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STRUCTURAL DESIGN BASIS REPORT

FOR

PROPOSED CONSTRUCTION OF 1 BASEMENT + STILT FLOOR + 19 FLOORS RESIDENTIAL BUILDING AT S.NO.14/2C1B2 AT EGATTUR VILLAGE, THIRUPORUR TALUK, CHENGA LPATTU DISTRICT, CHENNAI.

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R0–15 MARCH 2025

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1. INTRODUCTION

The proposed development consists of 1 **Basement +Stilt + 19 Floors + Terrace**. Tower is mean for use as residential apartments. The Basement floor and Stilt be used as Parking Area & for Services. The 1st to 19th floors are be used for residential blocks. Lift machine rooms are above the terrace level.

The Structural system for building consists of column, shear walls, beams & slabs. Shear walls are the part of Lateral Load Resistance system.

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

Floor level	Floor to Floor Ht (m)
Basement Floor	4
Stilt Floor	3
1st Floor to 19th Floor	3

The total height of building up to Terrace level is 60 meter (excluding parapet) from Stilt Floor 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:

External Light weight Wall with 200 thk = 2.51 kN/m²

Internal light weight Wall with 100 thk = 2.00 kN/m²

Typical calculations for wall load:

External Wall with 200 thick Light Weight wall

Light wall Density = 10 kN/ cu. meter

Plaster Density = 20.4 kN/ cu. meter

Plaster thickness = 25mm (Internal + External)

Wall Load = (0.20x10+0.025x20.4) = 2.51 KN/m²

Internal Wall with 150 thick Light Weight wall

Light wall Density = 10 kN/ cu. meter

Plaster Density = 20.4 kN/ cu. meter

Plaster thickness = 25mm (Internal+ External)

Wall Load = (0.150x10+0.025x20.4) = 2.00 KN/m²

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 PARKING AREA

Description		KN/m²
Dead Load	Slab & beam	Self-weight
Superimposed Dead Load	Floor Finishes including screed (50mm Thk Tremix)	1.0
	Services	0.5
Live Load	Parking Area	4.0

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2.3.2 1ST TO 19TH TYPICAL COMMERCIAL FLOORS

Description		KN/m²
Dead Load	Slab & Beam	Self-weight
Superimposed Dead Load	Floor Finishes	1
	Toilet Sunk 200 mm (Including Finish)	4
	Services	0.5
Live Load	Rooms	2
	Toilet	2
	Balconies, utility	3
	Corridors, Passages, Staircase including fire escapes, Lift lobbies,	3
	Electric Room	5
	Services	3

2.3.3 TERRACE LEVEL

Description		
Dead Load	Slab & Beam	Self-weight
	Water proofing & Floor Finishes including screed (150mm)	3.00 KN/m²
Live Load	Live	3.00 KN/m²

Description		
	Lift Machine Room	600KN per lift (as per architectural drawings)
	Head Room	1200KN (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 (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

$P_z = 0.6V_z^2$

2.4.1 GUST FACTOR

Gust factor method shall be used as per clause No. 10.0 IS 875 (part 3) - 2015. (If required.)

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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)	=	60.m

Height of building considered from footing level 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 21.0.0 & for foundation safe version 16.0.2.
The structure will be modeled as 3D space frame. Floor slabs shall be modeled as Shell thin elements for diaphragm effect only.

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)

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9. CONSTRUCTION DETAILS

1. Pile foundation -M: 30
2. Water Tanks -M: 30
3. Columns/Walls -M: 40/M30
4. Beams & Slabs -M: 40/M30

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)
Pile Foundation	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 pile foundation.

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

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

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

Verify My Land
Every record check run on one property and returned as a single report.
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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.
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Property Tracker
Watch a property and hear about it when something new is registered against it.
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Deal Room
Run the transaction in one place: documents, stamping, signatures and the parties.
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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
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- 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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