B.SRINIVASAN B.E AMIE.,
Chartered Engineer
IEI, CMDA & GCC
Reg Structural Engineer

Cell : 9445210268
Email : srinideepan@rediffmail.com

DATE : 08-01-2026

STABILITY CERTIFICATE

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

The detailed engineering and structure design of the proposed building comprising of Stilt and Five Upper floors at TAMBARAM - MUDICHUR ORAGADAM ROAD / RAJIV GANDHI STREET, PERUNGALATHUR, CHENNAI COMPRISED IN S.Nos. 246/6A1(PART), 246/6A2, 246/6B1(PART), 246/6B2 OF PERUNGALATHUR VILLAGE, TAMBARAM TALUK , GREATER CHENNAI CORPORATION has been done by me/us based on the report of geotechnical investigation (soil test) done by **MARS SYNERGY GEOTECH Pvt Ltd** No-30/25, Drowpathy Amman Koil 1st Street, Velachery, Chennai – 600 042. Report No MSGTPL/SI-6511-R2/25-26 Dated 27/06/2025 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 M40

(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 IS 875: 1987 (Part 1,2 and 4) and design of earthquake resistant structure as per IS Code No IS 1983:2016

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

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Stamp and Signature

Encl.: Structural Design Calculation

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Chartered Engineer
CMDA & Greater Chennai Corporation
Registered Structural Engineer

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STRUCTURAL STABILITY REPORT

STRUCTURAL STABILITY REPORT FOR THE PROPOSED CONSTRUCTION OF STILT FLOOR + 4 FLOORS + 5th FLOOR (PART) (HEIGHT-18.30m) RESIDENTIAL BUILDING WITH 58 DWELLING UNITS AVAILING PREMIUM FSI WITH AFFORDABLE HOUSHING BENEFIT (INDOOR GAMES ROOM, GYM ROOM AT 5th FLOOR) AT TAMBARAM - MUDICHUR ORAGADAM ROAD / RAJIV GANDHI STREET, PERUNGALATHUR, CHENNAI COMPRISED IN S.Nos. 246/6A1(PART), 246/6A2, 246/6B1(PART), 246/6B2 OF PERUNGALATHUR VILLAGE, TAMBARAM TALUK WITHIN THE LIMIT OF TAMBARAM MUNICIPAL CORPORATION.

The Proposed Building referred to above is a framed structure with Stilt and 5 Upper Floors for. The Structural Design and Drawing for the building are being prepared by me conforming to the relevant Bureau of Indian Standard viz. IS 456:2000 for Plain and Reinforced Concrete, IS 875(Part II)—1987 for Imposed Loads and IS 1893:2002(part 1) for Seismic Force. We certify that the building when constructed according to our Structural Designs and Drawings will be structurally safe and sound and fit for occupation.

1. The minimum grade of concrete is M30 and Fe550D
2. The minimum width of Column at Stilt Floor is 300mm.

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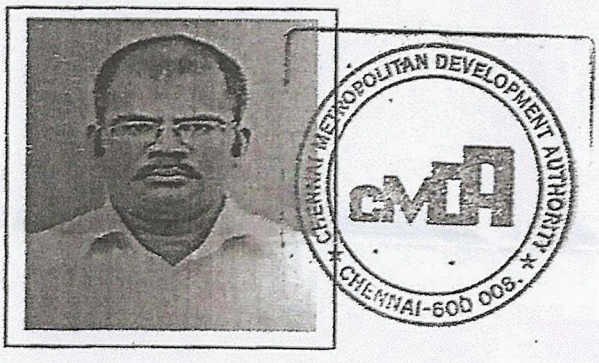
CHENNAI METROPOLITAN DEVELOPMENT AUTHORITY
'Thalamuthu Natarajan Building', No.1, Gandhi Irwin Road,
Egmore, Chennai-600 008.

PROFESSIONAL REGISTRATION CERTIFICATE

This is to certify that the **Thiru. B. SRINIVASAN** has enrolled as **Registered Structural Engineer Grade-II (SE)** with Chennai Metropolitan Development Authority (CMDA) who has the qualification of **B.E., (Civil Engg.)** and experience in the relevant field for **18 years**.

He has been given the Registration No.**SE/GR-II/2019/08/152 Renewed** on **21.08.2024.** 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 **20.08.2029**.



