R.C. wall (structural wall)

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Wall Load = (0.2x25)=5.0 KN/m^2

160mm thk R.C. wall (structural wall)

Concrete wall Density = 25 kN/ cu. meter

Wall Load = (0.160x25) =4.00KN/m^2

100mm thk R.C. wall (Non-structural wall)

Concrete wall Density = 25 kN/ cu. meter

Wall Load = (0.10x25) =3.00 KN/m^2

Note: For localized design of slabs, wall loading shall be applied as per actual layout.

2.3 DEAD& LIVE LOADS:

The construction load, super imposed dead load that are envisaged to act permanently (wherever applicable) as per IS:875(part-1)–1987 & Live loads for each occupancy category as per IS:875(part-2)–1987 and Live load reduction is considered as per IS:875(part-2) CL.3.2.

2.3.1 BASEMENT FLOOR-PARKING AREA

Description		KN/m^2
Dead Load	Slab & beam	Self-weight
Superimposed Dead Load	Floor Finishes including screed (50mm Thk Tremix)	1.0
	Services	1
Live Load	Parking Area	3.0

DESIGNAGE CONSULTING STRUCTURAL ENGINEERS

Designage Consultants Pvt. Ltd.

2.3.2 1ST TO 15TH (TYPICAL) FLOOR

Description		KN/m²
Dead Load	Slab & Beam	Self-weight
Superimposed Dead Load	Floor Finishes	1
	Toilet Sunk 65 mm (Light weight filling)	1.3
	Balcony Sunk 100 mm (Light weight filling)	2.0
	Balcony Sunk 150 mm (Light weight filling)	3.0
Live Load	Room	2
	Toilet	2
	Balconies	3
	Corridors, Passages, including fire escapes, Lift lobbies Staircase	3

2.3.4TERRACE LEVEL

Description		
Dead Load	Slab & Beam	Self-weight
	Water proofing & Floor Finishes including screed (150mm)	3 KN/m²
Live Load	Live	1.50 KN/m²

Description		
	Lift Machine Room	600KN per lift (as per architectural drawings)
	Head Room	200KN (Including Self Weight)

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2.4 WIND LOADS

The wind pressure is calculated on the basis of data furnished below and other provisions laid in IS875 (Part-3) – 2015

Basic Wind Speed V_b = 50 m/sec

Risk Coefficient K_1 = 1 (Based on 50 years return period)

Terrain, Height Factor K_2 = 1.16
(as per Table 2 of IS: 875 (Part 3) – 2015)

Terrain Category = II

K_3 = 1

K_4 = 1

Design Wind Speed (V_z)

$V_z = V_b \times K_1 \times K_2 \times K_3 \times K_4$

Where,

V_b =Basic Wind Speed

K_1 = Risk Co-efficient for different classes of structures in different wind speed zones.

K_2 = Terrain roughness & height factor.

K_3 = Topography factor.

K_4 = Importance factor for cyclonic region.

Design Wind Pressure

$Pz = 0.6Vz^2$

2.4.1 GUST FACTOR

Gust factor method is used as per clause No. 10.0 IS 875 (part 3) - 2015.

Wind Pressure Table in kN/m2								
Story Lable	Along+X	Across+X	Along-X	Across-X	Along+Y	Across+Y	Along-Y	Across-Y
Terrace	2.345	2.016	2.345	2.016	2.161	1.030	2.161	1.030
15th Floor	2.289	1.891	2.289	1.891	2.109	0.966	2.109	0.966
14th Floor	2.229	1.766	2.229	1.766	2.053	0.903	2.053	0.903
13th Floor	2.165	1.641	2.165	1.641	1.994	0.839	1.994	0.839
12th Floor	2.098	1.517	2.098	1.517	1.932	0.775	1.932	0.775
11th Floor	2.025	1.392	2.025	1.392	1.865	0.711	1.865	0.711
10th Floor	1.948	1.267	1.948	1.267	1.793	0.647	1.793	0.647
9th Floor	1.865	1.142	1.865	1.142	1.715	0.584	1.715	0.584
8th Floor	1.775	1.017	1.775	1.017	1.631	0.520	1.631	0.520
7th Floor	1.676	0.893	1.676	0.893	1.540	0.456	1.540	0.456
6th Floor	1.566	0.768	1.566	0.768	1.438	0.392	1.438	0.392
5th Floor	1.442	0.643	1.442	0.643	1.323	0.329	1.323	0.329
4th Floor	1.299	0.518	1.299	0.518	1.191	0.265	1.191	0.265
3rd Floor	1.128	0.393	1.128	0.393	1.034	0.201	1.034	0.201
2nd Floor	0.913	0.269	0.913	0.269	0.836	0.137	0.836	0.137
1st Floor	0.611	0.144	0.611	0.144	0.560	0.073	0.560	0.073
Ground Floor	0.188	0.019	0.188	0.019	0.172	0.010	0.172	0.010

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2.5 EARTHQUAKE LOAD

The loading due to earthquake is assessed as per the provisions of IS: 1893 (Part-1):2016

Seismic Zone		=	III
Soil type		=	I
Table-2	Zone factor (Z)	=	0.16
Table-6	Importance Factor (I)	=	1.2
Table-7	Response Reduction Factor (R)	=	4.0
	Height of buildings (H)	=	47.65 m

Height of building considered from stilt floor for time period calculation.

Fundamental natural time period (Ta)

Ta(x) = 0.09H / √ d from CL.7.6.1– IS1893 (part – I):2016

Ta(y) = 0.09H / √ d from CL.7.6.1 – IS1893 (part – I):2016

Sa/g from FIG-2 IS 1893 (part I):2016.

Horizontal Seismic Co-Efficient

$$Ahx = \frac{Z \times I \, Sa}{2 \times R \, g}$$

$$Ahy = \frac{Z \times I \, Sa}{2 \times R \, g}$$

Dynamic analysis is performed using response reduction as per IS-1893(2016) Clause 7.7.

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3. CHECK FOR LATERAL SWAY AS PER IS 456-2000 & IS 1893-2016

It is generally recognized that absolute sway is not a perceivable parameter; however, limiting sway is used to provide a reasonable level of stiffness and in order to limit damage to non-structural elements as well as limit size of curtain wall joints, etc.

Generally tall building lateral load resisting systems are sized on the basis of limiting overall lateral sways to limits of approximately Overall Height/500 under the 50 year return period wind loads, Overall Height/400 under the 20 year return period wind loads and Overall Height/250 under seismic loads.

4. CHECK FOR LATERAL SWAY (STOREY DRIFT) AS PER IS- 1893-2016

The allowable lateral sway (storey drift) due to earthquake force should not exceed L/250, Where L is the storey height

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5. BASIC LOAD CASES

The various loads are combined in accordance with the stipulations in IS: 875 (Part 5)-1987. Wherever imposed load is combined with earthquake load the appropriate part of the imposed

Load as specified in IS: 1893-2016 is adopted both for evaluating earthquake effect and for combined load effects, used in such combination.

5.1 Basic Load Cases

Load Case Type	Mark	Description
Primary	DL	SELF WEIGHT OF STRUCTURAL MEMBER
Primary	SDL	SUPERIMPOSED DEAD LOAD
Primary	LL1	LIVE LOAD =<3 kN/m^2 (Live 1)
Primary	LL2	LIVE LOAD > 3 kN/m^2 (Live 2)
Primary	LL3	NON REDUCIBLE LIVE LOAD
Primary	EQX	SEISMIC LOAD IN X DIRECTION
Primary	EQY	SEISMIC LOAD IN Y DIRECTION
Primary	WLX	WIND LOAD IN X DIRECTION
Primary	WLY	WIND LOAD IN Y DIRECTION
Primary	SLX	SEISMIC LOAD IN X DIRECTION
Primary	SLY	SEISMIC LOAD IN Y DIRECTION

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6. BASIC LOADS AND LOAD COMBINATIONS

The various loads are combined in accordance with the stipulations in IS: 875 (Part 5)-1987. Wherever imposed load is combined with earthquake load the appropriate part of the imposed load as specified in IS: 1893-2016 is adopted both for evaluating earthquake effect and for combined load effects, used in such combination.

Description of Load Combination	Load Factor for Primary Load Cases				
	Dead Load	Live Load	Wind Load	Seismic Load	Temp Load
Dead load	1.5	0.0	0.0	0.0	0.0
Dead load + Live load	1.5	1.5	0.0	0.0	0.0
Dead load+Wind load	1.5	0.0	±1.5	0.0	0.0
Dead load+Seismic load	1.5	0.0	0.0	±1.5	0.0
Dead load+Live load+Wind	1.2	1.2	±1.2	0.0	0.0
Dead load+Live load+Seismic	1.2	1.2	0	±1.2	0.0
Dead Load + Wind Load	0.9	0.0	±1.5	0.0	0.0
Dead Load + Seismic Load	0.9	0.0	0.0	±1.5	0.0

7. ANALYSIS METHOD

The structure is analyzed for Static loads (both dead and live loads) and Lateral loads due to Earthquake/Wind loads and its combinations. Software used is E-Tabs version 20.0.0 & for foundation safe version 16.0.2.

The structure will be modeled as 3D space frame. Floor slabs shall be modeled as shell thin with property modifiers.

8. DESIGN METHODOLOGY

All structural members will be designed according to the Limit State Method as specified in IS: 456-2000. Appropriate loads and its combinations, as per relevant clauses in Code IS 456:2000 Code IS 875 (Part-5) 1987, for the most unfavorable effects are chosen for design.

Limit state method is adopted for design of overhead water tanks by using IS-3370(2009)

9. CONSTRUCTION DETAILS

1. Foundation -M:35
2. Water Tanks -M:40
3. Columns/Walls -M:50- up to 10th floor
   M:40- above 10th floor
4. Beams & Slabs -M: 40

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10. REINFORCEMENT

Steel reinforcement shall be of Grade Fe 550 conforming to IS: 1786-1985.

11. EXPOSURE CONDITION

Structural elements below ground level and Exterior External faces of walls are designed for severe exposure condition and internal faces of walls, floor beams and slabs are designed for Mild exposure conditions per Table 16 of IS 456-2000.

12. COVER TO REINFORCEMENT

As per Table 16A-IS: 456-2000.

Member	Clear Cover (mm)
Footing	75 mm
Column	40 mm
Shear Walls	40 mm
Beams	40 mm
Slabs	20 mm
Staircase waist slab	30 mm
Water Tanks	40 mm

13. FOUNDATION SYSTEM

The building has been supported on Isolated column footing & Combined Raft footing as per soil investigation report provided by PRASAD AMSTRONG YEN GEC (P) LTD

14. FIRE RATING

Fire rating of 2 hours is considered for columns and 1.5 hours for beam and slabs.

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15. CODES AND STANDARDS

All the designs are conforming to the relevant Indian Standards. Some of the relevant Indian Standard Codes, which have been followed for the structural designs, are given below.

Code	Description
IS:875 (Part-1)-1987	Code of Practice for Design Loads (Other than Earthquake) for Building and Structures-Unit Weights of Buildings Materials and Stored Material.
IS:875 (Part-2)-1987	Code of Practice for Design Loads (Other than Earthquake) for Building and Structures-Imposed loads
IS:875 (Part-3)-2015	Code of Practice for Design Loads (Other than Earthquake) for Buildings and Structures - Wind Load.
IS:875 (Part-5)-1987	Code of Practice for Design Loads (Other than Earthquake) for Buildings and Structures - Special Loads and Load Combinations
IS:456-2000	Code of Practice for Plain and Reinforced Concrete
IS:1893 (Part-1)-2016	Indian Standard Criteria for Earthquake Resistant Design of Structures
IS:432 (Part-1)-1982	Specification of Mild Steel and Medium Tensile Steel bars and Hard drawn Steel Wire for concrete reinforcement -Mild Steel and Medium Tensile Steel Bars
IS:432 (Part-2)-1982	Specification of Mild Steel and Medium Tensile Steel bars and Hard drawn Steel Wire for concrete reinforcement -Hard drawn Steel Wire.
IS:1786-1985	Specification for High Strength Deformed Steel Bars and Wires for Concrete Reinforcement
IS:13920-2016	Ductile Detailing of reinforced concrete structures subjected to seismic forces - code of practice.
IS:1904	Indian Standard Code of practice for Design & Construction foundations in Soil: General Requirements.
IS:1642-1989	Indian Standard Code of practice for Fire Safety of Buildings (General): Details of Construction.
IS:3370-2009	Indian Standard Code of practice for Concrete Structures for Storage of Liquids.
IS:1343-1980	Indian Standard Code of practice for Pre-stressed Concrete.

