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3/350/2 Mettukuppam,
OMR Thoraipakkam,
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CHENNAI METROPOLITAN DEVELOPMENT AUTHORITY
Thalamuthu Natarajan Building, No.1, Gandhi Irwin Road, Egmore,
Chennai - 600 008
Phone : 28414855 Fax: 91-044-28548416
E-mail: mscmda@tn.gov.in
Web site: www.cmdachennai.gov.in.

PROFESSIONAL REGISTRATION CERTIFICATE

This is to certify that the Thiru / Tmt. / M/s. **C.KANNAN** has enrolled as **Registered Structural Engineer Grade-I(SE)** with Chennai Metropolitan Development Authority (CMDA) who has the qualification of **M.E Structures** and experience in the relevant field for **15** years.

He/She has been given the Registration No. **SE/I/2024/2/0047** on **28-Feb-2024** He/She 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 **27-Feb-2029**.

Validity unknown
Name :A Meganathan
Designation :Superintendent
Date :02/28/2024 12:50:37 PM



A Meganathan

Superintendent

C. KANNAN, B.E., M.E, (Structure)
Structural Engineer,
CMDA Reg. No: SE/I/2024/2/0047
Door No: 21, 4th Main Road,
Indira Nagar, Chennai - 600 020.

C.KANNAN, M.E. (Structure)
STRUCTURAL ENGINEER

Door .21, plot No. 257- W, Flat No. 2B
"Utopia Apartments" 2nd Floor,
4th Main Road, Indira Nagar,
Chennai- 600 020
Mobile: 9841249815
Email: kannankds2007@gmail.com

11-03-2026

STRUCTURAL STABILITY CERTIFICATE

The detailed engineering and structure design of the Proposed Residential Building comprising of Stilt Floor + 4 Floors + 5th Floor part (Height - 18.30m) Residential Building with 66 Dwelling Units (Indoor Games, Association Room & Swimming Pool at 5th floor level) Availing Premium FSI with TOD Benefit Pazhandi Amman Koil Street & Karneegar street, Adambakkam, Chennai – 600 088 comprised in Old S.No.113/7, T.S.No.6/2 & 8/2, Block No.11, Ward - G of Adambakkam Village within the Limits of Greater Chennai Corporation. has been done based on the report of geotechnical investigation (soil test) done by Geo Engineering Consultant **Report No:GEC-JC-GT-5080/2023-2024 dated: 10/01/2024** 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 have checked various parameters and found that the proposed building would be safe.

3. I 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-875 Part I to III and design of earthquake resistant structure as per one code IS 1893, is carried out.

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

C. KANNAN, B.E., M.E., (Structure)
Structural Engineer,
CMDA Reg. No: SE/I/2024/2/0047
Door No: 21, 4th Main Road,
Indira Nagar, Chennai-600 020.

PROPOSED RESIDENTIAL BUILDING COMPRISING OF STILT FLOOR + 4 FLOORS + 5TH FLOOR PART (HEIGHT - 18.30M) RESIDENTIAL BUILDING WITH 66 DWELLING UNITS (INDOOR GAMES, ASSOCIATION ROOM & SWIMMING POOL AT 5TH FLOOR LEVEL) AVAILING PREMIUM FSI WITH TOD BENEFIT PAZHANDI AMMAN KOIL STREET & KARNEEGAR STREET, ADAMBAKKAM, CHENNAI – 600 088 COMPRISED IN OLD S.NO.113/7, T.S.NO.6/2 & 8/2, BLOCK NO.11, WARD - G OF ADAMBAKKAM VILLAGE WITHIN THE LIMITS OF GREATER CHENNAI CORPORATION

GENERAL NOTE ON STRUCTURAL DESIGN

1.0 GENERAL

1.1 DESIGN BASIS

The proposed residential building consists of stilt plus Five upper floors.

The design of this building is carried out based on frame analysis using STAAD CONNECT.

1.2 CODES AND STANDARDS

All structural design is carried out conforming to the provisions of National Building Code of India and other relevant Indian Codes and Standards.

1. I.S. 456 - 2000
2. I.S. 875 - Part I to III
3. I.S.1893 - 2016

2.0 BASIC CIVIL DESIGN LOADS

2.1 DEAD LOADS & LIVE LOADS

Typical slab dead load is calculated as follows

Self weight of slab	=	3.25kN/m²
Floor finish	=	2.0kN/m²
Live load	=	2.0kN/m²
		7.25kN/m²

C. KANNAN, B.E., M.E, (Structure)
Structural Engineer,
CMDA Reg. No: SE/I/2024/2/0047
Door No: 21, 4th Main Road,
Indira Nagar, Chennai-600 020.

3.0 SOIL DETAILS

Based on soil test report Pile Foundation is adopted.