21/8/2024

(A. MEGANATHAN)
Superintendent

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STRUCTURAL DESIGN REPORT FOR RESIDENTIAL FLAT

PROJECT	:	**PROPOSED RESIDENTIAL FLAT @ TAMBARAM - MUDICHUR ORAGADAM ROAD / RAJIV GANDHI STREET, PERUNGALATHUR, CHENNAI**
STRUCTURAL CONSULTANTS	:	**B.SRINIVASAN Char. Engg.** No 311 ARCOT ROAD KODAMBAKKAM CHENNAI 600024

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1. GENERAL

SCOPE

This Residential apartment structure is basically a RC framed structure comprising of Stilt + 5 upper floors. The analysis and design are done using Finite Element method using software.

This document covers the general description of proposed structural framing plan for safe, economical & effective system, applicable design codes and standards for the building, loads and combinations considering for analysis and design, characteristics of locally available construction materials considered in the design.

SITE INFORMATION

CONSTRUCTION SITE LOCATION

The construction site is located at **TAMBARAM - MUDICHUR ORAGADAM ROAD / RAJIV GANDHI STREET, PERUNGALATHUR, CHENNAI**, Tamilnadu.

SEISMIC LOCATION

The proposed project site lies in **Zone – III** as per seismic code **IS: 1893 (Part 1)-2002**. All the structures shall be designed for seismic forces based on parameters mentioned in the code.

WIND PRESSURE

Wind force on structures shall be considered accounting basic wind speed of **50 m/s** (for Chennai) as per the provisions of **IS: 875-1987(Part 3)**. The wind may be assumed to blow in any direction and most unfavourable condition shall be considered for analysis and design.

REFERENCES, CODES AND STANDARDS FOR ANALYSIS & DESIGN

The structural analysis, design shall be developed on the basis of the latest standard codes and documents listed below.

All designs shall generally be prepared in accordance with Indian Standards (IS) codes of practice.

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CODES AND REFERENCES

All the Indian Standards referred to shall be the latest revision (including all amendments issued thereto) on the date of signing of the Contract.

In case of any deviation / conflict between provisions of IS codes and the design criteria, the provisions that are more stringent shall be followed unless specifically directed otherwise.

The Codes and Standards listed below are applicable for the design and construction of structures and buildings in general. Specifications for materials supplied from India shall follow the Indian Standard Specifications. Field and laboratory testing procedures for materials shall be as per Indian Standard Specifications.

LOADS

IS: 875	Code of Practice for design loads (other than earthquake) for Buildings and structures (All parts)
Part 1	Dead Loads — Unit Weights of Building materials and stored materials
Part 2	Imposed Loads
Part 3	Wind loads
Part 5	Special Loads and Combinations
IS: 1893	Criteria for earthquake resistant design of structure

FOUNDATIONS

IS: 1080	Code of Practice for design and construction of shallow Foundations in soils (other than raft, ring and shell)
IS: 1904	Code of Practice for design and construction of foundations in soils: General requirement
IS: 2950	Code of Practice for design and construction of raft foundations
IS: 8009	Code of practice for Shallow/Deep foundations subjected to symmetrical static vertical loads (All parts)

RCC

IS: 456	Code of Practice for plain and reinforced concrete
IS: 1786	Specification for high strength deformed steel bars and wires for concrete reinforcement
IS: 1893	Criteria for Earthquake resistant design of structures (General provisions and buildings)
IS: 3370	Code of Practice for concrete structures for the storage of liquids: (All parts)
IS: 3414	Code of Practice for design and installation of joints in buildings

IS: 4326	Code of Practice for earthquake resistant design and construction of buildings
IS: 5525	Recommendation for detailing of reinforcement in reinforced concrete works
IS: 10262	Recommended guidelines for concrete mix design
IS: 13920	Code of Practice for ductile detailing of reinforced concrete structures Subjected to seismic forces.