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For Designage Consultants Pvt Ltd.

STRUCTURAL DESIGN BASIS REPORT

FOR TOWER C OF

PROPOSED CONSTRUCTION OF 2 BASEMENT FLOOR + GROUND FLOOR + 15 FLOORS RESIDENTIAL BUILDING AT PALLAVARAM TOWN AND TALUK, CHENGALPATTU DISTRICT, 200 FEET PALLAVARAM THORAIPAKKAM RADIAL ROAD, TAMBARAM MUNICIPAL CORPORATION, CHENNAI.

OFFICE NO.403, WING-C, 4TH FLOOR,
AUDUMBAR APTS., CANAL ROAD,
WARJE, PUNE-411052.
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CLIENT
M/S EMERALD HAVEN REALITY LTD

ARCHITECT-
KAPADIA ASSOCIATES DESIGN LLP

GEOTECHNICAL CONSULTANTS
PRASAD ARMSTRONG YEN GEC (P) LTD

R1–13. OCTOBER. 2025

DESIGNAGE CONSULTING STRUCTURAL ENGINEERS

1. INTRODUCTION

2. DESIGN LOADS
   - 2.1 Material Dead Loads
   - 2.2 Weight of Walls
   - 2.3 Dead Loads
   - 2.4 Wind Loads
   - 2.5 Earthquake Load

3. CHECK FOR LATERAL SWAY

4. CHECK FOR LATERAL SWAY (STOREY DRIFT)

5. BASIC LOAD CASES

6. BASIC LOADS AND LOAD COMBINATIONS

7. ANALYSIS METHOD

8. DESIGN METHODOLOGY

9. CONSTRUCTION DETAILS

10. REINFORCEMENT

11. EXPOSURE CONDITION

12. COVER TO REINFORCEMENT

13. FOUNDATION SYSTEM

14. FIRE RATING

15. CODES AND STANDARDS

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1. INTRODUCTION

The proposed development consists 10 towers of 2 **Basement + Ground Floor + 15 Floors+ Terrace.** Tower C is mean for use as residential building. The basement Floors are to be used as Parking Area & for Services. The 1st to 15th floor to be used for residential purposes. Lift machine rooms are above the terrace level.

The building is essentially a RCC framed structure with Mivan Technology (Shear walls, Slabs, Beams). The slab transfers horizontal & vertical loads to beams & shear walls. The vertical & horizontal loads are transferred to the foundation through walls.

The floor-to-floor height of respective floors is as shown below.

Floor level	Floor to Floor Ht (m)
Basement floor 2	3.60
Basement floor 1	5.35
Ground Floor	2.95
1st Floor to 15th Floor	2.95

The total height of building up to Terrace level is 47.65 meter (excluding parapet) from Ground level.

2. DESIGN LOADS

2.1 Material Dead Loads as per IS875 (part-1) :

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

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

Density of Reinforced Cement Concrete	=	25 kN/m^3
Density of Plain Cement Concrete	=	24 kN/m^3
Density of Steel	=	78.5 kN/m^3
Density of Soil	=	18 kN/m^3
Density of Saturated Soil	=	20 kN/m^3
Density of Water	=	10 kN/m^3
Density of light weight Masonry	=	10 kN/m^3
Density of Plum Concrete	=	24 kN/m^3

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2.2 Weight of Walls:

200mm thk R.C. wall (structural wall) = 5.0 kN/m^2

160mm thk R.C. wall (structural wall) = 4.0 kN/m^2

100mm thk R.C. wall (Non-structural wall) = 2.5 kN/m^2

Typical calculations for wall load :

200mm thk R.C. wall (structural wall)

Concrete wall Density = 25 kN/ cu. meter

Wall Load = (0.2x25)=5.0 KN/m^2

160mm thk R.C. wall (structural wall)

Concrete wall Density = 25 kN/ cu. meter

Wall Load = (0.160x25) =4.00KN/m^2

100mm thk R.C. wall (Non-structural wall)

Concrete wall Density = 25 kN/ cu. meter

Wall Load = (0.10x25) =3.00 KN/m^2

Note: For localized design of slabs, wall loading shall be applied as per actual layout.

2.3 DEAD& LIVE LOADS:

The construction load, super imposed dead load that are envisaged to act permanently (wherever applicable) as per IS:875(part-1)–1987 & Live loads for each occupancy category as per IS:875(part-2)–1987 and Live load reduction is considered as per IS:875(part-2) CL.3.2.

2.3.1 BASEMENT FLOOR-PARKING AREA

Description		**KN/m^2**
Dead Load	Slab & beam	Self-weight
Superimposed Dead Load	Floor Finishes including screed (50mm Thk Tremix)	1.0
	Services	1
Live Load	Parking Area	3.0

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2.3.2 1ST TO 15TH (TYPICAL)FLOOR

Description		KN/m²
Dead Load	Slab & Beam	Self-weight
Superimposed Dead Load	Floor Finishes	1
	Toilet Sunk 65 mm (Light weight filling)	1.3
	Balcony Sunk 100 mm (Light weight filling)	2.0
	Utility Sunk 150 mm (Light weight filling	3.0
Live Load	Room	2
	Toilet	2
	Balconies	3
	Corridors, Passages, including fire escapes, Lift lobbies Staircase	3

2.3.4TERRACE LEVEL

Description		
Dead Load	Slab & Beam	Self-weight
	Water proofing & Floor Finishes including screed (150mm)	3 KN/m²
Live Load	Live	1.50 KN/m²

Description		
	Lift Machine Room	600KN per lift (as per architectural drawings)
	Head Room	200KN (Including Self Weight)

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2.4 WIND LOADS

The wind pressure is calculated on the basis of data furnished below and other provisions laid in IS875 (Part-3) – 2015

Basic Wind Speed V_b = 50 m/sec

Risk Coefficient K_1 = 1 (Based on 50 years return period)

Terrain, Height Factor K_2 = 1.16
(as per Table 2 of IS: 875 (Part 3) – 2015)

Terrain Category = II

K_3 = 1

K_4 = 1

Design Wind Speed (V_z)

$V_z = V_b \times K_1 \times K_2 \times K_3 \times K_4$

Where,

V_b =Basic Wind Speed

K_1 = Risk Co-efficient for different classes of structures in different wind speed zones.

K_2 = Terrain roughness & height factor.

K_3 = Topography factor.

K_4 = Importance factor for cyclonic region.

Design Wind Pressure

$Pz = 0.6Vz^2$

2.4.1 GUST FACTOR

Gust factor method is used as per clause No. 10.0 IS 875 (part 3) - 2015.

Wind Pressure Table in kN/m2								
Story Lable	Along+X	Across+X	Along-X	Across-X	Along+Y	Across+Y	Along-Y	Across-Y
Terrace	2.377	1.797	2.377	1.797	2.389	1.832	2.389	1.832
15th Floor	2.319	1.685	2.319	1.685	2.330	1.718	2.330	1.718
14th Floor	2.258	1.574	2.258	1.574	2.269	1.605	2.269	1.605
13th Floor	2.192	1.463	2.192	1.463	2.203	1.492	2.203	1.492
12th Floor	2.123	1.352	2.123	1.352	2.133	1.378	2.133	1.378
11th Floor	2.049	1.240	2.049	1.240	2.059	1.265	2.059	1.265
10th Floor	1.969	1.129	1.969	1.129	1.979	1.151	1.979	1.151
9th Floor	1.884	1.018	1.884	1.018	1.893	1.038	1.893	1.038
8th Floor	1.791	0.907	1.791	0.907	1.800	0.925	1.800	0.925
7th Floor	1.690	0.796	1.690	0.796	1.699	0.811	1.699	0.811
6th Floor	1.578	0.684	1.578	0.684	1.586	0.698	1.586	0.698
5th Floor	1.452	0.573	1.452	0.573	1.460	0.584	1.460	0.584
4th Floor	1.307	0.462	1.307	0.462	1.314	0.471	1.314	0.471
3rd Floor	1.135	0.351	1.135	0.351	1.140	0.358	1.140	0.358
2nd Floor	0.918	0.239	0.918	0.239	0.922	0.244	0.922	0.244
1st Floor	0.614	0.128	0.614	0.128	0.617	0.131	0.617	0.131
Ground Floor	0.188	0.016	0.188	0.016	0.189	0.017	0.189	0.017

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Wind Pressure Table in kN/m2								
Story Lable	Along+X	Across+X	Along-X	Across-X	Along+Y	Across+Y	Along-Y	Across-Y
Terrace	2.377	1.797	2.377	1.797	2.389	1.832	2.389	1.832
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2.5 EARTHQUAKE LOAD

The loading due to earthquake is assessed as per the provisions of IS: 1893 (Part-1):2016

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Soil type		=	I
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Primary	WLX	WIND LOAD IN X DIRECTION
Primary	WLY	WIND LOAD IN Y DIRECTION
Primary	SLX	SEISMIC LOAD IN X DIRECTION
Primary	SLY	SEISMIC LOAD IN Y DIRECTION

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6. BASIC LOADS AND LOAD COMBINATIONS

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Dead load+Wind load	1.5	0.0	±1.5	0.0	0.0
Dead load+Seismic load	1.5	0.0	0.0	±1.5	0.0
Dead load+Live load+Wind load	1.2	1.2	±1.2	0.0	0.0
Dead load+Live load+Seismic	1.2	1.2	0	±1.2	0.0
Dead Load + Wind Load	0.9	0.0	±1.5	0.0	0.0
Dead Load + Seismic Load	0.9	0.0	0.0	±1.5	0.0

7. ANALYSIS METHOD

The structure is analyzed for Static loads (both dead and live loads) and Lateral loads due to Earthquake/Wind loads and its combinations. Software used is E-Tabs version 20.0.0 & for foundation safe version 16.0.2.

The structure will be modeled as 3D space frame. Floor slabs shall be modeled as shell thin with property modifiers.

8. DESIGN METHODOLOGY

All structural members will be designed according to the Limit State Method as specified in IS: 456-2000. Appropriate loads and its combinations, as per relevant clauses in Code IS 456:2000 Code IS 875 (Part-5) 1987, for the most unfavorable effects are chosen for design.

Limit state method is adopted for design of overhead water tanks by using IS-3370(2009)

9. CONSTRUCTION DETAILS

1. Foundation -M:35
2. Water Tanks -M:40
3. Columns/Walls -M:50- up to 10th floor
   M:40- above 10th floor
4. Beams & Slabs -M: 40

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10. REINFORCEMENT

Steel reinforcement shall be of Grade Fe 550 conforming to IS: 1786-1985.

11. EXPOSURE CONDITION

Structural elements below ground level and Exterior External faces of walls are designed for severe exposure condition and internal faces of walls, floor beams and slabs are designed for Mild exposure conditions per Table 16 of IS 456-2000.

12. COVER TO REINFORCEMENT

As per Table 16A-IS: 456-2000.

Member	Clear Cover (mm)
Footing	75 mm
Column	40 mm
Shear Walls	40 mm
Beams	40 mm
Slabs	20 mm
Staircase waist slab	30 mm
Water Tanks	40 mm

13. FOUNDATION SYSTEM

The building has been supported on Isolated column footing & Combined Raft footing as per soil investigation report provided by PRASAD AMSTRONG YEN GEC (P) LTD

14. FIRE RATING

Fire rating of 2 hours is considered for columns and 1.5 hours for beam and slabs.

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15. CODES AND STANDARDS

All the designs are conforming to the relevant Indian Standards. Some of the relevant Indian Standard Codes, which have been followed for the structural designs, are given below.