DESIGN METHODS

General design and detailing of concrete members/elements are done conforming to the provisions of I.S: 456 and other relevant I.S codes. Limit State method is followed for the design.

Seismic Zone III load is taken into account for the analysis. The predominant direction of vibration is horizontal. Relevant combination of forces has been taken into account.

4.1

Load Combination	Ultimate Limit Load	Serviceability Limit State
DL+LL+WL Or DL+LL+EL	1.2DL+1.2LL+1.2WL Or 1.2DL+1.2LL+1.2EL	DL+LL+WL or DL+LL+EL

4.3 **MINIMUM COVER**

Slab	15 mm
Beam	25 mm
Columns	40 mm
Foundations	50 mm

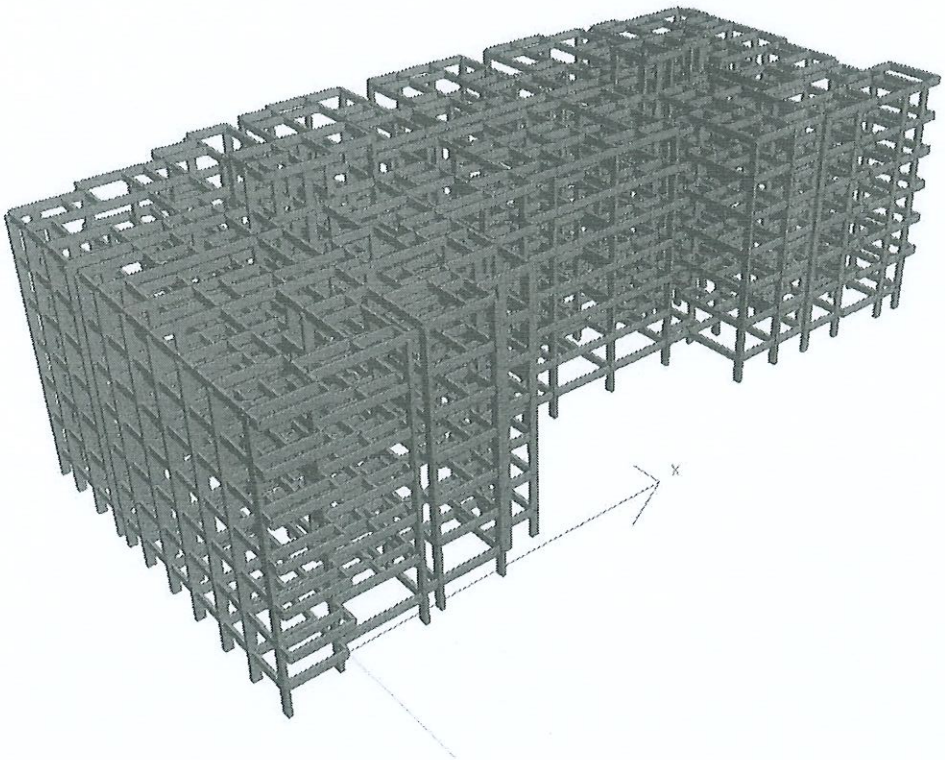
The Structure is safe and sound when used for the purpose for which it is designed.

C. KANNAN, B.E., M.E, (Structure)
Structural Engineer,
CMDA Reg. No: SE/I/2024/2/0047
Door No: 21, 4th Main Road,
Indira Nagar, Chennai-600 020.

PLAN SHOWING THE PROPOSED CONSTRUCTION OF RESIDENTIAL BUILDING COMPRISING OF STILT FLOOR + 4 FLOORS + 5TH FLOOR PART (HEIGHT - 18.30M) RESIDENTIAL BUILDING WITH66 DWELLING UNIT (INDOOR GAMES, ASSOCIATION ROOM & SWIMMING POOL AT 5TH FLOOR LEVEL) AVAILING PREMIUM FSI WITH TOD BENEFIT PAZHANDI AMMAN KOIL STREET & KARNEEGAR STREET, ADAMBAKKAM, CHENNAI – 600 088 COMPRISED IN OLD S.NO.113/7, T.S.NO.6/2 & 8/2, BLOCK NO.11, WARD - G OF ADAMBAKKAM VILLAGE WITHIN THE LIMITS OF GREATER CHENNAI CORPORATION

RESIDENTIAL BUILDING - Structural Design Report

MARCH -2026



C. KANNAN, B.E., M.E, (Structure)
Structural Engineer,
CMDA Reg. No: SE/I/2024/2/0047
Door No: 21, 4th Main Road,
Indira Nagar, Chennai-600 020.

STRUCTURAL CONSULTANT

C.KANNAN B.E., M.E (STRUCTURE)
INDIRA NAGAR, CHENNAI-20.

