



Your trusted partner for buying, selling, and managing property,
ensuring hassle-free service with **100% transparency.**

3/350/2 Mettukuppam,
OMR Thoraipakkam,
Chennai, India

hello@verified.realestate

+91 9996 12 9996

Official Property Record

Digitally Verified Record - Powered by Verified  RealEstate™



'MOUNT VIEW', Third Floor, New No.64(Old No.111) Mount Road, Guindy, Chennai 600032.
Telephone: 9940388755, E-mail: vsanga40@gmail.com, ssangrithi@gmail.com

STRUCTURAL STABILITY CERTIFICATE

Proposed High Rise Building (Basement + Stilt + 11 Floors) at Plot Nos. 1A, 2A, 3A, 4A, Clasic Farms 1st Main Road, Sholinganallur, Chennai – 600 119, comprised in Old Survey Nos. 602/2L Part and 602/2K Part, New Survey Nos. 602/212B, 602/2B1F, 602/2B1G and 602/2B1J, Sholinganallur Village, Sholinganallur Taluk, Chennai District, Zone – 15, Division - 199

The Building referred to above is a framed structure with Basement, Stilt and Eleven Upper Floors. Checks have been made and I hereby certify that

1. The minimum grade of concrete is M25 and the minimum grade of steel is Fe 500.
2. The Structural Design and Drawings for the building have been prepared by us conforming to the relevant Bureau of Indian Standards viz. IS 456:2000 for Plain and Reinforced Concrete, SP : 6(1)—1964, IS 456: 2000, IS 875(Part III):2015, IS 1893:2002(Part 1), SP 16, IS 1893 Part 1:2016 for Wind and Seismic Force.

I certify that the building when constructed according to our Structural Designs and Drawings will be structurally safe and sound against earthquake and fit for occupation.

Chennai,
25.10.2024.


(S.Sangeeta)

S. SANGEETA, M.E., M.I.E.,
STRUCTURAL ENGINEER,
CMDA REG. No. SE/GR-1/19/04/084
"MOUNT VIEW", THIRD FLOOR,
No. 64, MOUNT ROAD, GUINDY,
CHENNAI-600 032. PH: 9940388755



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 **Thirumathi. S.SANGEETHA** has enrolled as **Registered Structural Engineer Grade-I (SE)** with Chennai Metropolitan Development Authority (CMDA) who has the qualification of **M.E.,(Structural Engg.)** and experience in the relevant field for **15 years**.

She has been given the Registration No.**SE/GR-I/19/04/084** on **05.04.2019**. 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 **04.04.2024**.



S. Sangeeta 14.12.2023
S. SANGEETA, M.E., M.I.E.,
STRUCTURAL ENGINEER,
CMDA REG. No. SE/GR-I/19/04/084
"MOUNT VIEW", THIRD FLOOR,
No. 64, MOUNT ROAD, GUINDY,
CHENNAI-600 032. PH: 044-22350711

N. Muniprasad 5.4.19
N. MUNIPRASAD
ASSISTANT PLANNER
CHENNAI METROPOLITAN DEVELOPMENT AUTHORITY
CHENNAI - 600 008.

CONTENTS

A. Introduction	Pg 3
B. Statutory requirements	Pg 3
C. Design Standards	Pg 3
D. Design Data	Pg 6
1. Dead loads	Pg 6
2. Live loads	Pg 7
3. Wind load	Pg 8
4. Seismic forces	Pg 9
5. Environmental Conditions, Corrosion and Fire Protection	Pg 10
6. Temperature and Shrinkage Effects	Pg 11
7. Temperature Loads	Pg 11
8. Exceptional Loads	Pg 11
9. Materials	Pg 11
E. Structural concept	Pg 13
F. Structural Analysis	Pg 13
i. General	Pg 13
ii. Foundation, iii. Beam and iv. Slab Details	Pg 13,14
v. Column details and vi. Déflexion limits	Pg 14
vii. Cracking limits and viii. Load Combinations	Pg 15
ix. Staad Frame Model and x. 3D Rendered View	Pg 18-19
F. Structural Design	Pg 20
a. Column Design	Pg 20
b. Foundation Design	Pg 22
c. Beam Design	Pg 24
d. Slab Design	Pg 34

Appendix

STAAD INPUT FILE, COLUMN LOADS, EARTHQUAKE AND WIND LOADINGS

Proposed High Rise Residential Building(Basement+Stilt+11 Floors) at Plot No.1A, 2A,3A & 4A
Classic Farms Main Road, Sholinganallur, Chennai 600 119, Comprised In S.Nos:
602/2B1J,602/2B1F, 602/2Big & 602/212B, Sholinganallur Village, Sholinganallur Taluk, With In
The Limit Of Greater Chennai Corporation. Zone-15, Division-199.

STRUCTURAL DESIGN BASIS

A. INTRODUCTION

The Building referred to above is a framed structure with Basement, Stilt and Eleven Upper Floors. The building is analysed and designed conforming to loading standards IS: 875 (Part II) and to seismic forces as per IS 1893: 2002, the revised Indian Code for Earthquake Resistant Design of Structures.

B. STATUTORY REQUIREMENTS:

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

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

C. DESIGN STANDARDS

Design Method	LIMIT STATE DESIGN
Codes & Special Publications used	IS 456: 2000, IS 1893:2016(Part 1), SP 16,IS 875(Part II),2015 IS 13920 : 1993
Concrete Grade	M 40 for columns, M25 for all other structural elements
Steel Grade	Fe 500, Ductile detailing

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 in designs. All design work shall be based on Indian Standards and Codes with latest revision, with amendments if any, as on date.

- IS: 432(part 2) – 1982 : Specification for mild steel and medium tensile steel bars and hard-
Drawn steel wire for concrete reinforcement
- IS: 1786-1985 : Specification for high strength deformed steel bars and wires for
Concrete Reinforcements
- IS: 12269 : Ordinary Portland cement 43 grade.
- IS: 6313 (part II) : Standards for anti-termite treatment.
- IS: 875 (part 1)-1987 : Code of practice for design loads (other than earthquake) for
Buildings 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
Buildings and Structure - imposed.
- IS: 875 (part 3)-1987 : Code of practice for design loads (other than earthquake) for
Buildings and Structure - wind loads
- IS: 875 (part 5)-1987 : Code of practice for design loads (other than earthquake) for
Buildings / Structures – Special loads and load combinations
- IS: 456-2000 : Code of practice for plain and reinforced concrete.
- IS: 1343 – 1980 : Code of practice for pre stressed concrete.
- IS: 14268 – 1995 : Uncoated stress relieved low relaxation seven-ply strand for pre-
Stressed Concrete–Specification
- IS: 1893 part 1 – 2002 : Criteria for earthquake resistant design of structures (part-1 general
Provisions and buildings)
- IS: 4326 -1993 : Code of practice for earthquake resistant design and construction of
- IS: 13920-1993 : Ductile detailing of reinforced concrete structures subjected to
Seismic forces –code of practice.
- IS: 2751 : Code of practice for welding of mild steel bars used for reinforced
Concrete construction
- IS: SP 34-1987 : Handbook on concrete reinforcement and detailing.

IS: 800 –1984

(reaffirmed 1998) : Code of practice in general construction in Steel.

IS: 1904 - 1986 : Code of practice for structural safety of building foundations.

SP: 16 – 1980 : Design aid for reinforced concrete to IS 456.

Reference : Major Development Plan.

IRC 3- 1983 : Dimensions and Weights of Road Design Vehicles

Wherever appropriate Indian Regulation does not exist for any particular item, appropriate British standards will be used.

IS Standards – Building Materials

IS: 269 - 1989 : Specification for Ordinary, rapid hardening and low heat Portland Cement

IS: 455 - 1989 : 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 - 1970 : Specification for coarse and fine aggregates from natural sources for Concrete

IS: 516 -1959 : Method of test for strength of concrete.

IS: 1199 -1959 : Method of sampling and analysis of concrete.

IS: 432 -1982 : Specification for mild steel and medium tensile steel bars and hard drawn Steel wire for concrete reinforcement.

IS: 1139 : Specification for hot rolled mild steel and Medium tensile steel deformed Bars for concrete reinforcement.

IS: 1566 -1982 : Specification for plain hard drawn steel wire fabric for concrete Reinforcement

IS: 1786 -1985 : Specification for high tensile bars for concrete reinforcement.

IS: 4990 -1993 : Specification for plywood for concrete shuttering works.

IS: 2645 -1975 : Specification for integral cement water proofing compounds.

BS: 4449: 1997 : Specification for carbon steel bars for the reinforcement of concrete.

D. DESIGN DATA

Loads considered in the design

1.DEAD LOADS:

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

Floor finish of 100mm thickness	: 200 kg/sq.m (2.0 kN/sqm)
False ceiling + ducting + Sprinklers	: 50 kg/sq.m (0.5 kN/sq.m)
Partition walls	: 100 kg/sq.m (1.0 kN/sq.m).
Self-weight of Plain concrete	: 2400 kg/cu.m (24 kN/cu.m)
Self-weight of RCC	: 2500 kg/cu.m (25 kN/cu.m)
Solid block masonry	: 1800 kg/cu.m (18 kN/cu.m)
Brick Wall	: 1900 kg/cu.m (19 kN/cu.m)
Soil (Dry)	: 1800 kg/cu.m (18 kN/cu.m)
Soil (Wet)	: 2000 kg/cu.m (20 kN/cu.m)
Water	: 1000 kg/cu.m (10 kN/cu.m)
Glass	: 2500 kg/cu.m (25 kN/cu.m)
Stainless steel	: 7850 kg/cum
Masonry with plastering	: 2200 kg/cu.m (22 kN/cu.m)
Waterproofing	: 15 kg/sq.m (0.15 kN/sq.m) (membrane).
External finishes	: As per actuals.
Equipment loads	: As per Vendor details.

2. 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 as per codes.

Office area	: 400 kg/sq.m (4.0 kN/sq.m)
Stairs/lift lobbies	: 400 kg/sq.m (4.0 kN/sq.m)
Corridors / Balcony	: 400 kg/sq.m (4.0 kN/sq.m)
Public lobbies	: 400 kg/sq.m (4.0 kN/sq.m)
Storage rooms	: 500 kg/sq.m (5.0 kN/sq.m)
AHU Rooms	: 750 kg/sq.m (7.5 kN/sq.m)
Terrace with Access	: 400 kg/sq.m (4.0 kN/sq.m)
Electrical rooms	: 500 kg/sq.m (5.0 kN/sq.m)
UPS & battery rooms	: 1200 kg/sq.m (12.0 kN/sq.m)
Server rooms/MDF rooms/	: 1000 kg/sq.m (10.0 kN/sq.m)
Data center	: 1200 kg/sq.m (12.0 kN/sq.m)
Ramps	: 300 kg/sq.m (3 kN/sq.m) (Without fire truck movement).
Car parking area	: 250 kg/sq.m+ 25% impact (3.125 kN/sq.m)

3. WIND LOADS

Wind loads for design of structures shall be based on the design wind speeds arrived on the basis of IS: 875 (PART III) 2015.

The parameters for calculation of design wind speed as per IS: 875 (PART III) are as follows:

Basic wind speed (V_b) : 50 m/sec.

Height : 39m

From Table 1, IS 875 (Part 3), for Mean probable design life of Structure as 50 yrs and wind speed of 50m/sec, Risk coefficient, K_1 : 1.0

From Table 2, terrain category 3 for a maximum height of 39m and plan dimensions 33.3 x 27.75, Terrain, Height, Structure size factor

Topography factor, K_3 : 1, for slopes less than or equal to 3°

Importance factor for cyclonic region, K_4 : 1.15

Design wind speed (V_z) : $V_b \times K_1 \times K_2 \times K_3 \times K_4$

Wind pressure (P_z) : $0.6V_z^2$

Wind directionality factor, K_d : 1

Area Averaging factor, K_a : 1 (Table 4, Cl.7.2.2)

Combination factor, K_c : 1 (Cl.7.3.3.13)

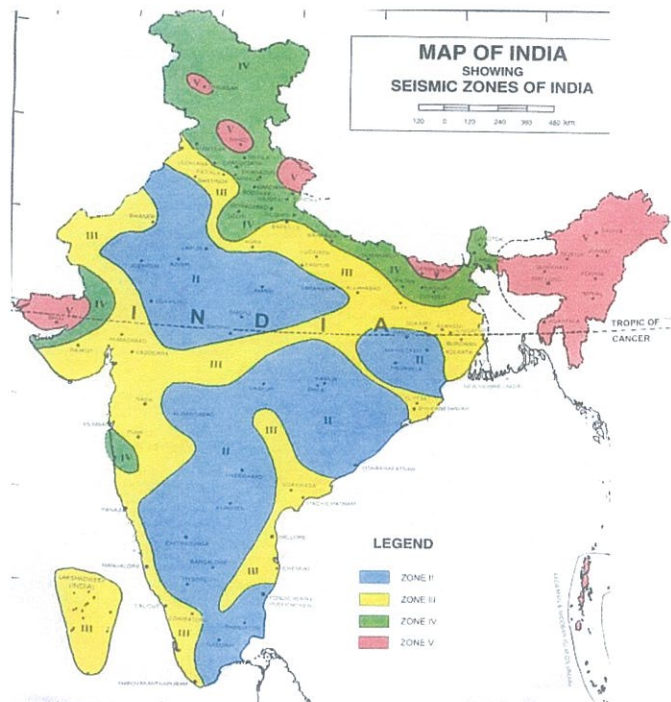
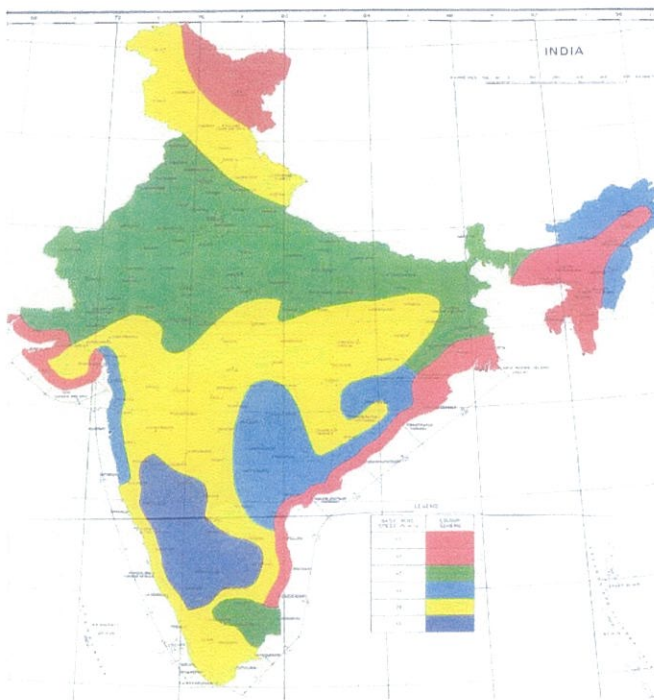
a. Design wind pressure (P_d) : $K_d \times K_a \times K_c \times P_z$, kN/m²

HEIGHT RANGE,m	K1	K2	K3	K4	Design wind pressure P_z , kN/m ²
3	1	0.91	1	1.15	1.6427
6	1	0.91	1	1.15	1.6427
9	1	0.91	1	1.15	1.6427
12	1	0.934	1	1.15	1.730

15	1	0.97	1	1.15	1.8665
18	1	0.994	1	1.15	1.960
21	1	1.015	1	1.15	2.0437
24	1	1.03	1	1.15	2.1046
27	1	1.045	1	1.15	2.1663
30	1	1.06	1	1.15	2.229
33	1	1.069	1	1.15	2.267
36	1	1.078	1	1.15	2.305

S. SANGEETA, M.E., M.I.E.,
 STRUCTURAL ENGINEER,
 CMDA REG. No. SE/GR-I/19/04/084
 "MOUNT VIEW", THIRD FLOOR,
 No. 64, MOUNT ROAD, GUINDY,
 CHENNAI-600 032. PH: 044-22350711

4. Determination of Earthquake Parameters and Loadings



Zone Factor, **Z** for Chennai Seismic **Zone III** : 0.16, (Table 2, Clause 6.4.2)

I, Importance Factor : 1.2, (From Table 8)

R, Response Reduction Factor : 5 for SMRF(Special Moment Resisting Frame, Table 9)

Fundamental Natural Period along X direction, **T_x** : $0.09xh / \sqrt{d_x}$: $0.09 \times 39 / \sqrt{33.3}$

: 0.6s (Clause 7.6.2)

The soil at the site is medium S_a/g : 1.36/T as $0.55s \leq T \leq 4s$: 2.27Fundamental Natural Period along Z direction, T_z : $0.09xh / \sqrt{d_z}$: $0.09 \times 39 / \sqrt{27.75}$

: 0.666s (Clause 7.6.2)

The soil at the site is medium S_a/g : 1.36/T as $0.55s \leq T \leq 4s$: 2.05**Design Horizontal Seismic Coefficient**

$$A_h : \frac{Z I S_a}{2R_g} \quad (\text{Clause 6.4.2})$$

$$: \frac{0.16 \times 1 \times 2.05}{2 \times 5} : 0.0328$$

14.12.2023
 S. SANGEETA, M.E., M.I.E.,
 STRUCTURAL ENGINEER,
 CMDA REG. No. SE/GR-I/19/04/084
 "MOUNT VIEW", THIRD FLOOR,
 No. 64, MOUNT ROAD, GUINDY,
 CHENNAI-600 032. PH: 044-22350711

Since the time period is greater than 0.4s, Dynamic Analysis in Response Spectra method is carried out.

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

- Environment : Moderate
- Exposure conditions : Concrete surfaces sheltered from severe rain or freezing wet Environment.
- Fire protection : Thickness of the structural elements as per table 15, 16 & 16A clause 26.4 of IS 456-2000
- Minimum grade of concrete : Moderate exposure – M25
- Nominal cover to reinforcement : For Moderate Exposure Nominal cover should not be less than 30mm
- 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

6. 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.

7. TEMPERATURE LOADS:

The effect of temperature will be considered wherever applicable in accordance with relevant Indian Codes. The coefficient for thermal expansion and contraction will be in accordance with IS: 456 and IS: 800 for concrete and steel respectively.

8. 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 hitting of vehicle on the façade
- Snow Load

9. MATERIALS:

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 at least M30 to M25 N/sq.mm 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
Foundation & Ramps	M25
Columns	M40
Slabs & beams	M25

Reinforcement steel:

- All reinforcement shall confirm to IS: 1786 – 1985 having minimum yield strength of 500 N/sq.mm.

Structural Steel

All structural steel shall confirm to IS: 2062 with minimum yield strength of 250 N/sq.mm

Water Proofing Material

Waterproofing for Basement including retaining walls shall be done by using self adhesive, self healing SBS Physical membrane with 2 mm thick and 1000N tensile resistance, and 250gsm polyester depending on the water table and site conditions.

Mechanical Splicing Material

Moment Coupler – parallel flange Threaded Type

E. STRUCTURAL CONCEPT

The Structural System comprises of R.C Slab & Beams for all the floors that supported by RCC columns. Floor slabs and beams are considered to act as a rigid diaphragm to transfer the lateral forces to the columns.

F. STRUCTURAL ANALYSIS AND DESIGN:

i. 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 Staad Pro 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 structure.
- 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 made using elastic method as per IS: 800 with relevant allowable stresses.

ii. Foundation Details

Type of foundation	Isolated footings with raft slab
Safe bearing capacity of the soil	300kN/m² as per soil test report
Depth of foundation	3m below existing ground level
Diameter of main bars	10mm,12mm,16mm

iii. **Slab Details**

Type of slab	Two Way Slab
Thickness of the slab provided	125mm, 150mm, 175mm, 230mm for fire tender
Steel cover to slab	25mm
Diameter of main bars used	8mm, 10mm, 12mm

iv. **Beam Details**

Size of the beam provided	300 x 450mm, 200mm x 450mm, 200mm x 600mm, 700mm x 750mm 300mm x 600mm, 200mm x 750mm, 300mm x 750mm
Bottom steel cover to beam	25mm
Diameter of main bars used	25mm, 20mm, 16mm, 12mm
Stirrups used	2 legged stirrups 8mm dia, 10mm dia, 12mm

v. **Column Details**

Size of the columns provided	300mm x 1000mm, 200mm x 1000mm, 200mm x 900mm, 300mm x 600mm, 450mm x 450mm, 400mm x 1000mm
Steel cover to column	40mm
Diameter of main bars used	25mm, 20mm, 16mm
Binder diameter	8mm

vi. **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 storey due to minimum specified design seismic lateral force shall not exceed 0.004 times the storey height design.