Code	Description
IS:875 (Part-1)-1987	Code of Practice for Design Loads (Other than Earthquake) for Building and Structures-Unit Weights of Buildings Materials and Stored Material.
IS:875 (Part-2)-1987	Code of Practice for Design Loads (Other than Earthquake) for Building and Structures-Imposed loads
IS:875 (Part-3)-2015	Code of Practice for Design Loads (Other than Earthquake) for Buildings and Structures - Wind Load.
IS:875 (Part-5)-1987	Code of Practice for Design Loads (Other than Earthquake) for Buildings and Structures - Special Loads and Load Combinations
IS:456-2000	Code of Practice for Plain and Reinforced Concrete
IS:1893 (Part-1)-2016	Indian Standard Criteria for Earthquake Resistant Design of Structures
IS:432 (Part-1)-1982	Specification of Mild Steel and Medium Tensile Steel bars and Hard drawn Steel Wire for concrete reinforcement -Mild Steel and Medium Tensile Steel Bars
IS:432 (Part-2)-1982	Specification of Mild Steel and Medium Tensile Steel bars and Hard drawn Steel Wire for concrete reinforcement -Hard drawn Steel Wire.
IS:1786-1985	Specification for High Strength Deformed Steel Bars and Wires for Concrete Reinforcement
IS:13920-2016	Ductile Detailing of reinforced concrete structures subjected to seismic forces - code of practice.
IS:1904	Indian Standard Code of practice for Design & Construction foundations in Soil: General Requirements.
IS:1642-1989	Indian Standard Code of practice for Fire Safety of Buildings (General): Details of Construction.
IS:3370-2009	Indian Standard Code of practice for Concrete Structures for Storage of Liquids.
IS:1343-1980	Indian Standard Code of practice for Pre-stressed Concrete.

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For Designage Consultants Pvt Ltd.

STRUCTURAL DESIGN BASIS REPORT

FOR TOWER D & E OF

PROPOSED CONSTRUCTION OF 2 BASEMENT FLOOR + GROUND FLOOR + 15 FLOORS RESIDENTIAL BUILDING AT PALLAVARAM TOWN AND TALUK, CHENGALPATTU DISTRICT, 200 FEET PALLAVARAM THORAIPAKKAM RADIAL ROAD, TAMBARAM MUNICIPAL CORPORATION, CHENNAI.

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R1–06. AUGUST. 2025

DESIGNAGE CONSULTING STRUCTURAL ENGINEERS

1. INTRODUCTION

2. DESIGN LOADS
   - 2.1 Material Dead Loads
   - 2.2 Weight of Walls
   - 2.3 Dead Loads
   - 2.4 Wind Loads
   - 2.5 Earthquake Load

3. CHECK FOR LATERAL SWAY

4. CHECK FOR LATERAL SWAY (STOREY DRIFT)

5. BASIC LOAD CASES

6. BASIC LOADS AND LOAD COMBINATIONS

7. ANALYSIS METHOD

8. DESIGN METHODOLOGY

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10. REINFORCEMENT

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12. COVER TO REINFORCEMENT

13. FOUNDATION SYSTEM

14. FIRE RATING

15. CODES AND STANDARDS

DESIGNAGE CONSULTING STRUCTURAL ENGINEERS

Designage Consultants Pvt. Ltd.

1. INTRODUCTION

The proposed development consists 10 towers of 2 **Basement + Ground Floor + 15 Floors+ Terrace.** Tower D & E is mean for use as residential building. The basement Floors are to be used as Parking Area & for Services. The 1st to 15th floor to be used for residential purposes. Lift machine rooms are above the terrace level.

The building is essentially a RCC framed structure with Mivan Technology (Shear walls, Slabs, Beams). The slab transfers horizontal & vertical loads to beams & shear walls. The vertical & horizontal loads are transferred to the foundation through walls.

The floor-to-floor height of respective floors is as shown below.

Floor level	Floor to Floor Ht (m)
Basement floor 2	3.60
Basement floor 1	5.35
Ground Floor	2.95
1st Floor to 15th Floor	2.95

The total height of building up to Terrace level is 47.65 meter (excluding parapet) from Ground level.

2. DESIGN LOADS

2.1 Material Dead Loads as per IS875 (part-1) :

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

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

Density of Reinforced Cement Concrete	=	25 kN/m^3
Density of Plain Cement Concrete	=	24 kN/m^3
Density of Steel	=	78.5 kN/m^3
Density of Soil	=	18 kN/m^3
Density of Saturated Soil	=	20 kN/m^3
Density of Water	=	10 kN/m^3
Density of light weight Masonry	=	10 kN/m^3
Density of Plum Concrete	=	24 kN/m^3

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2.2 Weight of Walls:

200mm thk R.C. wall (structural wall) = 5.0 kN/m^2

160mm thk R.C. wall (structural wall) = 4.0 kN/m^2

100mm thk R.C. wall (Non-structural wall) = 2.5 kN/m^2

Typical calculations for wall load :

200mm thk R.C. wall (structural wall)

Concrete wall Density = 25 kN/ cu. meter

Wall Load = (0.2x25)=5.0 KN/m^2

160mm thk R.C. wall (structural wall)

Concrete wall Density = 25 kN/ cu. meter

Wall Load = (0.160x25) =4.00KN/m^2

100mm thk R.C. wall (Non-structural wall)

Concrete wall Density = 25 kN/ cu. meter

Wall Load = (0.10x25) =3.00 KN/m^2

Note: For localized design of slabs, wall loading shall be applied as per actual layout.

2.3 DEAD& LIVE LOADS:

The construction load, super imposed dead load that are envisaged to act permanently (wherever applicable) as per IS:875(part-1)–1987 & Live loads for each occupancy category as per IS:875(part-2)–1987 and Live load reduction is considered as per IS:875(part-2) CL.3.2.

2.3.1 BASEMENT FLOOR-PARKING AREA

Description		KN/m^2
Dead Load	Slab & beam	Self-weight
Superimposed Dead Load	Floor Finishes including screed (50mm Thk Tremix)	1.0
	Services	1
Live Load	Parking Area	3.0

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2.3.2 1ST TO 15TH (TYPICAL)FLOOR

Description		KN/m²
Dead Load	Slab & Beam	Self-weight
Superimposed Dead Load	Floor Finishes	1
	Toilet Sunk 65 mm (Light weight filling)	1.3
	Balcony Sunk 100 mm (Light weight filling)	2.0
	Utility Sunk 150 mm (Light weight filling	3.0
Live Load	Room	2
	Toilet	2
	Balconies	3
	Corridors, Passages, including fire escapes, Lift lobbies Staircase	3

2.3.4TERRACE LEVEL

Description		
Dead Load	Slab & Beam	Self-weight
	Water proofing & Floor Finishes including screed (150mm)	3 KN/m²
Live Load	Live	1.50 KN/m²

Description		
	Lift Machine Room	600KN per lift (as per architectural drawings)
	Head Room	200KN (Including Self Weight)

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2.4 WIND LOADS

The wind pressure is calculated on the basis of data furnished below and other provisions laid in IS875 (Part-3) – 2015

Basic Wind Speed V_b = 50 m/sec

Risk Coefficient K_1 = 1 (Based on 50 years return period)

Terrain, Height Factor K_2 = 1.16
(as per Table 2 of IS: 875 (Part 3) – 2015)

Terrain Category = II

K_3 = 1

K_4 = 1

Design Wind Speed (V_z)

$V_z = V_b \times K_1 \times K_2 \times K_3 \times K_4$

Where,

V_b =Basic Wind Speed

K_1 = Risk Co-efficient for different classes of structures in different wind speed zones.

K_2 = Terrain roughness & height factor.

K_3 = Topography factor.

K_4 = Importance factor for cyclonic region.

Design Wind Pressure

$Pz = 0.6Vz^2$

2.4.1 GUST FACTOR

Gust factor method is used as per clause No. 10.0 IS 875 (part 3) - 2015.

Wind Pressure Table in kN/m2								
Story Lable	Along+X	Across+X	Along-X	Across-X	Along+Y	Across+Y	Along-Y	Across-Y
Terrace	2.377	1.797	2.377	1.797	2.389	1.832	2.389	1.832
15th Floor	2.319	1.685	2.319	1.685	2.330	1.718	2.330	1.718
14th Floor	2.258	1.574	2.258	1.574	2.269	1.605	2.269	1.605
13th Floor	2.192	1.463	2.192	1.463	2.203	1.492	2.203	1.492
12th Floor	2.123	1.352	2.123	1.352	2.133	1.378	2.133	1.378
11th Floor	2.049	1.240	2.049	1.240	2.059	1.265	2.059	1.265
10th Floor	1.969	1.129	1.969	1.129	1.979	1.151	1.979	1.151
9th Floor	1.884	1.018	1.884	1.018	1.893	1.038	1.893	1.038
8th Floor	1.791	0.907	1.791	0.907	1.800	0.925	1.800	0.925
7th Floor	1.690	0.796	1.690	0.796	1.699	0.811	1.699	0.811
6th Floor	1.578	0.684	1.578	0.684	1.586	0.698	1.586	0.698
5th Floor	1.452	0.573	1.452	0.573	1.460	0.584	1.460	0.584
4th Floor	1.307	0.462	1.307	0.462	1.314	0.471	1.314	0.471
3rd Floor	1.135	0.351	1.135	0.351	1.140	0.358	1.140	0.358
2nd Floor	0.918	0.239	0.918	0.239	0.922	0.244	0.922	0.244
1st Floor	0.614	0.128	0.614	0.128	0.617	0.131	0.617	0.131
Ground Floor	0.188	0.016	0.188	0.016	0.189	0.017	0.189	0.017

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2.5 EARTHQUAKE LOAD

The loading due to earthquake is assessed as per the provisions of IS: 1893 (Part-1):2016

Seismic Zone		=	III
Soil type		=	I
Table-2	Zone factor (Z)	=	0.16
Table-6	Importance Factor (I)	=	1.2
Table-7	Response Reduction Factor (R)	=	4.0
	Height of buildings (H)	=	47.65 m

Height of building considered from stilt floor for time period calculation.

Fundamental natural time period (Ta)

Ta(x) = 0.09H / √ d from CL.7.6.1– IS1893 (part – I):2016

Ta(y) = 0.09H / √ d from CL.7.6.1 – IS1893 (part – I):2016

Sa/g from FIG-2 IS 1893 (part I):2016.

Horizontal Seismic Co-Efficient

$$Ahx = \frac{Z \times I \, Sa}{2 \times R \, g}$$

$$Ahy = \frac{Z \times I \, Sa}{2 \times R \, g}$$

Dynamic analysis is performed using response reduction as per IS-1893(2016) Clause 7.7.

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3. CHECK FOR LATERAL SWAY AS PER IS 456-2000 & IS 1893-2016

It is generally recognized that absolute sway is not a perceivable parameter; however, limiting sway is used to provide a reasonable level of stiffness and in order to limit damage to non-structural elements as well as limit size of curtain wall joints, etc.

Generally tall building lateral load resisting systems are sized on the basis of limiting overall lateral sways to limits of approximately Overall Height/500 under the 50 year return period wind loads, Overall Height/400 under the 20 year return period wind loads and Overall Height/250 under seismic loads.

4. CHECK FOR LATERAL SWAY (STOREY DRIFT) AS PER IS- 1893-2016

The allowable lateral sway (storey drift) due to earthquake force should not exceed L/250, Where L is the storey height

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5. BASIC LOAD CASES

The various loads are combined in accordance with the stipulations in IS: 875 (Part 5)-1987. Wherever imposed load is combined with earthquake load the appropriate part of the imposed

Load as specified in IS: 1893-2016 is adopted both for evaluating earthquake effect and for combined load effects, used in such combination.

5.1 Basic Load Cases

Load Case Type	Mark	Description
Primary	DL	SELF WEIGHT OF STRUCTURAL MEMBER
Primary	SDL	SUPERIMPOSED DEAD LOAD
Primary	LL1	LIVE LOAD =<3 kN/m^2 (Live 1)
Primary	LL2	LIVE LOAD > 3 kN/m^2 (Live 2)
Primary	LL3	NON REDUCIBLE LIVE LOAD
Primary	EQX	SEISMIC LOAD IN X DIRECTION
Primary	EQY	SEISMIC LOAD IN Y DIRECTION
Primary	WLX	WIND LOAD IN X DIRECTION
Primary	WLY	WIND LOAD IN Y DIRECTION
Primary	SLX	SEISMIC LOAD IN X DIRECTION
Primary	SLY	SEISMIC LOAD IN Y DIRECTION

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6. BASIC LOADS AND LOAD COMBINATIONS

The various loads are combined in accordance with the stipulations in IS: 875 (Part 5)-1987. Wherever imposed load is combined with earthquake load the appropriate part of the imposed load as specified in IS: 1893-2016 is adopted both for evaluating earthquake effect and for combined load effects, used in such combination.