1.1 FOREWORD

1.1.1 - Description of Project

This report pertains to the construction of residential building at Adambakkam, Chennai. The proposed market comprises a five-storey building. The project construction is carried out as RCC framed structure with Beam and Slab system. The building is designed with accessibility in mind as well as earthquake-resistant construction to ensure the well-being of occupants.

1.1.2 – Objective of the Report

The objective of this report is to provide and furnish complete details related to Project and structural analysis and design considerations.

1.1.2 – Scope of the Report

This document describes the general requirements and various design parameters that are to be considered in the design of the entire building.

1.2 CODES, STANDARDS AND REFERENCES

Statutory Requirements:

The design of structural and other building services will comply with the following requirements:

- National Building Code The Building Regulations
- The Environmental Protection Act in liaison with the Environmental Agency.
- Fire prevention and detection in compliance with the local Fire Regulation.

DESIGN STANDARDS:

Specific applicable codes and standards will be identified and adopted in the design philosophies as appropriate to the structural elements. The latest editions of the Codes and Standards will be used indesigns. All design work shall be based on Indian Standards and Codes with latest revision, with amendments if any, as on date.

Loads:

IS: 875 -2015	-	Code of Practice for design loads (other than earthquake) for Buildings & structure (All parts)
IS: 1893-2016	-	Criteria for earthquake resistant design of structure

Foundations:

IS: 1080-1985(2016)	-	Code of Practice for design and construction of shallow foundations on soils(other than raft, ring and shell)
IS: 1904-1986(2015)	-	Code of Practice for design and construction of foundations in soils general requirement
IS: 2911-1980(2013)	-	Code of Practice for design and construction of pile foundations (All parts)
IS: 2911-1980(2013)	-	Code of Practice for design and construction of pile foundations (All parts)
IS: 2950-1981(2013)	-	Code of Practice for design and construction of raft foundations
IS: 2974-1998(2013/2015)	-	Code of Practice for design and construction of machine Foundations(All parts)
IS: 8009-1976/1980(2013/2015)	-	Code of Practice for calculation of settlement of foundations (All parts)

RCC:

IS: 456 -2000(2016)	-	Code of Practice for plain and reinforced concrete
IS: 458 -1988	-	Specification for precast concrete pipes
IS: 3370-2009	-	Code of Practice for concrete structures for the storage of liquids:(All parts)
IS: 4326-2013	-	Code of Practice for earthquake resistant design and construction of building
IS: 5525-1969(2013)	-	Recommendation for detailing of reinforced concrete works
IS: 1786-2008	-	Code of Practice for design and construction of machine Foundations(All parts)
IS: 5525-1969(2013)	-	Specification for high strength deformed steel bars and wires for concrete reinforcement
IS: 1786-2008	-	Recommended guidelines for concrete mix design
IS: 10262-2009	-	Criteria for earthquake resistant design of structures (General provisions and building).
IS: 1893 (Part-1)-2016	-	Criteria for structural safety of Tall Concrete buildings
IS: 16700 – 2017	-	Ductile design and Detailing of Reinforced concrete structures subjected to Seismic forces – Code of practice
IS: 13920 – 2016	-	Ductile design and Detailing of Reinforced concrete structures subjected to Seismic forces – Code of practice
IS: 1343 – 1980	-	Code of practice for Prestressed concrete

Miscellaneous:

IS: 432(part 2)-1995	-	Specification for mild steel and medium tensile steel bars and hard-drawnsteel wire for concrete reinforcement
IS: 6313(part II)-2001	-	Standards for anti-termite treatment
IS: 1905-1998	-	Code of Practice for structural use of unreinforced masonry
IS: 3067-1995	-	Code of Practice for general design details and preparatory works for damp proofing and water proofing of buildings
SP: 6 -1998	-	Handbook for structural engineers (all parts)
SP: 7 -2005	-	National Building Code of India
SP: 16-1999	-	Design Aids for reinforced concrete to IS:456-1978
SP: 22-1982	-	Explanatory handbook on codes for earthquake engineering (IS:1982-1975and IS:4326-1976)
SP: 24-1983	-	Explanatory handbook on Indian Standard code of Practice for plain andreinforced concrete
SP: 34-1987	-	Handbook of concrete reinforcement and detailing (SCIP)

Material:

IS: 269 -2015	-	Specification for Ordinary, rapid hardening and low heat Portland cement'
.IS: 455 -1995	-	Specification for Portland blast furnace slag cement.
IS: 1489-1991	-	Specification for Portland pozzolana cement
IS: 4031-1991	-	Method of physical tests for Portland cement.
IS: 383 - 2016	-	Specification for coarse and fine aggregates from natural sources for concrete.
IS: 516 – 1999	-	Method of test for strength of concrete
IS: 1199-1999	-	Method of sampling and analysis of concrete.
IS: 1566-2000	-	Specification for plain hard drawn steel wire fabric for concrete reinforcement
IS: 4990-1998	-	Specification for plywood for concrete shuttering works.
IS: 2645-1999	-	Specification for integral cement water proofing compounds.

