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The Proposed construction of High Rise Commercial (IT/ITES) Building with Extended Basement floor(Meant for parking) + Ground floor part/Stilt Floor part (with 3 level Mechanical stack parking) + 1st floor to 7th Floor, at in Plot No.4-C/1 (SP), abutting 3rd Main road (N.H. Bye-Pass road Fly over), Ambathur Industrial Estate, Ambathur, Chennai - 600 058. Comprised in Old S.No. 9 part, 27/1 part, 27/2 part,28 part, 29 part, T.S. No: 11, Block no: 18 of Athipattu village, Ambathur Taluk, Chennai District, within the limits of Greater Chennai Corporation

OFFICE BUILDING - Structural Design Report

October 2024

STRUCTURAL CONSULTANT

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1.1 FOREWORD

1.1.1 - Description of Project

M/s.Voora developers CITY is proposing a high rise office building at Chennai. Project is architectured by M/s Moadarch, Chennai.

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.

The Structural Report covers the complete Structural Elements design considerations for analysis of lateral loads & gravity loads.

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 in designs. 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 and 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: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 buildings
IS:5525-1969(2013)	Recommendation for detailing of reinforced concrete works
IS:1786-2008	Specification for high strength deformed steel bars and wires for concrete reinforcement
IS:10262-2009	Recommended guidelines for concrete mix design
IS: 1893 (Part-1)-2016	Criteria for earthquake resistant design of structures (General provisions and building).
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

Structural steel:

IS:800 -2007(2012)	Code of Practice for general construction in steel
IS:802 -1995	Code of Practice for use of structural steel in overhead transmission line towers: (All parts)
IS:806 -1968(2013)	Code of Practice for use of steel tubes in general building construction
IS:808 -1989	Dimensions for hot rolled steel beam, column channel and angle section
IS:816 -1998	Code of Practice for use of metal arc welding for general construction in mild steel
IS:1161-1998	Steel tubes for structural purposes
IS:4000-1998	High Strength bolts in steel structures - Code of Practice
IS:7215 -1995	Tolerances for fabrication of steel structures

Miscellaneous:

IS: 432(part 2)-1995	Specification for mild steel and medium tensile steel bars and hard-drawn steel 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:1982-1975 and IS:4326-1976)
SP:24-1983	Explanatory handbook on Indian Standard code of Practice for plain and reinforced 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 Portlandcement.
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:

1. Office building floor covered with RCC roofing.

The usages of individual floors are as given below:

Floors	Details
Main IT/ITES building	Space for office purpose
Basement	Car parking purpose

1.3.2 - Structural Arrangement:

	Description	Office Floor
a)	Column grids	8 m x 10.8 m (Varies for some grids)
b)	Structural system	RCC column, column drop beams and Flat slabs
c)	Slab thickness	250 mm
e)	Foundation	Pile with Raft slab
f)	Column size	As per design
g)	Peripheral 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 as per the Grade provided in layout 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	M30 for footing, raft slab, Retaining wall.
Columns	M45, M40, M35
Slab, beams	M35

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.

Structural Steel

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

1.4.3 - Design loads.

Loads:

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 for office space: 200kg/sqm[1]

- Unknown Partitions : 100 kg/sqm (1.0 kN/sqm)
- Self-weight of Plain concrete : 2400 kg/cum (24 kN/cum)
- Self-weight of RCC : 2500 kg/cum (25 kN/cum)
- Solid Block Work : 2000 kg/cum (20 kN/cum) [For peripheral walls, the decision to be taken on its usage]
- Block Work masonry : 2000 kg/cum (20 kN/cum)
  (With additional 20mm thick plastering on external surface and 14mm plastering on internal wall surfaces)
- Soil (Dry) : 1800 kg/cum (18 kN/cum)
- Soil (Wet) : 2000 kg/cum (20 kN/cum)
- Water : 1000 kg/cum (10 kN/cum)
- Glass : 2800 kg/cum (28 kN/cum)
- Masonry with plastering : 2200 kg/cum (22 kN/cum)
- Equipment loads on terraces : As per Vendor details.
- 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 as per codes.

Commercial Floor Live loads:

- Office area : 400 kg/sqm (4.0 kN/sqm)
- Car Parking : 300 kg/sqm (3.0 kN/sqm)
- Stairs : 400 kg/sqm (4.0 kN/sqm)
- Corridors / Balcony : 400 kg/sqm (4.0 kN/sqm)
- Toilets : 200 kg/sqm (2.0 kN/sqm)
- Terrace with Access : 200 kg/sqm (2.0 kN/sqm)
- Electrical rooms : 500 kg/sqm (5.0 kN/sqm)
- Ramps : 300 kg/sqm (3. kN/sqm)

Wind Loads

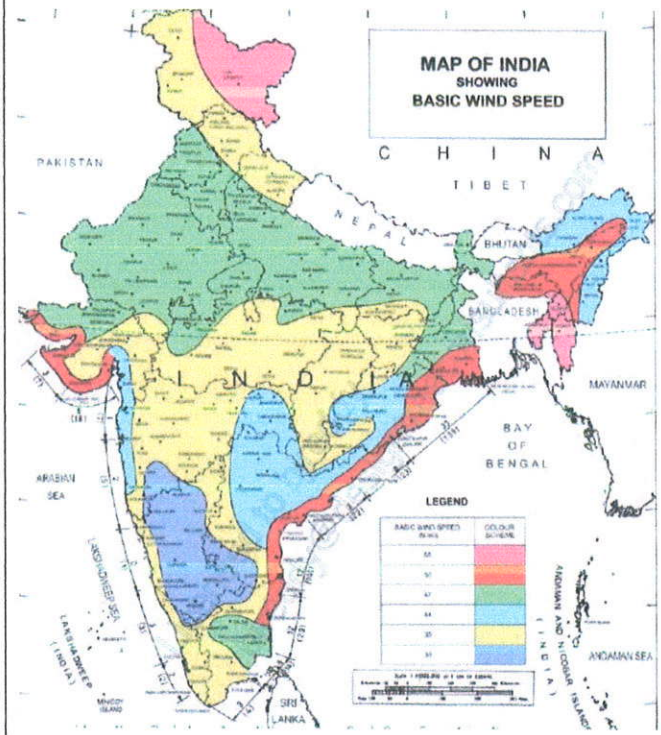
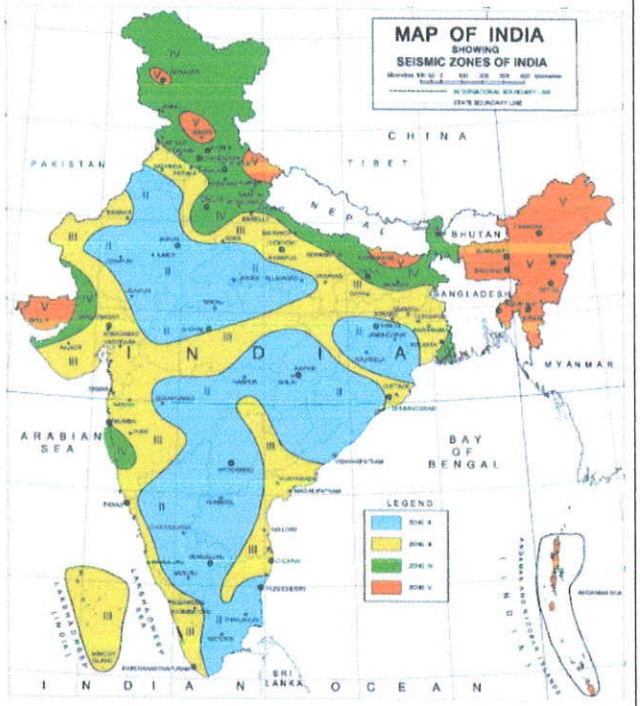
The Wind pressure shall be calculated in accordance with IS: 875 (Part-3):2015.

