

17.07.2025

STABILITY CERTIFICATE

1. The detailed engineering and structure design of the proposed building comprising of Stilt + Five (5) floors at 10 Dwelling Units S.F.No. 74/1B 33, Ward- D, Block-26, T.S.No-60, Plot No -78, At Alagapuram Village, Salem City Municipal Corporation, Salem Taluk, Salem District has been done by me based on the report of geotechnical investigation (soil test) done by Surya Builders Report No. 2023-2024/06/014 Dated: 14/06/2024 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.

3. I/We further certify that:

(i) The minimum grade of concrete is M25.

(ii) The design and analysis has been done using the code of practice for plain and reinforced concrete as per IS 456, design loads as per IS Codes No 875 and design of earthquake resistant structure as per IS Code No 1893 & 13920 are Carried out.

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

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NARAYANAN CONSTRUCTIONS
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DTCP/SALEM/RSE-II/06/2022
No:17/18-B, CONVENT ROAD,
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Encl.: Structural Design Calculation

LOAD CALCULATIONS

PROPOSED CONSTRUCTION OF METROPOLE – KRISHNA APARTMENT
AT NEW FAIRLANDS IN SALEM

V. Bhuvaneshwari
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1		LOAD CALCULATION REPORT					
Rev.	17.07.25	Description/issued for	Prepared by	Checked by	Approved by		
	Client:	1.Mrs. SUJITHRA VIJAYKUMAR					
	Project:	METROPOLE — KRISHNA APARTMENT AT NEW FAIRLAND IN SALEM TAMILNADU - INDIA.					
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FLOOR LOADS:**I. FLOOR LOADS:**

Floor finish	0.075x20	=	1.5 kN/m ²
Sand filling (0.2x18)		=	4.14kN/m ²
Sunken		=	5.64 kN/m ²

Say = 5.6 kN/m²

II. TERRACE FLOOR:

Floor finish & weathering coarse (0.15x20)	=	3.0 kN/m ²
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III. LIVE LOADS:

• Live load	=	2.5 kN/m ²
• Terrace	=	1.5 kN/m ²
• Corridor	=	4 kN/m ²

IV. WALL LOAD CALCULATIONS:**GROUND FLOOR:**

1. Wall load for plinth beam to stilt beam level: (3.15-0.600-0.38 x0.23 x20)	=	15.5 kN/m ²
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FIRST FLOOR TO FIFTH FLOOR (TYPICAL FLOORS):

2. Wall load for stilt floor Roof level to First Floor Roof Level: (3.15-0.38 x0.23 x20)	=	12.5 kN/m ²
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WATER TANK:

3. Wall load for Water tank bottom level: (1.52-0.38x0.23x25)	=	6.55 kN/m ²
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PARAPET:

4. Wall load for Parapet level:

$$0.9 \times 0.23 \times 20 = 4.14 \text{ kN/m}^2$$

HEAD ROOM:

5. Wall load for terrace level to Head Room Roof top level:

$$(3.15 \times 0.23 \times 20) = 14.49 \text{ kN/m}^2$$

V. STAIRCASE LOAD CALCULATION:

Self-weight	(0.20x1x25)	=	5.00 kN/m ²
Floor Finish		=	1.00 kN/m ²
R.C.C Steps	(0.15/2)x22	=	1.65 kN/m ²
Live Loads		=	4.00 kN/m ²
		=	11.65 kN/m ²
		=	12.00 kN/m ²
Total Load	(12x4.88)	=	58.56 kN/m ²
Load on One beam	(58.56/2)	=	29.28 kN/m ²
		Say	= 30 kN/m ²
Plinth Beam full wall load		=	15.5 kN/m ²
Plinth beam Mid Landing Load (15.5/2+30)		=	37.75 kN/m ²
Stilt beam full wall load		=	12.5 kN/m ²
Stilt beam Mid landing load (12.5+30)		=	42.5 kN/m ²

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DESIGN BASIS REPORT

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3. REFERENCES, CODES AND STANDARDS: The following codes and standards have been referred.

4. LOAD DEFINITIONS:

4.1 Dead Loads (DL) :

Dead Load shall be the total weight of the materials forming the permanent part of structure. The Unit weights of materials and components shall be as per the code defined.

Self-weights of the slabs are inbuilt with ETABS software at the time of application.

- (i) Concrete unit weight is taken as 25 kN/m³
- (ii) Brick unit weight is taken as 20 kN/m³
- (iii) Water unit weight is taken as 10 kN/m³
- (iv) Sand (Toilet sunken) unit weight is taken as 18 kN/m³

4.2 Live Loads (LL) :

Live Loads are all movable super imposed loads such as movable partitions, occupants and movable equipment, but not including wind or equipment dynamic loads. Live Loads shall be as specified in IS 875 Part 2 - 1987 Table 1.

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I. EARTHQUAKE LOAD CALCULATIUN (EL):

Seismic loads are considered for Zone II as per IS 1893 (Part-I) : 2016.