1.3 DESCRIPTION OF STRUCTURE

1.3.1 Building Description

The Development consists of the following:

a. Residential building floor covered with RCC roofing.

The usages of individual floors are as given below:

Floors	Details
Main Commercial Building	Space for Residential Purpose

1.3.2 Structural Arrangement:

The Structural System for the residential buildings comprises of RCC column and beam and PT slab.

S.No.	Description	Details
1.	Column Grids	5.20 m x 4.00 m (Varies for some grids)
2.	Structural System	RCC Column & Beam
3.	Slab Thickness RCC Slab	Min. 120mm (Varies on span)
4.	Foundation	Pile Foundation
5.	Column	As per design
6.	Beams	As per design

1.4 DESIGN APPROACH

1.4.1 – Design Life.

The design life of the building is assumed as 50 years. This requirement is applicable only for concrete works and not applicable to replaceable finishing materials, water proofing membrane and thermal insulations (if any). Hence periodic maintenance / refurbishment are required for all replaceable material for longer life.

1.4.2 – Material Properties.

Materials specified will conform to the latest edition of the relevant Indian Standard or other accepted standard. Specifications for materials will include sampling and testing as stipulated in the design standards. Detailed material specifications will be included in the Technical Specification.

Concrete:

All structural concrete shall have cube crushing strength of 30 N/sq.mm (M30) at 28 days.Plain cement concrete shall have cube crushing strength of 10 N/sq.mm (M10) at 28 days.

Concrete Mix:

Concrete Item	Grade
Pile Foundation	M30
Columns	M30
Slabs & Beams	M25

Reinforcement steel:

- All reinforcement shall confirm to IS: 1786 – 1985 having minimum yield strength of 500 N/sq.mm.Corrosion resistant steel is not required.

1.4.3 – Design loads

Dead loads:

Dead load shall include weight of all structural and Architectural components. Self-weight of the materialsshall be calculated on the basis of unit weights given in IS: 875.

- Floor finish of 75 mm thickness : 75 kg/sqm
- Self-weight of Plain concrete : 2400 kg/cum (24 kN/cum)
- Self-weight of RCC : 2500 kg/cum (25 kN/cum)
- Aerocon block masonry : 700 kg/cum (7 kN/cum) [For walls]
  (With additional 15mm thick plastering on external surface and 12mm plastering on internal wallsurfaces)
- Soil (Dry) : 1800 kg/cum (18 kN/cum)
- Soil (Wet) : 2000 kg/cum (20 kN/cum)
- Water : 1000 kg/cum (10 kN/cum)
- Masonry with plastering : 2200 kg/cum (22 kN/cum)
- Wall loads : As per actuals

Live loads:

The superimposed loads shall be calculated in accordance with IS: 875(Part-2) based on Occupancy Classification. For multiple occupancies of use in the building shall be referred with the other appropriate comparable occupancy classification as per Table.1 of IS 875(Part-2)-1987.

Following live loads are considered while designing the structural elements apart from the dead loads asper codes.

Floor Live loads:

- Commercial space : 500 kg/sqm (2.0 kN/sqm)
- Stairs : 400 kg/sqm (3.0 kN/sqm)
- Corridors / Balcony : 400 kg/sqm (3.0 kN/sqm)
- Toilets : 200 kg/sqm (2.0 kN/sqm)
- Terrace with Access : 200 kg/sqm (2.0 kN/sqm)
- Electrical rooms : 400 kg/sqm (4.0 kN/sqm)
- AHU : 400 kg/sqm (5.0 kN/sqm)

Sunken Details:

- Toilet : 250 mm

Wind Loads

The Wind pressure shall be calculated in accordance with IS: 875 (Part-3):2015.Chennai has a high wind speed of 50m/s.