Description of Load Combination	Load Factor for Primary Load Cases				
	Dead Load	Live Load	Wind Load	Seismic Load	Temp Load
Dead load	1.5	0.0	0.0	0.0	0.0
Dead load + Live load	1.5	1.5	0.0	0.0	0.0
Dead load+Wind load	1.5	0.0	±1.5	0.0	0.0
Dead load+Seismic load	1.5	0.0	0.0	±1.5	0.0
Dead load+Live load+Wind load	1.2	1.2	±1.2	0.0	0.0
Dead load+Live load+Seismic	1.2	1.2	0	±1.2	0.0
Dead Load + Wind Load	0.9	0.0	±1.5	0.0	0.0
Dead Load + Seismic Load	0.9	0.0	0.0	±1.5	0.0

7. ANALYSIS METHOD

The structure is analyzed for Static loads (both dead and live loads) and Lateral loads due to Earthquake/Wind loads and its combinations. Software used is E-Tabs version 20.0.0 & for foundation safe version 16.0.2.

The structure will be modeled as 3D space frame. Floor slabs shall be modeled as shell thin with property modifiers.

8. DESIGN METHODOLOGY

All structural members will be designed according to the Limit State Method as specified in IS: 456-2000. Appropriate loads and its combinations, as per relevant clauses in Code IS 456:2000 Code IS 875 (Part-5) 1987, for the most unfavorable effects are chosen for design.

Limit state method is adopted for design of overhead water tanks by using IS-3370(2009)

9. CONSTRUCTION DETAILS

1. Foundation -M:35
2. Water Tanks -M:40
3. Columns/Walls -M:50- up to 10th floor
   M:40- above 10th floor
4. Beams & Slabs -M: 40

DESIGNAGE CONSULTING STRUCTURAL ENGINEERS

Designage Consultants Pvt. Ltd.

10. REINFORCEMENT

Steel reinforcement shall be of Grade Fe 550 conforming to IS: 1786-1985.

11. EXPOSURE CONDITION

Structural elements below ground level and Exterior External faces of walls are designed for severe exposure condition and internal faces of walls, floor beams and slabs are designed for Mild exposure conditions per Table 16 of IS 456-2000.

12. COVER TO REINFORCEMENT

As per Table 16A-IS: 456-2000.

Member	Clear Cover (mm)
Footing	75 mm
Column	40 mm
Shear Walls	40 mm
Beams	40 mm
Slabs	20 mm
Staircase waist slab	30 mm
Water Tanks	40 mm

13. FOUNDATION SYSTEM

The building has been supported on Isolated column footing & Combined Raft footing as per soil investigation report provided by PRASAD AMSTRONG YEN GEC (P) LTD

14. FIRE RATING

Fire rating of 2 hours is considered for columns and 1.5 hours for beam and slabs.

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Designage Consultants Pvt. Ltd.

15. CODES AND STANDARDS

All the designs are conforming to the relevant Indian Standards. Some of the relevant Indian Standard Codes, which have been followed for the structural designs, are given below.

Code	Description
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IS:875 (Part-3)-2015	Code of Practice for Design Loads (Other than Earthquake) for Buildings and Structures - Wind Load.
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IS:1893 (Part-1)-2016	Indian Standard Criteria for Earthquake Resistant Design of Structures
IS:432 (Part-1)-1982	Specification of Mild Steel and Medium Tensile Steel bars and Hard drawn Steel Wire for concrete reinforcement -Mild Steel and Medium Tensile Steel Bars
IS:432 (Part-2)-1982	Specification of Mild Steel and Medium Tensile Steel bars and Hard drawn Steel Wire for concrete reinforcement -Hard drawn Steel Wire.
IS:1786-1985	Specification for High Strength Deformed Steel Bars and Wires for Concrete Reinforcement
IS:13920-2016	Ductile Detailing of reinforced concrete structures subjected to seismic forces - code of practice.
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For Designage Consultants Pvt Ltd.

STRUCTURAL DESIGN BASIS REPORT

FOR TOWER F OF

PROPOSED CONSTRUCTION OF 2 BASEMENT FLOOR + GROUND FLOOR + 15 FLOORS RESIDENTIAL BUILDING AT PALLAVARAM TOWN AND TALUK, CHENGALPATTU DISTRICT, 200 FEET PALLAVARAM THORAIPAKKAM RADIAL ROAD, TAMBARAM MUNICIPAL CORPORATION, CHENNAI.

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R1–13. OCTOBER. 2025

DESIGNAGE CONSULTING STRUCTURAL ENGINEERS

1. INTRODUCTION

2. DESIGN LOADS
   - 2.1 Material Dead Loads
   - 2.2 Weight of Walls
   - 2.3 Dead Loads
   - 2.4 Wind Loads
   - 2.5 Earthquake Load

3. CHECK FOR LATERAL SWAY

4. CHECK FOR LATERAL SWAY (STOREY DRIFT)

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10. REINFORCEMENT

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12. COVER TO REINFORCEMENT

13. FOUNDATION SYSTEM

14. FIRE RATING

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DESIGNAGE CONSULTING STRUCTURAL ENGINEERS

Designage Consultants Pvt. Ltd.

1. INTRODUCTION

The proposed development consists 10 towers of 2 **Basement + Ground Floor + 15 Floors+ Terrace.** Tower F is mean for use as residential building. The basement Floors are to be used as Parking Area & for Services. The 1st to 15th floor to be used for residential purposes. Lift machine rooms are above the terrace level.

The building is essentially a RCC framed structure with Mivan Technology (Shear walls, Slabs, Beams). The slab transfers horizontal & vertical loads to beams & shear walls. The vertical & horizontal loads are transferred to the foundation through walls.

The floor-to-floor height of respective floors is as shown below.

Floor level	Floor to Floor Ht (m)
Basement floor 2	3.60
Basement floor 1	5.35
Ground Floor	2.95
1st Floor to 15th Floor	2.95

The total height of building up to Terrace level is 47.65 meter (excluding parapet) from Ground level.

2. DESIGN LOADS

2.1 Material Dead Loads as per IS875 (part-1) :

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

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

Density of Reinforced Cement Concrete	=	25 kN/m^3
Density of Plain Cement Concrete	=	24 kN/m^3
Density of Steel	=	78.5 kN/m^3
Density of Soil	=	18 kN/m^3
Density of Saturated Soil	=	20 kN/m^3
Density of Water	=	10 kN/m^3
Density of light weight Masonry	=	10 kN/m^3
Density of Plum Concrete	=	24 kN/m^3

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2.2 Weight of Walls:

200mm thk R.C. wall (structural wall) = 5.0 kN/m^2

160mm thk R.C. wall (structural wall) = 4.0 kN/m^2

100mm thk R.C. wall (Non-structural wall) = 2.5 kN/m^2

Typical calculations for wall load :

200mm thk R.C. wall (structural wall)

Concrete wall Density = 25 kN/ cu. meter

Wall Load = (0.2x25)=5.0 KN/m^2

160mm thk R.C. wall (structural wall)

Concrete wall Density = 25 kN/ cu. meter

Wall Load = (0.160x25) =4.00KN/m^2

100mm thk R.C. wall (Non-structural wall)

Concrete wall Density = 25 kN/ cu. meter

Wall Load = (0.10x25) =3.00 KN/m^2

Note: For localized design of slabs, wall loading shall be applied as per actual layout.

2.3 DEAD& LIVE LOADS:

The construction load, super imposed dead load that are envisaged to act permanently (wherever applicable) as per IS:875(part-1)–1987 & Live loads for each occupancy category as per IS:875(part-2)–1987 and Live load reduction is considered as per IS:875(part-2) CL.3.2.

2.3.1 BASEMENT FLOOR-PARKING AREA

Description		KN/m^2
Dead Load	Slab & beam	Self-weight
Superimposed Dead Load	Floor Finishes including screed (50mm Thk Tremix)	1.0
	Services	1
Live Load	Parking Area	3.0

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2.3.2 1ST TO 15TH (TYPICAL)FLOOR

Description		KN/m²
Dead Load	Slab & Beam	Self-weight
Superimposed Dead Load	Floor Finishes	1
	Toilet Sunk 65 mm (Light weight filling)	1.3
	Balcony Sunk 100 mm (Light weight filling)	2.0
	Utility Sunk 150 mm (Light weight filling	3.0
Live Load	Room	2
	Toilet	2
	Balconies	3
	Corridors, Passages, including fire escapes, Lift lobbies Staircase	3

2.3.4TERRACE LEVEL

Description		
Dead Load	Slab & Beam	Self-weight
	Water proofing & Floor Finishes including screed (150mm)	3 KN/m²
Live Load	Live	1.50 KN/m²

Description		
	Lift Machine Room	600KN per lift (as per architectural drawings)
	Head Room	200KN (Including Self Weight)

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2.4 WIND LOADS

The wind pressure is calculated on the basis of data furnished below and other provisions laid in IS875 (Part-3) – 2015

Basic Wind Speed V_b = 50 m/sec

Risk Coefficient K_1 = 1 (Based on 50 years return period)

Terrain, Height Factor K_2 = 1.16
(as per Table 2 of IS: 875 (Part 3) – 2015)

Terrain Category = II

K_3 = 1

K_4 = 1

Design Wind Speed (V_z)

$V_z = V_b \times K_1 \times K_2 \times K_3 \times K_4$

Where,

V_b =Basic Wind Speed

K_1 = Risk Co-efficient for different classes of structures in different wind speed zones.

K_2 = Terrain roughness & height factor.

K_3 = Topography factor.

K_4 = Importance factor for cyclonic region.

Design Wind Pressure

$Pz = 0.6Vz^2$

2.4.1 GUST FACTOR

Gust factor method is used as per clause No. 10.0 IS 875 (part 3) - 2015.

Wind Pressure Table in kN/m2								
Story Lable	Along+X	Across+X	Along-X	Across-X	Along+Y	Across+Y	Along-Y	Across-Y
Terrace	2.345	2.016	2.345	2.016	2.161	1.030	2.161	1.030
15th Floor	2.289	1.891	2.289	1.891	2.109	0.966	2.109	0.966
14th Floor	2.229	1.766	2.229	1.766	2.053	0.903	2.053	0.903
13th Floor	2.165	1.641	2.165	1.641	1.994	0.839	1.994	0.839
12th Floor	2.098	1.517	2.098	1.517	1.932	0.775	1.932	0.775
11th Floor	2.025	1.392	2.025	1.392	1.865	0.711	1.865	0.711
10th Floor	1.948	1.267	1.948	1.267	1.793	0.647	1.793	0.647
9th Floor	1.865	1.142	1.865	1.142	1.715	0.584	1.715	0.584
8th Floor	1.775	1.017	1.775	1.017	1.631	0.520	1.631	0.520
7th Floor	1.676	0.893	1.676	0.893	1.540	0.456	1.540	0.456
6th Floor	1.566	0.768	1.566	0.768	1.438	0.392	1.438	0.392
5th Floor	1.442	0.643	1.442	0.643	1.323	0.329	1.323	0.329
4th Floor	1.299	0.518	1.299	0.518	1.191	0.265	1.191	0.265
3rd Floor	1.128	0.393	1.128	0.393	1.034	0.201	1.034	0.201
2nd Floor	0.913	0.269	0.913	0.269	0.836	0.137	0.836	0.137
1st Floor	0.611	0.144	0.611	0.144	0.560	0.073	0.560	0.073
Ground Floor	0.188	0.019	0.188	0.019	0.172	0.010	0.172	0.010

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Wind Pressure Table in kN/m2								
Story Lable	Along+X	Across+X	Along-X	Across-X	Along+Y	Across+Y	Along-Y	Across-Y
Terrace	2.377	1.797	2.377	1.797	2.389	1.832	2.389	1.832
15th Floor	2.319	1.685	2.319	1.685	2.330	1.718	2.330	1.718
14th Floor	2.258	1.574	2.258	1.574	2.269	1.605	2.269	1.605
13th Floor	2.192	1.463	2.192	1.463	2.203	1.492	2.203	1.492
12th Floor	2.123	1.352	2.123	1.352	2.133	1.378	2.133	1.378
11th Floor	2.049	1.240	2.049	1.240	2.059	1.265	2.059	1.265
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8th Floor	1.791	0.907	1.791	0.907	1.800	0.925	1.800	0.925
7th Floor	1.690	0.796	1.690	0.796	1.699	0.811	1.699	0.811
6th Floor	1.578	0.684	1.578	0.684	1.586	0.698	1.586	0.698
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4th Floor	1.307	0.462	1.307	0.462	1.314	0.471	1.314	0.471
3rd Floor	1.135	0.351	1.135	0.351	1.140	0.358	1.140	0.358
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1st Floor	0.614	0.128	0.614	0.128	0.617	0.131	0.617	0.131
Ground Floor	0.188	0.016	0.188	0.016	0.189	0.017	0.189	0.017

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2.5 EARTHQUAKE LOAD

The loading due to earthquake is assessed as per the provisions of IS: 1893 (Part-1):2016

Seismic Zone		=	III
Soil type		=	I
Table-2	Zone factor (Z)	=	0.16
Table-6	Importance Factor (I)	=	1.2
Table-7	Response Reduction Factor (R)	=	4.0
	Height of buildings (H)	=	47.65 m

Height of building considered from stilt floor for time period calculation.