Tiruchirapally has a high wind speed of 50 m/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	: 1.00
Importance factor for cyclonic region k_4	: 1.00

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

Design wind speed V_z	: $V_b \times k_1 \times k_2 \times k_3 \times k_4$
Design wind pressure p_z	: $0.6 \times V_z^2$

Map showing basic wind speed	Map showing seismic zones
	
Basic wind speed in m/s (based on 50-year return period)	Seismic zones of India

Seismic Forces:

Tiruchi falls under seismic zone II as per IS 1893-2016 (Part 1) (Sixth Revision) and has the following factors to be considered for designs. Ductile detailing is not 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 with N<100
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 arrived based on appropriate fundamental natural period of structure as per Cl 7.6.2 (b)

Design horizontal seismic coefficient (A_h) : $(Z/2)*(S_a/g)*(I/R)$

: $(0.1/2)*(1.2/5) * (S_a/g)$

A_h : $0.012 * (S_a/g)$

Design seismic base shear, V_b : $A_h * w$ where, w - seismic weight of building

Effect of infill panels : Not considered in the analysis

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

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.**

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

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
1)	(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.

- Exposure conditions : Concrete surfaces exposed to moderate environment
- Minimum grade of concrete : Moderate exposure - M25

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 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, pedestal and footings. Footings 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 Etabs software package for both vertical and lateral loads.
- 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 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. 5LL

Where DL - Dead Load;

SDL - Super Imposed Dead Load;

LL - Live Load

1.5.3 Static Analysis:

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

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.

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

On behalf of CMDA MSB Panel the Structural design Calculations are Generally reviewed.

Superintending Engineer, P.W.D.,
Planning and Designs Circle,
Chepauk, Chennai-5.

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

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: 1893-2016 / Clause

7.3.3 of seismic code will be used both for evaluating earthquake effect and for combined load effects used in such combination. Serviceability loads combinations with suitable live load reduction factor as per IS: 875(Part-2) will be used for foundation design.

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

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 at depth of 21m at N > 50.

1.9 DETAILING REQUIREMENTS:

- Detailing for all structural members shall be in accordance with IS: 456 & SP: 34.

IS 1893:2016 Auto Seismic Load Calculation

This calculation presents the automatically generated lateral seismic loads for load pattern EQX according to IS 1893:2016, as calculated by ETABS.

Direction and Eccentricity

Direction = X + Eccentricity Y

Eccentricity Ratio = 5% for all diaphragms

Structural Period

Period Calculation Method = User Specified

User Period $T = 0.33$ sec

Factors and Coefficients

Seismic Zone Factor, Z [IS Table 3] $Z = 0.12$

Response Reduction Factor, R [IS Table 9] $R = 5$

Importance Factor, I [IS Table 8] $I = 1.2$

Site Type [IS Table 1] = I

Seismic Response

Spectral Acceleration Coefficient, S_a/g [IS 6.4.2] $\frac{S_a}{g} = 2.5$ $\frac{S_a}{g} = 2.5$

Equivalent Lateral Forces

Seismic Coefficient, A_h [IS 6.4.2] $A_h = \frac{ZI\frac{S_a}{g}}{2R}$

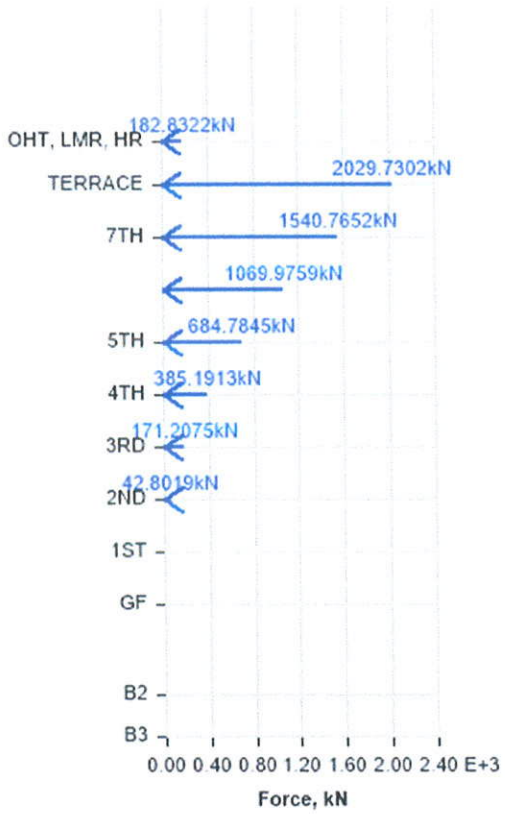
Calculated Base Shear

Direction	Period Used (sec)	W (kN)	V_b (kN)
X + Ecc. Y	0.33	203576.2873	6107.2886

Applied Story Forces

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Lateral Load to Stories - X



Story	Elevation	X-Dir	Y-Dir
	m	kN	kN
OHT, LMR, HR	40.85	182.8322	0
TERRACE	37.85	2029.7302	0
7TH	34.25	1540.7652	0
6TH	30.65	1069.9759	0
5TH	27.05	684.7845	0
4TH	23.45	385.1913	0
3RD	19.85	171.2075	0
2ND	16.25	42.8019	0
1ST	12.65	0	0
GF	9.05	0	0
B1	5.95	0	0

IS 1893:2016 Auto Seismic Load Calculation

This calculation presents the automatically generated lateral seismic loads for load pattern EQY according to IS 1893:2016, as calculated by ETABS.

Direction and Eccentricity

Direction = Y + Eccentricity X

Eccentricity Ratio = 5% for all diaphragms

Structural Period

Period Calculation Method = User Specified

User Period $T = 0.589 \text{ sec}$

Factors and Coefficients

Seismic Zone Factor, Z [IS Table 3] $Z = 0.16$

Response Reduction Factor, R [IS Table 9] $R = 5$

Importance Factor, I [IS Table 8] $I = 1.2$

Site Type [IS Table 1] = I

Seismic Response

Spectral Acceleration Coefficient, S_a/g [IS 6.4.2] $\frac{S_a}{g} = \frac{1}{T}$ $\frac{S_a}{g} = 1.697793$

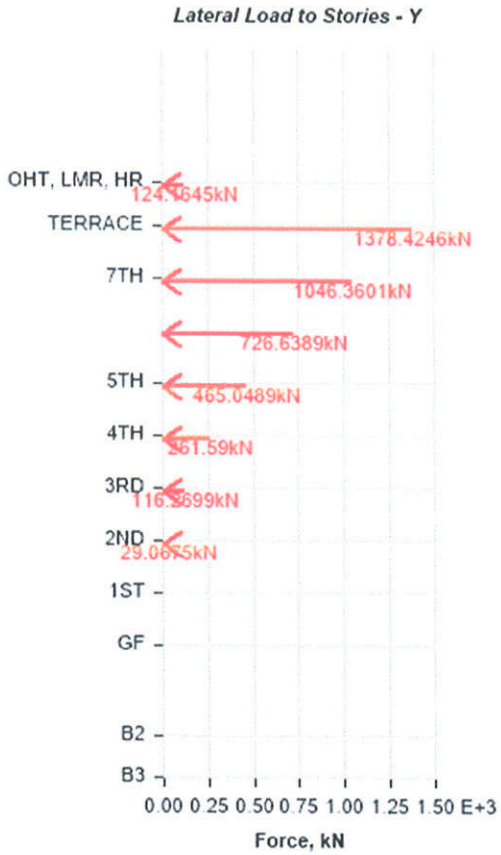
Equivalent Lateral Forces

Seismic Coefficient, A_h [IS 6.4.2] $A_h = \frac{ZI\frac{S_a}{g}}{2R}$

Calculated Base Shear

Direction	Period Used (sec)	W (kN)	V_b (kN)
Y + Ecc. X	0.589	203576.2873	4147.5644