Basic Wind Speed V_b : 50 m/s

Risk Coefficient k_1 : 1.00 (k_1 corresponds to 50 years Mean Probable Design Life of Structure)

Terrain, height, structure size factor k_2 : To suit the height of the structure for terrain category 2

Topography factor k_3 : 1.0

Importance factor for cyclonic region k_4 : 1.0

The external and internal pressure co-efficient shall be as per respective clauses of IS: 875 (Part 3):2015 Design

Design Wind speed V_z : $V_b \times k_1 \times k_2 \times k_3 \times k_4$

Design Wind speed V_z : $50 \times k_2$ m/s

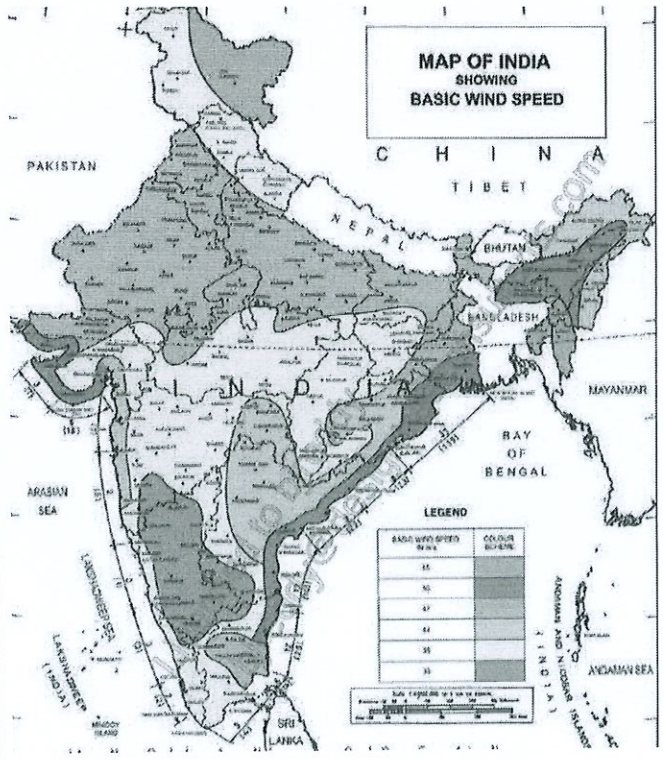
Height	k_2	V_z
0	0.91	45.5
5	0.91	45.5
10	0.91	45.5
15	0.97	48.5
20	1.010	50.5
21	1.015	50.75

Wind Pressure, P_z : $0.6V_z^2$

Design Wind Pressure, P_d : $(P_z \times K_a \times K_d \times K_c) > \mathbf{0.7\ P_z}$

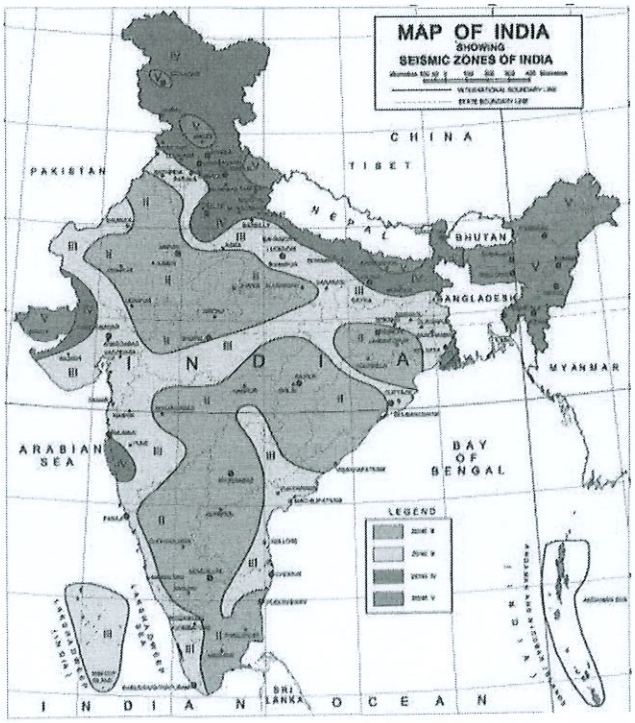
Height	k_2	Vz	P_z	K_a	K_d	K_c	P_d	**0.7 P_z**
0	0.91	45.5	1242.15	1	1	1	1242.15	**869.5**
5	0.91	45.5	1242.15	1	1	1	1242.15	**869.5**
10	0.91	45.5	1242.15	1	1	1	1242.15	**869.5**
15	0.97	48.5	1411.35	1	1	1	1411.35	**987.9**
20	1.010	50.5	1530.15	1	1	1	1530.15	**1071.11**
21	1.015	50.75	1545.34	1	1	1	1545.34	**1081.74**

Map showing basic wind speed



Basic wind speed in m/s (based on 50-year return period)

Map showing seismic zones



Seismic zones of India

Seismic Forces:

Chennai falls under seismic zone III as per IS 1893-2016 (Part 1) (Sixth Revision) and has the following factors to be considered for designs. Ductile detailing is required. (Please refer attached map above)

Seismic Zone	: III
Seismic Zone factor, Z	: 0.16 (As per Table 3; IS: 1893-2016)
Design horizontal seismic coefficient (Ah)	: $(Z/2)*(S_a/g)*(I/R)$
I -Importance factor	: 1.2 (Ref Table 8; IS: 1893-2016)
Response reduction Factor	: 5
Soil type	: Type -1
Damping Ratio for RCC	: 5 %