Fundamental natural time period (Ta)

Ta(x) = 0.09H / √ d from CL.7.6.1– IS1893 (part – I):2016

Ta(y) = 0.09H / √ d from CL.7.6.1 – IS1893 (part – I):2016

Sa/g from FIG-2 IS 1893 (part I):2016.

Horizontal Seismic Co-Efficient

$$Ahx = \frac{Z \times I \; Sa}{2 \times R \; g}$$

$$Ahy = \frac{Z \times I \; Sa}{2 \times R \; g}$$

Dynamic analysis is performed using response reduction as per IS-1893(2016) Clause 7.7.

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3. CHECK FOR LATERAL SWAY AS PER IS 456-2000 & IS 1893-2016

It is generally recognized that absolute sway is not a perceivable parameter; however, limiting sway is used to provide a reasonable level of stiffness and in order to limit damage to non-structural elements as well as limit size of curtain wall joints, etc.

Generally tall building lateral load resisting systems are sized on the basis of limiting overall lateral sways to limits of approximately Overall Height/500 under the 50 year return period wind loads, Overall Height/400 under the 20 year return period wind loads and Overall Height/250 under seismic loads.

4. CHECK FOR LATERAL SWAY (STOREY DRIFT) AS PER IS- 1893-2016

The allowable lateral sway (storey drift) due to earthquake force should not exceed L/250, Where L is the storey height

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5. BASIC LOAD CASES

The various loads are combined in accordance with the stipulations in IS: 875 (Part 5)-1987. Wherever imposed load is combined with earthquake load the appropriate part of the imposed

Load as specified in IS: 1893-2016 is adopted both for evaluating earthquake effect and for combined load effects, used in such combination.

5.1 Basic Load Cases

Load Case Type	Mark	Description
Primary	DL	SELF WEIGHT OF STRUCTURAL MEMBER
Primary	SDL	SUPERIMPOSED DEAD LOAD
Primary	LL1	LIVE LOAD =<3 kN/m^2 (Live 1)
Primary	LL2	LIVE LOAD > 3 kN/m^2 (Live 2)
Primary	LL3	NON REDUCIBLE LIVE LOAD
Primary	EQX	SEISMIC LOAD IN X DIRECTION
Primary	EQY	SEISMIC LOAD IN Y DIRECTION
Primary	WLX	WIND LOAD IN X DIRECTION
Primary	WLY	WIND LOAD IN Y DIRECTION
Primary	SLX	SEISMIC LOAD IN X DIRECTION
Primary	SLY	SEISMIC LOAD IN Y DIRECTION

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6. BASIC LOADS AND LOAD COMBINATIONS

The various loads are combined in accordance with the stipulations in IS: 875 (Part 5)-1987. Wherever imposed load is combined with earthquake load the appropriate part of the imposed load as specified in IS: 1893-2016 is adopted both for evaluating earthquake effect and for combined load effects, used in such combination.

Description of Load Combination	Load Factor for Primary Load Cases				
	Dead Load	Live Load	Wind Load	Seismic Load	Temp Load
Dead load	1.5	0.0	0.0	0.0	0.0
Dead load + Live load	1.5	1.5	0.0	0.0	0.0
Dead load+Wind load	1.5	0.0	±1.5	0.0	0.0
Dead load+Seismic load	1.5	0.0	0.0	±1.5	0.0
Dead load+Live load+Wind load	1.2	1.2	±1.2	0.0	0.0
Dead load+Live load+Seismic	1.2	1.2	0	±1.2	0.0
Dead Load + Wind Load	0.9	0.0	±1.5	0.0	0.0
Dead Load + Seismic Load	0.9	0.0	0.0	±1.5	0.0

7. ANALYSIS METHOD

The structure is analyzed for Static loads (both dead and live loads) and Lateral loads due to Earthquake/Wind loads and its combinations. Software used is E-Tabs version 20.0.0 & for foundation safe version 16.0.2.

The structure will be modeled as 3D space frame. Floor slabs shall be modeled as shell thin with property modifiers.

8. DESIGN METHODOLOGY

All structural members will be designed according to the Limit State Method as specified in IS: 456-2000. Appropriate loads and its combinations, as per relevant clauses in Code IS 456:2000 Code IS 875 (Part-5) 1987, for the most unfavorable effects are chosen for design.

Limit state method is adopted for design of overhead water tanks by using IS-3370(2009)

9. CONSTRUCTION DETAILS

1. Foundation -M:35
2. Water Tanks -M:40
3. Columns/Walls -M:50- up to 10th floor
   M:40- above 10th floor
4. Beams & Slabs -M: 40

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10. REINFORCEMENT

Steel reinforcement shall be of Grade Fe 550 conforming to IS: 1786-1985.

11. EXPOSURE CONDITION

Structural elements below ground level and Exterior External faces of walls are designed for severe exposure condition and internal faces of walls, floor beams and slabs are designed for Mild exposure conditions per Table 16 of IS 456-2000.

12. COVER TO REINFORCEMENT

As per Table 16A-IS: 456-2000.

Member	Clear Cover (mm)
Footing	75 mm
Column	40 mm
Shear Walls	40 mm
Beams	40 mm
Slabs	20 mm
Staircase waist slab	30 mm
Water Tanks	40 mm

13. FOUNDATION SYSTEM

The building has been supported on Isolated column footing & Combined Raft footing as per soil investigation report provided by PRASAD AMSTRONG YEN GEC (P) LTD

14. FIRE RATING

Fire rating of 2 hours is considered for columns and 1.5 hours for beam and slabs.

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15. CODES AND STANDARDS

All the designs are conforming to the relevant Indian Standards. Some of the relevant Indian Standard Codes, which have been followed for the structural designs, are given below.

Code	Description
IS:875 (Part-1)-1987	Code of Practice for Design Loads (Other than Earthquake) for Building and Structures-Unit Weights of Buildings Materials and Stored Material.
IS:875 (Part-2)-1987	Code of Practice for Design Loads (Other than Earthquake) for Building and Structures-Imposed loads
IS:875 (Part-3)-2015	Code of Practice for Design Loads (Other than Earthquake) for Buildings and Structures - Wind Load.
IS:875 (Part-5)-1987	Code of Practice for Design Loads (Other than Earthquake) for Buildings and Structures - Special Loads and Load Combinations
IS:456-2000	Code of Practice for Plain and Reinforced Concrete
IS:1893 (Part-1)-2016	Indian Standard Criteria for Earthquake Resistant Design of Structures
IS:432 (Part-1)-1982	Specification of Mild Steel and Medium Tensile Steel bars and Hard drawn Steel Wire for concrete reinforcement -Mild Steel and Medium Tensile Steel Bars
IS:432 (Part-2)-1982	Specification of Mild Steel and Medium Tensile Steel bars and Hard drawn Steel Wire for concrete reinforcement -Hard drawn Steel Wire.
IS:1786-1985	Specification for High Strength Deformed Steel Bars and Wires for Concrete Reinforcement
IS:13920-2016	Ductile Detailing of reinforced concrete structures subjected to seismic forces - code of practice.
IS:1904	Indian Standard Code of practice for Design & Construction foundations in Soil: General Requirements.
IS:1642-1989	Indian Standard Code of practice for Fire Safety of Buildings (General): Details of Construction.
IS:3370-2009	Indian Standard Code of practice for Concrete Structures for Storage of Liquids.
IS:1343-1980	Indian Standard Code of practice for Pre-stressed Concrete.

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For Designage Consultants Pvt Ltd.

STRUCTURAL DESIGN BASIS REPORT

FOR TOWER G OF

PROPOSED CONSTRUCTION OF 2 BASEMENT FLOOR + GROUND FLOOR + 15 FLOORS RESIDENTIAL BUILDING AT PALLAVARAM TOWN AND TALUK, CHENGALPATTU DISTRICT, 200 FEET PALLAVARAM THORAIPAKKAM RADIAL ROAD, TAMBARAM MUNICIPAL CORPORATION, CHENNAI.

OFFICE NO.403, WING-C, 4TH FLOOR,
AUDUMBAR APTS., CANAL ROAD,
WARJE, PUNE-411052.
tp.designage@gmail.com, *ss.designage@gmail.com*.

CLIENT
M/S EMERALD HAVEN REALITY LTD

ARCHITECT-
KAPADIA ASSOCIATES DESIGN LLP

GEOTECHNICAL CONSULTANTS
PRASAD ARMSTRONG YEN GEC (P) LTD

R1–06. AUGUST. 2025

DESIGNAGE CONSULTING STRUCTURAL ENGINEERS

1. INTRODUCTION

2. DESIGN LOADS
   - 2.1 Material Dead Loads
   - 2.2 Weight of Walls
   - 2.3 Dead Loads
   - 2.4 Wind Loads
   - 2.5 Earthquake Load

3. CHECK FOR LATERAL SWAY

4. CHECK FOR LATERAL SWAY (STOREY DRIFT)

5. BASIC LOAD CASES

6. BASIC LOADS AND LOAD COMBINATIONS

7. ANALYSIS METHOD

8. DESIGN METHODOLOGY

9. CONSTRUCTION DETAILS

10. REINFORCEMENT

11. EXPOSURE CONDITION

12. COVER TO REINFORCEMENT

13. FOUNDATION SYSTEM

14. FIRE RATING

15. CODES AND STANDARDS

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1. INTRODUCTION

The proposed development consists 10 towers of 2 **Basement + Ground Floor + 15 Floors+ Terrace.** Tower G is mean for use as residential building. The basement Floors are to be used as Parking Area & for Services. The 1st to 15th floor to be used for residential purposes. Lift machine rooms are above the terrace level.

The building is essentially a RCC framed structure with Mivan Technology (Shear walls, Slabs, Beams). The slab transfers horizontal & vertical loads to beams & shear walls. The vertical & horizontal loads are transferred to the foundation through walls.

The floor-to-floor height of respective floors is as shown below.

Floor level	Floor to Floor Ht (m)
Basement floor 2	3.60
Basement floor 1	5.35
Ground Floor	2.95
1st Floor to 15th Floor	2.95

The total height of building up to Terrace level is 47.65 meter (excluding parapet) from Ground level.