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

vii. 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 basement retaining wall and water retaining structures, crack width is limited to 0.2mm.

viii. LOAD COMBINATIONS:

The various loads are combined in accordance with the stipulations in IS: 875 (Part 5)-1987; whichever combination produces the most unfavorable effect in the building foundation or structural member concerned may be adopted. Wind load and earthquake loads are considered for both x & y directions. Whenever imposed load is combined with earthquake load, the appropriate part of imposed load as specified in IS: 1893-2002 / Clause 7.3.1 of seismic code will be used both for evaluating earthquake effect and for combined load effects used in such combination.

a. DYNAMIC ANALYSIS RESPONSE SPECTRA

Type	L/C	Name
Primary	1	LOAD CASE 1 D.L
Primary	2	LOAD CASE 2 L.L
Primary	3	LOAD CASE 3 RESPONSE SPECTRUM LOAD X
Primary	4	LOAD CASE 4 RESPONSE SPECTRUM LOAD Y
Primary	5	LOAD CASE 5 RESPONSE SPECTRUM LOAD Z
Combination	6	COMBINATION LOAD CASE 6
Combination	7	COMBINATION LOAD CASE 7
Combination	8	COMBINATION LOAD CASE 8
Combination	9	COMBINATION LOAD CASE 9
Combination	10	COMBINATION LOAD CASE 10
Combination	11	COMBINATION LOAD CASE 11
Combination	12	COMBINATION LOAD CASE 12
Combination	13	COMBINATION LOAD CASE 13
Combination	14	COMBINATION LOAD CASE 14
Combination	15	COMBINATION LOAD CASE 15
Combination	16	COMBINATION LOAD CASE 16
Combination	17	COMBINATION LOAD CASE 17
Combination	18	COMBINATION LOAD CASE 18

Combination Load Cases

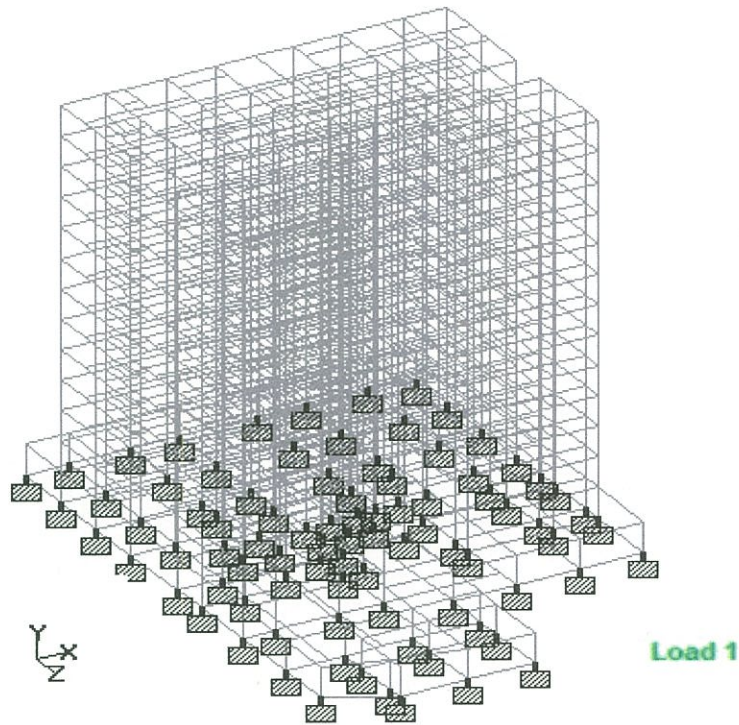
Comb.	Combination L/C Name	Primary	Primary L/C Name
6	COMBINATION LOAD CASE 6	1	LOAD CASE 1 D.L
		2	LOAD CASE 2 L.L
7	COMBINATION LOAD CASE 7	1	LOAD CASE 1 D.L
		2	LOAD CASE 2 L.L
		3	LOAD CASE 3 RESPONSE SPECTRUM LOAD X
		4	LOAD CASE 4 RESPONSE SPECTRUM LOAD Y
		5	LOAD CASE 5 RESPONSE SPECTRUM LOAD Z
8	COMBINATION LOAD CASE 8	1	LOAD CASE 1 D.L
		2	LOAD CASE 2 L.L
		3	LOAD CASE 3 RESPONSE SPECTRUM LOAD X
		4	LOAD CASE 4 RESPONSE SPECTRUM LOAD Y
		5	LOAD CASE 5 RESPONSE SPECTRUM LOAD Z
9	COMBINATION LOAD CASE 9	1	LOAD CASE 1 D.L
		3	LOAD CASE 3 RESPONSE SPECTRUM LOAD X
		4	LOAD CASE 4 RESPONSE SPECTRUM LOAD Y
		5	LOAD CASE 5 RESPONSE SPECTRUM LOAD Z
10	COMBINATION LOAD CASE 10	1	LOAD CASE 1 D.L
		3	LOAD CASE 3 RESPONSE SPECTRUM LOAD X
		4	LOAD CASE 4 RESPONSE SPECTRUM LOAD Y
		5	LOAD CASE 5 RESPONSE SPECTRUM LOAD Z
11	COMBINATION LOAD CASE 11	1	LOAD CASE 1 D.L
		3	LOAD CASE 3 RESPONSE SPECTRUM LOAD X
		4	LOAD CASE 4 RESPONSE SPECTRUM LOAD Y
		5	LOAD CASE 5 RESPONSE SPECTRUM LOAD Z
12	COMBINATION LOAD CASE 12	1	LOAD CASE 1 D.L
		3	LOAD CASE 3 RESPONSE SPECTRUM LOAD X
		4	LOAD CASE 4 RESPONSE SPECTRUM LOAD Y
		5	LOAD CASE 5 RESPONSE SPECTRUM LOAD Z
13	COMBINATION LOAD CASE 13	1	LOAD CASE 1 D.L
		2	LOAD CASE 2 L.L
		3	LOAD CASE 3 RESPONSE SPECTRUM LOAD X
		4	LOAD CASE 4 RESPONSE SPECTRUM LOAD Y
		5	LOAD CASE 5 RESPONSE SPECTRUM LOAD Z
14	COMBINATION LOAD CASE 14	1	LOAD CASE 1 D.L
		2	LOAD CASE 2 L.L
		3	LOAD CASE 3 RESPONSE SPECTRUM LOAD X
		4	LOAD CASE 4 RESPONSE SPECTRUM LOAD Y
		5	LOAD CASE 5 RESPONSE SPECTRUM LOAD Z
15	COMBINATION LOAD CASE 15	1	LOAD CASE 1 D.L
		3	LOAD CASE 3 RESPONSE SPECTRUM LOAD X
		4	LOAD CASE 4 RESPONSE SPECTRUM LOAD Y
		5	LOAD CASE 5 RESPONSE SPECTRUM LOAD Z
16	COMBINATION LOAD CASE 16	1	LOAD CASE 1 D.L
		3	LOAD CASE 3 RESPONSE SPECTRUM LOAD X
		4	LOAD CASE 4 RESPONSE SPECTRUM LOAD Y
		5	LOAD CASE 5 RESPONSE SPECTRUM LOAD Z
17	COMBINATION LOAD CASE 17	1	LOAD CASE 1 D.L
		3	LOAD CASE 3 RESPONSE SPECTRUM LOAD X
		4	LOAD CASE 4 RESPONSE SPECTRUM LOAD Y
		5	LOAD CASE 5 RESPONSE SPECTRUM LOAD Z
18	COMBINATION LOAD CASE 18	1	LOAD CASE 1 D.L
		3	LOAD CASE 3 RESPONSE SPECTRUM LOAD X
		4	LOAD CASE 4 RESPONSE SPECTRUM LOAD Y
		5	LOAD CASE 5 RESPONSE SPECTRUM LOAD Z

b. STATIC ANALYSIS SEISMIC

Number	Name
1	EQ X
2	EQ Z
3	DEAD LOAD
4	LIVE LAOD
5	D.L+L.L
6	1.5(D.L+ L.L)
7	1.2 (D.L+L.L+E.QX)
8	1.2 (D.L+L.L-EQX)
9	1.2(D.L+L.L+EQZ)
10	1.2 (D.L+L.L-EQZ)
11	0.9D.L+1.5EQX
12	0.9D.L-1.5EQX
13	0.9D.L+EQZ
14	0.9D.L-1.5EQZ
15	D.L+L.L+EQX+EQY
16	D.L+L.L-EQX-EQY

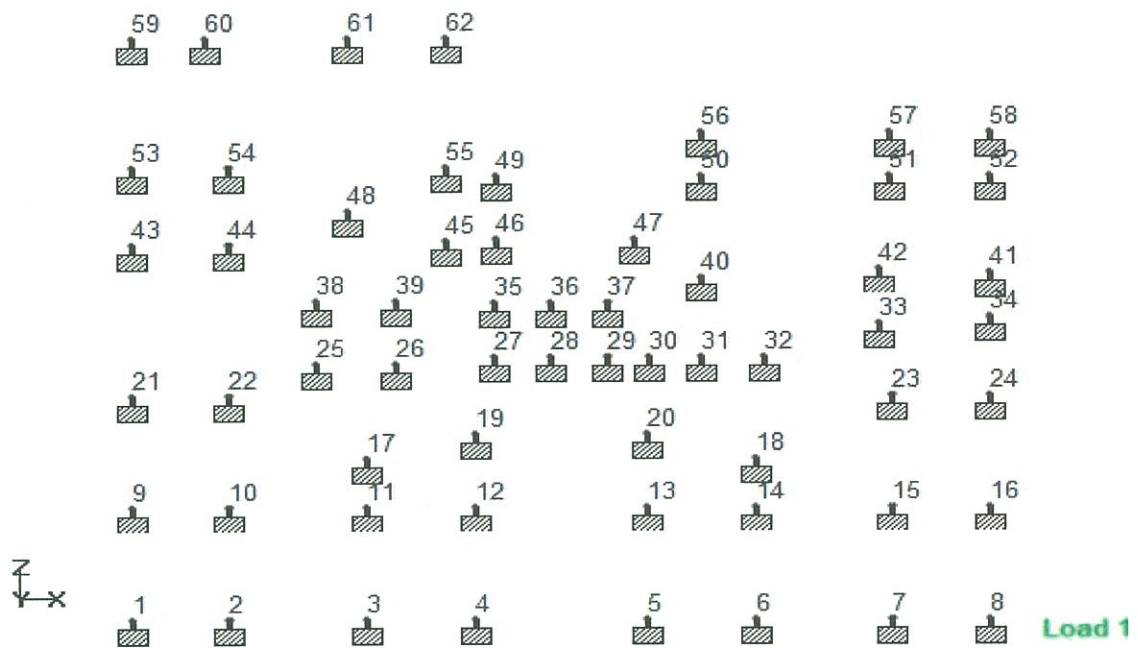
c.WIND LOAD

Type	L/C	Name
Primary	1	WL+ X
Primary	2	WL -X
Primary	3	WL +Z
Primary	4	WL -Z
Primary	5	DEAD LOAD
Primary	6	LIVE LOAD
Primary	7	D.L+L.L
Primary	8	1.5(D.L+ L.L)
Primary	9	1.2 (D.L+L.L+WLX)
Primary	10	1.2 (D.L+L.L-WLX)
Primary	11	1.2(D.L+L.L+WLZ)
Primary	12	1.2 (D.L+L.L-WLZ)
Primary	13	0.9D.L+1.5WLX
Primary	14	0.9D.L-1.5WLX
Primary	15	0.9D.L+WLZ
Primary	16	0.9D.L-1.5WLZ

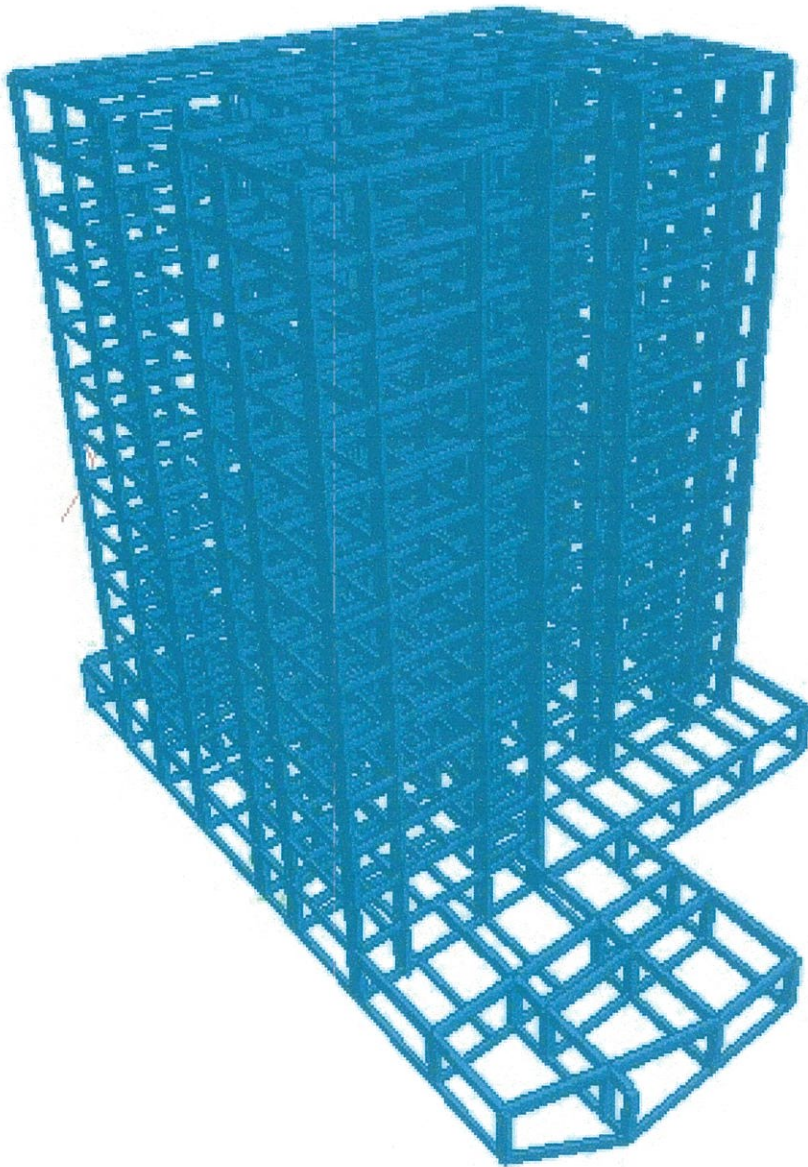


b.

STAAD FRAME MODEL



COLUMN SUPPORTS NODES-PLAN



STAAD 3D RENDERED VIEW

G. STRUCTURAL DESIGN**A. COLUMN DESIGN D19**

LOAD COMBINATION 7 : 1.2 (D.L+L.L+E.QX)

F_x :	-187.575 kN	F_y :	5762.927 kN	F_z :	3.811 kN
M_x :	-87.185 kNm	M_y :	2.323 kNm	M_z :	559.584 kNm

Column Size

b	1000 mm	f _{ck}	40	
D	400 mm	f _y	500	
Cover	40 mm	Effective Length ratio	0.65	
				IS 456:2000pg.94
Ground Floor Height,L	3000 mm	L _{eff1}	0.65 x L	1950
First Floor Height,L	3000 mm	L _{eff2}	0.65 x L	1950
Second Floor Height,L	3000 mm	L _{eff3}	0.65 x L	1950
Third Floor Height,L	3000 mm	L _{eff4}	0.65 x L	1950

Check for slenderness

L _{eff1} /D	4.88	L _{eff1} /b	1.95
L _{eff2} /D	4.88	L _{eff2} /b	1.95
L _{eff3} /D	4.88	L _{eff3} /b	1.95
L _{eff4} /D	4.88	L _{eff4} /b	1.95

All columns are short about both axis

Axial Load, P _u	:	5762.927 kN
Moment, M _x	:	-87.185 kNm
Moment, M _z	:	559.584 kNm

Check for Accidental Eccentricity

Equivalent Eccentricity of Loads is given by

M _x / P _u	:	15.13 mm
M _z / P _u	:	97.10 mm

Only M_z / P_u is greater than 20mm minimum. Hence only Uniaxial Bending.Size of column and check e_{min}

$$e_{min} : L_{eff}/500 + D/30 : 17.23333 > 20$$

Hence adopt 20mm eccentricity.

Design Axial Load, P _u	:	5762.927 kN		
Design Moment, M _x	:	P _u x e _{min}	115.25 kNm	less than 559.584
Hence design moment :			559.584 kNm	

Designing the column as an axially loaded column with uniaxial momentCalculation of Area of Steel

Cover	40 mm
Design Axial Load, P _u	: 5762.927 kN
Design Moment, M _x	: P _u x e _{min} 559.584 kNm

b	400 mm	f _{ck}	40
D	1000 mm	f _y	500
Cover	40 mm		

Diameter of rod assumed 28 mm

d' : 40 + 25/2 :	52.5 mm		
d'/D : 52.5/ 400 :	0.130		
M _x /f _{ck} bD ² : 559.584 x 10 ⁶ /40 x 1000 x 400 x 400 :		0.0900	
P _u /f _{ck} bD : 5762.97 x 10 ³ /40 x 1000 x 400 :		0.36	

From SP16 Chart 49

p/f_{ck} : 0.13

$p : 0.06 \times 40$: 2.4 %

$A_s : 2.4 \times 400 \times 1000 / 100$: 9600 mm²

Provide 20NosY25, A_s provided : 9820 mm²

Check for Horizontal Shear

Shear force : 187.575 kN

The horizontal shear the column is subjected to : $187.575 \times 10^3 / 1000 \times 400$

0.467 : N/mm²

less than 0.98/mm²

From IS : 456, Table 19 and Clause 40.2.2 design shear strength of members under axial compression is not to exceed 0.98/mm²

S. Sangeeta 14.12.2023

**S. SANGEETA, M.E., M.I.E.,
STRUCTURAL ENGINEER,**

CMDA REG. No. SE/GR-I/19/04/084
"MOUNT VIEW", THIRD FLOOR,
No. 64, MOUNT ROAD, GUINDY,
CHENNAI-600 032. PH: 044-22350711

B. DESIGN OF FOUNDATION

Load on column	4120 kN
Add 10% for self weight	412 kN
Total Load	4532 kN
Area of the footing required	15.11 mm ²
Provide a footing of size	4 x 4m
Maximum bearing pressure on soil	283.25 kN/mm ²
	283.25 < 300kN/m ² O.K
Design bearing pressure on soil	4120 / 4 x 4 = 257.50 kN/m ²
Factored bearing pressure	1.5 x 257.50 = 386.25 kN/mm ²
M _{xx} at the face of the column	4 x 1.85 ² / 2 x 386.25 = 2643.881 kNm

Effective depth required $\sqrt{2643.88 \times 10^6 / 0.138 \times 25 \times 4000}$
437.70 mm

An effective depth of **1192 mm** and an overall depth of 1250mm is provided.

Mu/bd² : $2643.881 \times 10^6 / 4000 \times 1192 \times 844$: 0.5

From Table 3 of SP16 pt 0.118

Ast : $0.118 \times 1192 \times 4000 / 100$: **5626.24 mm²**

8Nos. of Y16 is provided bothways. Area of steel provided : 5628mm²

Check for One Way Shear

Maximum Shear force : $4 \times 0.658 \times 386.25$: 1016.61 kN

Maximum Shear stress, t_c : $1016.61 \times 10^3 / 4000 \times 1192.00$: 0.21

Hence the section is safe in One Way Shear $< 0.36 \text{ N/mm}^2$

Check for Two Way Shear

Maximum Shear force: $(4 \times 4 - 1.492 \times 2.192) \times 386.25$: 4916.78 kN

Maximum Shear stress, t_p : $4916.78 \times 10^3 / 2 (1492 + 2192) \times 4000.00$: 0.16 N/mm

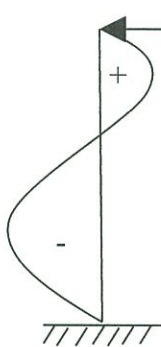
Allowable Shear Stress : $0.25 \sqrt{25}$ 1.25 N/ mm² 0.16 N/ mm² < 1.25 N/ mm²

Hence the section is safe in Two Way Shear

S. Sangeeta 14.12.2023
S. SANGEETA, M.E., M.I.E.,
STRUCTURAL ENGINEER,
CMDA REG. No. SE/GR-I/19/04/084
"MOUNT VIEW", THIRD FLOOR,
No. 64, MOUNT ROAD, GUINDY,
CHENNAI-600 032. PH: 044-22350711

C. DESIGN OF RETAINING WALLUnit weight of soil, $w : 18\text{kN/m}^2$ Height of the retaining wall, $h : 3\text{m}$

Designing the retaining wall as a propped cantilever:



$$M_{a-ve} : \frac{2}{15} Wh \quad ; w : 18 \times \frac{1}{2} \times \frac{wh}{3} \times \frac{h}{2}$$

$$: \frac{2}{15} \times 18 \times \frac{1}{2} \times \frac{wh}{3} \times \frac{h}{2} \times h$$

$$: \frac{2}{5}h^3 : \frac{2}{5} \times 3^3 : 10.8\text{kNm}$$

$$M_{a+ve} : 0.056 Wh : 0.056 \times 3h^3 : 4.546\text{kNm}$$

$$\text{Factored -ve Design Moment} : 10.8 \times 1.5 : 16.2\text{kNm}$$

$$\text{Effective wall thickness required} : \sqrt{16.2 \times 10^6 / 0.138 \times 25 \times 1000}$$

$$: 68.52\text{mm.}$$

Providing 300 thick wall

$$\mu_u/bd^2 : 16.2 \times 10^6 / 1000 \times 230^2 : 0.405$$

$$\text{From Table 3 of SP16 } p_t = 0.1144, A_{st} : 0.1144 \times 1000 \times 200 / 100 : 228.8\text{mm}^2$$

However Y10 @ 125 mm c/c (629mm²) is provided and distributor rods ofY10 @ 150 mm c/c (524mm²).