Applied Story Forces



Story	Elevation	X-Dir	Y-Dir
	m	kN	kN
OHT, LMR, HR	40.85	0	124.1645
TERRACE	37.85	0	1378.4246
7TH	34.25	0	1046.3601
6TH	30.65	0	726.6389
5TH	27.05	0	465.0489
4TH	23.45	0	261.59
3RD	19.85	0	116.2699
2ND	16.25	0	29.0675
1ST	12.65	0	0
GF	9.05	0	0
B1	5.95	0	0

TABLE: Modal Participating Mass Ratios								
Case	Mode	Period	UX	UY	UZ	SumUX	SumUY	SumUZ
		sec						
Modal	1	1.783	0	0.599	0	0	0.599	0
Modal	2	1.541	0.5855	0.000001719	0	0.5855	0.599	0
Modal	3	1.369	0.0067	0.00003034	0	0.5922	0.5991	0
Modal	4	0.56	0	0.0838	0	0.5922	0.6829	0
Modal	5	0.487	0.0729	0	0	0.6651	0.6829	0
Modal	6	0.422	0.0009	0.000005221	0	0.666	0.6829	0
Modal	7	0.318	0	0.0396	0	0.666	0.7225	0
Modal	8	0.274	0.0269	0	0	0.6929	0.7225	0
Modal	9	0.244	0.0023	0.00000527	0	0.6952	0.7225	0
Modal	10	0.221	0	0.0368	0	0.6952	0.7594	0
Modal	11	0.188	0.0087	7.551E-07	0	0.7039	0.7594	0
Modal	12	0.177	0.009	0	0	0.7129	0.7594	0
Modal	13	0.167	0	0.0563	0	0.7129	0.8156	0
Modal	14	0.138	0.000000655	0.0427	0	0.7129	0.8584	0
Modal	15	0.132	0.0156	0	0	0.7285	0.8584	0
Modal	16	0.121	0.000001766	0.0283	0	0.7285	0.8867	0
Modal	17	0.103	0.0099	0.0028	0	0.7384	0.8895	0
Modal	18	0.101	0.0014	0.0259	0	0.7399	0.9154	0
Modal	19	0.084	0.0252	0.0005	0	0.7651	0.9158	0
Modal	20	0.074	0.001	0.0165	0	0.7661	0.9323	0
Modal	21	0.058	0.164	0.0002	0	0.93	0.9326	0
Modal	22	0.051	0.0012	0.0374	0	0.9313	0.97	0
Modal	23	0.033	0.0464	0.0053	0	0.9776	0.9753	0
Modal	24	0.031	0.0094	0.0207	0	0.987	0.996	0

RX	RY	RZ	SumRX	SumRY	SumRZ
0.418	0	0.0001	0.418	0	0.0001
9.902E-07	0.4192	0.0063	0.418	0.4192	0.0064
0.00001355	0.004	0.558	0.418	0.4232	0.5644
0.1273	0	0.000007977	0.5453	0.4232	0.5644
0	0.1155	0.001	0.5453	0.5388	0.5654
0.000007479	0.0013	0.0785	0.5454	0.54	0.6439
0.0166	0	0.000004359	0.5619	0.54	0.6439
0	0.0078	0.0019	0.5619	0.5479	0.6458
0.000003636	0.0007	0.0242	0.5619	0.5486	0.67
0.0357	0	0.000001908	0.5977	0.5486	0.67
7.956E-07	0.0074	0.0151	0.5977	0.5559	0.6852
0	0.008	0.0102	0.5977	0.5639	0.6954
0.0628	0	0	0.6605	0.5639	0.6954
0.0591	5.635E-07	0.00000409	0.7197	0.5639	0.6954
5.812E-07	0.0113	0.0014	0.7197	0.5751	0.6968
0.0466	0.000001231	0.00001174	0.7663	0.5751	0.6968
0.0054	0.0084	0.0015	0.7717	0.5835	0.6983
0.0473	0.0012	0.0001	0.8189	0.5848	0.6984
0.0008	0.0248	0.0244	0.8197	0.6096	0.7228
0.0333	0.0011	0.0007	0.853	0.6107	0.7235
0.0006	0.2233	0.0088	0.8536	0.834	0.7323
0.0768	0.0019	0.0008	0.9303	0.8359	0.7331
0.0104	0.1072	0.0025	0.9407	0.9431	0.7356
0.0428	0.0226	0.0024	0.9835	0.9657	0.738

Table_6 of IS1893 (Part_1)_2016_Irregular Modes of Oscillation in Two Principal Directions_(Vii):

Mode No.	Fundamental Lateral Natural Period	Ux	Uy	Rz
	(Sec)			
	(T)			
MODE - 1	2.001	0	0.599	0.0058
MODE - 2	1.541	0.5855	1.72E-06	0.0064
MODE - 3	1.369	0.0067	3.03E-05	0.5644
TOTAL %age		59.22	59.90	57.66

TABLE: Story Drifts

Story	Output Case	Case Type	Step Type	Step Number	Direction	Drift
OHT, LMR, HR	EQX	LinStatic			X	0.00063
OHT, LMR, HR	EQY	LinStatic			Y	0.000558
OHT, LMR, HR	WINDY	LinStatic	Step By Step	1	X	0.000103
OHT, LMR, HR	WINDY	LinStatic	Step By Step	2	Y	0.000418
OHT, LMR, HR	RESP X	LinRespSpec	Max		X	0.000499
OHT, LMR, HR	RESP X	LinRespSpec	Max		Y	0.000112
OHT, LMR, HR	RESP Y	LinRespSpec	Max		Y	0.000582
TERRACE	EQX	LinStatic			X	0.000777
TERRACE	EQY	LinStatic			Y	0.000815
TERRACE	WINDY	LinStatic	Step By Step	1	X	0.000101
TERRACE	WINDY	LinStatic	Step By Step	2	Y	0.000412
TERRACE	RESP X	LinRespSpec	Max		X	0.000596
TERRACE	RESP X	LinRespSpec	Max		Y	0.000113
TERRACE	RESP Y	LinRespSpec	Max		Y	0.000571
7TH	EQX	LinStatic			X	0.001099
7TH	EQY	LinStatic			Y	0.001128
7TH	WINDY	LinStatic	Step By Step	1	X	0.000146
7TH	WINDY	LinStatic	Step By Step	2	Y	0.000586
7TH	RESP X	LinRespSpec	Max		X	0.000823
7TH	RESP Y	LinRespSpec	Max		Y	0.000759
6TH	EQX	LinStatic			X	0.001387
6TH	EQY	LinStatic			Y	0.001416
6TH	WINDY	LinStatic	Step By Step	1	X	0.000199
6TH	WINDY	LinStatic	Step By Step	2	Y	0.000792
6TH	RESP X	LinRespSpec	Max		X	0.001023
6TH	RESP Y	LinRespSpec	Max		Y	0.000927
5TH	EQX	LinStatic			X	0.001591
5TH	EQY	LinStatic			Y	0.001616
5TH	WINDY	LinStatic	Step By Step	1	X	0.000252

5TH	WINDY	LinStatic	Step By Step	2	Y	0.001
5TH	RESP X	LinRespSpec	Max		X	0.001181
5TH	RESP Y	LinRespSpec	Max		Y	0.001058
4TH	EQX	LinStatic			X	0.001708
4TH	EQY	LinStatic			Y	0.001715
4TH	WINDY	LinStatic	Step By Step	1	X	0.000302
4TH	WINDY	LinStatic	Step By Step	2	Y	0.001188
4TH	RESP X	LinRespSpec	Max		X	0.001317
4TH	RESP Y	LinRespSpec	Max		Y	0.001165
3RD	EQX	LinStatic			X	0.001718
3RD	EQY	LinStatic			Y	0.001697
3RD	WINDY	LinStatic	Step By Step	1	X	0.000338
3RD	WINDY	LinStatic	Step By Step	2	Y	0.00132
3RD	RESP X	LinRespSpec	Max		X	0.001412
3RD	RESP Y	LinRespSpec	Max		Y	0.001236
2ND	EQX	LinStatic			X	0.001628
2ND	EQY	LinStatic			Y	0.001587
2ND	WINDY	LinStatic	Step By Step	1	X	0.000357
2ND	WINDY	LinStatic	Step By Step	2	Y	0.001379
2ND	RESP X	LinRespSpec	Max		X	0.001437
2ND	RESP Y	LinRespSpec	Max		Y	0.001251
1ST	EQX	LinStatic			X	0.001005
1ST	EQY	LinStatic			Y	0.000973
1ST	WINDY	LinStatic	Step By Step	1	X	0.000236
1ST	WINDY	LinStatic	Step By Step	2	Y	0.000903
1ST	RESP X	LinRespSpec	Max		X	0.000933
1ST	RESP Y	LinRespSpec	Max		Y	0.000807
GF	EQX	LinStatic			X	0.000125
GF	EQY	LinStatic			Y	0.000216