Zone Factor = 0.16

Importance Factor = 1

Response reduction Factor (Special Moment Resisting Frames) = 5

Damping = 5%

Soil Type = II

Time Period:

Time period are considered as per IS 1893(PART- 1): 2016 Clause No. 7.6.2(C)

$$0.075*(18.9)^{0.75} = 0.67$$

4.5 Loading Combinations:

SERVICEABILITY COMBINATION

- 1) 1.0 D.L + 1.0 L.L
- 2) 1.0 D.L+ 1.0 W.L- (+X DIRECTION)
- 3) 1.0 D.L + 1.0 W.L- (-X DIRECTION)
- 4) 1.0 D.L + 1.0 W.L - (+Y DIRECTION) 5) 1.0 D.L+ 1.0 W.L- (-Y DIRECTION)
- 6) 1.0 D.L + 1.0 E.L - (+X DIRECTION)
- 7) 1.0 D.L + 1.0 EL - (-X DIRECTION)
- 8) 1.0 D.L+ 1.0 E.L-(+Y DIRECTION)
- 9) 1.0 D.L+ 1.0 E.L-(-Y DIRECTION)
- 10) 1.0 D.L + 0.8 L.L + 0.8 w.L DIRECTION)
- 11) 1.0 D.L + 0.8 L.L+ 0.8 w.L (-X DIRECTION)
- 12) 1.0 D.L + 0.8 L.L + 0.8 w.L (+Y DIRECTION)

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- 13) 1.0 D.L + 0.8 L.L + 0.8 W.L (-Y DIRECTION)
 14) 1.0 D.L + 0.8 L.L + 0.8 E.L (+X DIRECTION)
 15) 1.0 D.L + 0.8 L.L + 0.8 E.L (-X DIRECTION)
 16) 1.0 D.L + 0.8 L.L + 0.8 E.L (+Y DIRECTION)
 17) 1.0 D.L + 0.8 L.L + 0.8 E.L (-Y DIRECTION)

ULTIMATE COMBINATION

- 18) 1.5 D.L + 1.5 L.L
 19) 1.5 D.L + 1.5 W.L (+X DIRECTION)
 20) 1.5 D.L + 1.5 W.L (-X DIRECTION)
 21) 1.5 D.L + 1.5 W.L (+Y DIRECTION)
 22) 1.5 D.L + 1.5 W.L (-Y DIRECTION)
 23) 1.5 D.L + 1.5 E.L DIRECTION)
 24) 1.5 D.L + 1.5 E.L (-X DIRECTION)
 25) 1.5 D.L + 1.5 E.L (+Y DIRECTION)
 26) 1.5 D.L + 1.5 E.L (-Y DIRECTION)
 27) 0.9 D.L + 1.5 W.L (+X DIRECTION)
 28) 0.9 D.L + 1.5 W.L (-X DIRECTION)
 29) 0.9 D.L + 1.5 W.L (+Y DIRECTION)
 30) 0.9 D.L + 1.5 W.L (-Y DIRECTION)
 31) 0.9 D.L + 1.5 E.L (+X DIRECTION)
 32) 0.9 D.L + 1.5 E.L (-X DIRECTION)
 33) 0.9 D.L + 1.5 E.L (+Y DIRECTION)
 34) 0.9 D.L + 1.5 E.L (-Y DIRECTION)
 35) 1.2 D.L + 1.2 L.L + 1.2 W.L DIRECTION)
 36) 1.2 D.L + 1.2 L.L + 1.2 W.L (-X DIRECTION)
 37) 1.2 D.L + 1.2 L.L + 1.2 W.L (+Y DIRECTION)
 38) 1.2 D.L + 1.2 L.L + 1.2 W.L (-Y DIRECTION)
 39) 1.2 D.L + 1.2 L.L + 1.2 E.L (+X DIRECTION)

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40) 1.2 D.L+ 1.2L.L+1.2E.L (-X DIRECTION)

41) 1.2 D.L+ 1.2L.L+1.2E.L (+Y DIRECTION)

42) 1.2 D.L+ 1.2L.L+1.2E.L (-Y DIRECTION)

(D.L = Dead load, L.L = Live load, W.L = wind load, E.L = Earthquake load,).

Temperature Load is not considered since the lateral dimension of the building is limited as per Clauses 19.5.1 & 27.20 of IS 456:2000.

5 Reinforced concrete works:

5.1 General:

Design of Structural Concrete works shall be in accordance with IS 456:2000.

Design of Truss steel member works shall be in accordance with IS 800:2007.

5.2 Cement and Aggregates:

Cement to be ordinary Portland cement in accordance with (IS 269).

Aggregates shall be accordance with (IS 383).

5.3 Concrete Grades:

Structural Concrete:

Sub & Super Structure — M25

P.C.C - M7.5

5.4 Reinforcing Steel:

Reinforcing Steel Bars shall be CRS (Corrosion resistant steel) Uncoated High Yield deformed bars Fe 500 D of Minimum Characteristic Yield strength of 500 N/mm² having elongation of 16%. Deformed bars confirming to IS 1786:2008.

5.5 Description of structural arrangement:

Super structure:

The buildings will be designed as framed structure with columns and beams are

Interconnected with flat R.C.C Roof Slab.

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Sub structure:

The foundation will be designed generally as per the soil report recommendations.

5.6 Properties for design purpose:

- a. Grade of Concrete f_{ck} - 25 N/mm²
- b. Grade of Steel f_y - 500 N/mm²
- c. Young's Modulus of Steel E_s - 200000 N/mm²
- d. Modulus of Elasticity of Concrete E_c - 500 root of f_{ck} - 25000 N/mm²

5.7 Development Length of bars:

For M25:

(Ld) In Tension = 50 ϕ

(Ld) In Compression = 40 ϕ

5.8 Cover to Concrete :

Footing	=	50 mm
Column	=	40 mm
Beam	=	30 mm
Slab	=	25 mm
Shear wall	=	25 mm
R.C.C Retaining Wall	=	25 mm

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SOIL PROPERTIES & FOUNDATION DEPTH:

6.1 Safe Bearing Capacity of Soil:

Net Allowable bearing capacity of soil is taken as per soil report = 200 KN/m²

6.2 Analysis and design methodology:

The Building is analyzed as 3-D space structure using finite element method in ETABS the foundations is designed in 'SAFE' software & XL sheets. Fixed condition is considered at supports for 3-D structure & the steel member designed for the using 'ETABS' software, to carryout analysis for various load combinations as per design basis.

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