14.12.2023
 S. SANGEETA, M.E., M.I.E.,
 STRUCTURAL ENGINEER,
 CMDA REG. No. SE/GR-I/19/04/084
 "MOUNT VIEW", THIRD FLOOR,
 No. 64, MOUNT ROAD, GUINDY,
 CHENNAI-600 032. PH: 044-22350711

D. DESIGN OF PLINTH BEAM

Assuming a plinth beam of size 300mm x 450mm.

$$\text{Self weight of the plinth beam} : 0.30 \times 0.450 \times 25 : 3.375\text{kN/m}$$

$$\text{Slab reaction on the plinth beam} : 5.6 \times 8/3 : 14.93\text{kN/m}$$

$$\text{Total load on the plinth beam} : 14.93 + 3.375 : 18.305\text{kN/m}$$

$$\text{Maximum Moment for a span of 5.6m} : 18.305 \times 1.5 \times 5.6^2 / 16 : 53.82\text{kNm}$$

$$\mu_u/bd^2 : 53.82 \times 10^6 / 300 \times 394^2 : 1.2 \text{ From Table 3 of SP16 } p_t = 0.293,$$

$$A_{st} : 0.293 \times 2300 \times 394 / 100 : 346.326\text{mm}^2$$

Top and bottom steel of 3 Nos. of Y16 is provided. Area of steel provided : 603mm²

E.DESIGN OF FLOOR BEAMS**a.DESIGN OF GROUND FLOOR BEAM TL20-b20-450mm x 600mm**

The flexural members shall fulfill the following general requirements.

IS 13920; Clause 6.1.2:

Effective Depth : d : 600-25-12.5:562.5mm

$b / D \geq 0.3$; 450 / 600 : 0.75 , O.K

IS 13920; Clause 6.1.3:

$b \geq 200\text{mm}$, b : 450mm, hence O.K

IS 13920; Clause 6.1.4 :

$D \leq L_c / 4$, 8000/ 600 : 13.33 > 4, hence O.K.

Limiting Longitudinal Steel %

Minimum reinforcement : 0.24%(Clause 6.2.1(b) of IS 13920: 1993): 607.5mm².

Maximum reinforcement: 2.5 % (Clause 6.2.2 of IS 13920: 1993): 6328.125mm²

Self weight of the beam : 0.450x0.370x25 : 4.1625kN/m

Total Load from slab including weight from fire truck : 33.83kN/m²

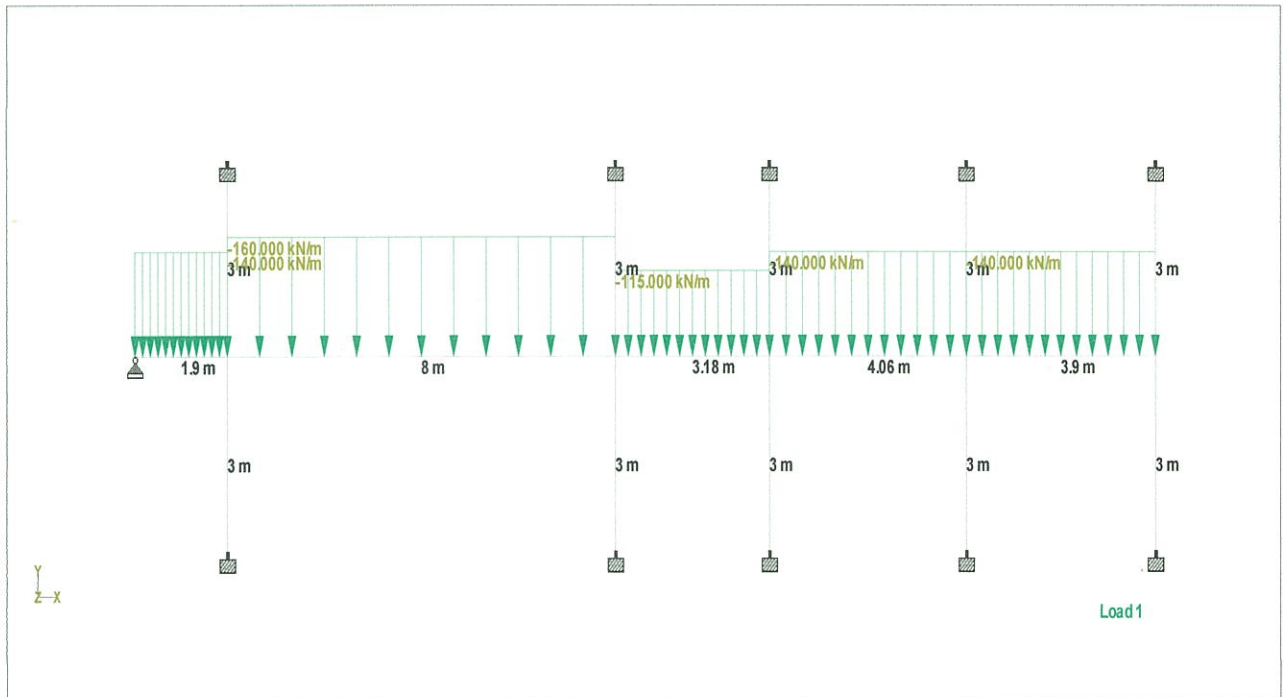


STAAD.Pro Report

Type	L/C	Name
Primary	1	1.5(D.L+L.L)

Beam Loads : 1 1.5(D.L+L.L)

Beam	Type	Direction	Fa	Da (m)	Fb	Db	Ecc. (m)
23	UNI kN/m	GY	-140.000	-	-	-	-
24	UNI kN/m	GY	-160.000	-	-	-	-
29	UNI kN/m	GY	-115.000	-	-	-	-
34	UNI kN/m	GY	-140.000	-	-	-	-
35	UNI kN/m	GY	-140.000	-	-	-	-

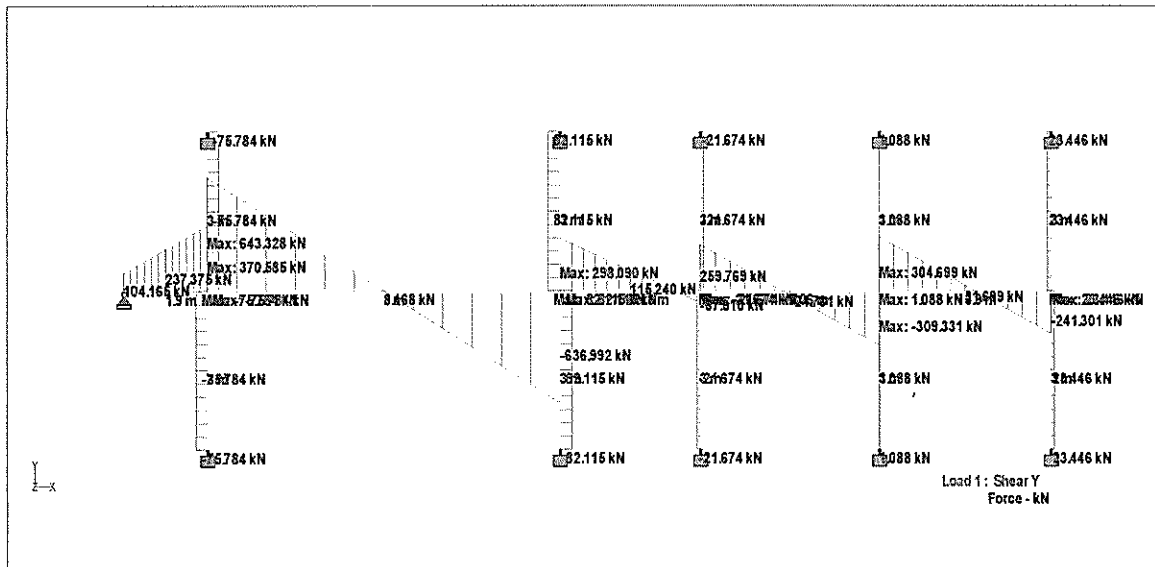


Whole Structure Loads 0.1kN:1m 1 1.5(D.L+L.L)

Beam Maximum Shear Forces

Distances to maxima are given from beam end A.

Beam	Node A	Length (m)	L/C		d (m)	Max Fz (kN)	d (m)	Max Fy (kN)
19	24	3.000	1:1.5(D.L+L.L)	Max -ve		0.000		
				Max +ve		0.000	0.000	-75.784
20	24	3.000	1:1.5(D.L+L.L)	Max -ve		0.000		
				Max +ve		0.000	0.000	-75.784
21	10	3.000	1:1.5(D.L+L.L)	Max -ve		0.000	0.000	82.115
				Max +ve		0.000		
22	10	3.000	1:1.5(D.L+L.L)	Max -ve		0.000	0.000	82.115
				Max +ve		0.000		
23	24	1.903	1:1.5(D.L+L.L)	Max -ve		0.000	0.000	370.585
				Max +ve		0.000		
24	24	8.002	1:1.5(D.L+L.L)	Max -ve		0.000	0.000	643.328
				Max +ve		0.000	8.002	-636.992
27	31	3.000	1:1.5(D.L+L.L)	Max -ve		0.000		
				Max +ve		0.000	0.000	-21.674
28	31	3.000	1:1.5(D.L+L.L)	Max -ve		0.000		
				Max +ve		0.000	0.000	-21.674
29	10	3.180	1:1.5(D.L+L.L)	Max -ve		0.000	0.000	298.090
				Max +ve		0.000	3.180	-67.610
30	34	3.000	1:1.5(D.L+L.L)	Max -ve		0.000	0.000	1.088
				Max +ve		0.000		
31	34	3.000	1:1.5(D.L+L.L)	Max -ve		0.000	0.000	1.088
				Max +ve		0.000		
32	37	3.000	1:1.5(D.L+L.L)	Max -ve		0.000	0.000	23.446
				Max +ve		0.000		
33	37	3.000	1:1.5(D.L+L.L)	Max -ve		0.000	0.000	23.446
				Max +ve		0.000		
34	31	4.065	1:1.5(D.L+L.L)	Max -ve		0.000	0.000	259.769
				Max +ve		0.000	4.065	-309.331
35	34	3.900	1:1.5(D.L+L.L)	Max -ve		0.000	0.000	304.699
				Max +ve		0.000	3.900	-241.301

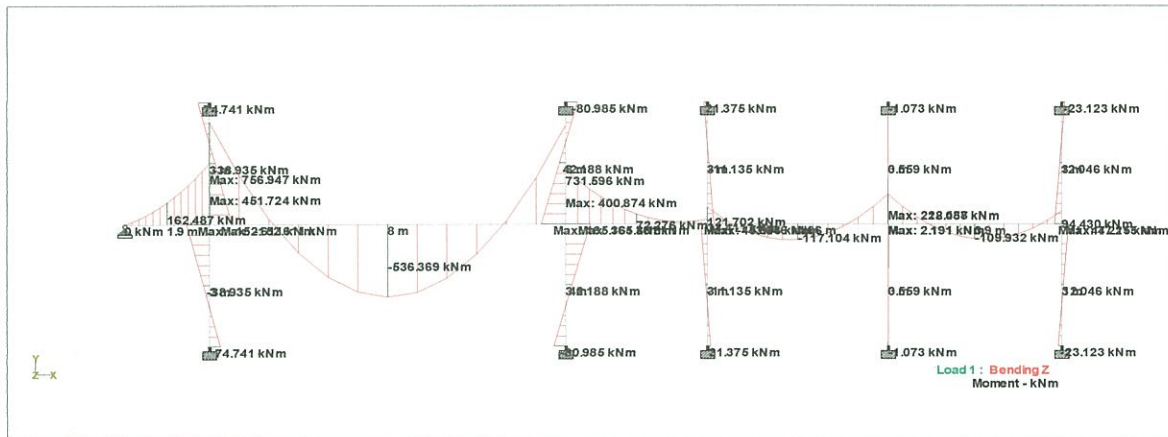


Whole Structure Fy 300kN:1m 1 1.5(D.L+L.L)

Beam Maximum Moments

Distances to maxima are given from beam end A.

Beam	Node A	Length (m)	L/C		d (m)	Max My (kNm)	d (m)	Max Mz (kNm)
19	24	3.000	1:1.5(D.L+L.L)	Max -ve	0.000	0.000	3.000	74.741
				Max +ve	0.000	0.000	0.000	-152.611
20	24	3.000	1:1.5(D.L+L.L)	Max -ve	0.000	0.000	3.000	74.741
				Max +ve	0.000	0.000	0.000	-152.611
21	10	3.000	1:1.5(D.L+L.L)	Max -ve	0.000	0.000	0.000	165.361
				Max +ve	0.000	0.000	3.000	-80.985
22	10	3.000	1:1.5(D.L+L.L)	Max -ve	0.000	0.000	0.000	165.361
				Max +ve	0.000	0.000	3.000	-80.985
23	24	1.903	1:1.5(D.L+L.L)	Max -ve	0.000	0.000	0.000	451.724
				Max +ve	0.000	0.000	1.903	-0.000
24	24	8.002	1:1.5(D.L+L.L)	Max -ve	0.000	0.000	0.000	756.947
				Max +ve	0.000	0.000	4.001	-536.369
27	31	3.000	1:1.5(D.L+L.L)	Max -ve	0.000	0.000	3.000	21.375
				Max +ve	0.000	0.000	0.000	-43.646
28	31	3.000	1:1.5(D.L+L.L)	Max -ve	0.000	0.000	3.000	21.375
				Max +ve	0.000	0.000	0.000	-43.646
29	10	3.180	1:1.5(D.L+L.L)	Max -ve	0.000	0.000	0.000	400.874
				Max +ve	0.000	0.000		
30	34	3.000	1:1.5(D.L+L.L)	Max -ve	0.000	0.000	0.000	2.191
				Max +ve	0.000	0.000	3.000	-1.073
31	34	3.000	1:1.5(D.L+L.L)	Max -ve	0.000	0.000	0.000	2.191
				Max +ve	0.000	0.000	3.000	-1.073
32	37	3.000	1:1.5(D.L+L.L)	Max -ve	0.000	0.000	0.000	47.215
				Max +ve	0.000	0.000	3.000	-23.123
33	37	3.000	1:1.5(D.L+L.L)	Max -ve	0.000	0.000	0.000	47.215
				Max +ve	0.000	0.000	3.000	-23.123
34	31	4.065	1:1.5(D.L+L.L)	Max -ve	0.000	0.000	4.065	222.438
				Max +ve	0.000	0.000	1.694	-117.466
35	34	3.900	1:1.5(D.L+L.L)	Max -ve	0.000	0.000	0.000	218.057
				Max +ve	0.000	0.000	2.275	-112.840



Whole Structure Mz 300kNm: 1m 1.5(D.L+L.L)

Beam Size: 450mm x 600mm

Maximum moment at support : 756.947kNm

$M_u/bd^2 : 756.847 \times 10^6 / 450 \times 562.5^2 : 5.35$ From Table 55 of SP16 $p_t : 1.434$

$A_{st} : 1.434 \times 450 \times 562.5/100 : 3629.81\text{mm}^2$, A_{st} provided : 4Y25+4Y25(3928mm²).

Maximum moment at midspan : 536.369kNm

$M_u/bd^2 : 536.369 \times 10^6 / 450 \times 562.5^2 : 3.8$, From Table 55 of SP16 $p_t : 1.059$

$A_{st} : 1.059 \times 450 \times 562.5/100 : 2680.6\text{mm}^2$, A_{st} provided : 4Y25+4Y20 (3220mm²).

Maximum Shear Force : 643.328kN. For $p_t : 0.7$

Shear capacity of the section : $\tau_c'bd : 0.56 \times 450 \times 562.5 : 141.75$ kN

Shear to be carried by the stirrups, $V_{us} : 643.328 - 141.75 : 501.578$ kN

$V_{us}/d : 501.578/56.25 : 8.916$. Provide stirrups of Y10ST4@100mm for 1m near the supports

and Y10ST4@125mm for the next 1m and Y10ST4@150mm for the next 1m

and Y10ST4@200mm for the remaining span.

All the other beams are designed in a similar way.

S. SANGEETA, M.E., M.I.E.,
STRUCTURAL ENGINEER,
CMDA REG. No. SE/GR-I/19/04/084
"MOUNT VIEW", THIRD FLOOR,
No. 64, MOUNT ROAD, GUINDY,
CHENNAI-600 032. PH: 044-22350711

b.DESIGN OF FIRST FLOOR BEAM F9-F22-700mm x 750mm

The flexural members shall fulfill the following general requirements.

IS 13920; Clause 6.1.2:

Effective Depth : $d : 750-25-12.5:712.5\text{mm}$

$b/D \geq 0.3$; $700/750 : 0.933$, O.K

IS 13920; Clause 6.1.3:

$b \geq 200\text{mm}$, $b : 700\text{mm}$, hence O.K

IS 13920; Clause 6.1.4 :

$D \leq L_c / 4$, $8000 / 750 : 10.67 > 4$, hence O.K.

Limiting Longitudinal Steel %

Minimum reinforcement : 0.24%(Clause 6.2.1(b) of IS 13920: 1993): 1197mm^2 .

Maximum reinforcement: 2.5 % (Clause 6.2.2 of IS 13920: 1993): 12468.75mm^2

Self weight of the beam : $0.700 \times 0.625 \times 25$: 10.9375kN/m

Weight of 200mm wall : $0.2 \times 2.55 \times 20$: 10.2kN/m^2



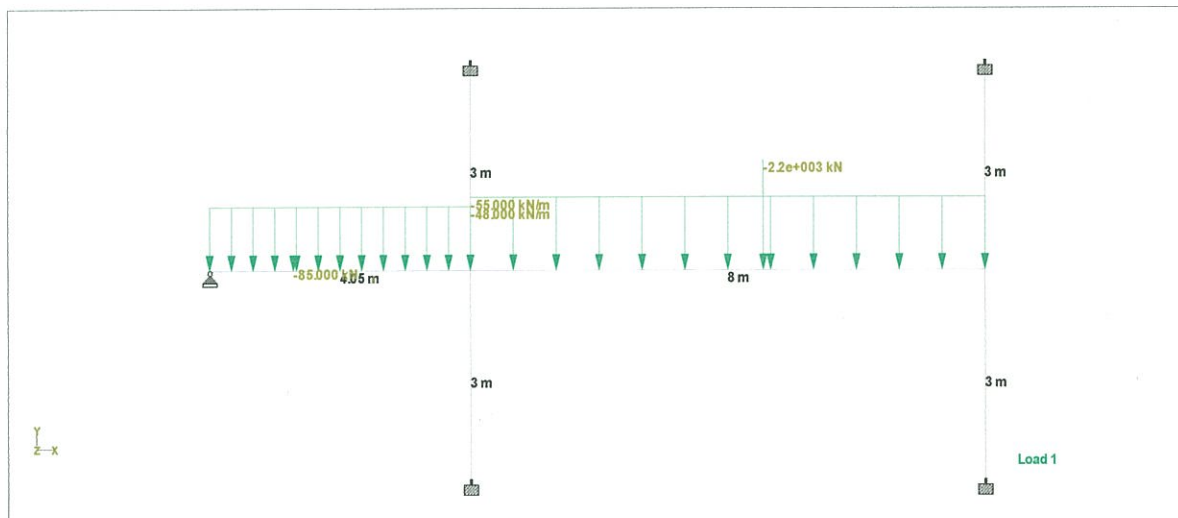
STAAD.Pro Report

Included in this printout are results for load cases:

Type	L/C	Name
Primary	1	1.5(D.L+L.L)

Beam Loads : 1 1.5(D.L+L.L)

Beam	Type	Direction	Fa	Da (m)	Fb	Db	Ecc. (m)
23	UNI kN/m	GY	-48.000	-	-	-	-
	CON kN	GY	-85.000	2.750	-	-	-
24	UNI kN/m	GY	-55.000	-	-	-	-
	CON kN	GY	-2.2E 3	4.550	-	-	-

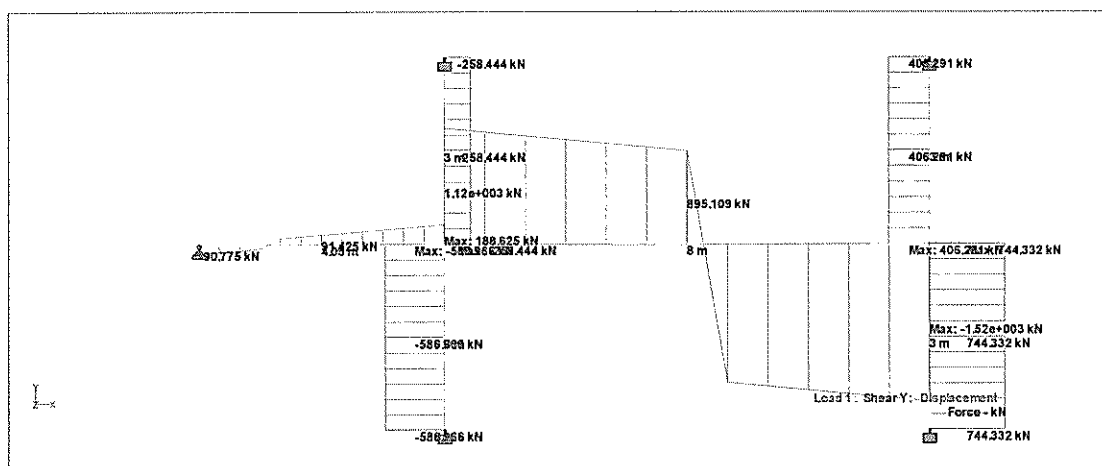


Whole Structure Loads 1405.44kN/m 1 1.5(D.L+L.L)

Beam Maximum Shear Forces

Distances to maxima are given from beam end A.