GF	WINDY	LinStatic	Step By Step	1	X	0.00003
GF	WINDY	LinStatic	Step By Step	2	Y	0.000232
GF	RESP X	LinRespSpec	Max		X	0.000119
GF	RESP X	LinRespSpec	Max		Y	0.000071
GF	RESP Y	LinRespSpec	Max		X	0.000024
GF	RESP Y	LinRespSpec	Max		Y	0.000204
B1	EQX	LinStatic			X	0.000019
B1	EQY	LinStatic			Y	0.000054
B1	WINDY	LinStatic	Step By Step	1	X	0.000005
B1	WINDY	LinStatic	Step By Step	2	Y	0.000061
B1	RESP X	LinRespSpec	Max		X	0.00002
B1	RESP X	LinRespSpec	Max		Y	0.000011
B1	RESP Y	LinRespSpec	Max		X	0.000016
B1	RESP Y	LinRespSpec	Max		Y	0.000069

TABLE: Story Max Over Avg Displacements

Story	Output Case	Case Type	Step Type	Step Number	Direction	Maximum mm	Average mm	Ratio
OHT, LMR, HR	EQX	LinStatic			X	41.167	40.616	1.014
TERRACE	EQX	LinStatic			X	39.277	37.823	1.038
7TH	EQX	LinStatic			X	36.479	35.169	1.037
6TH	EQX	LinStatic			X	32.525	31.384	1.036
5TH	EQX	LinStatic			X	27.53	26.585	1.036
4TH	EQX	LinStatic			X	21.801	21.067	1.035
3RD	EQX	LinStatic			X	15.651	15.136	1.034
2ND	EQX	LinStatic			X	9.467	9.162	1.033
1ST	EQX	LinStatic			X	3.719	3.565	1.043
OHT, LMR, HR	EQY	LinStatic			Y	37.575	35.357	1.063
TERRACE	EQY	LinStatic			Y	39.617	33.834	1.171
7TH	EQY	LinStatic			Y	36.683	31.371	1.169
6TH	EQY	LinStatic			Y	32.62	27.94	1.168
5TH	EQY	LinStatic			Y	27.524	23.626	1.165
4TH	EQY	LinStatic			Y	21.705	18.691	1.161
3RD	EQY	LinStatic			Y	15.532	13.437	1.156
2ND	EQY	LinStatic			Y	9.423	8.208	1.148
1ST	EQY	LinStatic			Y	3.844	3.326	1.156
OHT, LMR, HR	WINDY	LinStatic	Step By Step	1	X	7.243	7.192	1.007
TERRACE	WINDY	LinStatic	Step By Step	1	X	6.936	6.821	1.017
7TH	WINDY	LinStatic	Step By Step	1	X	6.573	6.474	1.015
6TH	WINDY	LinStatic	Step By Step	1	X	6.048	5.965	1.014
5TH	WINDY	LinStatic	Step By Step	1	X	5.332	5.264	1.013
4TH	WINDY	LinStatic	Step By Step	1	X	4.424	4.371	1.012
3RD	WINDY	LinStatic	Step By Step	1	X	3.337	3.299	1.012
2ND	WINDY	LinStatic	Step By Step	1	X	2.121	2.096	1.012
1ST	WINDY	LinStatic	Step By Step	1	X	0.882	0.852	1.034
OHT, LMR, HR	WINDY	LinStatic	Step By Step	2	Y	28.61	28.524	1.003
TERRACE	WINDY	LinStatic	Step By Step	2	Y	27.51	27.271	1.009
7TH	WINDY	LinStatic	Step By Step	2	Y	26.027	25.796	1.009
6TH	WINDY	LinStatic	Step By Step	2	Y	23.918	23.698	1.009
5TH	WINDY	LinStatic	Step By Step	2	Y	21.066	20.862	1.01
4TH	WINDY	LinStatic	Step By	2	Y	17.466	17.287	1.01

			Step					
3RD	WINDY	LinStatic	Step By Step	2	Y	13.188	13.054	1.01
2ND	WINDY	LinStatic	Step By Step	2	Y	8.436	8.365	1.009
1ST	WINDY	LinStatic	Step By Step	2	Y	4.013	3.722	1.078
OHT, LMR, HR	RESP X	LinRespSpec	Max		X	30.518	30.334	1.006
TERRACE	RESP X	LinRespSpec	Max		X	29.358	28.962	1.014
7TH	RESP X	LinRespSpec	Max		X	27.656	27.309	1.013
6TH	RESP X	LinRespSpec	Max		X	25.212	24.913	1.012
5TH	RESP X	LinRespSpec	Max		X	22.002	21.751	1.012
4TH	RESP X	LinRespSpec	Max		X	18.087	17.884	1.011
3RD	RESP X	LinRespSpec	Max		X	13.526	13.373	1.011
2ND	RESP X	LinRespSpec	Max		X	8.509	8.408	1.012
1ST	RESP X	LinRespSpec	Max		X	3.483	3.385	1.029
OHT, LMR, HR	RESP Y	LinRespSpec	Max		Y	26.423	26.053	1.014
TERRACE	RESP Y	LinRespSpec	Max		Y	26.1	25.104	1.04
7TH	RESP Y	LinRespSpec	Max		Y	24.512	23.573	1.04
6TH	RESP Y	LinRespSpec	Max		Y	22.297	21.438	1.04
5TH	RESP Y	LinRespSpec	Max		Y	19.43	18.68	1.04
4TH	RESP Y	LinRespSpec	Max		Y	15.962	15.349	1.04
3RD	RESP Y	LinRespSpec	Max		Y	11.958	11.516	1.038
2ND	RESP Y	LinRespSpec	Max		Y	7.587	7.335	1.034
1ST	RESP Y	LinRespSpec	Max		Y	3.505	3.215	1.09

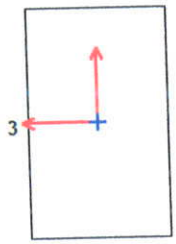
TABLE: Story Stiffness

Story	Output Case	Case Type	Step Type	Step Number	Shear X	Drift X
					kN	mm
OHT, LMR, HR	EQX	LinStatic	Step By Step	1	182.8322	1.815
TERRACE	EQX	LinStatic	Step By Step	1	2212.5624	2.655
7TH	EQX	LinStatic	Step By Step	1	3753.3276	3.785
6TH	EQX	LinStatic	Step By Step	1	4823.3034	4.799
5TH	EQX	LinStatic	Step By Step	1	5508.088	5.517
4TH	EQX	LinStatic	Step By Step	1	5893.2793	5.932
3RD	EQX	LinStatic	Step By Step	1	6064.4868	5.974
2ND	EQX	LinStatic	Step By Step	1	6107.2886	5.625
1ST	EQX	LinStatic	Step By Step	1	6107.2886	3.376
GF	EQX	LinStatic	Step By Step	1	6107.2886	0.21
B1	EQX	LinStatic	Step By Step	1	6107.2886	0.03
B2	EQX	LinStatic	Step By Step	1	6107.2886	0.018
OHT, LMR, HR	EQY	LinStatic	Step By Step	1	0	0.069
TERRACE	EQY	LinStatic	Step By Step	1	0	0.082
7TH	EQY	LinStatic	Step By Step	1	0	0.11
6TH	EQY	LinStatic	Step By Step	1	0	0.136
5TH	EQY	LinStatic	Step By Step	1	0	0.154
4TH	EQY	LinStatic	Step By Step	1	0	0.16
3RD	EQY	LinStatic	Step By Step	1	0	0.153
2ND	EQY	LinStatic	Step By Step	1	0	0.211
1ST	EQY	LinStatic	Step By Step	1	0	0.121
GF	EQY	LinStatic	Step By Step	1	0	0.041
B1	EQY	LinStatic	Step By Step	1	0	0.025