STRUCTURAL STEEL

IS: 800	Code of Practice for general construction in steel
IS: 808	Dimensions for hot rolled steel sections
IS: 813	Scheme of symbols for welding
IS: 1161	Steel tubes for structural purposes
IS: 2062	Steel for general structural purposes (fusion welding quality)
IS: 4000	High Strength bolts in steel structures – Code of Practice
IS: 7215	Tolerances for fabrication of steel structures
IS: 12843	Tolerances for erection of steel structures

MISCELLANEOUS

IS: 1172	Code of basic requirements for water supply, drainage and sanitation
IS: 1742	Code of Practice for building drainage
IS: 3067	Code of Practice for general design details and preparatory works for damp proofing and water proofing of buildings
SP 6	Handbook for Structural Engineers (all parts)
SP 7	National Building Code of India
SP 16	Design Aids for reinforced concrete to IS: 456-1978
SP 20	Handbook on masonry design and construction
SP 22	Explanatory handbook on codes on earthquake engineering (IS 1893-1975 and IS: 4326-1976)
SP 24	Explanatory handbook on Indian Standard code of Practice For plain and reinforced concrete (IS: 456 -1976)
SP 25	Handbook on causes and prevention of cracks in buildings
SP 34	Handbook of concrete reinforcement and detailing
IRC 15	Standard specifications and Code of practice for construction of concrete roads

IRC 37	Guidelines for design of flexible pavements
IRC 73	Geometric design of roads
	Bridge rules of Government of India, Ministry of Railways
	(Railway Board)

LOADS AND LOAD COMBINATIONS CONSIDERED FOR DESIGN

The structures shall be designed for the most critical combinations of dead loads, imposed loads, equipment loads, wind loads, seismic loads, temperature loads and any other loading condition which can occur during the design life of the facility as per code provisions.

DEAD LOADS

Dead loads consist of the weights of the structure complete with finishes, fixtures, partitions and all equipment of semi-permanent nature including roofing etc.

The following unit weight of material shall be considered for computation of loads. Loads given in IS: 875 (Part-I) shall be made use of for the materials not listed below.

- Self weight of Plain cement concrete : 23.5 KN/cu.m
- Self weight of Reinforced cement concrete : 25 KN/cu.m
- Solid block masonry : 22 KN/cu.m
- Burnt brick masonry : 19.20 KN/cu.m
- Floor finish : 23.5 KN/cu.m
- Cement plaster : 21.0 KN/cu.m
- Structural steel : 78.5 KN/cu.m
- Aerocon blocks : 7.8 KN/cu.m
- Soil (Dry) : 18 KN/cu.m
- Soil (Wet) : 20 KN/cu.m
- Water : 10 KN/cu.m
- Cinder Filling for sunken portion : 8 KN/cu.m (Wherever filling is required)

IMPOSED LOADS

The imposed loads shall be considered as per **IS: 875 (Part-II)** for different occupancies as per each apartment unit.

Floors and supporting members which may be subjected to heavy equipment live loads shall be designed on the basis of the weight of equipment or specifically defined live loads, whichever is greater.

EARTH PRESSURE LOADS

Earth pressure load is the horizontal pressure of the soil acting on the underground structure and foundation. Earth pressure for all underground structures shall be calculated using coefficient of earth pressure at rest, coefficient of active or passive earth pressure (whichever is applicable)..

The earth pressure including the surcharge load shall be calculated as follows:

$p = K(\gamma h + q)$ -------- For Normal Condition

$p = K[(\gamma - \gamma_w)h + q] + \gamma_w h$ -------- For submerged condition

Where,

γ = Unit soil weight (kN/m^3)

γ_w = Unit weight of water (kN/m^3)

h = position of earth pressure p from ground surface (m)