Beam	Node A	Length (m)	L/C		d (m)	Max Fz (kN)	d (m)	Max Fy (kN)
19	24	3.000	1:1.5(D.L+L.L)	Max -ve	0.000	0.000		
				Max +ve	0.000	0.000	0.000	-258.444
20	24	3.000	1:1.5(D.L+L.L)	Max -ve	0.000	0.000		
				Max +ve	0.000	0.000	0.000	-586.966
21	10	3.000	1:1.5(D.L+L.L)	Max -ve	0.000	0.000	0.000	406.291
				Max +ve	0.000	0.000		
22	10	3.000	1:1.5(D.L+L.L)	Max -ve	0.000	0.000	0.000	744.332
				Max +ve	0.000	0.000		
23	24	4.050	1:1.5(D.L+L.L)	Max -ve	0.000	0.000	0.000	188.625
				Max +ve	0.000	0.000	4.050	-90.775
24	24	8.000	1:1.5(D.L+L.L)	Max -ve	0.000	0.000	0.000	1.12E 3
				Max +ve	0.000	0.000	8.000	-1.52E 3

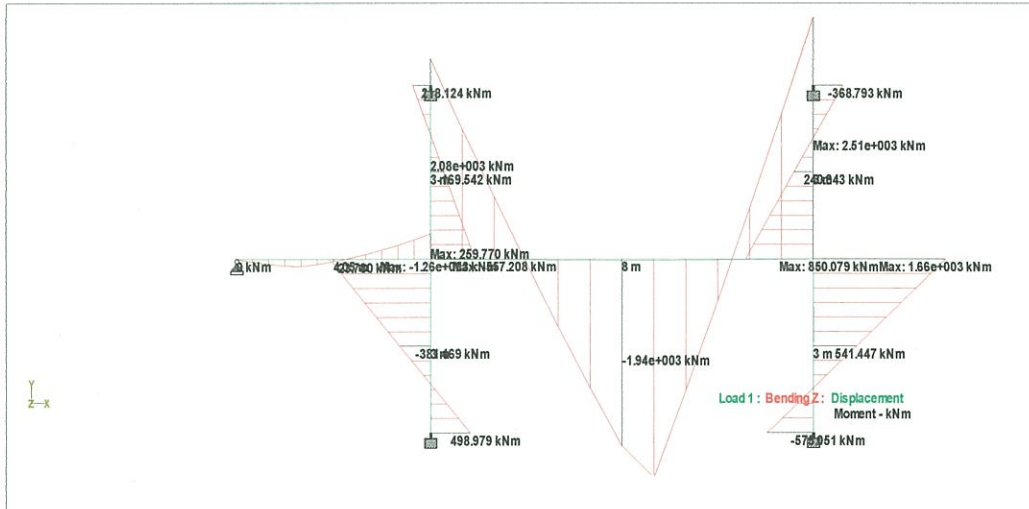


Whole Structure Fy 600kN: 1m Displacements 1000mm: 1m 1 1.5(D.L+L.L)

Beam Maximum Moments

Distances to maxima are given from beam end A.

Beam	Node A	Length (m)	L/C		d (m)	Max My (kNm)	d (m)	Max Mz (kNm)
19	24	3.000	1:1.5(D.L+L.L)	Max -ve	0.000	0.000	3.000	218.124
				Max +ve	0.000	0.000	0.000	-557.208
20	24	3.000	1:1.5(D.L+L.L)	Max -ve	0.000	0.000	3.000	498.979
				Max +ve	0.000	0.000	0.000	-1.26E 3
21	10	3.000	1:1.5(D.L+L.L)	Max -ve	0.000	0.000	0.000	850.079
				Max +ve	0.000	0.000	3.000	-368.793
22	10	3.000	1:1.5(D.L+L.L)	Max -ve	0.000	0.000	0.000	1.66E 3
				Max +ve	0.000	0.000	3.000	-575.051
23	24	4.050	1:1.5(D.L+L.L)	Max -ve	0.000	0.000	0.000	259.770
				Max +ve	0.000	0.000	2.700	-74.557
24	24	8.000	1:1.5(D.L+L.L)	Max -ve	0.000	0.000	8.000	2.51E 3
				Max +ve	0.000	0.000	4.667	-2.27E 3



Whole Structure Mz 600kNm:1m Displacements 1000mm:1m 1 1.5(D.L+L.L)

Beam Size: 700mm x 750mm

Maximum moment at support : 2510kNm

M_u/bd^2 : $2510 \times 10^6 / 700 \times 712.5^2$: 7.1 From Table 55 of SP16 p_t : 1.858

A_{st} : $1.858 \times 700 \times 712.5/100$: 9266.775mm² , A_{st} provided : 8Y25+8Y25+4Y25 (9820mm²).

Maximum moment at midspan : 2270kNm

M_u/bd^2 : $2270 \times 10^6 / 700 \times 712.5^2$: 5.8, From Table 55 of SP16 p_t : 1.543

A_{st} : $1.543 \times 750 \times 712.5/100$: 7695mm² , A_{st} provided : 8Y25+8Y25(7856mm²).

Maximum Shear Force : 1520kN. For p_t : 1.5

Shear capacity of the section : $\tau_c'bd$: $0.74 \times 700 \times 712.5$: 369 kN

Shear to be carried by the stirrups, V_{us} : $1520 - 369$: 1151kN

V_{us}/d : $1151/71.25$: 1615. Provide stirrups of Y12ST4@100mm for 1m near the supports

and Y12ST4@125mm for the next 1m and Y12ST4@150mm for the next 1m

and Y12ST4@200mm for the remaining span.

All the other beams are designed in a similar way.

S. Sangeeta 14.12.2023
S. SANGEETA, M.E., M.I.E.,
 STRUCTURAL ENGINEER,
 CMDA REG. No. SE/GR-I/19/04/084
 "MOUNT VIEW", THIRD FLOOR,
 No. 64, MOUNT ROAD, GUINDY,
 CHENNAI-600 032. PH: 044-22350711

c.DESIGN OF TYPICAL FLOOR BEAM C4 -a4-200mm x 500mm

The flexural members shall fulfill the following general requirements.

IS 13920; Clause 6.1.2:

Effective Depth : d : 500-25-12.5:462.5mm

$b / D \geq 0.3$; 200 / 500 : 0.4 , O.K

IS 13920; Clause 6.1.3:

$b \geq 200\text{mm}$, b : 200mm, hence O.K

IS 13920; Clause 6.1.4 :

$D \leq L_c / 4$, 5600/ 500 : 11.2 > 4, hence O.K.

Limiting Longitudinal Steel %

Minimum reinforcement : 0.24%(Clause 6.2.1(b) of IS 13920: 1993): 222mm².

Maximum reinforcement: 2.5 % (Clause 6.2.2 of IS 13920: 1993): 2312.5mm²

Self weight of the beam : 0.200x0.375x25 : 1.875kN/m

Weight of 200mm wall : 0.2 x 2.55 x 20 : 10.2kN/m²



STAAD.Pro Report

Included in this printout are data for:

All The Whole Structure

Included in this printout are results for load cases:

Type	L/C	Name
Primary	1	1.5(D.L+L.L)

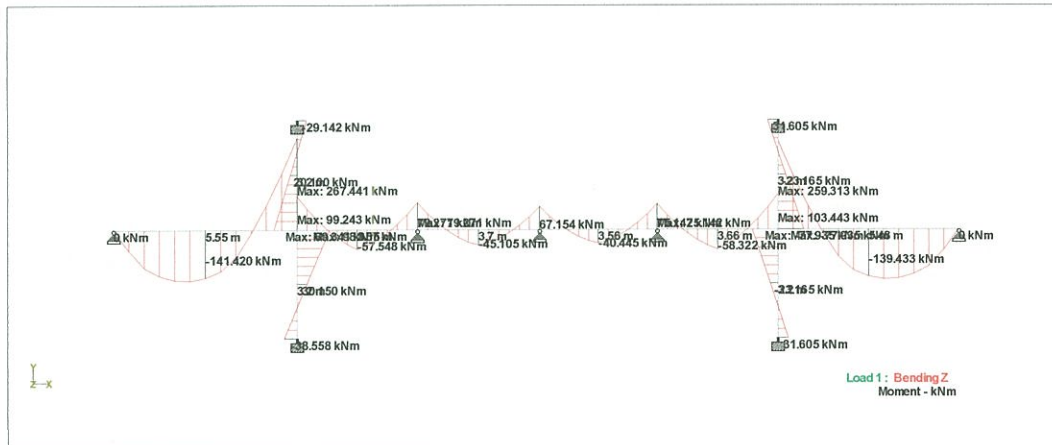
Beam Loads : 1 1.5(D.L+L.L)

Beam	Type	Direction	Fa	Da (m)	Fb	Db	Ecc. (m)
4	UNI kN/m	GY	-46.000	-	-	-	-
	CON kN	GY	-78.000	1.850	-	-	-
18	UNI kN/m	GY	-50.000	-	-	-	-
	CON kN	GY	-35.000	0.950	-	-	-
	CON kN	GY	-66.000	3.550	-	-	-
31	UNI kN/m	GY	-46.000	-	-	-	-
	CON kN	GY	-44.000	1.800	-	-	-
32	UNI kN/m	GY	-46.000	-	-	-	-
	CON kN	GY	-44.000	1.800	-	-	-
33	UNI kN/m	GY	-46.000	-	-	-	-
	CON kN	GY	-78.000	1.850	-	-	-

Beam Maximum Moments

Distances to maxima are given from beam end A.

Beam	Node A	Length (m)	L/C		d (m)	Max My (kNm)	d (m)	Max Mz (kNm)
4	9	3.650	1:1.5(D.L+L.L)	Max -ve	0.000	0.000	0.000	99.243
				Max +ve	0.000	0.000	1.825	-57.548
7	9	3.200	1:1.5(D.L+L.L)	Max -ve	0.000	0.000	0.000	69.341
				Max +ve	0.000	0.000	3.200	-29.142
8	9	3.200	1:1.5(D.L+L.L)	Max -ve	0.000	0.000	0.000	98.857
				Max +ve	0.000	0.000	3.200	-38.558
18	24	5.550	1:1.5(D.L+L.L)	Max -ve	0.000	0.000	5.550	267.441
				Max +ve	0.000	0.000	2.313	-150.130
27	35	3.200	1:1.5(D.L+L.L)	Max -ve	0.000	0.000	3.200	31.605
				Max +ve	0.000	0.000	0.000	-77.935
28	35	3.200	1:1.5(D.L+L.L)	Max -ve	0.000	0.000	3.200	31.605
				Max +ve	0.000	0.000	0.000	-77.935
31	10	3.700	1:1.5(D.L+L.L)	Max -ve	0.000	0.000	0.000	79.271
				Max +ve	0.000	0.000	1.850	-45.105
32	29	3.560	1:1.5(D.L+L.L)	Max -ve	0.000	0.000	3.560	75.142
				Max +ve	0.000	0.000	1.780	-40.445
33	32	3.660	1:1.5(D.L+L.L)	Max -ve	0.000	0.000	3.660	103.443
				Max +ve	0.000	0.000	1.830	-58.322
34	35	5.480	1:1.5(D.L+L.L)	Max -ve	0.000	0.000	0.000	259.313
				Max +ve	0.000	0.000	3.197	-147.396



Whole Structure Mz 100kNm:1m 1 1.5(D.L+L.L)

Whole Structure Mz 100kNm:1m Displacements 1000mm:1m 1 1.5(D.L+L.L)

Beam Size: 200mm x 50mm

Maximum moment at support : 267.441kNm

M_u/bd^2 : $267.441 \times 10^6 / 200 \times 462.5^2$: 6.3 From Table 55 of SP16 p_t : 1.664

A_{st} : $1.664 \times 200 \times 462.5/100$: 1872mm^2 , A_{st} provided : $3Y20+3Y20$ (1884mm^2).

Maximum moment at midspan : 150.13kNm

M_u/bd^2 : $150.13 \times 10^6 / 200 \times 462.5^2$: 3.5, From Table 55 of SP16 p_t : 0.986

A_{st} : $0.986 \times 200 \times 462.5/100$: 912.05mm^2 , A_{st} provided : $3Y20$ (942mm^2).

Maximum Shear Force : 231.853kN. For p_t : 0.7

Shear capacity of the section : $\tau_c'bd : 0.56 \times 200 \times 462.5 : 51.8 \text{ kN}$

Shear to be carried by the stirrups, $V_{us} : 231.853 - 50.6 : 180 \text{ kN}$

$V_{us}/d : 180/46.25 : 3.89$. **Provide stirrups of Y10ST2@100mm for 1m near the supports**

and Y8ST2@125mm for the next 1m and Y8ST2@150mm for the next 1m

and Y8ST2@200mm for the remaining span.

All the other beams are designed in a similar way.

S. Sangeeta 14.12.2023
S. SANGEETA, M.E., M.I.E.,
 STRUCTURAL ENGINEER,
 CMDA REG. No. SE/GR-I/19/04/084
 "MOUNT VIEW", THIRD FLOOR,
 No. 64, MOUNT ROAD, GUINDY,
 CHENNAI-600 032. PH: 044-22350711

F.DESIGN OF FLOOR SLABS

1.TWO WAY SLAB

Self Weight of the slab 125mm thick	: 3.125kN/m ²
Floor Finish	: 1 kN/m ²
Live Load	: 2kN/m ²
Total Load	: 6.125 kN/m ²

The slab has two adjacent edges discontinuous

$l_y/l_x : 5.2/3.95 : 1.32 < 2$. The slab is designed as a two-way slab.

From Table 26 of IS 456: 2000 for $l_y/l_x : 1.32$; $\alpha_x : 0.0662$, $\alpha_y : 0.047$

Negative moment at continuous edge for shorter side $M_x : \alpha_x w l_x^2$

$$: 0.0662 \times 6.125 \times 3.95^2 \times 1.5 : 9.5 \text{ kNm}$$

Effective depth required : $\sqrt{9.5 \times 10^6 / 0.138 \times 25 \times 1000}$

$$: 52.47 \text{ mm.}$$

A slab depth of 125mm is provided.

$$M_u/bd^2 : 9.5 \times 10^6 / 1000 \times 105^2 : 0.9$$

From Table 3 of SP16 $p_t : 0.142$

$$A_{st} \text{ required} : 0.142 \times 1000 \times 125 / 100 : 177.5 \text{ mm}^2.$$

However Y8@ 125mm c/c (403mm²) is provided along the shorter span.

Positive moment at midspan for the longer side $M_y : \alpha_y w l_x^2$

$$: 0.047 \times 6.125 \times 3.95^2 \times 1.5 : 6.74 \text{ kNm}$$

$$M_u/bd^2 : 6.74 \times 10^6 / 1000 \times 105^2 : 0.65 \text{ p}_t : 0.154.$$

$$A_{st} \text{ required} : 0.154 \times 1000 \times 125 / 100 : 192.5 \text{ mm}^2.$$

However Y8 @ 150 mm c/c (335mm²) is provided along the shorter span.

All other slabs are designed in a similar way.

2. FIRE TRUCK ACCESS SLAB DESIGN

4. NOTATIONS FOR VEHICLE TYPES

The Figure shows the outline of the vehicle types covered by this Standard. The first digit indicates the number of axles of the truck or truck-tractor. The letter "S" indicates a semi-trailer and the letter immediately following an "S" indicates the number of axles on the semi-trailer. Any digit other than the first in a combination, when not preceded by "S" indicates a trailer and the

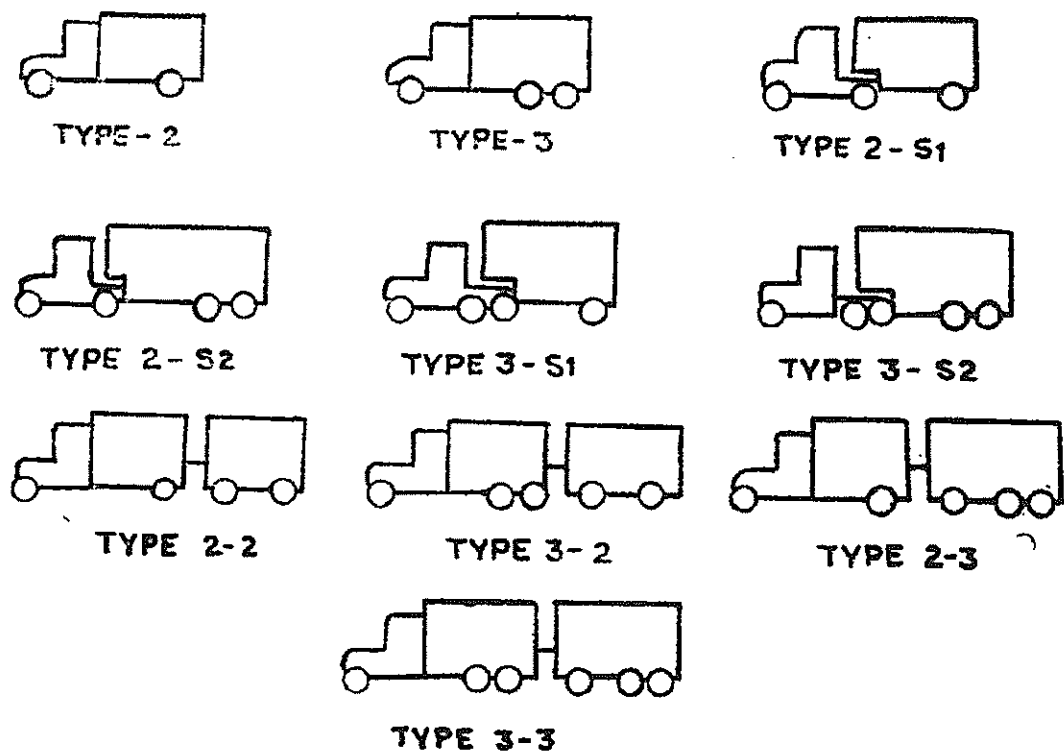


Fig. Vehicle Types

6.3. Maximum Permissible Gross Weight

The maximum permissible gross weight for a given vehicle or vehicle combination would be equal to the sum of the individual single axle and tandem axle weights indicated above. For typical vehicles, maximum permissible gross weights are given in the Table.

TABLE : MAXIMUM PERMISSIBLE GROSS WEIGHTS AND MAXIMUM AXLE WEIGHTS OF TRANSPORT VEHICLES

Vehicle type	Maximum gross weight (tonnes)	Maximum axle weight (tonnes)			
		Truck/Tractor		Trailer	
		FAW	RAW	FAW	RAW
Type 2 (Both axles single tyre)	12	6	6		
Type 2 (FA-Single tyre RA-Dual tyre)	16.2	6	10.2		
Type 3	24	6	18 (TA)		
Type 2-S1	26.4	6	10.2		10.2
Type 2-S2	34.2	6	10.2		18 (TA)
Type 3-S1	34.2	6	18 (TA)		10.2
Type 3-S2	42	6	18 (TA)		18 (TA)
Type 2-2	36.6	6	10.2	10.2	10.2
Type 3-2	44.4	6	18 (TA)	10.2	10.2
Type 2-3	44.4	6	10.2	10.2	18 (TA)
Type 3-3	52.2	6	18 (TA)	10.2	18 (TA)

FA — Front Axle

RA — Rear Axle

FAW — Weight on Front Axle

RAW — Weight on Rear Axle

TA — Tandem axle fitted with 8 tyres.

From the specifications of IRC 3 1983 shown in the previous pages the following load is considered for design of the slab supporting the fire truck

Live Load considering type 3-2 vehicle,

gross weight : 450kN

Weight of water/foam and equipments : 330kN

Total : 780kN

Add 25 % impact weight : 195kN

Total : 975kN

937.5kN acting down on the plan

of the vehicle 12×3 : $975/12 \times 3$
: 27.08 kN/m^2

Self Weight of the slab 230mm thick : 5.75 kN/m^2

Floor Finish : 1 kN/m^2

Total Load : 33.83 kN/m^2

The slab is an interior panel

$l_y / l_x : 6.471/5.76 : 1.15 < 2$. The slab is designed as a two-way slab.