2. DESIGN LOADS

2.1 Material Dead Loads as per IS875 (part-1) :

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

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

Density of Reinforced Cement Concrete	=	25 kN/m^3
Density of Plain Cement Concrete	=	24 kN/m^3
Density of Steel	=	78.5 kN/m^3
Density of Soil	=	18 kN/m^3
Density of Saturated Soil	=	20 kN/m^3
Density of Water	=	10 kN/m^3
Density of light weight Masonry	=	10 kN/m^3
Density of Plum Concrete	=	24 kN/m^3

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2.2 Weight of Walls:

200mm thk R.C. wall (structural wall) = 5.0 kN/m^2

160mm thk R.C. wall (structural wall) = 4.0 kN/m^2

100mm thk R.C. wall (Non-structural wall) = 2.5 kN/m^2

Typical calculations for wall load :

200mm thk R.C. wall (structural wall)

Concrete wall Density = 25 kN/ cu. meter

Wall Load = (0.2x25)=5.0 KN/m^2

160mm thk R.C. wall (structural wall)

Concrete wall Density = 25 kN/ cu. meter

Wall Load = (0.160x25) =4.00KN/m^2

100mm thk R.C. wall (Non-structural wall)

Concrete wall Density = 25 kN/ cu. meter

Wall Load = (0.10x25) =3.00 KN/m^2

Note: For localized design of slabs, wall loading shall be applied as per actual layout.

2.3 DEAD& LIVE LOADS:

The construction load, super imposed dead load that are envisaged to act permanently (wherever applicable) as per IS:875(part-1)–1987 & Live loads for each occupancy category as per IS:875(part-2)–1987 and Live load reduction is considered as per IS:875(part-2) CL.3.2.

2.3.1 BASEMENT FLOOR-PARKING AREA

Description		KN/m^2
Dead Load	Slab & beam	Self-weight
Superimposed Dead Load	Floor Finishes including screed (50mm Thk Tremix)	1.0
	Services	1
Live Load	Parking Area	3.0

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2.3.2 1ST TO 15TH (TYPICAL)FLOOR

Description		KN/m²
Dead Load	Slab & Beam	Self-weight
Superimposed Dead Load	Floor Finishes	1
	Toilet Sunk 65 mm (Light weight filling)	1.3
	Balcony Sunk 100 mm (Light weight filling)	2.0
	Utility Sunk 150 mm (Light weight filling	3.0
Live Load	Room	2
	Toilet	2
	Balconies	3
	Corridors, Passages, including fire escapes, Lift lobbies Staircase	3

2.3.4TERRACE LEVEL

Description		
Dead Load	Slab & Beam	Self-weight
	Water proofing & Floor Finishes including screed (150mm)	3 KN/m²
Live Load	Live	1.50 KN/m²

Description		
	Lift Machine Room	600KN per lift (as per architectural drawings)
	Head Room	200KN (Including Self Weight)

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2.4 WIND LOADS

The wind pressure is calculated on the basis of data furnished below and other provisions laid in IS875 (Part-3) – 2015

Basic Wind Speed V_b = 50 m/sec

Risk Coefficient K_1 = 1 (Based on 50 years return period)

Terrain, Height Factor K_2 = 1.16
(as per Table 2 of IS: 875 (Part 3) – 2015)

Terrain Category = II

K_3 = 1

K_4 = 1

Design Wind Speed (V_z)

$V_z = V_b \times K_1 \times K_2 \times K_3 \times K_4$

Where,

V_b =Basic Wind Speed

K_1 = Risk Co-efficient for different classes of structures in different wind speed zones.

K_2 = Terrain roughness & height factor.

K_3 = Topography factor.

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Design Wind Pressure

$Pz = 0.6Vz^2$

2.4.1 GUST FACTOR

Gust factor method is used as per clause No. 10.0 IS 875 (part 3) - 2015.

Wind Pressure Table in kN/m2								
Story Lable	Along+X	Across+X	Along-X	Across-X	Along+Y	Across+Y	Along-Y	Across-Y
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11th Floor	2.026	1.391	2.026	1.391	1.867	0.711	1.867	0.711
10th Floor	1.948	1.267	1.948	1.267	1.795	0.648	1.795	0.648
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8th Floor	1.775	1.017	1.775	1.017	1.634	0.520	1.634	0.520
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Ground Floor	0.188	0.016	0.188	0.016	0.189	0.017	0.189	0.017

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2.5 EARTHQUAKE LOAD

The loading due to earthquake is assessed as per the provisions of IS: 1893 (Part-1):2016

Seismic Zone		=	III
Soil type		=	I
Table-2	Zone factor (Z)	=	0.16
Table-6	Importance Factor (I)	=	1.2
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	Height of buildings (H)	=	47.65 m

Height of building considered from stilt floor for time period calculation.

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Sa/g from FIG-2 IS 1893 (part I):2016.

Horizontal Seismic Co-Efficient

$$Ahx = \frac{Z \times I \; Sa}{2 \times R \; g}$$

$$Ahy = \frac{Z \times I \; Sa}{2 \times R \; g}$$

Dynamic analysis is performed using response reduction as per IS-1893(2016) Clause 7.7.

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Generally tall building lateral load resisting systems are sized on the basis of limiting overall lateral sways to limits of approximately Overall Height/500 under the 50 year return period wind loads, Overall Height/400 under the 20 year return period wind loads and Overall Height/250 under seismic loads.

4. CHECK FOR LATERAL SWAY (STOREY DRIFT) AS PER IS- 1893-2016

The allowable lateral sway (storey drift) due to earthquake force should not exceed L/250, Where L is the storey height

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5. BASIC LOAD CASES

The various loads are combined in accordance with the stipulations in IS: 875 (Part 5)-1987. Wherever imposed load is combined with earthquake load the appropriate part of the imposed

Load as specified in IS: 1893-2016 is adopted both for evaluating earthquake effect and for combined load effects, used in such combination.

5.1 Basic Load Cases

Load Case Type	Mark	Description
Primary	DL	SELF WEIGHT OF STRUCTURAL MEMBER
Primary	SDL	SUPERIMPOSED DEAD LOAD
Primary	LL1	LIVE LOAD =<3 kN/m^2 (Live 1)
Primary	LL2	LIVE LOAD > 3 kN/m^2 (Live 2)
Primary	LL3	NON REDUCIBLE LIVE LOAD
Primary	EQX	SEISMIC LOAD IN X DIRECTION
Primary	EQY	SEISMIC LOAD IN Y DIRECTION
Primary	WLX	WIND LOAD IN X DIRECTION
Primary	WLY	WIND LOAD IN Y DIRECTION
Primary	SLX	SEISMIC LOAD IN X DIRECTION
Primary	SLY	SEISMIC LOAD IN Y DIRECTION

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6. BASIC LOADS AND LOAD COMBINATIONS

The various loads are combined in accordance with the stipulations in IS: 875 (Part 5)-1987. Wherever imposed load is combined with earthquake load the appropriate part of the imposed load as specified in IS: 1893-2016 is adopted both for evaluating earthquake effect and for combined load effects, used in such combination.

Description of Load Combination	Load Factor for Primary Load Cases				
	Dead Load	Live Load	Wind Load	Seismic Load	Temp Load
Dead load	1.5	0.0	0.0	0.0	0.0
Dead load + Live load	1.5	1.5	0.0	0.0	0.0
Dead load+Wind load	1.5	0.0	±1.5	0.0	0.0
Dead load+Seismic load	1.5	0.0	0.0	±1.5	0.0
Dead load+Live load+Wind load	1.2	1.2	±1.2	0.0	0.0
Dead load+Live load+Seismic load	1.2	1.2	0	±1.2	0.0
Dead Load + Wind Load	0.9	0.0	±1.5	0.0	0.0
Dead Load + Seismic Load	0.9	0.0	0.0	±1.5	0.0

7. ANALYSIS METHOD

The structure is analyzed for Static loads (both dead and live loads) and Lateral loads due to Earthquake/Wind loads and its combinations. Software used is E-Tabs version 20.0.0 & for foundation safe version 16.0.2.

The structure will be modeled as 3D space frame. Floor slabs shall be modeled as shell thin with property modifiers.

8. DESIGN METHODOLOGY

All structural members will be designed according to the Limit State Method as specified in IS: 456-2000. Appropriate loads and its combinations, as per relevant clauses in Code IS 456:2000 Code IS 875 (Part-5) 1987, for the most unfavorable effects are chosen for design.

Limit state method is adopted for design of overhead water tanks by using IS-3370(2009)

9. CONSTRUCTION DETAILS

1. Foundation -M:35
2. Water Tanks -M:40
3. Columns/Walls -M:50- up to 10th floor
   M:40- above 10th floor
4. Beams & Slabs -M: 40

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10. REINFORCEMENT

Steel reinforcement shall be of Grade Fe 550 conforming to IS: 1786-1985.

11. EXPOSURE CONDITION

Structural elements below ground level and Exterior External faces of walls are designed for severe exposure condition and internal faces of walls, floor beams and slabs are designed for Mild exposure conditions per Table 16 of IS 456-2000.

12. COVER TO REINFORCEMENT

As per Table 16A-IS: 456-2000.

Member	Clear Cover (mm)
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Column	40 mm
Shear Walls	40 mm
Beams	40 mm
Slabs	20 mm
Staircase waist slab	30 mm
Water Tanks	40 mm

13. FOUNDATION SYSTEM

The building has been supported on Isolated column footing & Combined Raft footing as per soil investigation report provided by PRASAD AMSTRONG YEN GEC (P) LTD

14. FIRE RATING

Fire rating of 2 hours is considered for columns and 1.5 hours for beam and slabs.

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All the designs are conforming to the relevant Indian Standards. Some of the relevant Indian Standard Codes, which have been followed for the structural designs, are given below.

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For Designage Consultants Pvt Ltd.

STRUCTURAL DESIGN BASIS REPORT

FOR TOWER H OF

PROPOSED CONSTRUCTION OF 2 BASEMENT FLOOR + GROUND FLOOR + 15 FLOORS RESIDENTIAL BUILDING AT PALLAVARAM TOWN AND TALUK, CHENGALPATTU DISTRICT, 200 FEET PALLAVARAM THORAIPAKKAM RADIAL ROAD, TAMBARAM MUNICIPAL CORPORATION, CHENNAI.

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1. INTRODUCTION

2. DESIGN LOADS
   - 2.1 Material Dead Loads
   - 2.2 Weight of Walls
   - 2.3 Dead Loads
   - 2.4 Wind Loads
   - 2.5 Earthquake Load

3. CHECK FOR LATERAL SWAY

4. CHECK FOR LATERAL SWAY (STOREY DRIFT)

5. BASIC LOAD CASES

6. BASIC LOADS AND LOAD COMBINATIONS

7. ANALYSIS METHOD

8. DESIGN METHODOLOGY

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DESIGNAGE CONSULTING STRUCTURAL ENGINEERS

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1. INTRODUCTION

The proposed development consists 10 towers of 2 **Basement + Ground Floor + 15 Floors+ Terrace.** Tower H is mean for use as residential building. The basement Floors are to be used as Parking Area & for Services. The 1st to 15th floor to be used for residential purposes. Lift machine rooms are above the terrace level.

The building is essentially a RCC framed structure with Mivan Technology (Shear walls, Slabs, Beams). The slab transfers horizontal & vertical loads to beams & shear walls. The vertical & horizontal loads are transferred to the foundation through walls.

The floor-to-floor height of respective floors is as shown below.

Floor level	Floor to Floor Ht (m)
Basement floor 2	3.60
Basement floor 1	5.35
Ground Floor	2.95
1st Floor to 15th Floor	2.95

The total height of building up to Terrace level is 47.65 meter (excluding parapet) from Ground level.

2. DESIGN LOADS

2.1 Material Dead Loads as per IS875 (part-1) :

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

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

Density of Reinforced Cement Concrete	=	25 kN/m^3
Density of Plain Cement Concrete	=	24 kN/m^3
Density of Steel	=	78.5 kN/m^3
Density of Soil	=	18 kN/m^3
Density of Saturated Soil	=	20 kN/m^3
Density of Water	=	10 kN/m^3
Density of light weight Masonry	=	10 kN/m^3
Density of Plum Concrete	=	24 kN/m^3

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2.2 Weight of Walls:

200mm thk R.C. wall (structural wall) = 5.0 kN/m^2

160mm thk R.C. wall (structural wall) = 4.0 kN/m^2

100mm thk R.C. wall (Non-structural wall) = 2.5 kN/m^2

Typical calculations for wall load :

200mm thk R.C. wall (structural wall)

Concrete wall Density = 25 kN/ cu. meter

Wall Load = (0.2x25)=5.0 KN/m^2

160mm thk R.C. wall (structural wall)

Concrete wall Density = 25 kN/ cu. meter

Wall Load = (0.160x25) =4.00KN/m^2

100mm thk R.C. wall (Non-structural wall)

Concrete wall Density = 25 kN/ cu. meter

Wall Load = (0.10x25) =3.00 KN/m^2

Note: For localized design of slabs, wall loading shall be applied as per actual layout.