Sa/g – Average response acceleration coefficient for soil sites as per Fig.2 of IS: 1893-2016 and it is arrivedbased on appropriate fundamental natural period of structure as per Cl 7.6.2 (b)

Design horizontal seismic coefficient (A_h)	: $(Z/2)*(S_a/g)*(I/R)$
	: $(0.16/2)*(1.2/5) * (S_a/g)$
A_h	: $0.0192 * (S_a/g)$
Design seismic base shear, V_b	: $A_h * w$ where, w - seismic weight of building
Effect of infill panels	: Not considered in the analysis

Time period Calculation:

T	$= 0.09H/\sqrt{(d)}$
T_x	$= 0.09 \times 18 / \sqrt{(65.15)}$
	$= 0.2$ s
T_z	$= 0.09 \times 18 / \sqrt{(36.45)}$
	$= 0.27$ s

FACTOR APPLIED IN STAAD

X-DIRECTION	$= (Z/2) * (I/R)$
	$= (0.16/2)*(1.2/5)$
	$= 0.0192$
Z-DIRECTION	$= (Z/2) * (I/R)$
	$= (0.16/2)*(1.2/5)$
	$= 0.0192$
Y-DIRECTION	$= (Z/2) * (I/R) * (2/3) * 2.5$
	$= (0.16/2)*(1.2/5) * (2/3) * 2.5$
	$= 0.032$

Table No : 03

Seismic Zone Factor Z

(Clause 6.4.2)

Seismic Zone	II	III	IV	V
Seismic Intensity	Low	Moderate	Severe	Very Severe
Z	0.10	0.16	0.24	0.36

Temperature Loads:

The effect of temperature will be considered wherever applicable in accordance with relevant Indian Codes. Minimum & maximum temperatures considered are as shown in the table below. Same will be used for the analysis & design. The coefficient for thermal expansion and contraction will be in accordance withIS: 456 and IS: 800 for concrete and steel respectively.

Station Name	Month	Period	No. of Years	Mean Temperature in Degree C		Mean rainfall in mm
				Maximum	Minimum	
Chennai (Minambakkam)	January	1901-2000	100	28.8	20.4	35.3
Chennai (Minambakkam)	February	1901-2000	100	30.5	21.1	13.0
Chennai (Minambakkam)	March	1901-2000	100	32.6	23.0	14.5
Chennai (Minambakkam)	April	1901-2000	100	34.7	25.8	15.9
Chennai (Minambakkam)	May	1901-2000	100	37.4	27.6	42.4
Chennai (Minambakkam)	June	1901-2000	100	37.3	27.4	53.9
Chennai (Minambakkam)	July	1901-2000	100	35.3	26.1	99.6
Chennai (Minambakkam)	August	1901-2000	100	34.5	25.5	129.9
Chennai (Minambakkam)	September	1901-2000	100	33.9	25.2	123.5
Chennai (Minambakkam)	October	1901-2000	100	31.8	24.2	284.6
Chennai (Minambakkam)	November	1901-2000	100	29.4	22.6	353.0
Chennai (Minambakkam)	December	1901-2000	100	28.4	21.2	146.3

[Source: National Data Centre: ndc@imdpune.gov.inDGM (Sectt.): dgm.hq@imd.gov.in]

Considering the average **daily** maximum temperature as 34 degrees and minimum as 24 degrees, the variation in temperature for analysis is considered as **10 degrees.** [Source https://www.wunderground.com/history/airport/VOMM/2016/1/4/CustomHistory.html?dayend=5&monthend=2&yearend=2017&req_city=&req_state=&req_statename=&reqdb.zip=&reqdb.magic=&reqdb.wmo=]

Temperature and shrinkage effect:

Horizontal floor displacement due to differential temperatures and shrinkage is of importance in long concrete buildings. It can be taken care of by either providing expansion joints at an appropriate spacing or designing structural members for the additional moments caused by the temperature and shrinkage effects. Pour strips at suitable locations shall also be considered where required.