From Table 26 of IS 456: 2000 for $l_y / l_x : 1.15$; $\alpha_x : 0.04$, $\alpha_y : 0.032$

Negative moment at continuous edge for shorter side $M_x : \alpha_x w l_x^2$

$$: 0.04 \times 33.83 \times 5.76^2 \times 1.5 : 67.35 \text{ kNm}$$

Effective depth required : $\sqrt{67.35 \times 10^6 / 0.138 \times 25 \times 1000}$

: 139.72mm.

A slab depth of 230mm is provided.

$$M_u / bd^2 : 67.35 \times 10^6 / 1000 \times 199^2 : 1.7$$

From Table 3 of SP16 $p_t : 0.428$.

$A_{st} \text{ required} : 0.428 \times 1000 \times 199 / 100 : 851.72 \text{ mm}^2$.

However Y12 @ 125mm c/c (906 mm^2), top and bottom is provided along the shorter span.

Positive moment at midspan for the longer side $M_y : \alpha_y w l_y^2$

$$: 0.032 \times 33.83 \times 5.76^2 \times 1.5 : 53.87 \text{ kNm}$$

$$M_u / bd^2 : 53.87 \times 10^6 / 1000 \times 199^2 : 1.4 \quad p_t : 0.346$$

$A_{st} \text{ required} : 0.346 \times 1000 \times 202 / 100 : 698.92 \text{ mm}^2$.

However Y12 @ 150mm c/c (754 mm^2), top and bottom is provided along the longer span.

S. SANGEETA, M.E., M.I.E.,
STRUCTURAL ENGINEER,
CMDA REG. No. SE/GR-I/19/04/084
"MOUNT VIEW", THIRD FLOOR,
No. 64, MOORE ROAD, GUINDY,
CHENNAI-600 032. PH: 044-22350711

APPENDIX

COLUMN LOADS FROM STAAD

Node	L/C	Force-X kN	Force-Y kN	Force-Z kN	Moment-X kNm	Moment-Y kNm	Moment-Z kNm
32	7	-835.84	7321.395	13.341	-72.48	-2.321	3467.543
15	6	-9.536	6697.507	-15.126	-8.145	0.15	-44.487
13	6	-55.377	6099.686	-16.703	29.705	-0.093	-48.625
12	6	62.051	6059.923	-15.012	31.166	0.253	9.796
20	7	-615.721	5871.794	9.169	-214.672	-18.356	3949.703
12	7	-895.395	5863.51	-19.666	8.731	5.589	7008.027
54	7	-187.575	5762.927	3.811	-87.185	2.323	559.584
6	7	-222.542	5672.372	11.198	1.844	-30.993	462.227
19	6	87.175	5550.992	3.228	-314.995	-0.144	7.778
14	7	-192.287	5499.637	-30.673	22.067	1.834	403.936
17	6	18.294	5474.178	24.56	-181.139	-0.071	184.41
10	6	7.362	5453.375	-10.84	-0.884	0.021	36.416
20	6	-81.679	5356.042	1.157	-302.659	0.5	-37.76
15	7	-213.406	5209.599	-6.602	0.551	3.101	353.949
18	6	-11.077	5184.833	21.989	-177.298	0.023	-209.348
7	6	-23.266	5092.613	9.629	-1.427	-0.264	-46.248
26	7	-465.089	5071.013	-13.652	-43.83	-10.106	1771.478
5	6	-36.345	5053.266	0.751	-13.719	-0.15	-71.069
42	6	-8.749	5050.44	9.598	-56.734	0.129	-109.146
24	7	-174.533	5012.894	8.148	32.893	-5.816	370.553
4	7	-501.895	4962.681	-0.001	-13.371	-29.481	2857.048
6	6	13.251	4954.527	9.454	7.97	-0.206	29.673
4	6	39.493	4952.971	-1.299	-15.753	0.238	60.831
49	7	-174.971	4911.729	32.156	38.484	10.594	378.884
8	7	-175.119	4873.257	29.315	34.902	-38.647	358.465

16	7	-164.227	4827.276	14.911	20.855	2.416	331.45
39	7	-594.893	4810.783	0.66	31.549	2.34	2023.244
48	6	-1.55	4765.863	33.493	-25.982	-1.532	-3.452
3	6	-11.159	4736.5	10.936	23.714	0.179	-32.648
52	7	-177.771	4731.102	-12.156	24.151	9.255	360.016
18	7	-457.446	4657.62	9.792	-150.53	-9.877	2375.247
2	6	18.036	4633.344	9.797	3.019	0.261	34.898
2	7	-207.404	4572.734	6.772	-15.146	-24.108	452.837
32	6	11.218	4557.621	5.916	-103.254	-0.47	-32.408
10	7	-199.874	4514.985	-18.919	-29.904	2.803	418.669
46	7	-101.976	4492.744	-0.951	-30.501	2.804	268.578
60	7	-179.277	4478.499	-33.96	-52.9	-5.541	494.087
9	6	11.921	4419.712	8.273	23.509	0.201	18.042
16	6	-10.19	4413.446	4.148	11.858	0.116	-11.298
58	7	-170.085	4396.947	27.963	-62.802	23.244	318.679
23	6	-16.37	4348.554	-25.631	-36.366	0.197	-118.199
51	6	-1.157	4344.175	-9.71	2.609	3.217	-51.951
41	7	-173.498	4326.873	-1.026	-21.636	1.196	391.591
14	6	9.832	4289.795	-27.789	49.867	0.063	24.932
40	6	41.788	4253.668	14.299	-20.132	-0.81	13.316
11	6	-7.624	4170.519	-18.671	73.241	0.397	-28.296
54	6	17.611	4162.881	11.449	-54.905	-2.443	177.945
53	6	15.094	4084.204	13.572	-22.417	0.527	34.848
40	7	-149.683	4083.046	20.724	-4.655	17.419	430.713
44	7	-250.922	4077.944	12.98	105.234	2.655	527.995
34	7	-174.109	4059.149	-13.887	18.424	-3.106	390.502
50	6	-34.269	4057.081	-12.07	77.584	1.31	67.312

17	7	-435.073	4008.541	24.898	-139.979	-8.85	2691.068
33	6	-36.732	3959.74	11.177	8.721	1.204	41.484
39	6	9.213	3856.851	7.17	45.424	0.026	-24.521
22	7	-250.24	3853.95	-43.077	-189.442	-16.666	566.291
57	6	-1.707	3842.065	-3.899	-19.404	4.233	-19.735
61	6	-19.198	3837.368	-58.546	-37.344	-0.523	-57.106
13	7	-988.433	3783.963	-6.925	36.371	5.861	6960.677
47	6	-6.112	3759.793	24.796	-166.561	-0.461	-99.416
60	6	31.152	3533.676	-47.973	-39.187	-0.311	117.844
22	6	7.299	3424.768	13.974	-150.832	-0.122	117.168
1	6	12.934	3396.724	2.455	37.471	0.219	26.102
55	6	-30.494	3362.496	21.695	-17.842	1.131	-215.044
61	7	-218.067	3309.53	-33.417	-33.59	-16.428	351.576
56	6	-37.57	3288.656	26.147	-27.592	-1.669	-157.703
44	6	3.051	3269.384	-27.282	141.658	-0.121	27.759
25	6	-7.988	3231.579	-6.167	-42.376	0.008	14.669
7	7	-239.298	3176.832	3.458	-6.084	-24.349	386.211
21	6	9.959	3174.372	31.335	-25.716	0.101	19.542
46	6	11.387	3144.346	-10.862	-51.734	-0.103	100.368
38	6	-5.07	3137.877	4.968	37.406	-0.228	-83.322
31	6	2.945	3120.586	-41.542	-80.198	0.261	-0.693
47	7	-104.754	3111.325	19.622	-108.675	3.999	98.137
33	7	-627.602	3098.971	0.523	-1.184	-0.339	3099.033
8	6	-9.536	3091.849	9.751	15.909	-0.229	-13.983
37	7	-108.663	3090.317	9.327	-12.78	-1.543	174.601
45	6	-11.605	3053.81	7.871	24.268	1.977	19.937
59	6	1.179	3047.08	19.315	2.588	0.241	9.517

24	6	-6.602	3008.014	-7.714	18.99	-0.009	-16.456
5	7	-561.053	2999.234	-1.303	-11.644	-29.633	2749.002
26	6	6.705	2890.468	-15.824	-53.978	0.166	-25.413
43	6	10.553	2885.693	-28.225	93.165	-0.744	18.595
41	6	-8.552	2868.123	2.892	-41.637	0.419	-6.771
52	6	-5.298	2851.295	-13.419	11.574	1.363	-19.987
19	7	-478.282	2819.12	-10.81	-291.224	-18.734	3984.856
58	6	-5.558	2667.812	39.813	-94.229	0.167	-43.577
42	7	-551.417	2647.857	8.104	-44.739	19.518	2943.804
35	6	-3.549	2628.703	-3.795	4.025	0.375	-30.716
62	7	-158.641	2544.96	-41.866	-110.988	-6.176	404.58
49	6	39.826	2455.565	39.472	40.09	1.759	-49.118
48	7	-107.132	2402.15	31.859	-39.201	17.807	342.171
50	7	-280.376	2398.262	-22.382	54.017	18.037	513.956
51	7	-249.891	2367.845	-17.793	-10.502	8.22	410.756
27	6	-1.765	2360.679	-1.469	-16.145	0.297	8.11
34	6	-13.966	2336.718	-8.998	14.58	-0.121	0.028
31	7	-353.451	2319.348	-27.062	-55.87	-19.203	604.251
37	6	3.98	2265.918	-4.01	-45.318	0.527	-15.622
9	7	-146.598	2231.767	-5.202	-7.184	2.483	354.994
28	6	0.288	2121.947	-1.486	-16.14	-0.044	-0.691
3	7	-242.488	2031.227	1.384	9.211	-30.851	413.087
36	6	0.601	1991.086	-10.825	-17.223	-0.18	3.611
29	6	0.092	1945.504	2.044	-15.446	-0.048	-0.47
23	7	-238.989	1925.716	-21.874	-27.181	-5.196	345.526
30	7	-113.259	1896.364	-1.559	9.697	-0.927	182.425
30	6	0.491	1865.558	-4.967	-3.409	-0.276	0.796

57	7	-231.789	1817.6	-12.797	-28.134	4.693	403.662
62	6	-14.272	1787.255	-18.904	-59.451	3.222	78.487
35	7	-124.491	1637.523	5.161	13.327	-0.648	172.213
36	7	-121.058	1536.514	-5.627	-7.36	-1.933	199.757
56	7	-253.361	1495.382	19.426	-19.51	13.209	288.619
28	7	-110.964	1463.404	1.966	-6.279	-1.716	179.938
11	7	-206.271	1262.573	-10.782	60.264	1.877	361.381
29	7	-111.175	1181.895	15.577	12.32	-1.271	179.679
27	7	-109.017	960.14	3.091	-6.26	-2.192	183.502
55	7	-184.387	919.77	22.151	-34.622	3.345	201.438
2103	7	-158.247	860.139	10.747	71.886	-3.761	382.506
2103	6	11.925	804.16	-5.621	12.176	-0.297	7.046
2025	6	0.284	683.654	-21.752	122.762	-0.063	64.973
2105	7	-135.14	596.982	16.164	52.95	-5.266	347.51
2032	6	0.119	589.122	-18.216	2.585	-0.241	-6.447
53	7	-148.312	586.185	10.41	-48.867	7.042	404.836
2035	6	12.498	568.33	-14.299	31.84	-0.099	48.285
2029	6	2.437	540.716	-27.669	6.412	-0.267	-1.844
2017	6	27.014	537.937	19.735	-36.398	0.444	49.338
2018	6	-23.818	537.375	19.561	-36.564	-0.327	-54.851
2020	6	-12.519	537.357	25.531	-68.751	-0.204	-26.873
2025	7	-48.072	525.412	-17.294	97.49	2.236	138.579
2105	6	16.45	522.062	8.204	5.873	-0.703	6.302
2024	6	-6.045	500.714	-37.191	107.774	-0.201	-52.386
2032	7	-10.324	485.678	-18.616	-3.284	5.016	8.586
2031	6	8.941	484.212	-27.337	48.354	-0.25	36.342
2030	6	3.818	481.738	35.041	-18.446	-0.164	-4.49

2023	6	29.2	474.706	-33.069	119.279	-0.747	31.173
2015	6	10.758	473.801	20.06	-34.267	0.129	28.357
2019	6	17.495	472.859	21.666	-33.573	-0.159	11.109
2016	6	-13.146	472.776	22.696	-31.791	0.2	-17.959
2022	6	-26.313	442.337	-32.963	87.996	0.981	-57.196
2035	7	13.686	441.666	-14.37	17.283	9.643	36.16
2017	7	-3.362	441.285	14.793	-31.062	-10.884	91.597
2029	7	0.785	438.357	4.288	47.325	-4.256	0.33
2027	6	-24.762	420.337	26.741	-36.217	0.056	-36.86
2018	7	-44.292	418.429	15.989	-28.298	-11.44	8.697
2020	7	-45.815	411.147	17.699	-57.928	-8.688	41.381
2015	7	-26.38	397.047	15.289	-28.92	-9.149	83.981
2037	6	4.263	396.029	-3.069	31.273	-0.249	-5.202
2024	7	-52.528	395.918	-31.285	83.781	6.71	39.921
2019	7	-20.822	392.852	18.861	-25.693	-10.128	70.554
2023	7	-28.629	383.916	-25.491	97.22	3.811	108.309
2031	7	5.633	381.727	-9.191	61.12	-0.691	32.018
2030	7	3.05	378.164	45.255	12.462	1.406	-3.528
2022	7	-46.027	369.581	-27.322	70.236	12.134	11.583
2028	6	-30.477	367.459	-23.628	64.419	0.116	-56.153
2016	7	-44.65	362.399	15.305	-28.49	-9.872	46.193
2036	6	16.384	346.46	-17.428	32.347	-0.024	21.5
2027	7	-19.657	337.36	18.494	-33.555	0.065	-29.639
2014	6	8.769	316.07	21.511	-45.592	0.46	23.509
2037	7	6.531	313.283	-4.78	21.502	-0.341	-9.866
2021	6	-15.007	312.497	15.979	-24.053	-0.411	-23.814
2028	7	-26.26	295.456	-21.167	47.649	1.174	-41.681

2021	7	-33.217	289.295	15.817	-15.82	-19.741	31.081
45	7	-293.67	287.22	-6.47	-13.985	6.125	557.196
2036	7	14.515	280.87	-20.337	14.583	-1.559	15.073
1	7	-156.614	277.644	-17.537	-3.932	-30.016	390.817
2033	6	20.778	256.807	19.964	-6.805	-0.214	39.036
2026	6	-13.273	245.829	15.365	56.045	-0.102	-49.168
2087	6	0	243.972	0	0.488	0	204.39
2014	7	-14.56	217.643	11.672	-43.05	-14.391	67.512
2033	7	16.538	201.402	11.384	-13.17	-1.756	31.181
2026	7	-11.345	199.396	7.465	37.356	2.423	-37.901
2087	7	0	195.178	0	0.39	0	163.512
2104	6	2.938	165.813	1.524	57.026	-2.209	-20.642
2034	6	0.426	147.249	0.3	25.575	-0.351	8.417
2104	7	-24.697	133.093	3.799	53.16	-7.762	24.773
2034	7	1.037	123.078	-4.191	13.097	-0.66	4.839
21	7	-162.905	-43.685	10.36	-52.242	-5.3	403.532
43	7	-196.93	-460.96	-18.171	49.386	2.482	472.363
59	7	-160.127	-773.433	24.727	-18.472	27.093	365.053
25	7	-517.82	-1890.387	-13.399	-43.448	-6.487	1831.952
38	7	-611.885	-2185.161	7.589	32.477	-0.868	1969.423

```

*
*
*      STAAD.Pro V8i SELECTseries1      *
*      Version  20.07.06.35              *
*      Proprietary Program of            *
*      Bentley Systems, Inc.              *
*      Date=   DEC 13, 2023              *
*      Time=   16:40: 2                   *

```

```

*
*
*   USER ID:
*
*****

```

1. STAAD SPACE

INPUT FILE: Lancor Sholinganallur Dynamic.STD

2. START JOB INFORMATION
3. ENGINEER DATE 12-NOV-23
4. END JOB INFORMATION
5. INPUT WIDTH 79
6. UNIT METER KN

RESPONSE LOAD CASE 3

MODE	SPECTRAL ACCELERATION	DESIGN	SEISMIC	COEFFICIENT
-----	-----	-----	-----	-----
		X	Y	Z
1	0.41178	0.2471	0.0000	0.0000
2	0.49075	0.2945	0.0000	0.0000
3	0.51765	0.3106	0.0000	0.0000
4	0.84547	0.5073	0.0000	0.0000
5	1.00425	0.6025	0.0000	0.0000
6	1.09977	0.6599	0.0000	0.0000

FLOOR	PEAK STOREY SHEAR IN KN	
-----	-----	
	X	Z
14	2423.32	0.00
13	5667.92	0.00
12	9010.38	0.00
11	12164.41	0.00

10	15081.89	0.00
9	17717.23	0.00
8	20029.34	0.00
7	21983.45	0.00
6	23553.02	0.00
5	24721.89	0.00
4	25487.93	0.00
3	26164.86	0.00
2	26314.53	0.00
1	26314.53	0.00

STAAD SPACE

-- PAGE NO. 56

MODAL WEIGHT (MODAL MASS TIMES g) IN KN

MODE	X	Y	Z
1	1.064683E+05	3.339337E-02	2.541572E+01
2	1.200197E+02	2.527511E-03	1.124954E+03
3	1.920420E+01	2.748196E-02	1.029125E+05
4	8.551225E+00	1.161659E-01	3.060882E+01
5	7.326872E-02	1.971168E-03	6.377650E+01
6	4.651094E+01	4.513754E-02	5.660372E+00

RESPONSE LOAD CASE 3

CQC MODAL COMBINATION METHOD USED.

DYNAMIC WEIGHT X Y Z 1.545062E+05 1.545034E+05 1.545066E+05 KN

MISSING WEIGHT X Y Z -4.784353E+04 -1.545032E+05 -5.034373E+04 KN

MODAL WEIGHT X Y Z 1.066626E+05 2.266775E-01 1.041629E+05 KN

MODE	ACCELERATION-G	DAMPING
----	-----	-----
1	0.41178	0.05000
2	0.49075	0.05000

3	0.51765	0.05000
4	0.84547	0.05000
5	1.00425	0.05000
6	1.09977	0.05000

MASS PARTICIPATION FACTORS IN PERCENT BASE SHEAR IN KN

MODE	X	Y	Z	SUMM-X	SUMM-Y	SUMM-Z	X	Y	Z
1	68.91	0.00	0.02	68.909	0.000	0.016	26304.85	0.00	0.00
2	0.08	0.00	0.73	68.986	0.000	0.745	35.34	0.00	0.00
3	0.01	0.00	66.61	68.999	0.000	67.352	5.96	0.00	0.00
4	0.01	0.00	0.02	69.004	0.000	67.371	4.34	0.00	0.00
5	0.00	0.00	0.04	69.004	0.000	67.413	0.04	0.00	0.00
6	0.03	0.00	0.00	69.035	0.000	67.416	30.69	0.00	0.00

TOTAL SRSS SHEAR 26304.89 0.00 0.00

TOTAL 10PCT SHEAR 26304.90 0.00 0.00

TOTAL ABS SHEAR 26381.23 0.00 0.00

TOTAL CQC SHEAR 26314.53 0.00 0.00

S. SANGHITA M.E., M.I.E.
 STRUCTURAL ENGINEER,
 CMDA REG. No. SE/GR-I/19/04/G81
 "MOUNT VIEW", THIRD FLOOR,
 No. 64, MOUNT ROAD, GUINDY,
 CHENNAI-600 032. PH: 044-22350711

RESPONSE LOAD CASE 5

MODE	SPECTRAL ACCELERATION	DESIGN	SEISMIC	COEFFICIENT
------	-----------------------	--------	---------	-------------

		X	Y	Z
1	0.41178	0.0000	0.0000	0.2718
2	0.49075	0.0000	0.0000	0.3239
3	0.51765	0.0000	0.0000	0.3416
4	0.84547	0.0000	0.0000	0.5580
5	1.00425	0.0000	0.0000	0.6628
6	1.09977	0.0000	0.0000	0.7259

FLOOR	PEAK STOREY SHEAR IN KN	
-------	-------------------------	--

	X	Z
14	0.00	3397.78
13	0.00	7913.37
12	0.00	12523.86
11	0.00	16837.70
10	0.00	20793.63
9	0.00	24334.23
8	0.00	27409.23
7	0.00	29978.12
6	0.00	32012.95
5	0.00	33502.59
4	0.00	34460.36
3	0.00	35249.99
2	0.00	35446.71
1	0.00	35446.71

STAAD SPACE

-- PAGE NO. 59

MODAL WEIGHT (MODAL MASS TIMES g) IN KN

MODE	X	Y	Z
1	1.064683E+05	3.339337E-02	2.541572E+01
2	1.200197E+02	2.527511E-03	1.124954E+03

3 1.920420E+01 2.748196E-02 1.029125E+05
 4 8.551225E+00 1.161659E-01 3.060882E+01
 5 7.326872E-02 1.971168E-03 6.377650E+01
 6 4.651094E+01 4.513754E-02 5.660372E+00

RESPONSE LOAD CASE 5

CQC MODAL COMBINATION METHOD USED.