q = surcharge load

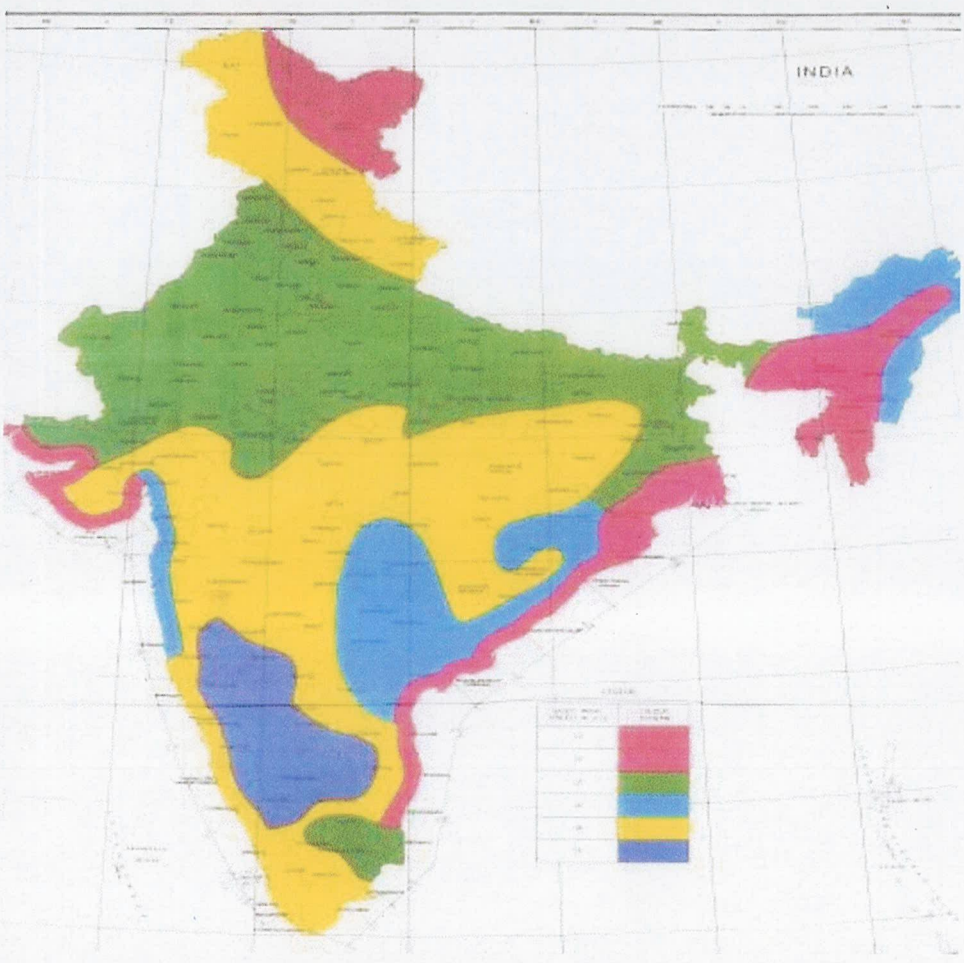
K = Earth pressure coefficient

LIVE LOAD REDUCTION

Live load reduction shall be considered as per **IS: 875 (Part-II)**.

WIND LOADS

The Wind pressure shall be calculated in accordance with IS: 875 (Part-3).



Bangalore is in the state of Karnataka, winds with a wind speed of 33 m/s.