Stiff X	Shear Y	Drift Y	Stiff Y	
kN/m	kN	mm	kN/m	
100761.648	0	0.138	0	CHECK X
833413.172	0	0.221	0	no soft storey
991732.823	5.215E-07	0.262	0	no soft storey
1005028.36	8.459E-07	0.3	0	no soft storey
998301.629	0.00000153	0.326	0	no soft storey
993524.573	0.000001865	0.336	0	no soft storey
1015177.799	0.000001785	0.324	0	no soft storey
1085814.686	0.000001726	0.293	0	no soft storey
1809163.885	0.000001807	0.176	0	no soft storey
29098706.22	0.000001843	0.117	0	no soft storey
204744013	0.000001846	0.009	0	no soft storey
341444893	0.000001847	0.003	0	no soft storey
0	124.1645	1.534	80944.994	no soft storey
0	1502.589	2.463	610067.208	no soft storey
0	2548.9491	3.431	742847.507	no soft storey
0	3275.5881	4.314	759333.706	no soft storey
0	3740.637	4.935	757991.826	no soft storey
0	4002.227	5.254	761774.04	no soft storey
0	4118.4969	5.23	787538.926	no soft storey
0	4147.5644	4.931	841198.204	no soft storey
0	4147.5644	2.977	1393124.479	no soft storey
0	4147.5644	0.383	10818434.6	no soft storey
0	4147.5644	0.109	38201272.05	no soft storey
0	4147.5644	0.043	96200934.34	no soft storey

ETABS Concrete Frame Design

IS 456:2000 + IS 13920:2016 Beam Section Design (Summary)



Beam Element Details

Level	Element	Unique Name	Section ID	Combo ID	Station Loc	Length (mm)	LLRF	Type
2ND	B3	853	B - 45 X 75	DConS13	7305	7680	1	Ductile Frame

Section Properties

b (mm)	h (mm)	b_f (mm)	d_s (mm)	d_{ct} (mm)	d_{cb} (mm)
450	750	450	0	65	65

Material Properties

E_c (MPa)	f_{ck} (MPa)	Lt.Wt Factor (Unitless)	f_y (MPa)	f_{ys} (MPa)
29580.4	35	1	500	415

Design Code Parameters

γ_c	γ_s
1.5	1.15

Factored Forces and Moments

Factored M_{u3} kN-m	Factored T_u kN-m	Factored V_{u2} kN	Factored P_u kN
-298.8994	50.876	146.1907	0

Design Moments, M_{u3} & M_t

Factored Moment kN-m	Factored M_t kN-m	Positive Moment kN-m	Negative Moment kN-m
-298.8994	79.8055	0	-378.7049

Design Moment and Flexural Reinforcement for Moment, M_{u3} & T_u

	Design -Moment kN-m	Design +Moment kN-m	-Moment Rebar mm²	+Moment Rebar mm²	Minimum Rebar mm²	Required Rebar mm²
Top (+2 Axis)	-378.7049		1358	0	1358	875
Bottom (-2 Axis)		0	679	0	0	679

Shear Force and Reinforcement for Shear, V_{u2} & T_u

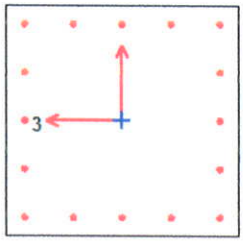
Shear V_e kN	Shear V_c kN	Shear V_s kN	Shear V_p kN	Rebar A_{sv} /s mm²/m
178.7102	0	359.6028	129.4674	1454.73

Torsion Force and Torsion Reinforcement for Torsion, T_u & V_{U2}

T_u kN-m	V_u kN	Core b_1 mm	Core d_1 mm	Rebar A_{svt} /s mm²/m
50.876	146.1907	340	640	901.09

ETABS Concrete Frame Design

IS 456:2000 + IS 13920:2016 Column Section Design (Summary)



Column Element Details

Level	Element	Unique Name	Section ID	Combo ID	Station Loc	Length (mm)	LLRF	Type
2ND	C35	842	C - 75 X 75 M40	DConS16	0	3600	0.6	Ductile Frame

Section Properties

b (mm)	h (mm)	dc (mm)	Cover (Torsion) (mm)
750	750	60	30

Material Properties

E_c (MPa)	f_{ck} (MPa)	Lt.Wt Factor (Unitless)	f_y (MPa)	f_{ys} (MPa)
31622.78	40	1	500	415

Design Code Parameters

γ_c	γ_s
1.5	1.15

Axial Force and Biaxial Moment Design For P_u , M_{u2} , M_{u3}

Design P_u kN	Design M_{u2} kN-m	Design M_{u3} kN-m	Minimum M_2 kN-m	Minimum M_3 kN-m	Rebar Area mm²	Rebar % %
5511.3217	-494.3056	-172.5044	172.5044	172.5044	4500	0.8

Axial Force and Biaxial Moment Factors

	K Factor Unitless	Length mm	Initial Moment kN-m	Additional Moment kN-m	Minimum Moment kN-m
Major Bend(M3)	1	3150	-6.5921	0	172.5044
Minor Bend(M2)	1	3150	-197.7222	0	172.5044

Shear Design for V_{u2} , V_{u3}

	Shear V_u kN	Shear V_c kN	Shear V_s kN	Shear V_p kN	Rebar A_{sv} /s mm²/m
Major, V_{u2}	120.0894	369.563	207.0006	120.0894	831.33
Minor, V_{u3}	234.1603	369.563	207.0006	0	831.33

Joint Shear Check/Design

	Joint Shear Force kN	Shear V_{Top} kN	Shear $V_{u,Tot}$ kN	Shear V_c kN	Joint Area cm²	Shear Ratio Unitless

	Joint Shear Force kN	Shear V_{Top} kN	Shear $V_{u,Tot}$ kN	Shear V_c kN	Joint Area cm²	Shear Ratio Unitless
Major Shear, V_{u2}	N/N	N/N	N/N	N/N	N/N	N/N
Minor Shear, V_{u3}	N/N	N/N	N/N	N/N	N/N	N/N