DYNAMIC WEIGHT X Y Z 1.545062E+05 1.545034E+05 1.545066E+05 KN

MISSING WEIGHT X Y Z -4.784353E+04 -1.545032E+05 -5.034373E+04 KN

MODAL WEIGHT X Y Z 1.066626E+05 2.266775E-01 1.041629E+05 KN

MODE ACCELERATION-G DAMPING

---	-----	-----
1	0.41178	0.05000
2	0.49075	0.05000
3	0.51765	0.05000
4	0.84547	0.05000
5	1.00425	0.05000
6	1.09977	0.05000

MASS PARTICIPATION FACTORS IN PERCENT BASE SHEAR IN KN

-----	-----
MODE X Y Z SUMM-X SUMM-Y SUMM-Z X Y Z	
1 68.91 0.00 0.02 68.909 0.000 0.016 0.00 0.00 6.91	
2 0.08 0.00 0.73 68.986 0.000 0.745 0.00 0.00 364.37	
3 0.01 0.00 66.61 68.999 0.000 67.352 0.00 0.00 35159.74	
4 0.01 0.00 0.02 69.004 0.000 67.371 0.00 0.00 17.08	
5 0.00 0.00 0.04 69.004 0.000 67.413 0.00 0.00 42.27	
6 0.03 0.00 0.00 69.035 0.000 67.416 0.00 0.00 4.11	

 TOTAL SRSS SHEAR 0.00 0.00 35161.66

TOTAL 10PCT SHEAR 0.00 0.00 35524.15

TOTAL ABS SHEAR 0.00 0.00 35594.48

TOTAL CQC SHEAR 0.00 0.00 35446.71

```

*
*
*      STAAD.Pro V8i SELECTseries1      *
*
*      Version  20.07.06.35              *
*
*      Proprietary Program of            *
*
*      Bentley Systems, Inc.             *
*
*      Date=   DEC 14, 2023              *
*
*      Time=   15:20: 3                  *
*
*
*
*      USER ID:                          *

```

1. STAAD SPACE

INPUT FILE: Lancor Sholingallur Static.STD

2. START JOB INFORMATION

3. ENGINEER DATE 12-NOV-23

4. END JOB INFORMATION

5. INPUT WIDTH 79

6. UNIT METER KN

* TIME PERIOD FOR X 1893 LOADING = 0.60000 SEC *

* SA/G PER 1893= 2.267, LOAD FACTOR= 1.872 *

* FACTOR V PER 1893= 0.0499 X 165507.94 *

*

JOINT LATERAL TORSIONAL LOAD - 1

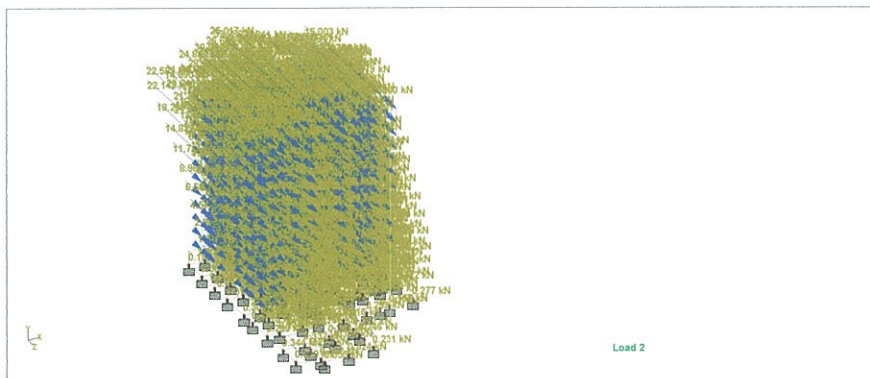
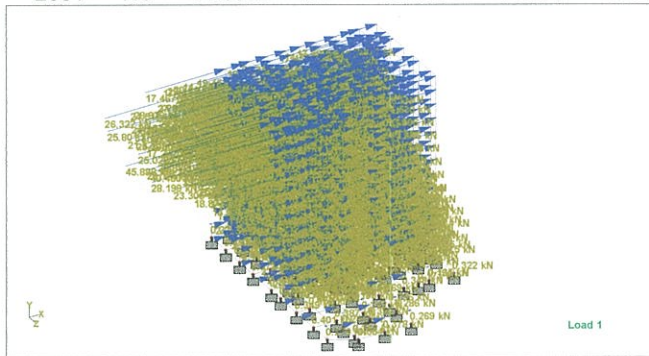
LOAD (KN) MOMENT (KN - METER) FACTOR 1.872

63 FX 0.353 MY 0.000

64 FX 0.333 MY 0.000

S. SANGHETA, M.E., M.I.E.,
STRUCTURAL ENGINEER,
CMDA REG. No. SE/GR-I/19/04/084
"MOUNT VIEW" THIRD FLOOR,
No. 64, MOUNT ROAD, GUINDY,
CHENNAI-600 022. TEL: 44-22350711

1986	FX	12.775	MY	0.000		
1987	FX	14.402	MY	0.000		
1988	FX	17.892	MY	0.000		
1989	FX	9.422	MY	0.000		
1990	FX	8.415	MY	0.000		
1991	FX	11.260	MY	0.000		
1992	FX	9.934	MY	0.000		
1993	FX	17.936	MY	0.000		
1994	FX	18.614	MY	0.000		
1995	FX	20.741	MY	0.000		
1996	FX	17.334	MY	0.000		
1997	FX	22.416	MY	0.000		
1998	FX	13.697	MY	0.000		
1999	FX	27.077	MY	0.000		
2000	FX	19.922	MY	0.000		
2001	FX	21.666	MY	0.000	TOTAL = 2327.211	0.000 AT LEVEL 39.000 METE



LOADING 2 LOADTYPE SEISMIC TITLE EQ Z

***** *

*

* TIME PERIOD FOR Z 1893 LOADING = 0.66600 SEC *

* SA/G PER 1893= 2.042, LOAD FACTOR= 1.783 *

* FACTOR V PER 1893= 0.0449 X 165507.94 * *

*

1978 FZ 21.506 MY 0.000

1979 FZ 15.661 MY 0.000

1980 FZ 15.487 MY 0.000

1981 FZ 12.663 MY 0.000

1982 FZ 15.129 MY 0.000

1983 FZ 8.602 MY 0.000

1984 FZ 8.602 MY 0.000

1985 FZ 11.373 MY 0.000

1986 FZ 10.963 MY 0.000

1987 FZ 12.359 MY 0.000

1988 FZ 15.354 MY 0.000

1989 FZ 8.085 MY 0.000

1990 FZ 7.221 MY 0.000

1991 FZ 9.663 MY 0.000

1992 FZ 8.525 MY 0.000

1993 FZ 15.392 MY 0.000

1994 FZ 15.974 MY 0.000

1995 FZ 17.800 MY 0.000

1996 FZ 14.875 MY 0.000

1997 FZ 19.237 MY 0.000

1998 FZ 11.755 MY 0.000

1999 FZ 23.237 MY 0.000

2000 FZ 17.097 MY 0.000

2001 FZ 18.593 MY 0.000

TOTAL = 1997.144 0.000 AT LEVEL 39.000 METE

STORY HEIGHT LOAD AVG. DISP(CM) DRIFT(CM) RATIO

(METE) X Z X Z

BASE= 0.00

9	0.0982	27.1453	0.0234	3.8647 L / 77
10	-0.3257	-27.4349	0.0631	3.9079 L / 77
11	62.9134	0.2603	8.4888	0.0503 L / 35
12	-63.0552	-0.4398	8.5151	0.0781 L / 35
13	0.1941	34.0229	0.0410	4.8440 L / 62
14	-0.3359	-34.2023	0.0672	4.8718 L / 61
15	42.0714	22.8544	5.6875	3.2634 L / 53
16	-42.2610	-23.0957	5.7206	3.2994 L / 52

10 27.00 3 -0.0947 -0.1158 0.0159 0.0161 L / 18614

4	-0.0180	-0.0235	0.0020	0.0026 L / 116632
5	-0.1126	-0.1393	0.0178	0.0187 L / 16052
6	-0.1689	-0.2090	0.0267	0.0280 L / 10701
7	56.4422	0.1640	6.1685	0.0288 L / 48
8	-56.7125	-0.4984	6.2113	0.0736 L / 48
9	0.1207	30.7071	0.0225	3.5618 L / 84
10	-0.3910	-31.0415	0.0653	3.6067 L / 83

11	70.6365	0.3098	7.7231	0.0495 L /	39
12	-70.8069	-0.5183	7.7517	0.0785 L /	39
13	0.2347	38.4886	0.0406	4.4658 L /	67
14	-0.4050	-38.6971	0.0691	4.4948 L /	67
15	47.2484	25.8653	5.1770	3.0108 L /	58
16	-47.4736	-26.1439	5.2126	3.0482 L /	57

11	30.00	3	-0.1118	-0.1326	0.0171	0.0168 L /	17527
		4	-0.0200	-0.0261	0.0020	0.0026 L /	116293
		5	-0.1318	-0.1587	0.0192	0.0194 L /	15470
		6	-0.1977	-0.2381	0.0287	0.0291 L /	10313
		7	61.8372	0.1907	5.3950	0.0266 L /	55
		8	-62.1534	-0.5716	5.4409	0.0732 L /	55
		9	0.1413	33.8753	0.0205	3.1681 L /	94
		10	-0.4575	-34.2562	0.0665	3.2147 L /	93
		11	77.3935	0.3570	6.7570	0.0473 L /	44
		12	-77.5947	-0.5958	6.7878	0.0775 L /	44
		13	0.2737	42.4628	0.0390	3.9741 L /	75
		14	-0.4749	-42.7015	0.0698	4.0044 L /	75
		15	51.7805	28.5470	4.5320	2.6817 L /	66
		16	-52.0440	-28.8644	4.5704	2.7205 L /	65

12	33.00	3	-0.1304	-0.1504	0.0186	0.0178 L /	16094
		4	-0.0222	-0.0286	0.0022	0.0026 L /	116742
		5	-0.1526	-0.1791	0.0208	0.0204 L /	14405
		6	-0.2289	-0.2686	0.0312	0.0306 L /	9603

STAAD SPACE

-- PAGE NO. 3174

STORY	HEIGHT	LOAD	AVG. DISP(CM)	DRIFT(CM)	RATIO
-------	--------	------	----------------	------------	-------

	(METE)	X	Z	X	Z	
BASE= 0.00						
7	66.3131	0.2138	4.4759	0.0232 L /	67	
8	-66.6793	-0.6436	4.5259	0.0720 L /	66	
9	0.1589	36.5735	0.0176	2.6983 L /	111	
10	-0.5252	-37.0033	0.0676	2.7471 L /	109	
11	83.0028	0.4005	5.6093	0.0435 L /	53	
12	-83.2376	-0.6713	5.6429	0.0755 L /	53	
13	0.3102	45.8502	0.0365	3.3874 L /	88	
14	-0.5449	-46.1209	0.0701	3.4194 L /	88	
15	55.5459	30.8352	3.7655	2.2882 L /	79	
16	-55.8511	-31.1934	3.8071	2.3290 L /	79	
13	36.00	3	-0.1516	-0.1699	0.0212	0.0195 L / 14169
4	-0.0247	-0.0312	0.0025	0.0026 L /	115396	
5	-0.1763	-0.2011	0.0237	0.0221 L /	12653	
6	-0.2645	-0.3017	0.0356	0.0331 L /	8435	
7	69.7659	0.2310	3.4529	0.0172 L /	87	
8	-70.1891	-0.7138	3.5098	0.0701 L /	85	
9	0.1726	38.7632	0.0137	2.1897 L /	137	
10	-0.5957	-39.2459	0.0706	2.2426 L /	134	
11	87.3354	0.4376	4.3326	0.0371 L /	69	
12	-87.6083	-0.7434	4.3707	0.0721 L /	68	
13	0.3438	48.6028	0.0336	2.7526 L /	109	
14	-0.6166	-48.9086	0.0717	2.7877 L /	107	
15	58.4584	32.6963	2.9125	1.8611 L /	103	

	16	-58.8111	-33.0986	2.9600	1.9052 L / 101	
14	39.00	3	-0.1790	-0.1925	0.0274	0.0226 L / 10949
	4	-0.0277	-0.0339	0.0030	0.0026 L / 100675	
	5	-0.2067	-0.2264	0.0304	0.0253 L / 9875	
	6	-0.3100	-0.3396	0.0456	0.0379 L / 6583	
	7	72.2035	0.2345	2.4375	0.0034 L / 123	
	8	-72.6995	-0.7778	2.5104	0.0640 L / 119	
	9	0.1793	40.4684	0.0068	1.7052 L / 176	
	10	-0.6754	-41.0118	0.0797	1.7659 L / 170	
	11	90.4032	0.4594	3.0678	0.0218 L / 98	
	12	-90.7254	-0.8059	3.1171	0.0625 L / 96	
	13	0.3731	50.7519	0.0294	2.1491 L / 139	
	14	-0.6953	-51.0984	0.0787	2.1898 L / 137	
	15	60.5257	34.1455	2.0673	1.4491 L / 145	
	16	-60.9391	-34.5983	2.1280	1.4997 L / 141	

1685. FINISH

STAAD SPACE

-- PAGE NO. 3175

```

*****
*
*      STAAD.Pro V8i SELECTseries1      *
*
*      Version  20.07.06.35              *
*
*      Proprietary Program of            *
*
*      Bentley Systems, Inc.             *
*
*      Date=   DEC 14, 2023              *
*
*      Time=   15:14:14                  *
*
*****

```

1. STAAD SPACE

INPUT FILE: Lancor Sholinganallur Wind.STD

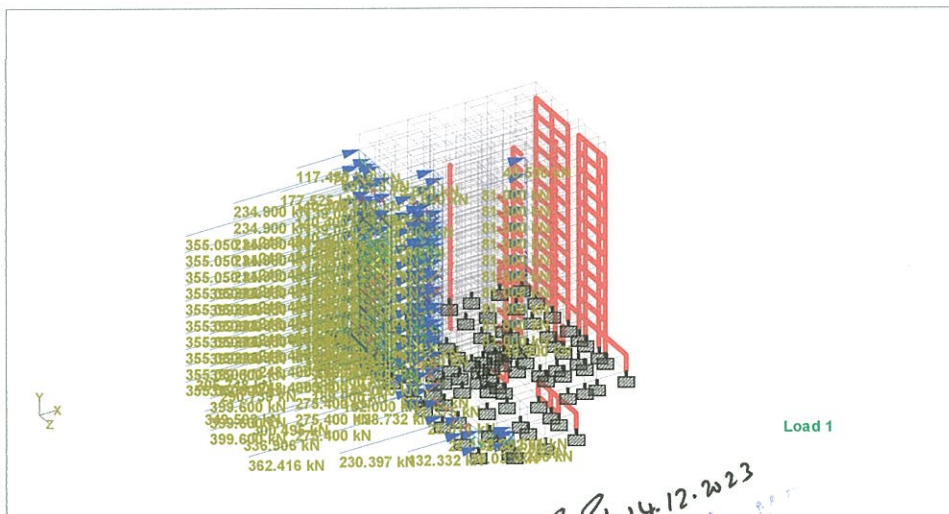
2. START JOB INFORMATION

3. ENGINEER DATE 12-NOV-23

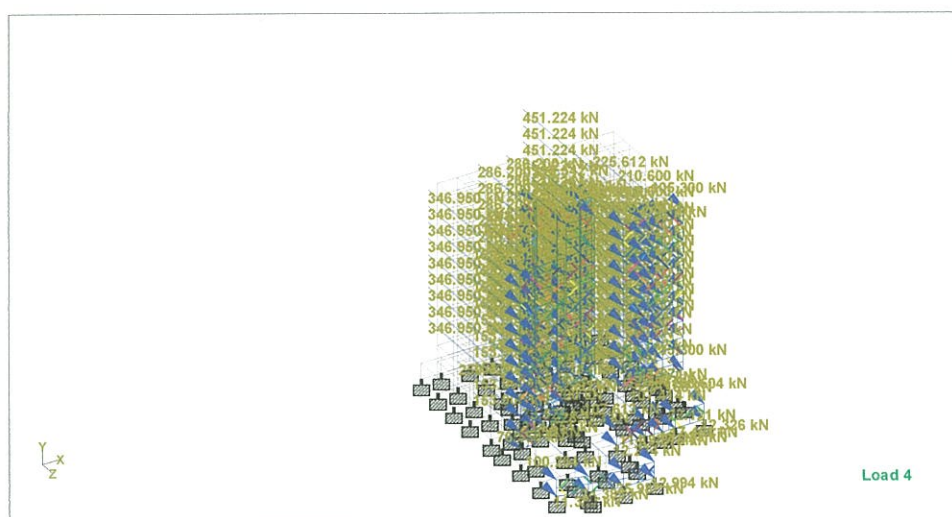
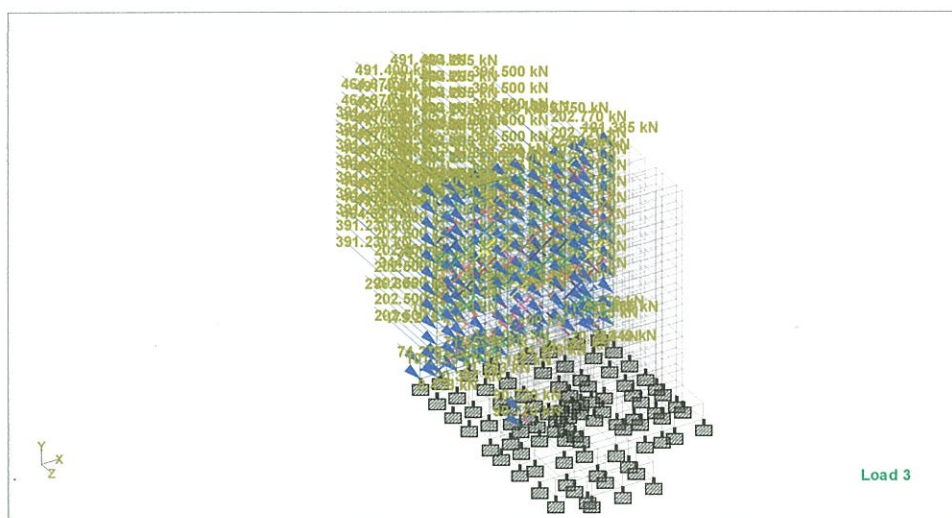
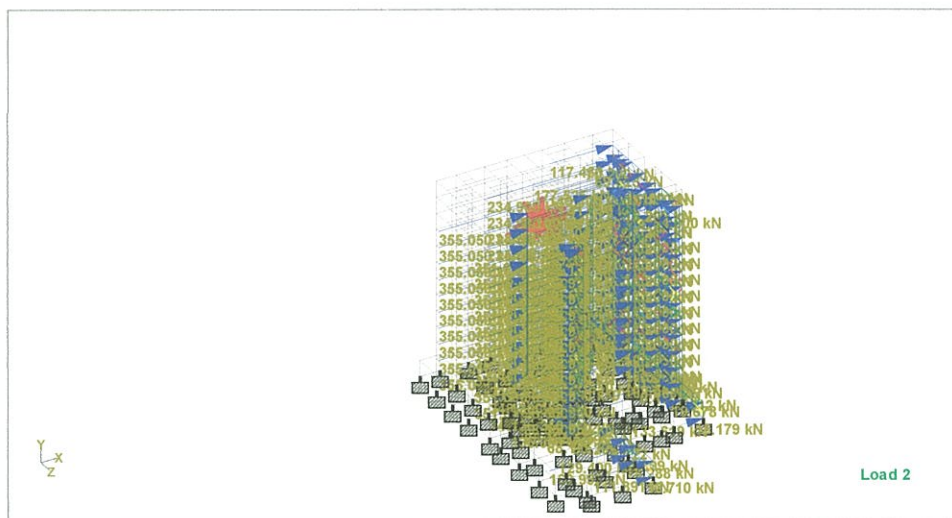
4. END JOB INFORMATION

5. INPUT WIDTH 79

6. UNIT METER KN



S. SANGEETA
 STRUCTURAL ENGINEER
 CMDA REG. No. SE/1412/2023
 "MOUNT VIEW"
 No. 64, MOUNT VIEW
 CHENNAI-600 081



STORY HEIGHT LOAD DRIFT(CM) ECCENTRICITY RATIO

 (METE) X Z (METE)

BASE=

9	66.1880	0.2072	0.0000	L / 36
10	63.7441	0.4085	0.0000	L / 37
11	0.0589	57.2132	0.0000	L / 42
12	0.3486	46.3542	0.0000	L / 52
13	82.8063	0.3502	0.0000	L / 29
14	79.7514	0.6018	0.0000	L / 30
15	0.1449	71.6077	0.0000	L / 33
16	-0.6489	-58.2135	0.0000	L / 41