Exceptional Loads:

Loads due to the following catastrophe scenarios are not considered in the design:

- Exceptional loads due to terrorist attacks (Explosions)
- Accidental loads (Falling of aircraft on the building)
- Accidental collision of vehicles on the façade of the building

1.4.4 Durability Considerations:

Environmental conditions, Corrosion and Fire protection for concrete and structural steel

- Environment : Moderate
- Exposure conditions : Concrete surfaces exposed to moderate environment
- Minimum grade of Concrete : Moderate Exposure – M25

Table 5 Minimum Cement Content, Maximum Water-Cement Ratio and Minimum Grade of Concrete for Different Exposures with Normal Weight Aggregates of 20 mm Nominal Maximum Size

(Clauses 6.1.2, 8.2.4.1 *and* 9.1.2)

Sl No.	Exposure	Plain Concrete			Reinforced Concrete		
		Minimum Cement Content kg/m³	Maximum Free Water-Cement Ratio	Minimum Grade of Concrete	Minimum Cement Content kg/m³	Maximum Free Water-Cement Ratio	Minimum Grade of Concrete
i)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
i)	Mild	220	0.60	–	300	0.55	M 20
iii)	Moderate	240	0.60	M 15	300	0.50	M 25
iii)	Severe	250	0.50	M 20	320	0.45	M 30
iv)	Very severe	260	0.45	M 20	340	0.45	M 35
v)	Extreme	280	0.40	M 25	360	0.40	M 40

NOTES

1 Cement content prescribed in this table is irrespective of the grades of cement and it is inclusive of additions mentioned in 5.2. The additions such as fly ash or ground granulated blast furnace slag may be taken into account in the concrete composition with respect to the cement content and water-cement ratio if the suitability is established and as long as the maximum amounts taken into account do not exceed the limit of pozzolona and slag specified in IS 1489 (Part 1) and IS 455 respectively.

2 Minimum grade for plain concrete under mild exposure condition is not specified.

1.4.5 Fire Rating

Thickness of the structural elements as per table 15, 16 & 16A clause 26.4 of IS 456-2000.

Fire Resistance h	*Minimum Beam Width b*	*Rib Width of Slabs b_w*	*Minimum Thickness of Floors D*	*Column Dimension (b or D)*			*Minimum Wall Thickness*		
				Fully Exposed	50% Exposed	One Face Exposed	$p<0.4\%$	$0.4\%\leq p\leq 1\%$	$p>1\%$
	mm	mm	mm	mm	mm	mm	mm	mm	mm
0.5	200	125	75	150	125	100	150	100	100
1	200	125	95	200	160	120	150	120	100
1.5	200	125	110	250	200	140	175	140	100
2	200	125	125	300	200	160	–	160	100
3	240	150	150	400	300	200	–	200	150
4	280	175	170	450	350	240	–	240	180

NOTES

1 These minimum dimensions relate specifically to the covers given in Table 16A.

2 p is the percentage of steel reinforcement.

FIG. 1 MINIMUM DIMENSIONS OF REINFORCED CONCRETE MEMBERS FOR FIRE RESISTANCE

Nominal covers for 2 hr. fire resistance:

Nominal Cover						
Beams		Slabs		Ribs		Columns
Simply supported	Continuous	Simply supported	Continuous	Simply supported	Continuous	
mm	mm	mm	mm	mm	mm	mm
40	30	35	25	45	35	40

1.5 ANALYSIS METHODOLOGY:

This structure has a physical interface with almost all the disciplines like geotechnical works, MEP services, etc. The structure proposed is of cast in-situ concrete construction with columns suitably placed. The vertical loads including the dead and super imposed loads are transferred to the soil through columns and foundation. Foundations are sized with consideration to the safe bearing capacity of soil at the level of transfer of load recommended by specialist soil investigation consultants.

1.5.1 Assumptions:

- The structure is idealized as 3D space frame and analyzed using STAAD Pro. software package for lateral loads.
- The structure is analyzed for specific loads like dead load, live load, wind, and seismic loads and forthe load combinations as given in the relevant codes.
- The foundation is represented in analysis model using fixed end conditions.

1.5.2 Mathematical model

Mass Modelling:

Mass Source as per IS: 1893_2016 is considered as follows.

Mass source = DL+SDL+ 0. 5LLWhere DL - Dead Load;

SDL – Super Imposed Dead Load;LL - Live Load

1.5.3 Static Analysis:

The following Static loads cases are considered in the analysis.

DL - Dead Load which includes self-weight of the structure.

SDL – Super Imposed Dead Load, including load due to finishes, wall Loads, Soil filling loads etc.

LL - Live Load

1.6 LOAD COMBINATIONS:

Load combinations Used for Strength, Serviceability are tabulated below:

Load Combination	Limit State of Collapse			Limit State of Serviceability		
	DL+SDL	*LL*	*WL/EL/TL*	*DL+SDL*	*LL*	*WL/EL/TL*
DL + LL	1.5	1.5	—	1	1	—
DL + WL	1.5 or 0.9*	—	1.5	1	—	1
DL + EL	1.5 or 0.9*	—	1.5	1	—	1
DL + TL	1.5	—	1.5	1	—	1
DL+LL+WL	1.2	1.2	1.2	1	0.8	0.8
DL+LL+EL	1.2	1.2	1.2	1	0.8	0.8
DL+LL+TL	1.2	1.2	1.2	1	1	1
DL+WL+TL	1.2	—	1.2	1	—	1
DL+EL+TL	1.2	—	1.2	1	—	1
DL+LL+EL+TL	1.2	1.2	1.2	1	1	1

1.7 DESIGN METHODOLOGY:

- All R.C.C structures shall be designed according to the Limit State Method as specified in IS: 456 – 2000.
- 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 special members like retaining wall, water tanks will be done in accordance with the relevant IS Codes.