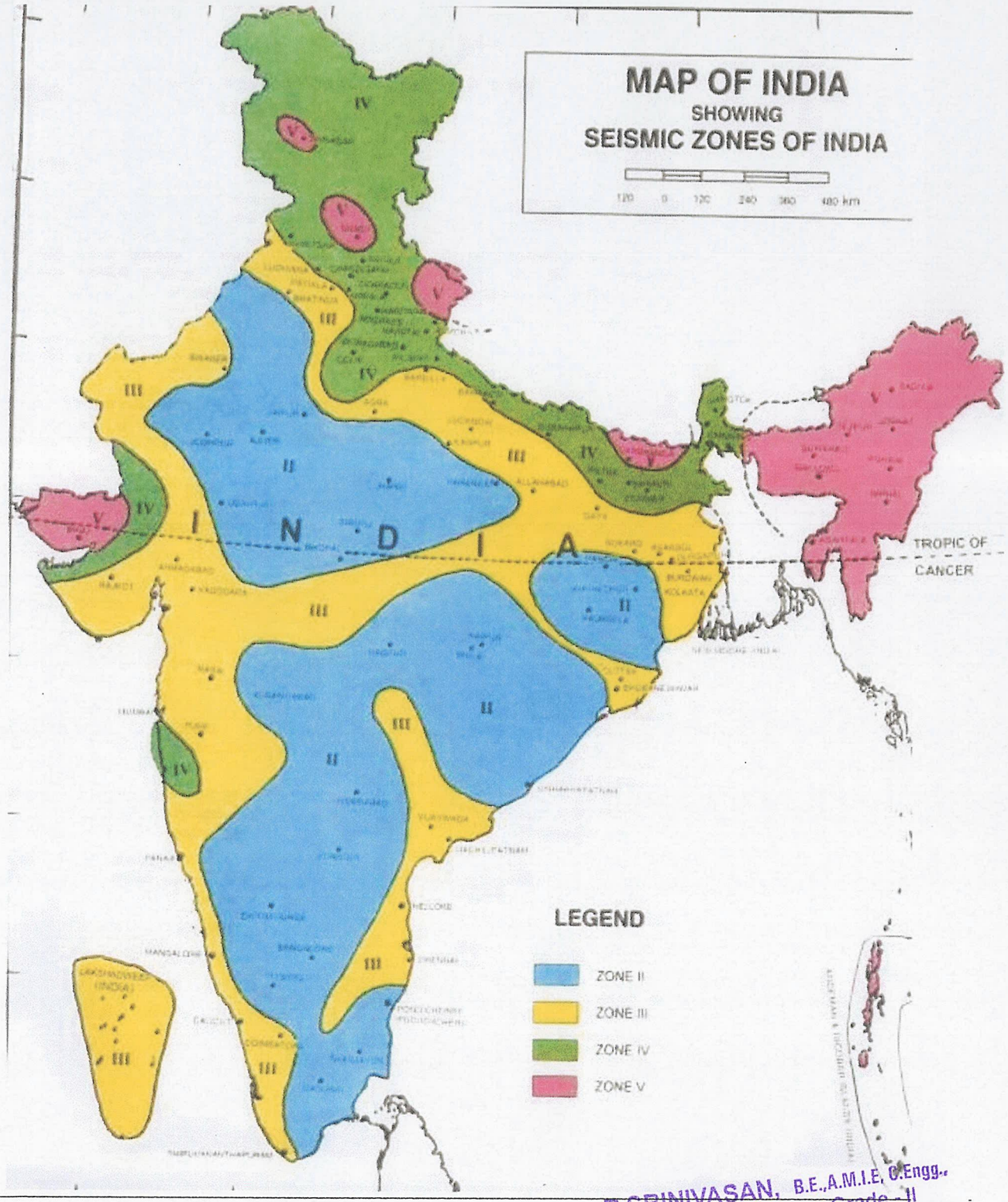
Basic Wind Speed V_b	: 50 m/s
Risk Coefficient k_1	: 1.08
(k_1 corresponds to 100 years Mean Probable Design Life of Structure)	
Terrain, height, structure size factor k_2	: 1.12
Topography factor k_3	: 1.0

The external and internal pressure co-efficient shall be as per respective clauses of IS: 875 (Part 3)

Design wind speed V_z	: $V_b \times k_1 \times k_2 \times k_3$
Design wind pressure p_z	: $0.6 \times V_z^2$

SEISMIC LOADS

All structures / units shall be designed for seismic forces using relevant provisions defined as per **IS: 1893 (Part1):2002.**



Chennai falls under seismic zone III as per IS 1893-2002 (Part 1) (Fifth Revision) and has the following factors to be considered for designs.

- Seismic Zone : III
- Seismic Zone factor, Z : 0.16 (As per Table 2-IS: 1893-2002)
- I -Importance factor : 1.0 (Ref Table 6-IS: 1893-2002)
- R -Response reduction Factor : 5 (SMRF)
- Sa/g= For medium soil will be adopted (Depending on Time period to be calculated separately).
- Infill walls will be considered

ELEVATOR LOADS

Elevator / Lift supporting columns / walls shall be designed for vertical and horizontal forces (including impact forces) as per vendor data.

LOAD COMBINATIONS

The individual members of the frame shall be designed for worst combination of forces such as bending moment, axial force, shear force and torsion. Permissible load combinations shall be as per **IS 875 (Part V)** and other relevant IS codes. Following combinations shall be considered for the analysis and design of different blocks/units.

GRAVITY LOAD COMBINATION

1.5DL+1.5LL

SEISMIC LOAD COMBINATIONS (STATIC)

1.5DL + 1.5EQX
1.5DL + 1.5EQY
0.9DL + 1.5EQX
0.9DL + 1.5EQY
1.2DL + 1.2LL + 1.2EQX
1.2DL + 1.2LL + 1.2EQY

WIND LOAD COMBINATIONS

1.5DL + 1.5WLX
1.5DL + 1.5WLY
0.9DL + 1.5WLX
0.9DL + 1.5WLY
1.2DL + 1.2LL + 1.2WLX
1.2DL + 1.2LL + 1.2WLY

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This value is to be considered when stability against overturning and stress reversal is critical where DL/LL/WL/EL denotes,

DL - Dead Load; LL - Live Load; TL - Temperature Load; WL - Wind Load;

EL - Earthquake Load

LOAD COMBINATIONS FOR UNDERGROUND STRUCTURES

Following loading conditions shall be considered in addition to the loading from superstructure for the design of sub structure of pump house, sumps, tanks, trenches and other underground structures.