10 27.00 1 59.5657 0.3379 0.0000 L / 45

2	57.4180	0.5108	0.0000	L / 47
3	0.1834	51.9398	0.0000	L / 52
4	0.4445	42.2655	0.0000	L / 64
5	-0.0947	-0.1158	0.0000	L / 23310
6	-0.0180	-0.0235	0.0000	L / 114902
7	-0.1126	-0.1393	0.0000	L / 19378
8	-0.1689	-0.2090	0.0000	L / 12919
9	71.3437	0.2382	0.0000	L / 38
10	68.7665	0.4457	0.0000	L / 39
11	0.0850	62.1605	0.0000	L / 43
12	0.3982	50.5514	0.0000	L / 53
13	89.2634	0.4026	0.0000	L / 30
14	86.0419	0.6619	0.0000	L / 31
15	0.1899	77.8054	0.0000	L / 35
16	-0.7519	-63.5025	0.0000	L / 42

S. SANGHVI, M.E., M.I.E.,
 STRUCTURAL ENGINEER
 CMDA REG. No. SE/GR-I/19/04/08
 "MOUNT VIEW", THIRD FLOOR,
 No. 64, MOUNT ROAD, CHENNAI-600 032. PH: 044-4444444

11	30.00	1	62.8437	0.3778	0.0000	L / 48
		2	60.6236	0.5530	0.0000	L / 49
		3	0.2234	55.1887	0.0000	L / 54
		4	0.4986	45.0774	0.0000	L / 66
		5	-0.1118	-0.1326	0.0000	L / 22617
		6	-0.0200	-0.0261	0.0000	L / 115040
		7	-0.1318	-0.1587	0.0000	L / 18901
		8	-0.1977	-0.2381	0.0000	L / 12601
		9	75.2543	0.2628	0.0000	L / 40
		10	72.5902	0.4731	0.0000	L / 41
		11	0.1099	66.0360	0.0000	L / 45
		12	0.4402	53.9024	0.0000	L / 55
		13	94.1650	0.4472	0.0000	L / 32
		14	90.8348	0.7101	0.0000	L / 33
		15	0.2345	82.6637	0.0000	L / 36
		16	-0.8485	-67.7355	0.0000	L / 44

12	33.00	1	65.1037	0.4139	0.0000	L / 50
		2	62.8529	0.5871	0.0000	L / 52
		3	0.2638	57.5877	0.0000	L / 57
		4	0.5481	47.2151	0.0000	L / 70
		5	-0.1304	-0.1504	0.0000	L / 21935
		6	-0.0222	-0.0286	0.0000	L / 115193
		7	-0.1526	-0.1791	0.0000	L / 18426
		8	-0.2289	-0.2686	0.0000	L / 12284
		9	77.9413	0.2817	0.0000	L / 42
		10	75.2404	0.4897	0.0000	L / 44
		11	0.1334	68.8904	0.0000	L / 48

12	0.4746	56.4432	0.0000	L /	58
13	97.5382	0.4854	0.0000	L /	34
14	94.1620	0.7453	0.0000	L /	35
15	0.2783	86.2462	0.0000	L /	38
16	-0.9395	-70.9580	0.0000	L /	46

13	36.00	1	66.4134	0.4486	0.0000	L /	54
		2	64.1779	0.6118	0.0000	L /	56
		3	0.3063	59.2337	0.0000	L /	61
		4	0.5947	48.7608	0.0000	L /	74
		5	-0.1516	-0.1699	0.0000	L /	21190
		6	-0.0247	-0.0312	0.0000	L /	115210
		7	-0.1763	-0.2011	0.0000	L /	17898
		8	-0.2645	-0.3017	0.0000	L /	11932
		9	79.4845	0.2969	0.0000	L /	45
		10	76.8019	0.4928	0.0000	L /	47
		11	0.1560	70.8390	0.0000	L /	51
		12	0.5020	58.2716	0.0000	L /	62
		13	99.4836	0.5199	0.0000	L /	36
		14	96.1304	0.7649	0.0000	L /	37
		15	0.3230	88.6976	0.0000	L /	40
		16	-1.0284	-73.2941	0.0000	L /	49

14	39.00	1	67.2327	0.4762	0.0000	L /	58
		2	65.0128	0.6276	0.0000	L /	60
		3	0.3541	60.4386	0.0000	L /	64
		4	0.6426	49.9360	0.0000	L /	78
		5	-0.1790	-0.1925	0.0000	L /	20258
		6	-0.0277	-0.0339	0.0000	L /	115092

7	-0.2067	-0.2264	0.0000	L / 17226
8	-0.3100	-0.3396	0.0000	L / 11484
9	80.4312	0.2997	0.0000	L / 48
10	77.7674	0.4815	0.0000	L / 50
11	0.1769	72.2546	0.0000	L / 54
12	0.5231	59.6515	0.0000	L / 65
13	100.6880	0.5410	0.0000	L / 39
14	97.3582	0.7682	0.0000	L / 40
15	0.3701	90.4845	0.0000	L / 43
16	-1.1249	-75.0773	0.0000	L / 52

1557. FINISH

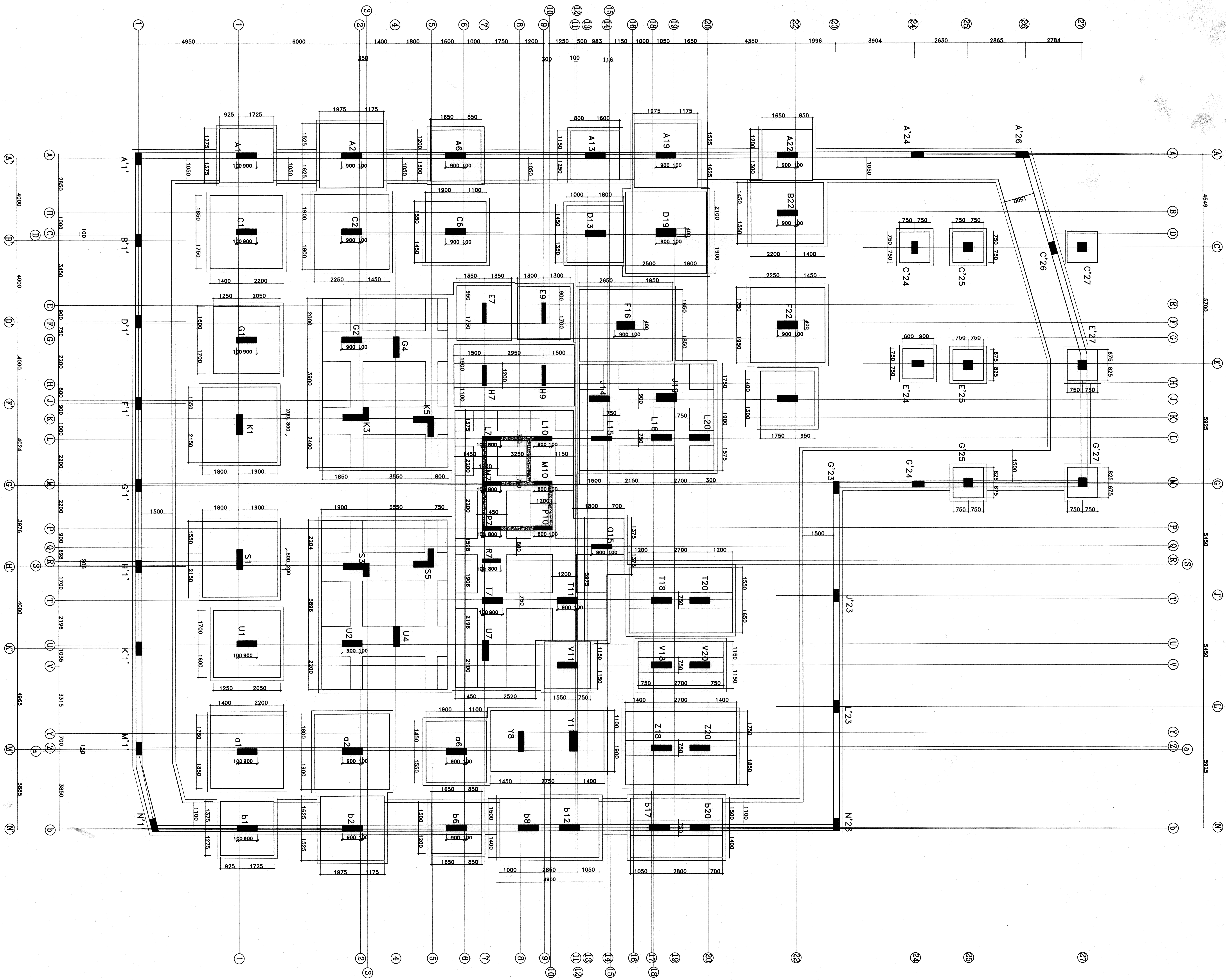
STAAD SPACE

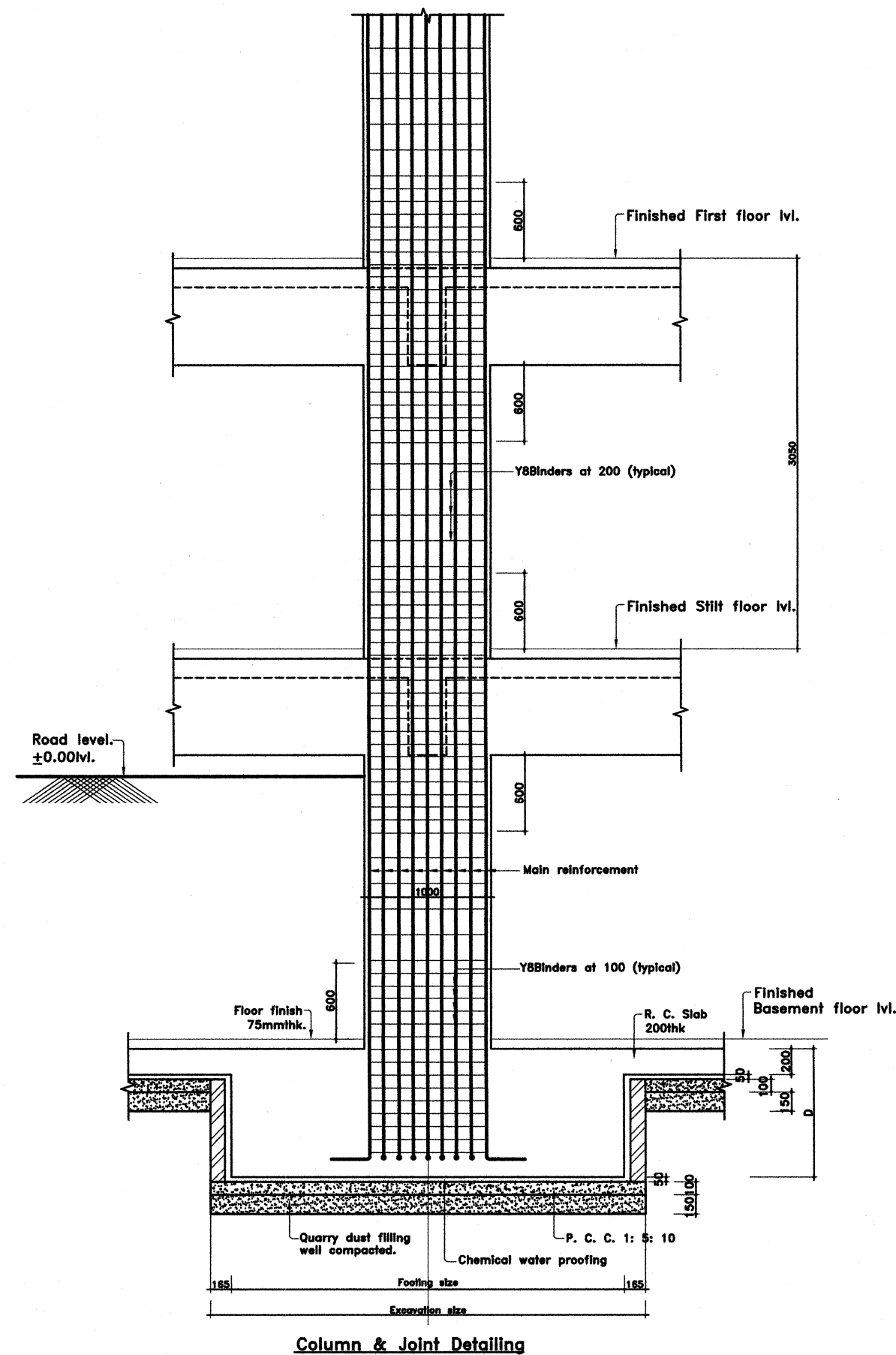
-- PAGE NO. 3537

***** END OF THE STAAD.Pro RUN *****

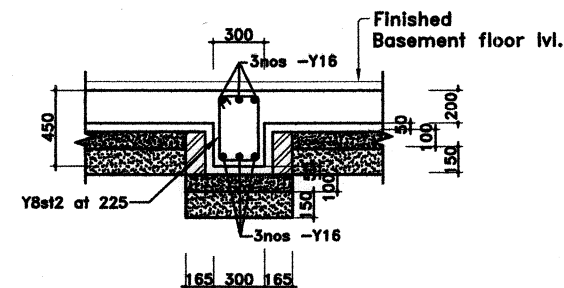
S. Sangeeta 14.12.2023
S. SANGEETA, M.E., M.I.E.,
 STRUCTURAL ENGINEER,
 CMDA REG. No. SE/GR-I/19/04/084
 "MOUNT VIEW", THIRD FLOOR,
 No. 64, MOUNT ROAD, GUINDY,
 CHENNAI-600 032. PH: 044-22350711

*** DATE= DEC 14,2023 TIME= 15:17:33 ***

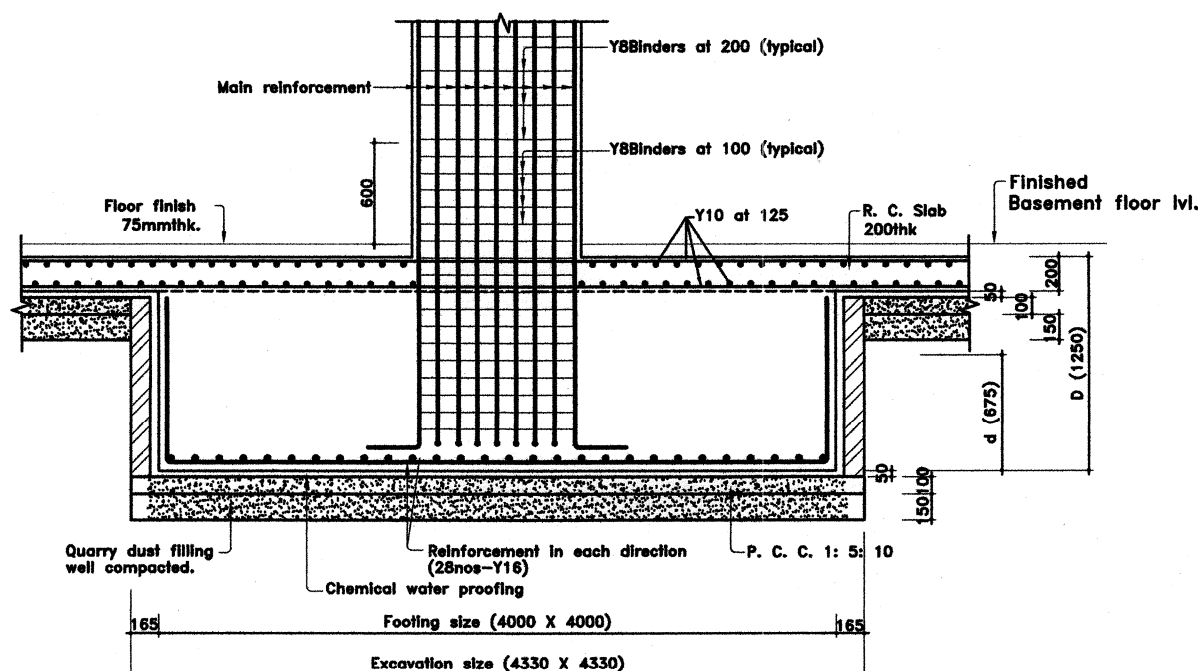




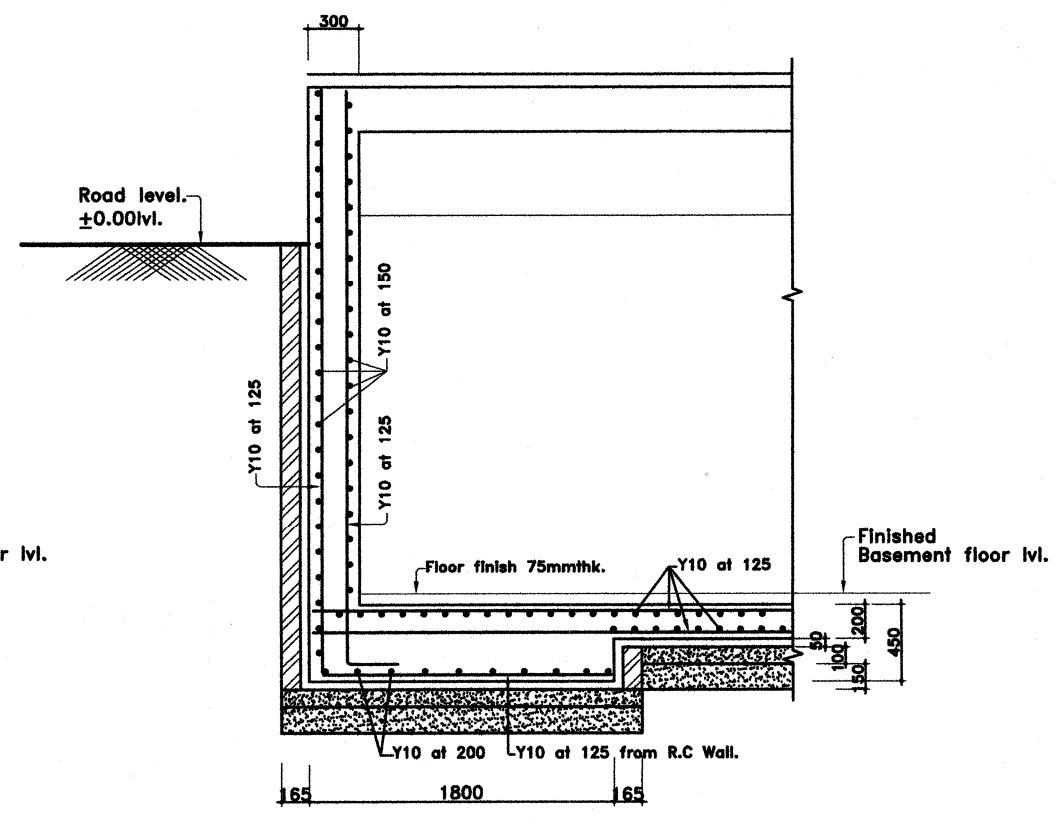
Column & Joint Detailing



Typ. c. s. of basement grade beam
300 X 450



Typical details of Column footing



Section thro' R. C. Wall

P. Sangeeta 15.12.2023
S. SANGEETA, M.E., M.I.E.,
STRUCTURAL ENGINEER,
CMDA REG. No. SE/GR-I/19/04/084
"MOUNT VIEW", THIRD FLOOR,
No. 64, MOUNT ROAD, GUINDY,
CHENNAI-600 032. PH: 044-22350711

Notes:

1. This drawing should be read along with the architectural drawings.
2. Grade of concrete for all R.C.C. items of work shall be M25, unless otherwise specified.
3. Clear cover to steel shall be 50 for footings
40 for columns
25 for beams & r.c.walls
15 for slabs
4. 'Y' Denotes Fe500 steel conforming to I.S 1786 - 1985
5. Lap length for all bars shall mbe 50 times the dia of the bars. Unless otherwise specified not more than 331/3% of bars shall be lapped at the same section.
6. Safe bearing carrying capacity of the soil is assumed as 300kn/m² as per soil test report.
7. Foundation is designed for Basement + Silt + 11 Upper floors only.

Project	Scale:	Project Management Consultants	Architects	Structural Consultants	Details of Foundation (Sections)				
	1 : 30				Designed	Drawn	Checked	Job. no.	Org. no.
	Date:				S.Sangeeta	V.M.Selvi	S.S.	2944	S4
RESIDENTIAL APARTMENT At Sholinganallur, Chennai.		14. December 2023	LANCOR HOLDINGS LTD. Arhant VTN Square, 2nd floor, No.58, G.N.Chetty Road, T. Nagar, Chennai – 600 017.	NATARAJ & VENKAT ASSOCIATES. 18, 3rd Seaward road, Valmiki nagar, Thiruvanniyur, Chennai – 600 041.	V. SANGAMESWARAN CONSULTING ENGINEERS "MOUNT VIEW" Third floor, 64, Mount road, Guindy, Chennai – 600 032.				