(1.4) Beam/Column Capacity Ratio

Major Ratio	Minor Ratio
N/N	N/N

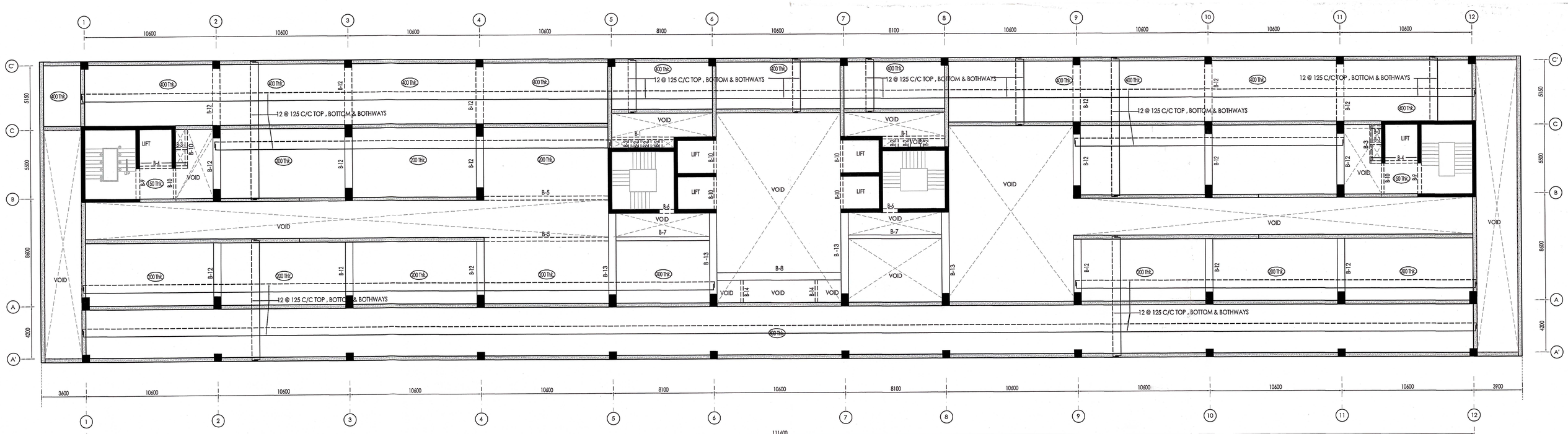
Additional Moment Reduction Factor k (IS 39.7.1.1)

A_g cm²	A_{sc} cm²	P_{uz} kN	P_b kN	P_u kN	k Unitless
5625	45	11812.5	4732.6833	5511.3217	0.89002

Additional Moment (IS 39.7.1)

	Consider M_a	Length Factor	Section Depth (mm)	KL/Depth Ratio	KL/Depth Limit	KL/Depth Exceeded	M_a Moment (kN-m)
Major Bending (M_3)	Yes	0.875	750	4.2	12	No	0
Minor Bending (M_2)	Yes	0.875	750	4.2	12	No	0

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GROUND FLOOR LEVEL BEAM LAYOUT & SLAB DETAILS ALL DIMENSIONS ARE IN MILLIMETERS

NOTES:
1. ALL DIMENSIONS ARE IN MILLIMETERS
2. ALL MIX GRADE **M-30**
3. REINFORCEMENT SHOULD BE OF GRADE **Fe500**
4. CLEAR COVER TO THE MAIN REINFORCEMENT FOR

MEMBER	COVER
BEAM	30
SLAB	25
COLUMN	40
R.C.C WALL	30

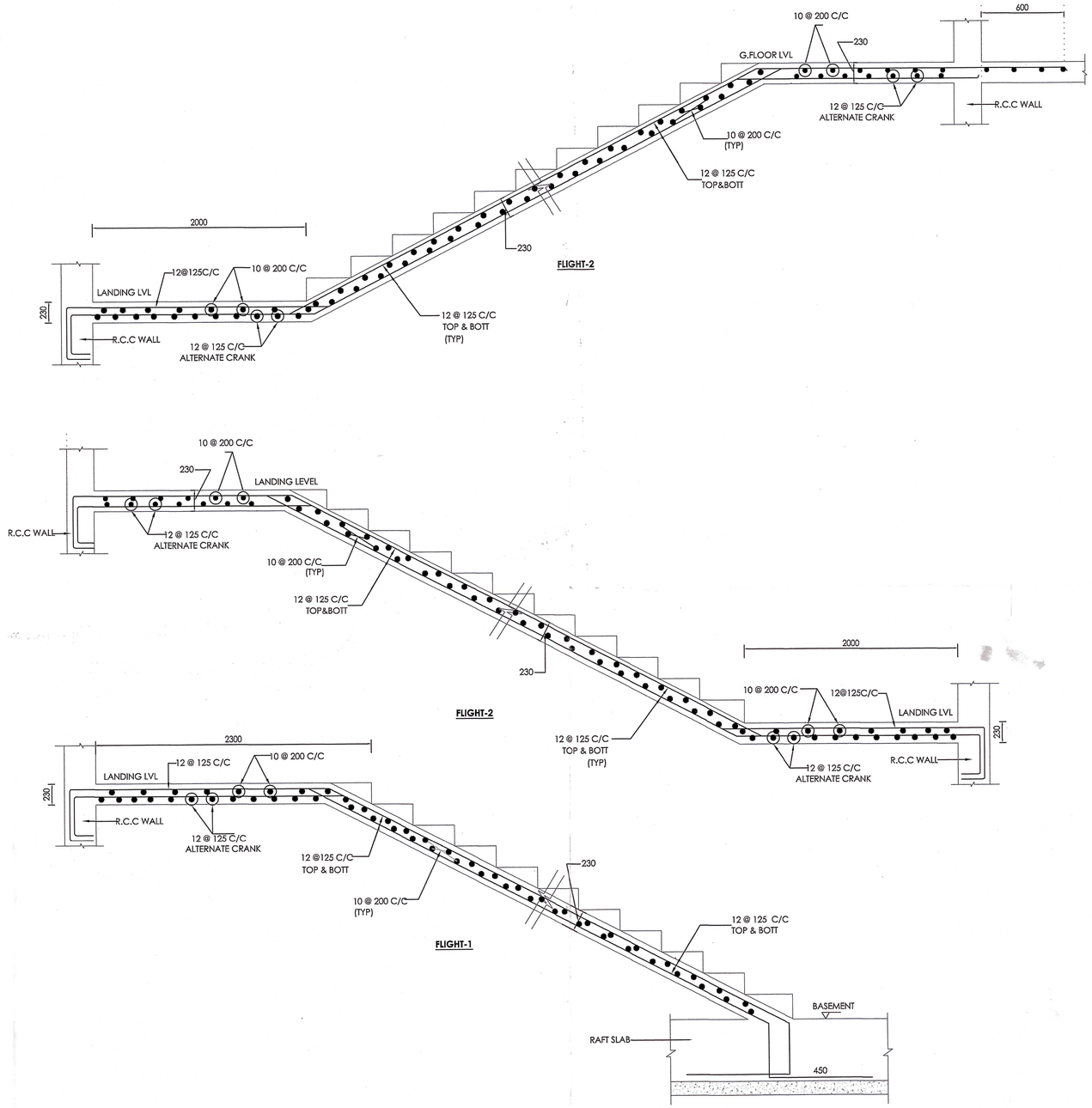
TITLE :
The Proposed construction of High Rise Commercial (IT/ITES) Building with Extended Basement floor (Meant for parking) + Ground floor part/Stilt Floor part (with 3 level Mechanical stack parking) + 1st floor to 7th Floor, at in Plot No.4-C/1 (SP), abutting 3rd Main road (N.H. Bye-Pass road Fly over), Ambathur Industrial Estate, Ambathur, Chennai - 600 058. Comprised in Old S.No. 9 part, 27/1 part, 27/2 part,28 part, 29 part, T.S. No: 11, Block no: 18 of Athipattu village, Ambathur Taluk, Chennai District, within the limits of Greater Chennai Corporation

GROUND LEVEL BEAM LAYOUT & SLAB DETAILS

DATE	09-10-2024
DRAWN	G.P
SCALE	1 : 150
DESIGN	N.C
NORTH POINT:	

STRUCTURAL ENGINEER:

N. CHANDRU, M.E., M.I.E.,
Structural Engineer
CMDA REG. No: SE/GR-I/19/04/090
GCC REG No : RSE 101062019
A20, 100 Feet Road, Hindu Colony,
Nanganallur, Chennai - 600 061.
Mail : chandrun23@gmail.com
Mobile : 9840767580



NOTE : -
WAIST SLAB THK - 230 mm
RISER, TREAD & LEVELS REFER ARCHITECTURAL DRAWING

NOTES:
1. ALL DIMENSIONS ARE IN MILLIMETERS
2. ALL MIX GRADE **M-30**
3. REINFORCEMENT SHOULD BE OF GRADE **Fe500**
4. CLEAR COVER TO THE MAIN REINFORCEMENT FOR