Earth pressure, surcharge pressure and ground water pressure from outside in combination with / without water pressure from inside shall be accounted.

Base slab of the pump house shall be designed for the condition of different combinations of pump sumps being empty during maintenance stages with maximum ground water table. Intermediate walls in sumps shall be designed considering water on one side only and the other side being empty for maintenance.

Design shall also be checked against buoyancy due to ground water during construction and operation stage. Minimum factor of safety as per IS: 3370 against buoyancy shall be ensured considering empty condition ignoring superimposed loads.

DESIGN DATA SHEETS AND METHODOLOGY

All units/ structures shall be analyzed as framed structures using FINITE ELEMENT MENTHOD. For the loads and their combinations as specified in previous sections, the design shall be done using STRAP using in-house Excel spread sheets.

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STRUCTURAL ANALYSIS AND DESIGN:

GENERAL:

All R.C.C structures shall be designed according to the Limit State Method as specified in IS: 456 – 2000. The structure is idealized as 3D space frame and analyzed using FEM software package for both vertical and lateral loads.
Forces and moments from the 3D analysis output for the worst combinations are used for the design of the structure.
The foundations are designed for critical load combination.
The structure is analyzed for specific loads like dead load, live load, wind and seismic loads and for the load combinations as given in the relevant codes.
The slab is analyzed as two-way and one way slabs.

Design of structural steel members are done using elastic method as per IS: 800 with relevant allowable stresses.

DEFLECTION LIMITS:

For Reinforced concrete works:

Limiting values of deflection (Short and Long term) as per clause 35.3 of IS: 456-2000 is followed in the design.

Limiting value for short term deflection is considered as span/250 and for the long term deflection is considered as span/350 or 20mm whichever less as per IS 456 – 2000.

As per IS1893 (Part1) :2002, Story drift in any story due to minimum specified design seismic lateral force shall not exceed 0.004 times the story height design.

Lateral sway due to wind load should not exceed H/500 (H is the total height of structure).

CRACKING LIMITS:

Limiting values of crack width as per clause 35.3 of IS: 456-2000 is followed in the design.

In general for slabs and beams, the crack width is limited to 0.3mm.

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Type of foundation system, shall be based on loading arrangement, load intensity and soil strata. Design of foundation at various levels shall be dependent upon the soil bearing capacity at that level, which in turn shall be as per recommendation of soil investigation report.

All foundations will be designed in accordance with relevant parts of IS: 456 as per limit state method of design. Raft foundation if needed will be designed as per IS: 2950.

Safe bearing capacity of the soil will be increased by 25% and 50% under seismic load combinations for isolated and raft foundations respectively.

3.5 NOMINAL COVER TO REINFORCEMENT:

Nominal cover to main reinforcement shall be as follows:

Footing/Raft	• 50mm/75mm
Columns	• 40mm or Diameter of longitudinal reinforcement
Walls below ground level	• 30mm
Walls above ground level	• 25mm
Lifts and staircase	• 30mm
Beams	• 30mm
Slabs	• 20mm

For any other elements not specified above, clear cover shall be as per the clause 26.4 of **IS: 456 – 2000.** Nominal cover to reinforcement is 25mm for 2 hr. fire resistance.

4. GEOTECHNICAL INVESTIGATION

Soil exploration Report – **MARS SYNERGY GEOTECH PRIVATE LIMITED.**

INTRODUCTION

Construct Residential Apartment at Medavakkamvillage, This preliminary report presents a brief summary of the results of the soil investigations work carried out, and includes preliminary recommendations for the design of foundation of the proposed Multi-storeyed buildings.

SCOPE OF WORK

Three boreholes were progressed to study the subsoil conditions of the site

PROJECT DETAILS

THE SITE

The proposed Stilt +5 Floors Buildings is located Old Perungalathur Chennai district. The site is fairly level. The ground level at the site is same as road level.