2.3 DEAD& LIVE LOADS:

The construction load, super imposed dead load that are envisaged to act permanently (wherever applicable) as per IS:875(part-1)–1987 & Live loads for each occupancy category as per IS:875(part-2)–1987 and Live load reduction is considered as per IS:875(part-2) CL.3.2.

2.3.1 BASEMENT FLOOR-PARKING AREA

Description		KN/m^2
Dead Load	Slab & beam	Self-weight
Superimposed Dead Load	Floor Finishes including screed (50mm Thk Tremix)	1.0
	Services	1
Live Load	Parking Area	3.0

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2.3.2 1ST TO 15TH (TYPICAL)FLOOR

Description		KN/m²
Dead Load	Slab & Beam	Self-weight
Superimposed Dead Load	Floor Finishes	1
	Toilet Sunk 65 mm (Light weight filling)	1.3
	Balcony Sunk 100 mm (Light weight filling)	2.0
	Utility Sunk 150 mm (Light weight filling	3.0
Live Load	Room	2
	Toilet	2
	Balconies	3
	Corridors, Passages, including fire escapes, Lift lobbies Staircase	3

2.3.4TERRACE LEVEL

Description		
Dead Load	Slab & Beam	Self-weight
	Water proofing & Floor Finishes including screed (150mm)	3 KN/m²
Live Load	Live	1.50 KN/m²

Description		
	Lift Machine Room	600KN per lift (as per architectural drawings)
	Head Room	200KN (Including Self Weight)

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2.4 WIND LOADS

The wind pressure is calculated on the basis of data furnished below and other provisions laid in IS875 (Part-3) – 2015

Basic Wind Speed V_b = 50 m/sec

Risk Coefficient K_1 = 1 (Based on 50 years return period)

Terrain, Height Factor K_2 = 1.16
(as per Table 2 of IS: 875 (Part 3) – 2015)

Terrain Category = II

K_3 = 1

K_4 = 1

Design Wind Speed (V_z)

$V_z = V_b \times K_1 \times K_2 \times K_3 \times K_4$

Where,

V_b =Basic Wind Speed

K_1 = Risk Co-efficient for different classes of structures in different wind speed zones.

K_2 = Terrain roughness & height factor.

K_3 = Topography factor.

K_4 = Importance factor for cyclonic region.

Design Wind Pressure

$Pz = 0.6Vz^2$

2.4.1 GUST FACTOR

Gust factor method is used as per clause No. 10.0 IS 875 (part 3) - 2015.

Wind Pressure Table in kN/m2								
Story Lable	Along+X	Across+X	Along-X	Across-X	Along+Y	Across+Y	Along-Y	Across-Y
Terrace	2.345	2.016	2.345	2.016	2.161	1.030	2.161	1.030
15th Floor	2.289	1.891	2.289	1.891	2.109	0.966	2.109	0.966
14th Floor	2.229	1.766	2.229	1.766	2.053	0.903	2.053	0.903
13th Floor	2.165	1.641	2.165	1.641	1.994	0.839	1.994	0.839
12th Floor	2.098	1.517	2.098	1.517	1.932	0.775	1.932	0.775
11th Floor	2.025	1.392	2.025	1.392	1.865	0.711	1.865	0.711
10th Floor	1.948	1.267	1.948	1.267	1.793	0.647	1.793	0.647
9th Floor	1.865	1.142	1.865	1.142	1.715	0.584	1.715	0.584
8th Floor	1.775	1.017	1.775	1.017	1.631	0.520	1.631	0.520
7th Floor	1.676	0.893	1.676	0.893	1.540	0.456	1.540	0.456
6th Floor	1.566	0.768	1.566	0.768	1.438	0.392	1.438	0.392
5th Floor	1.442	0.643	1.442	0.643	1.323	0.329	1.323	0.329
4th Floor	1.299	0.518	1.299	0.518	1.191	0.265	1.191	0.265
3rd Floor	1.128	0.393	1.128	0.393	1.034	0.201	1.034	0.201
2nd Floor	0.913	0.269	0.913	0.269	0.836	0.137	0.836	0.137
1st Floor	0.611	0.144	0.611	0.144	0.560	0.073	0.560	0.073
Ground Floor	0.188	0.019	0.188	0.019	0.172	0.010	0.172	0.010

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Wind Pressure Table in kN/m2								
Story Lable	Along+X	Across+X	Along-X	Across-X	Along+Y	Across+Y	Along-Y	Across-Y
Terrace	2.377	1.797	2.377	1.797	2.389	1.832	2.389	1.832
15th Floor	2.319	1.685	2.319	1.685	2.330	1.718	2.330	1.718
14th Floor	2.258	1.574	2.258	1.574	2.269	1.605	2.269	1.605
13th Floor	2.192	1.463	2.192	1.463	2.203	1.492	2.203	1.492
12th Floor	2.123	1.352	2.123	1.352	2.133	1.378	2.133	1.378
11th Floor	2.049	1.240	2.049	1.240	2.059	1.265	2.059	1.265
10th Floor	1.969	1.129	1.969	1.129	1.979	1.151	1.979	1.151
9th Floor	1.884	1.018	1.884	1.018	1.893	1.038	1.893	1.038
8th Floor	1.791	0.907	1.791	0.907	1.800	0.925	1.800	0.925
7th Floor	1.690	0.796	1.690	0.796	1.699	0.811	1.699	0.811
6th Floor	1.578	0.684	1.578	0.684	1.586	0.698	1.586	0.698
5th Floor	1.452	0.573	1.452	0.573	1.460	0.584	1.460	0.584
4th Floor	1.307	0.462	1.307	0.462	1.314	0.471	1.314	0.471
3rd Floor	1.135	0.351	1.135	0.351	1.140	0.358	1.140	0.358
2nd Floor	0.918	0.239	0.918	0.239	0.922	0.244	0.922	0.244
1st Floor	0.614	0.128	0.614	0.128	0.617	0.131	0.617	0.131
Ground Floor	0.188	0.016	0.188	0.016	0.189	0.017	0.189	0.017

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2.5 EARTHQUAKE LOAD

The loading due to earthquake is assessed as per the provisions of IS: 1893 (Part-1):2016

Seismic Zone		=	III
Soil type		=	I
Table-2	Zone factor (Z)	=	0.16
Table-6	Importance Factor (I)	=	1.2
Table-7	Response Reduction Factor (R)	=	4.0
	Height of buildings (H)	=	47.65 m

Height of building considered from stilt floor for time period calculation.

Fundamental natural time period (Ta)

Ta(x) = 0.09H / √ d from CL.7.6.1– IS1893 (part – I):2016

Ta(y) = 0.09H / √ d from CL.7.6.1 – IS1893 (part – I):2016

Sa/g from FIG-2 IS 1893 (part I):2016.

Horizontal Seismic Co-Efficient

$$Ahx = \frac{Z \times I \, Sa}{2 \times R \, g}$$

$$Ahy = \frac{Z \times I \, Sa}{2 \times R \, g}$$

Dynamic analysis is performed using response reduction as per IS-1893(2016) Clause 7.7.

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3. CHECK FOR LATERAL SWAY AS PER IS 456-2000 & IS 1893-2016

It is generally recognized that absolute sway is not a perceivable parameter; however, limiting sway is used to provide a reasonable level of stiffness and in order to limit damage to non-structural elements as well as limit size of curtain wall joints, etc.

Generally tall building lateral load resisting systems are sized on the basis of limiting overall lateral sways to limits of approximately Overall Height/500 under the 50 year return period wind loads, Overall Height/400 under the 20 year return period wind loads and Overall Height/250 under seismic loads.

4. CHECK FOR LATERAL SWAY (STOREY DRIFT) AS PER IS- 1893-2016

The allowable lateral sway (storey drift) due to earthquake force should not exceed L/250, Where L is the storey height

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14. FIRE RATING

15. CODES AND STANDARDS

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1. INTRODUCTION

The proposed development consists 10 towers of 2 **Basement + Ground Floor + 15 Floors+ Terrace.** Tower J&K is mean for use as residential building. The basement Floors are to be used as Parking Area & for Services. The 1st to 15th floor to be used for residential purposes. Lift machine rooms are above the terrace level.

The building is essentially a RCC framed structure with Mivan Technology (Shear walls, Slabs, Beams). The slab transfers horizontal & vertical loads to beams & shear walls. The vertical & horizontal loads are transferred to the foundation through walls.

The floor-to-floor height of respective floors is as shown below.

Floor level	Floor to Floor Ht (m)
Basement floor 2	3.60
Basement floor 1	5.35
Ground Floor	2.95
1st Floor to 15th Floor	2.95

The total height of building up to Terrace level is 47.65 meter (excluding parapet) from Ground level.

2. DESIGN LOADS

2.1 Material Dead Loads as per IS875 (part-1) :

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

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

Density of Reinforced Cement Concrete	=	25 kN/m^3
Density of Plain Cement Concrete	=	24 kN/m^3
Density of Steel	=	78.5 kN/m^3
Density of Soil	=	18 kN/m^3
Density of Saturated Soil	=	20 kN/m^3
Density of Water	=	10 kN/m^3
Density of light weight Masonry	=	10 kN/m^3
Density of Plum Concrete	=	24 kN/m^3

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2.2 Weight of Walls:

200mm thk R.C. wall (structural wall) = 5.0 kN/m^2

160mm thk R.C. wall (structural wall) = 4.0 kN/m^2

100mm thk R.C. wall (Non-structural wall) = 2.5 kN/m^2

Typical calculations for wall load :

200mm thk R.C. wall (structural wall)

Concrete wall Density = 25 kN/ cu. meter

Wall Load = (0.2x25)=5.0 KN/m^2

160mm thk R.C. wall (structural wall)

Concrete wall Density = 25 kN/ cu. meter

Wall Load = (0.160x25) =4.00KN/m^2

100mm thk R.C. wall (Non-structural wall)

Concrete wall Density = 25 kN/ cu. meter

Wall Load = (0.10x25) =3.00 KN/m^2

Note: For localized design of slabs, wall loading shall be applied as per actual layout.

2.3 DEAD& LIVE LOADS:

The construction load, super imposed dead load that are envisaged to act permanently (wherever applicable) as per IS:875(part-1)–1987 & Live loads for each occupancy category as per IS:875(part-2)–1987 and Live load reduction is considered as per IS:875(part-2) CL.3.2.

2.3.1 BASEMENT FLOOR-PARKING AREA

Description		KN/m^2
Dead Load	Slab & beam	Self-weight
Superimposed Dead Load	Floor Finishes including screed (50mm Thk Tremix)	1.0
	Services	1
Live Load	Parking Area	3.0

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2.3.2 1ST TO 15TH (TYPICAL)FLOOR

Description		KN/m²
Dead Load	Slab & Beam	Self-weight
Superimposed Dead Load	Floor Finishes	1
	Toilet Sunk 65 mm (Light weight filling)	1.3
	Balcony Sunk 100 mm (Light weight filling)	2.0
	Utility Sunk 150 mm (Light weight filling	3.0
Live Load	Room	2
	Toilet	2
	Balconies	3
	Corridors, Passages, including fire escapes, Lift lobbies Staircase	3

2.3.4TERRACE LEVEL

Description		
Dead Load	Slab & Beam	Self-weight
	Water proofing & Floor Finishes including screed (150mm)	3 KN/m²
Live Load	Live	1.50 KN/m²

Description		
	Lift Machine Room	600KN per lift (as per architectural drawings)
	Head Room	200KN (Including Self Weight)

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2.4 WIND LOADS

The wind pressure is calculated on the basis of data furnished below and other provisions laid in IS875 (Part-3) – 2015

Basic Wind Speed V_b = 50 m/sec

Risk Coefficient K_1 = 1 (Based on 50 years return period)

Terrain, Height Factor K_2 = 1.16
(as per Table 2 of IS: 875 (Part 3) – 2015)

Terrain Category = II

K_3 = 1

K_4 = 1

Design Wind Speed (V_z)

$V_z = V_b \times K_1 \times K_2 \times K_3 \times K_4$

Where,

V_b =Basic Wind Speed

K_1 = Risk Co-efficient for different classes of structures in different wind speed zones.