MEMBER	COVER
BEAM	30

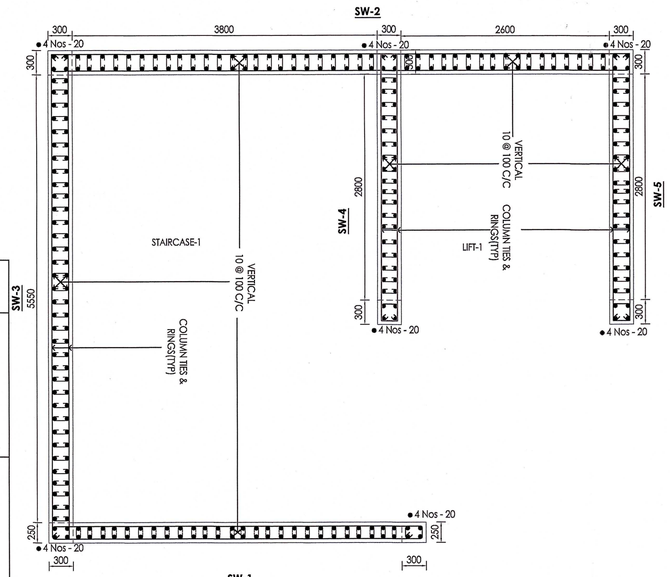
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STAIRCASE DETAILS

DATE	09-10-2024
DRAWN	G.P
SCALE	1 : 150
DESIGN	N.C

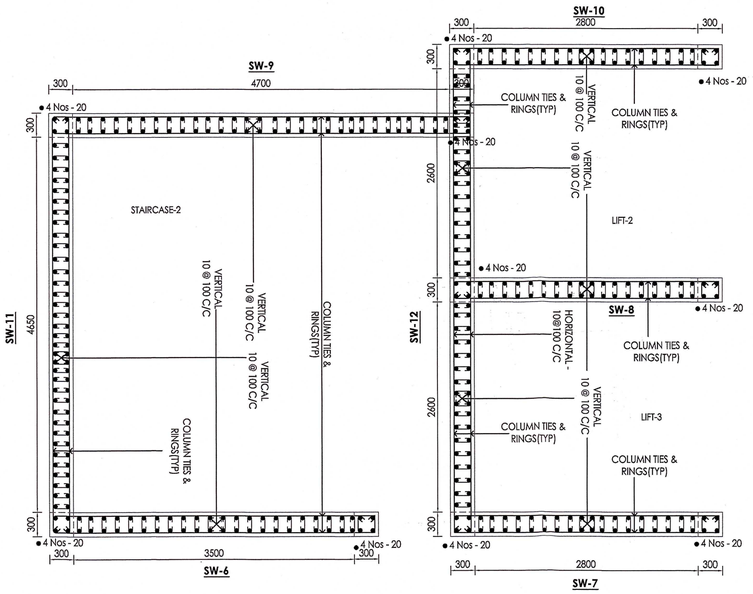
STRUCTURAL ENGINEER:
N. CHANDRU, M.E., M.I.E.,
Structural Engineer
CMDA REG. No: SE/GR-I/19/04/090
GCC REG No : RSE 101062019
A20, 100 Feet Road, Hindu Colony,
Nanganallur, Chennai - 600 061.
Mail : chandrun23@gmail.com
Mobile : 9840767580

COLUMN SCHEDULE

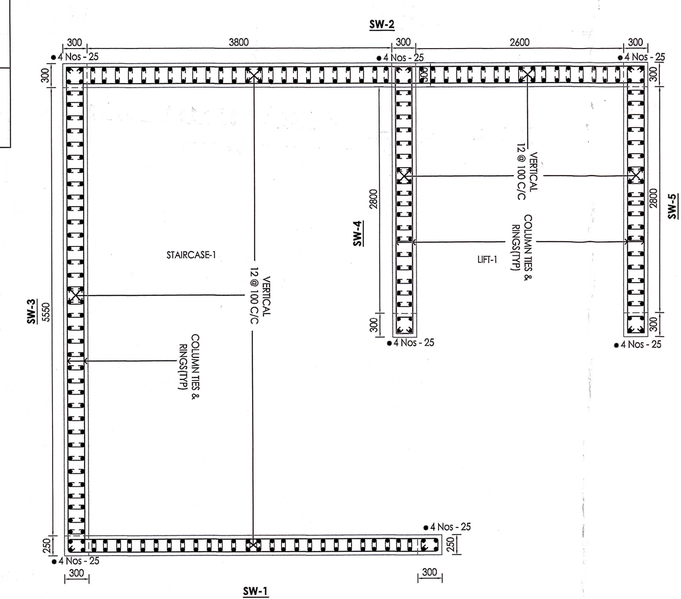
Nos.	RAFT TO SECOND FLOOR LVL	SECOND TO FOURTH FLOOR LVL	FIFTH TO TERRACE LVL	COLUMN TIES ARRANGEMENT
C1	1000 / 600 — 18 Nos - 32	1000 / 600 — 12 Nos - 32 +6 Nos - 25	1000 / 600 — 4 Nos - 32 +14 Nos - 25	
C2	1000 / 600 — 12 Nos - 32 +6 Nos - 25	1000 / 600 — 4 Nos - 32 +14 Nos - 25	1000 / 600 — 18 Nos - 25	
C3	600 / 600 — 12 Nos - 32	600 / 600 — 4 Nos - 32 +8 Nos - 25	600 / 600 — 12 Nos - 25	
CONCRETE GRADE	M50	M45	M40	



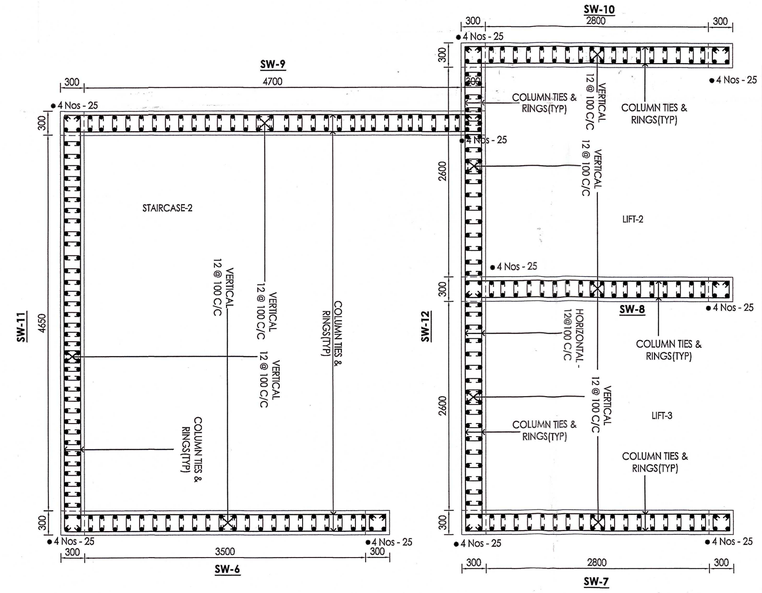
SHEAR WALL DETAILS
FIFTH FLOOR TO TERRACE LVL



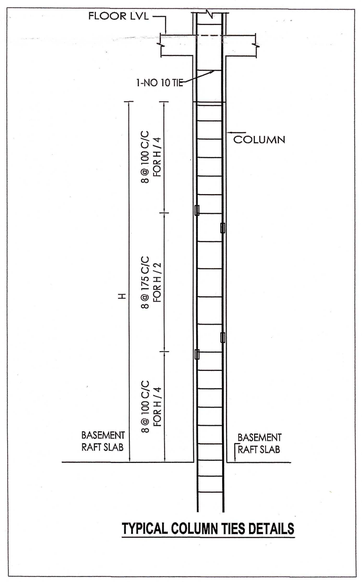
SHEAR WALL DETAILS
FIFTH FLOOR TO TERRACE LVL



SHEAR WALL DETAILS
BASEMENT TO FOURTH FLOOR LVL



SHEAR WALL DETAILS
BASEMENT TO FOURTH FLOOR LVL



TYPICAL COLUMN TIES DETAILS

NOTES:
1. ALL DIMENSIONS ARE IN MILLIMETERS
2. REINFORCEMENT SHOULD BE OF GRADE **Fe500**
3. CLEAR COVER TO THE MAIN REINFORCEMENT FOR