THE STRUCTURES

The proposed Buildings are understood to be RCC Framed Structures, consisting of Stilt and Five upper floors for Block 1 and Stilt and Three upper floors.

RESULTS AND DISCUSSIONS

RECOMMENDATIONS

Minimum Depth of Foundations :

Allowable Bearing Pressure:

For ISLOATED Footing, the Net Allowable Bearing Pressure can be expected to vary between 25t/m2 to 30t/m2.

Construction Advisory

Loose pockets of soil / disintegrated rock, wherever encountered, should be completely removed and backfilled with well compacted earth. A 15cm thick layer of 40-50mm size gravel should be laid and rammed into the backfilled earth. A layer of sand should be placed and compacted in order to fill the voids. A levelling course of lean concrete can then be laid over the gravel, and construction of foundations can be taken up subsequently.

Refusal strata are encountered at shallow depths in the boreholes. Hence, during excavation for basement and foundations, hard disintegrated rock to hard rock will be encountered, and further excavation by ordinary manual means, (using crowbar and pickaxe) or mechanical means, will not be possible. This should be taken into account while planning the work.

Wherever hard disintegrated rock / hard rock is encountered, and further excavation is not possible, the foundations may rest on the hard strata, after suitably dressing and benching the area.

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From Analysis the Seismic and Axial Load to the Footing are 1307 KN from a rectangular column 300x750 mm . M30 Grade of Concrete and Fe 550D steel is used and safe bearing capacity of soil is taken as 250KN/sqm as per soil report.

Maximum Load from Column = 1307 KN.

Add 10% self weight of Footing = 130 KN.

Total = 1436 KN.

Area of Footing required A = 1346 KN / 250 KN/m2 = 7.18 m2.

Size of footing required = 2.68 m x 2.68m.

Providing footing size = 2.75 x 2.75 m.

Ultimate Soil reaction = P/A = 1.5 x 1078 / 2.75m x 2.75m

= 221 KN/m2 = 0.221N/sqmm.

Depth of footing for shear.

d = 0.221 x 2700 x(1250-d)

=745875 – 597d.

Assume Pt = 0.12 ζc = 0.29N/sqmm.

shear resistance

Vc1 = 0.29 x 2700xd

=783d

Vu1 ≤ Vc1

=745875-597d ≤ 783d

d ≥ 540mm

Providing effective depth d=638 D=700.

Flextural moment

Mu = wl2/2

= 221x2.7x 1.25x1.25/2 = 466KNm = 466000000Nmm.

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d'/D = 52.5/750 = 0.07

$Mu/FckbD^2$ =25x1.5x10^6 /30x375x750x750 = 0.035

Pu/Fckbd = 810x1.5x10^3/30x375x750 = 0.812

From SP 16 Chart 44, p/Fck = 0.10

Ast = 0.1x25x200x500/100 = 2500sqmm.

Required 6 Nos of 25 tor rods to be provided.

For Distributing even arrangement of rod on all 4 sides of column

6 Nos of 25 tor rods are provided.

Also Lateral ties 8 tor rods @ 150c/c are Provided.

And Design of other Column calculated in similar way.

7.4 Design of Beam

TYPICAL BEAM DESIGN

Continuous beam supported by Columns of Effective span 10mt of 2 bay of size 300mm x 600mm has to carry Factored moment as follows.

Negative moment @ Top of Left Support of first span = 678KNm

Positive moment @ Bottom of Mid of first span = 645KNm

Negative Moment @ Top of mid support = 937KNm

Positive moment @ Bottom of Mid of Second span = 612KNm

Negative moment @ Top of Right Support of first span = 640KNm

Negative moment @ Top of Left Support of first span = 678KNm

Mu limit = 0.138 x fck x b x d x d = 0.138 x 25 x 300 x 854 x 854 = 754KNm

As Mu limit is greater than Mu

678000000=0.87Ast x 500 x 854[1-(Ast x 500/300x854x25)]

678000000 = 371490Ast-29Ast^2

Ast = 2204 sqmm.