Schedule of footings

Sl.no.	C o l u m n s	No.off	Excavation size	Footling size	Depth	Reinforcement in
					D	each direction
1	D19	1	4330 X 4330	4000 X 4000	1250	28nos -Y16
2	C2 F22 K1 S1 a2	5	4010 X 4010	3700 X 3700	1250	26nos -Y16
3	C1 a1	2	3930 X 3930	3600 X 3600	1050	24nos -Y16
4	G1 U1	2	3630 X 3630	3300 X 3300	1050	20nos -Y16
5	A2 A19 b2	3	3480 X 3480	3150 X 3150	900	18nos -Y16
6	C6 a6	2	3330 X 3330	3000 X 3000	900	14nos -Y16
7	D13	1	3130 X 3130	2800 X 2800	900	12nos -Y16
8	A1 E7 E9 J22 b1	5	3030 X 3030	2700 X 2700	750	20nos -Y12
9	A6 A22 b6	3	2830 X 2830	2500 X 2500	750	18nos -Y12
10	A13	1	2730 X 2730	2400 X 2400	750	16nos -Y12
11	V11	1	2630 X 2630	2300 X 2300	675	15nos -Y12
12		8	1830 X 1830	1500 X 1500	600	12nos -Y10
13	F16	1	3830 X 4990	3500 X 4600	1250	28nos -Y16 along longer side 20nos -Y16 along shorter side
14	B22	1	3330X 3930	3000 X 3600	1125	24nos -Y16 along longer side 18nos -Y16 along shorter side
15	G2 - G4 - K3 - K5; S3 - S5 - U2 - U4	8	8630 X 6530	8300 X 6200	COMBINED FOOTING (See saparate details)	
16	J14 - J19 - L15 - L18 - L20	5	5555 X 6975	5225 X 6645	COMBINED FOOTING (See saparate details)	
17	H7 - H9	2	3330 X 6280	3000 X 5950	COMBINED FOOTING (See saparate details)	
18	T18 - T20	2	3530 X 5430	3200 X 5100	COMBINED FOOTING (See saparate details)	
19	V8 - V20	2	3230 X 5330	2900 X 5000	COMBINED FOOTING (See saparate details)	
20	Y8 - Y11	2	3330 X 5930	3000 X 5600	COMBINED FOOTING (See saparate details)	
21	b8 - b12	2	3230 X 5230	2900 X 4900	COMBINED FOOTING (See saparate details)	
22	b17 - b20	2	3230 X 4880	2900 X 4550	COMBINED FOOTING (See saparate details)	
23	H7 - H9 - L7 - L10 - M7 - M10 - P7 - Q15 - R7 - T7 - T11 - U7	12	TO SHAPE			

Schedule of columns

Sl.no.	C o l u m n s	No.off	Size	Cross section	Main Reinforcement	Binders
1	D19 F16 F22 J19	4	400 X 1000		20nos -Y25	ALL BINDERS -Y8mm
2	C1 C2 a1 a2 T11 b1 b2 Z18 Z20	9	300 X 1000		20nos -Y25	
3	K1 S1 G4 U4 U7	5	1000 X 300		18nos -Y25	
4	Y8 Y11	2	1000 X 300		16nos -Y25	
5	A2 A19 B22 C6 G1 G2 T7 T18 T20 U1 U2 a6	12	300 X 1000		16nos -Y25	
6	A1 A6 D13 J14 J22 b8 b12 b17	8	300 X 1000		18nos -Y20	
7	A13 A22 L18 V11* V18* V20* L20* b6 b20	9	300 X 1000		16nos -Y20	
8	L15	1	200 X 1000		14nos -Y25	
9	Q15	1	200 X 1000		16nos -Y20	

Sl.no.	C o l u m n s	No.off	Size	Cross section	Main Reinforcement	Binders
10	P10	1	200 X 900		14nos -Y25	
11	L7 L10 M7 M10 P7 R7	6	200 X 900		14nos -Y20	
12	E7 E9	2	1000 X 200		16nos -Y20	
13	H7 H9	2	1000 X 200		18nos -Y20	
14	K3 S3	2	TO SHAPE		18nos -Y25	
15	K5 S5	2	TO SHAPE		18nos -Y25	
17	C'25 C'27 E'25 E'27 G'25 G'27	6	450 X 450		8nos -Y16	
18	A'24 A'26 E'24 G'24	4	300 X 600		6nos -Y16	
18	A'1' B'1' C'24 C'26 D'1' F'1' G'1' G'23' H'1' J'23' K'1' L'23 M'1' N'1' N'23	15	600 X 300		6nos -Y16	

Project

RESIDENTIAL APARTMENT
At Sholinganallur, Chennai.

Scale:

1 : 30

Date:

14. December 2023

Project Management Consultants

LANCOR HOLDINGS LTD.
Arthant VTN Square, 2nd floor, No.58, G.N.Chetty Road,
T. Nagar, Chennai - 600 017.

Architects

NATARAJ & VENKAT ASSOCIATES.
18, 3rd Seaward road, Valmiki nagar,
Thiruvanniyur, Chennai -600 041.

Structural Consultants

S. SANGEETA, M.E., M.I.E.,
STRUCTURAL ENGINEER,
CMDA REG. No. SE/GR-1/19/04/084
"MOUNT VIEW", THIRD FLOOR,
No. 64, MOUNT ROAD, GUINDY,
CHENNAI - 600 032. 22-04-2023
V. SANGAMESWARAN CONSULTING ENGINEERS
"MOUNT VIEW" Third floor,
64, Mount road, Guindy, Chennai - 600 032.Details of Foundation
(Schedule of Footings & Columns)

Designed	Drawn	Checked	Job. no.	Dr. no.
S.Sangeeta	V.M.Selvi	S.S.	2944	S3



Lay - out of First floor slabs & beams

Note: All slabs 125mm thick unless otherwise specified.

Slab sunk by 250 Slab sunk by 150
FC - Floating Column TC - Terminated Column

Project

RESIDENTIAL APARTMENT
At Sholinganallur, Chennai.

Scale:

1 : 80

Date:

14. December 2023

Project Management Consultants

LANCOR HOLDINGS LTD.
Arthant VTN Square, 2nd floor, No.58, G.N.Chetty nagar,
T. Nagar, Chennai - 600 017.

NATARAJ & VENKAT ASSOCIATES.
18, 3rd Seaward road, Valmiki nagar,
Thiruvanniyur, Chennai -600 041.

Structural Consultants

S. SANGEETA, M.E., M.I.E.,
STRUCTURAL ENGINEER,
CMDA REG. No. SE/GR-1/19/04/084
"MOUNT VIEW", THIRD FLOOR,
No. 64, MOUNT ROAD, GUNDIRY,
THIRUVANMIYUR, CHENNAI
V. SANGAMESWARAN CONSULTING ENGINEERS
"MOUNT VIEW" Third floor,
64, Mount road, Guindy, Chennai - 600 032.

Details of First floor
slabs and beams

Designed	Drawn	Checked	Job. no.	Drg. no.
S.Sangeeta	S.Vijayalakshmi	S.S.	2944	SF



Lay - out of Typical floor slabs & beams

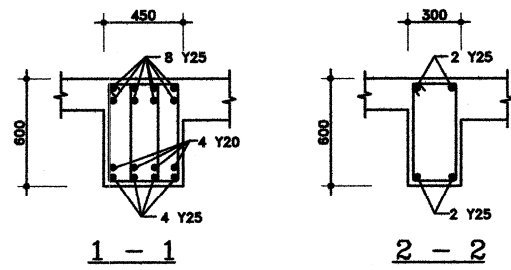
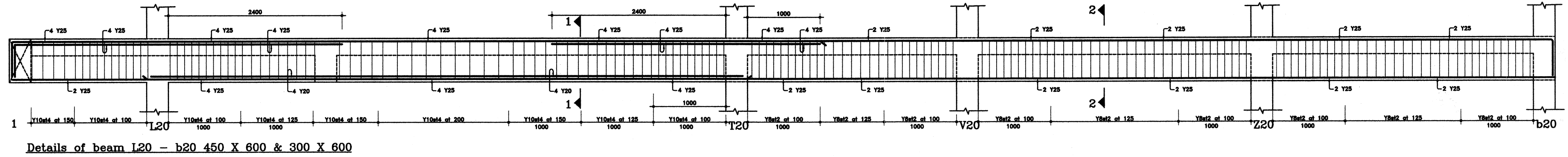
Note: All slabs 125mm thick unless otherwise specified.

Slab sunk by 250 Slab sunk by 150

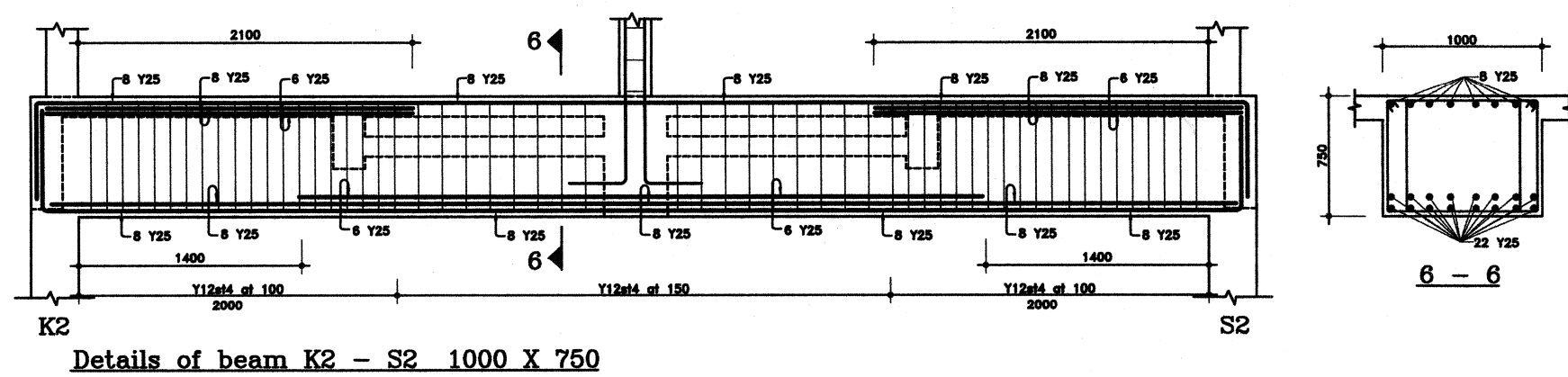
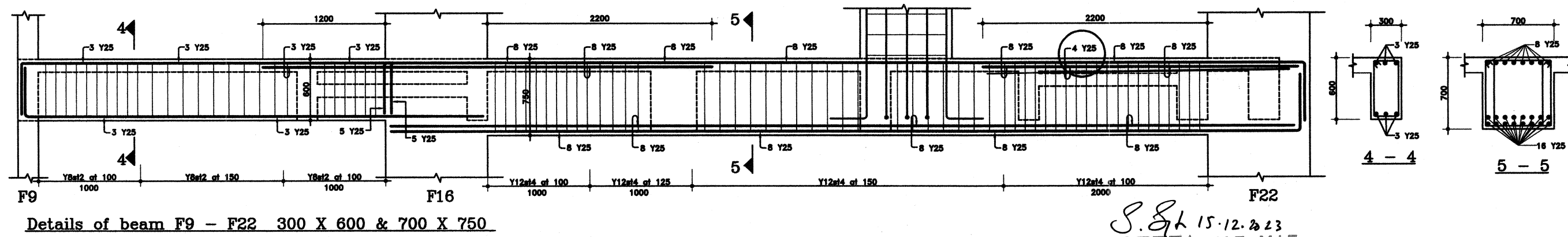
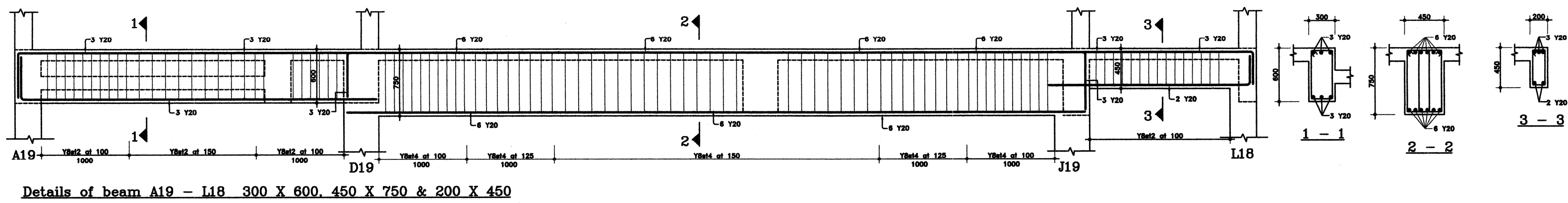
FC - Floating Column

Project	Scale:	Project Management Consultants		Structural Consultants	Details of Typical floor slabs and beams				
	1 : 80								
RESIDENTIAL APARTMENT	Date:	LANCOR HOLDINGS LTD. Arhant VTN Square, 2nd floor, No.58, G.N.Chetty Road, T. Nagar, Chennai – 600 017.	NATARAJ & VENKAT ASSOCIATES. 18, 3rd Seaward road, Valmiki nagar, Thiruvanniyur, Chennai – 600 041.	S. SANGEETA, M.E., M.I.E., STRUCTURAL ENGINEER, CMDA REG. No. SE/GR-1/19/04/084 "MOUNT VIEW", THIRD FLOOR, V. SANGAMESWARAN CONSULTING ENGINEERS "MOUNT VIEW", THIRD FLOOR, 64, Mount road, Guindy, Chennai – 600 032.	Designed	Drawn	Checked	Job. no.	Dr. no.
	12. December 2023				S.Sangeeta	S.Vijayalakshmi	S.S.	2944	ST
At Sholinganallur, Chennai.									

GROUND FLOOR

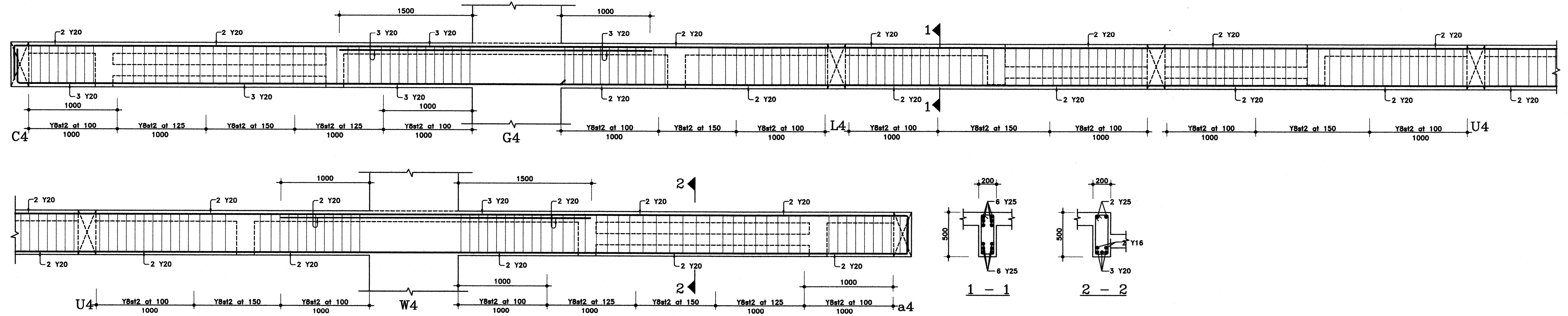


FIRST FLOOR

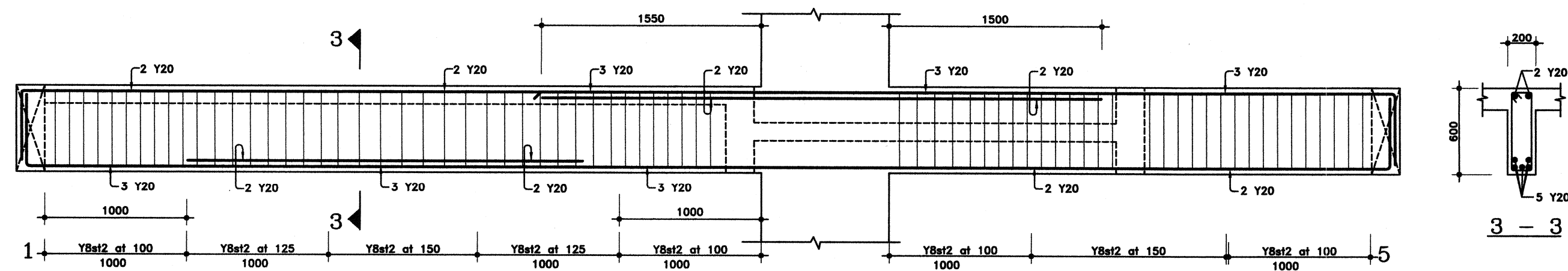


2000
F22
S. SANGEETA, M.E., M.I.E.,
STRUCTURAL ENGINEER,
CMDA REG. No. SE/GR-1/94/084
"MOUNT VIEW", THIRD FLOOR,
No. 64, MOUNT ROAD, GUINDY,
CHENNAI-600 032. PH: 044-22350711

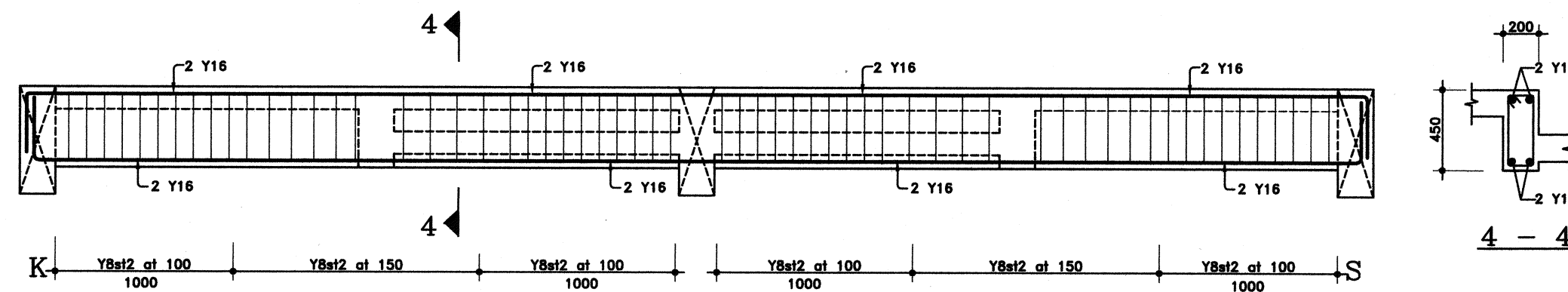
TYPICAL FLOOR



Details of beam C4 - a4 200 X 500

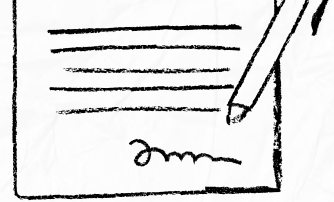


Details of beam - B1 200 X 600



Details of beam - B2 200 X 450

S. S. SANGHETA, M.E., M.I.E.,
STRUCTURAL ENGINEER,
CMDA REG. No. SE/GR-I/19/04/084
"MOUNT VIEW", THIRD FLOOR,
No. 64, MOUNT ROAD, GUINDY,
CHENNAI-600 032. PH: 044-22350711



our services doesn't just end there



Buying & Selling Services

Property Buying Assistance, Property Selling Support, Market Price Analysis, Owner Outreach and Negotiation.



Legal & Documentation Services

Certified EC, Patta, legal opinions, property verification, due diligence, litigation solutions, and legal heir certificates.



Property Development & Approvals

Building plan approvals, construction, layout and sub-division approvals, zone conversion, and occupancy certification.



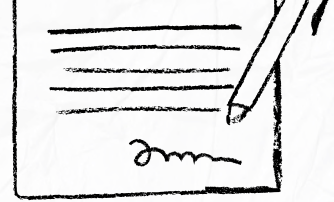
NRI & Investment Services

Escrow Services, Rentals, Litigation Solutions, Property Valuation and Property Management



Compliance & Special Services

Demolition, Vaasthu checks, regularization of unauthorized buildings, and office space solutions.



 **empowering your real estate decisions**
with smart tools



Property Valuation & Cost Estimation

Guideline Value, Apartment Composite Value, Stamp Duty & Registration Fees Calculator, Building Value Calculator, Capital Gains Calculator, Area Unit Converter, Length Unit Converter



Ownership, Compliance & Legal Verification

Encumbrance Certificate (EC) Search, Find Your SRO, Temple Property Check, WAQF Property Check, View Patta/Chitta, View FMB, Patta Analyzer, EC Analyzer



Zoning & Land Use Analysis

Land Use Zone Finder, CRZ Zone Check, Aquifer Zone Check, CBA Check, EWS Check, Road Width Check, Proposed Road Widening Check, FSI Calculator



Property Documentation & Workflow Tools

Forms & Templates, Document Generator, Document Translation, Dictionary



Vastu & Property Management Tools

Home Vastu Shastra, Plot Vastu Shastra, Property Management



We're honored to be part of your
real estate journey

3/350/2 Mettukuppam,
OMR Thoraipakkam,
Chennai, India

hello@verified.realestate
[+91 9996 12 9996](tel:+919996129996)
www.verified.realestate