K_2 = Terrain roughness & height factor.

K_3 = Topography factor.

K_4 = Importance factor for cyclonic region.

Design Wind Pressure

$Pz = 0.6Vz^2$

2.4.1 GUST FACTOR

Gust factor method is used as per clause No. 10.0 IS 875 (part 3) - 2015.

Wind Pressure Table in kN/m2								
Story Lable	Along+X	Across+X	Along-X	Across-X	Along+Y	Across+Y	Along-Y	Across-Y
Terrace	2.377	1.797	2.377	1.797	2.389	1.832	2.389	1.832
15th Floor	2.319	1.685	2.319	1.685	2.330	1.718	2.330	1.718
14th Floor	2.258	1.574	2.258	1.574	2.269	1.605	2.269	1.605
13th Floor	2.192	1.463	2.192	1.463	2.203	1.492	2.203	1.492
12th Floor	2.123	1.352	2.123	1.352	2.133	1.378	2.133	1.378
11th Floor	2.049	1.240	2.049	1.240	2.059	1.265	2.059	1.265
10th Floor	1.969	1.129	1.969	1.129	1.979	1.151	1.979	1.151
9th Floor	1.884	1.018	1.884	1.018	1.893	1.038	1.893	1.038
8th Floor	1.791	0.907	1.791	0.907	1.800	0.925	1.800	0.925
7th Floor	1.690	0.796	1.690	0.796	1.699	0.811	1.699	0.811
6th Floor	1.578	0.684	1.578	0.684	1.586	0.698	1.586	0.698
5th Floor	1.452	0.573	1.452	0.573	1.460	0.584	1.460	0.584
4th Floor	1.307	0.462	1.307	0.462	1.314	0.471	1.314	0.471
3rd Floor	1.135	0.351	1.135	0.351	1.140	0.358	1.140	0.358
2nd Floor	0.918	0.239	0.918	0.239	0.922	0.244	0.922	0.244
1st Floor	0.614	0.128	0.614	0.128	0.617	0.131	0.617	0.131
Ground Floor	0.188	0.016	0.188	0.016	0.189	0.017	0.189	0.017

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Wind Pressure Table in kN/m2								
Story Lable	Along+X	Across+X	Along-X	Across-X	Along+Y	Across+Y	Along-Y	Across-Y
Terrace	2.377	1.797	2.377	1.797	2.389	1.832	2.389	1.832
15th Floor	2.319	1.685	2.319	1.685	2.330	1.718	2.330	1.718
14th Floor	2.258	1.574	2.258	1.574	2.269	1.605	2.269	1.605
13th Floor	2.192	1.463	2.192	1.463	2.203	1.492	2.203	1.492
12th Floor	2.123	1.352	2.123	1.352	2.133	1.378	2.133	1.378
11th Floor	2.049	1.240	2.049	1.240	2.059	1.265	2.059	1.265
10th Floor	1.969	1.129	1.969	1.129	1.979	1.151	1.979	1.151
9th Floor	1.884	1.018	1.884	1.018	1.893	1.038	1.893	1.038
8th Floor	1.791	0.907	1.791	0.907	1.800	0.925	1.800	0.925
7th Floor	1.690	0.796	1.690	0.796	1.699	0.811	1.699	0.811
6th Floor	1.578	0.684	1.578	0.684	1.586	0.698	1.586	0.698
5th Floor	1.452	0.573	1.452	0.573	1.460	0.584	1.460	0.584
4th Floor	1.307	0.462	1.307	0.462	1.314	0.471	1.314	0.471
3rd Floor	1.135	0.351	1.135	0.351	1.140	0.358	1.140	0.358
2nd Floor	0.918	0.239	0.918	0.239	0.922	0.244	0.922	0.244
1st Floor	0.614	0.128	0.614	0.128	0.617	0.131	0.617	0.131
Ground Floor	0.188	0.016	0.188	0.016	0.189	0.017	0.189	0.017

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2.5 EARTHQUAKE LOAD

The loading due to earthquake is assessed as per the provisions of IS: 1893 (Part-1):2016

Seismic Zone		=	III
Soil type		=	I
Table-2	Zone factor (Z)	=	0.16
Table-6	Importance Factor (I)	=	1.2
Table-7	Response Reduction Factor (R)	=	4.0
	Height of buildings (H)	=	47.65 m

Height of building considered from stilt floor for time period calculation.

Fundamental natural time period (Ta)

Ta(x) = 0.09H / √ d from CL.7.6.1– IS1893 (part – I):2016

Ta(y) = 0.09H / √ d from CL.7.6.1 – IS1893 (part – I):2016

Sa/g from FIG-2 IS 1893 (part I):2016.

Horizontal Seismic Co-Efficient

$$Ahx = \frac{Z \times I \; Sa}{2 \times R \; g}$$

$$Ahy = \frac{Z \times I \; Sa}{2 \times R \; g}$$

Dynamic analysis is performed using response reduction as per IS-1893(2016) Clause 7.7.

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3. CHECK FOR LATERAL SWAY AS PER IS 456-2000 & IS 1893-2016

It is generally recognized that absolute sway is not a perceivable parameter; however, limiting sway is used to provide a reasonable level of stiffness and in order to limit damage to non-structural elements as well as limit size of curtain wall joints, etc.

Generally tall building lateral load resisting systems are sized on the basis of limiting overall lateral sways to limits of approximately Overall Height/500 under the 50 year return period wind loads, Overall Height/400 under the 20 year return period wind loads and Overall Height/250 under seismic loads.

4. CHECK FOR LATERAL SWAY (STOREY DRIFT) AS PER IS- 1893-2016

The allowable lateral sway (storey drift) due to earthquake force should not exceed L/250, Where L is the storey height

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5. BASIC LOAD CASES

The various loads are combined in accordance with the stipulations in IS: 875 (Part 5)-1987. Wherever imposed load is combined with earthquake load the appropriate part of the imposed

Load as specified in IS: 1893-2016 is adopted both for evaluating earthquake effect and for combined load effects, used in such combination.

5.1 Basic Load Cases

Load Case Type	Mark	Description
Primary	DL	SELF WEIGHT OF STRUCTURAL MEMBER
Primary	SDL	SUPERIMPOSED DEAD LOAD
Primary	LL1	LIVE LOAD =<3 kN/m^2 (Live 1)
Primary	LL2	LIVE LOAD > 3 kN/m^2 (Live 2)
Primary	LL3	NON REDUCIBLE LIVE LOAD
Primary	EQX	SEISMIC LOAD IN X DIRECTION
Primary	EQY	SEISMIC LOAD IN Y DIRECTION
Primary	WLX	WIND LOAD IN X DIRECTION
Primary	WLY	WIND LOAD IN Y DIRECTION
Primary	SLX	SEISMIC LOAD IN X DIRECTION
Primary	SLY	SEISMIC LOAD IN Y DIRECTION

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6. BASIC LOADS AND LOAD COMBINATIONS

The various loads are combined in accordance with the stipulations in IS: 875 (Part 5)-1987. Wherever imposed load is combined with earthquake load the appropriate part of the imposed load as specified in IS: 1893-2016 is adopted both for evaluating earthquake effect and for combined load effects, used in such combination.

Description of Load Combination	Load Factor for Primary Load Cases				
	Dead Load	Live Load	Wind Load	Seismic Load	Temp Load
Dead load	1.5	0.0	0.0	0.0	0.0
Dead load + Live load	1.5	1.5	0.0	0.0	0.0
Dead load+Wind load	1.5	0.0	±1.5	0.0	0.0
Dead load+Seismic load	1.5	0.0	0.0	±1.5	0.0
Dead load+Live load+Wind load	1.2	1.2	±1.2	0.0	0.0
Dead load+Live load+Seismic	1.2	1.2	0	±1.2	0.0
Dead Load + Wind Load	0.9	0.0	±1.5	0.0	0.0
Dead Load + Seismic Load	0.9	0.0	0.0	±1.5	0.0

7. ANALYSIS METHOD

The structure is analyzed for Static loads (both dead and live loads) and Lateral loads due to Earthquake/Wind loads and its combinations. Software used is E-Tabs version 20.0.0 & for foundation safe version 16.0.2.

The structure will be modeled as 3D space frame. Floor slabs shall be modeled as shell thin with property modifiers.

8. DESIGN METHODOLOGY

All structural members will be designed according to the Limit State Method as specified in IS: 456-2000. Appropriate loads and its combinations, as per relevant clauses in Code IS 456:2000 Code IS 875 (Part-5) 1987, for the most unfavorable effects are chosen for design.

Limit state method is adopted for design of overhead water tanks by using IS-3370(2009)

9. CONSTRUCTION DETAILS

1. Foundation -M:35
2. Water Tanks -M:40
3. Columns/Walls -M:50- up to 10th floor
   M:40- above 10th floor
4. Beams & Slabs -M: 40

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10. REINFORCEMENT

Steel reinforcement shall be of Grade Fe 550 conforming to IS: 1786-1985.

11. EXPOSURE CONDITION

Structural elements below ground level and Exterior External faces of walls are designed for severe exposure condition and internal faces of walls, floor beams and slabs are designed for Mild exposure conditions per Table 16 of IS 456-2000.

12. COVER TO REINFORCEMENT

As per Table 16A-IS: 456-2000.

Member	Clear Cover (mm)
Footing	75 mm
Column	40 mm
Shear Walls	40 mm
Beams	40 mm
Slabs	20 mm
Staircase waist slab	30 mm
Water Tanks	40 mm

13. FOUNDATION SYSTEM

The building has been supported on Isolated column footing & Combined Raft footing as per soil investigation report provided by PRASAD AMSTRONG YEN GEC (P) LTD

14. FIRE RATING

Fire rating of 2 hours is considered for columns and 1.5 hours for beam and slabs.

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15. CODES AND STANDARDS

All the designs are conforming to the relevant Indian Standards. Some of the relevant Indian Standard Codes, which have been followed for the structural designs, are given below.

Code	Description
IS:875 (Part-1)-1987	Code of Practice for Design Loads (Other than Earthquake) for Building and Structures-Unit Weights of Buildings Materials and Stored Material.
IS:875 (Part-2)-1987	Code of Practice for Design Loads (Other than Earthquake) for Building and Structures-Imposed loads
IS:875 (Part-3)-2015	Code of Practice for Design Loads (Other than Earthquake) for Buildings and Structures - Wind Load.
IS:875 (Part-5)-1987	Code of Practice for Design Loads (Other than Earthquake) for Buildings and Structures - Special Loads and Load Combinations
IS:456-2000	Code of Practice for Plain and Reinforced Concrete
IS:1893 (Part-1)-2016	Indian Standard Criteria for Earthquake Resistant Design of Structures
IS:432 (Part-1)-1982	Specification of Mild Steel and Medium Tensile Steel bars and Hard drawn Steel Wire for concrete reinforcement -Mild Steel and Medium Tensile Steel Bars
IS:432 (Part-2)-1982	Specification of Mild Steel and Medium Tensile Steel bars and Hard drawn Steel Wire for concrete reinforcement -Hard drawn Steel Wire.
IS:1786-1985	Specification for High Strength Deformed Steel Bars and Wires for Concrete Reinforcement
IS:13920-2016	Ductile Detailing of reinforced concrete structures subjected to seismic forces - code of practice.
IS:1904	Indian Standard Code of practice for Design & Construction foundations in Soil: General Requirements.
IS:1642-1989	Indian Standard Code of practice for Fire Safety of Buildings (General): Details of Construction.
IS:3370-2009	Indian Standard Code of practice for Concrete Structures for Storage of Liquids.
IS:1343-1980	Indian Standard Code of practice for Pre-stressed Concrete.

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For Designage Consultants Pvt Ltd.

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

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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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