Use 3 Nos of 32 mm Rod and 2 Nos of 20mm Rod

Positive moment @ Bottom of Mid of first span = 645KNm

Mu limit = 0.138 x fck x b x d x d = 0.138 x 25 x 300 x 854 x 854 = 754KNm

As Mu limit is greater than Mu

645000000=0.87Ast x 500 x 854[1-(Ast x 500/300x854x25)]

645000000 = 371490Ast-29Ast^2

Ast = 2072 sqmm.

Use 3 Nos of 32 mm Rod and 2 Nos of 25mm Rod

Negative moment @ Top of Left Support of first span = 937KNm

Mu limit = 0.138 x fck x b x d x d = 0.138 x 25 x 300 x 854 x 854 = 754KNm

As Mu limit is less than Mu

Mu – Mu limit = 937 – 754 = 183KNm

fsc = [0.0035(Xumax – d')/ Xumax] x Es

=[{0.0035(0.46 x 854) – 46}/0.46 x 854] x 200000 = 618 N/sqmm

But fsc is greater than 0.87 fy (0.87 x 500 = 435 N/sqmm)

Asc = (Mu-Mulimit)/(fsc (d-d') = 183000000/435 x 808 = 520 sqmm

Provide 2 bars of 20mm Rod (Asc = 628 sqmm).

Ast2 = (Asc x fsc)/0.87fy = 628 x 435 / 0.87 x 500 = 628 sqmm

Ast1 = (0.36 x fck x b x (Xu limit) / 0.87 fy = 0.36 x 25 x 300 x 0.46 x 854 / 0.87 x 500

Ast1 = 2438 sqmm

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Ast = Ast1 + Ast2 = 3066 sqmm

So Provide 5 nos of 32mm Rod.

Positive moment @ Bottom of Mid of Second span = 612KNm

Mu limit = 0.138 x fck x b x d x d = 0.138 x 25 x 300 x 854 x 854 = 754KNm

As Mu limit is greater than Mu

612000000=0.87Ast x 500 x 854[1-(Ast x 500/300x854x25)]

612000000 = 371490Ast-29Ast^2

Ast = 1942 sqmm.

Use 3 Nos of 32 mm Rod and 2 Nos of 25mm Rod

Negative moment @ Top of Right Support of first span = 640KNm

Mu limit = 0.138 x fck x b x d x d = 0.138 x 25 x 300 x 854 x 854 = 754KNm

As Mu limit is greater than Mu

640000000=0.87Ast x 500 x 854[1-(Ast x 500/300x854x25)]

640000000 = 371490Ast-29Ast^2

Ast = 2052 sqmm.

Use 3 Nos of 32 mm Rod and 2 Nos of 20mm Rod

And Design of other Beam calculated in similar way.

Design of RCC SLAB

TYP RCC SLAB DESIGN

Effective span of Slab is 4.26mt x 9.88mt with beam support of 200mm spaced @ 4260mmc/c Taking M25 Grade Concrete and Fe500 Grade steel.

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Thickness of slab = 4260/25 = 170mm

Slab thickness is taken as 200mm as the building is used for storage purpose.

Effective depth = d = 200 – 20 – 6 = 174mm

Self wt of slab = 0.2 x 25 = 5KN/sqm Finish = 2KN/sqm

Total Dead Load = 7KN/sqm

Live load for storage building having a roof ht of 5mt = 12KN/sqm

Total Load = 7+12 = 19KN/sqm

Factored Load W= 1.5 x 19 = 28.5KN/sqm

Moment Mu = W L^2 / 12 = 28.5 x 4.26x4.26/8 = 64.65KNm

Mu limit = 0.138 fck bdd = 0.138 x 25 x 1000 x 174 x 174 = 104 KNm

Since Mu is less than Mu limit the section is under reinforced.

Mu = 0.87Ast fy d[1-(Ast fy/b d fck)]

64650000 = 0.87 x Ast x 500 x 174 [1-(Ast x 500/1000 x 174 x 30)]

64650000 = 75690 Ast – 7.25 Ast^2

Ast = 938.5 sqmm

Provide 12 Tor @ 100mm c/c

Distributor Steel Percentage = 0.12%

Ast = 0.12 x 1000 x 174 / 100 = 208sqmm

Provide 10 Tor @ 200c/c as Distributor wherever required.

Check for Shear

Span load = 28.5 x 4.26 = 121 KN V = 121/2 = 60.5KN.

Actual Shear stress V = 60500/1000 x 174 = 0.34N/sqmm < Tc(min).