1.8 ACCEPTANCE CRITERIA:

1.8.1 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 long term deflection is considered as span/250 and for the long term deflection after erection of partitions & finishes is considered as span/350 or 20mm whichever less as per IS 456 – 2000.

1.8.2 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.
- For water retaining structures, crack width is limited to 0.2mm.

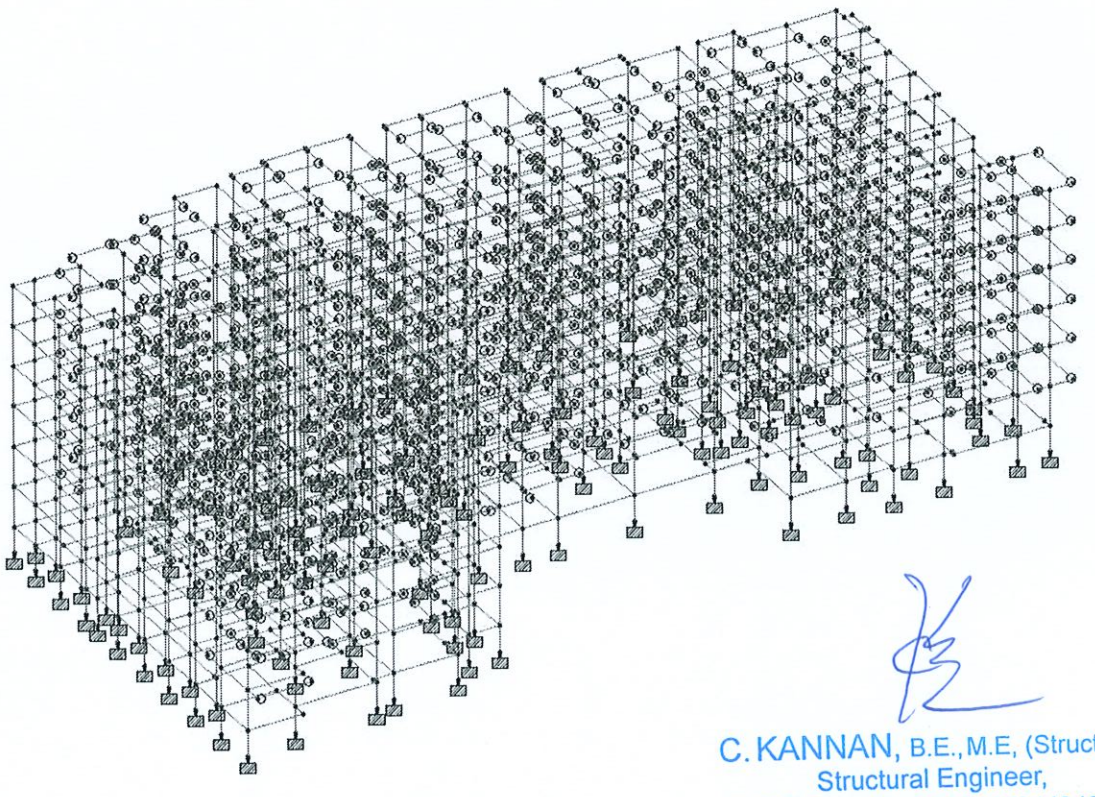
1.8.3 Soil data:

Foundations are designed based on Geo Technical investigation report and will dissipate all the vertical and horizontal loads safely to the soil below. The soil investigation report recommends pile foundation system.

1.9 DETAILING REQUIREMENTS:

Columns and beams are detailed as per normal detailing requirement. Detailing for all structural members shall be in accordance with IS: 456 & SP: 34.

1.10 STAAD Pro. MODEL



C. KANNAN, B.E., M.E, (Structure)
Structural Engineer,
CMDA Reg. No: SE/I/2024/2/0047
Door No: 21, 4th Main Road,
Indira Nagar, Chennai-600 020.

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.
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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
/tools

Services we run for you
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The LandLens suite
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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
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Verified RealEstate
3/350/2 Mettukuppam,
OMR Thoraipakkam,
Chennai 600 097, India
hello@verified.realestate
+91 9996 12 9996

Prepared from the registers named on the page each finding sits on. Where a register could not be read, this document says so in its place rather than leaving the gap to be read as a clean result.