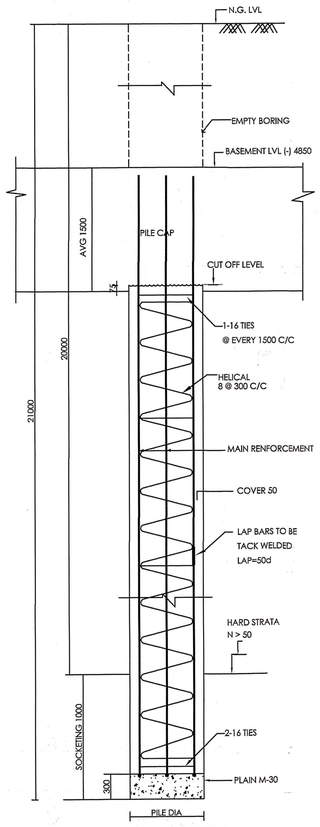
MEMBER	COVER
COLUMN	40

TITLE :
The Proposed construction of High Rise Commercial (IT/ITES) Building with Extended Basement floor (Meant for parking) + Ground floor part/Stilt Floor part (with 3 level Mechanical stack parking) + 1st floor to 7th Floor, at in Plot No.4-C/1 (SP), abutting 3rd Main road (N.H. Bye-Pass road Fly over), Ambathur Industrial Estate, Ambathur, Chennai - 600 058. Comprised in Old S.No. 9 part, 27/1 part, 27/2 part,28 part, 29 part, T.S. No: 11, Block no: 18 of Athipattu village, Ambathur Taluk, Chennai District, within the limits of Greater Chennai Corporation
COLUMN DETAILS

DATE	09-10-2024
DRAWN	G.P
SCALE	1 : 150
DESIGN	N.C
NORTH POINT:	

STRUCTURAL ENGINEER:

N. CHANDRU, M.E., M.I.E.,
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CMDA REG. No: SE/GR-I/19/04/090
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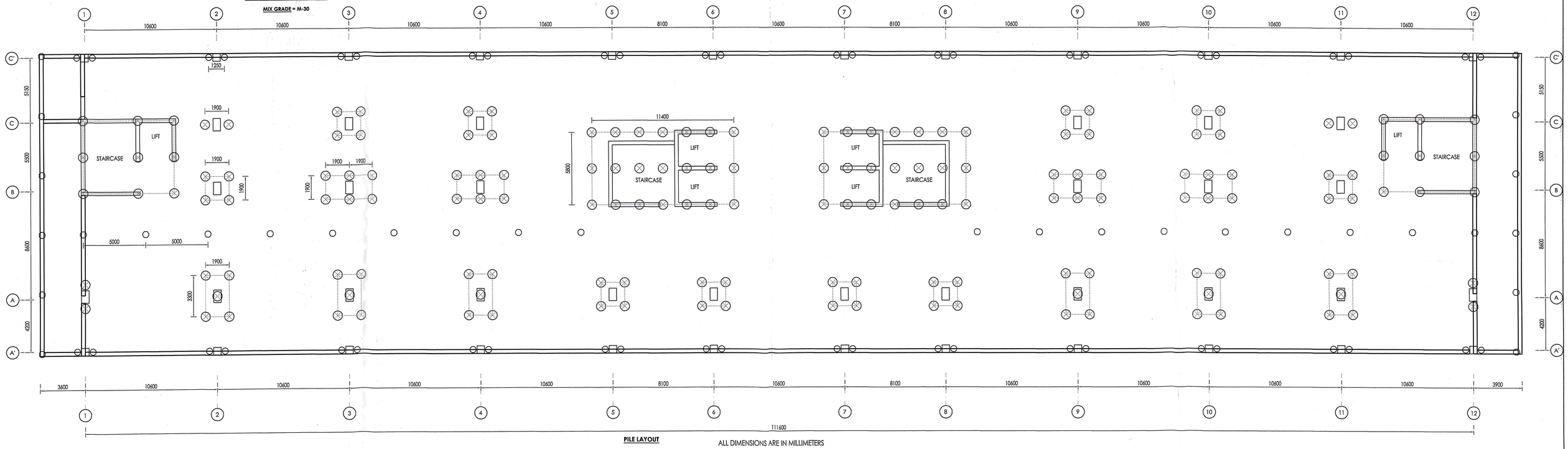


TYPICAL ELEVATION OF BORED CAST IN SITU PILE

MIX GRADE = M-30

PILE SCHEDULE

PILE NOTATION	PILE Ø	PILE REBARS (USE CRS BARS)	TOTAL NUMBER OF PILES	SAFE CAPACITY
⊗	750	12 Nos - 20	162	185 TONNE
○	500	6 Nos - 20	78	95 TONNE



PILE LAYOUT

ALL DIMENSIONS ARE IN MILLIMETERS

TITLE :

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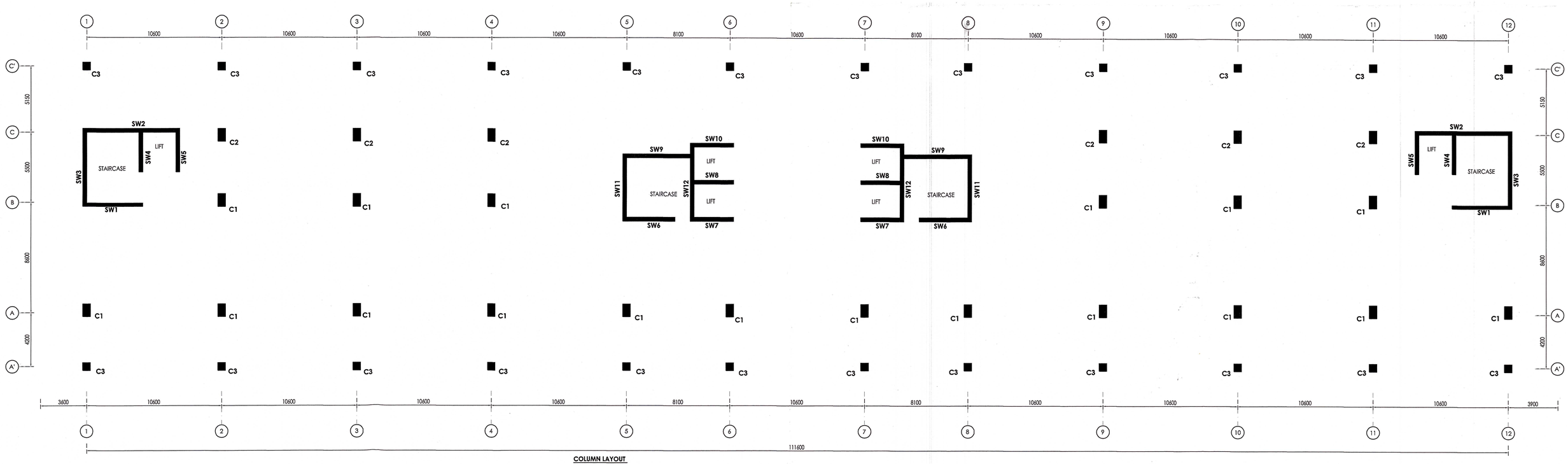
PILE LAYOUT & PILE DETAILS

DATE	09-10-2024
DRAWN	G.P
SCALE	1 : 150
DESIGN	N.C

NORTH POINT:

STRUCTURAL ENGINEER:

N. CHANDRU, M.E., M.I.E.,
Structural Engineer
CMDA REG. No: SE/GR-I/19/04/090
GCC REG No : RSE 101062019
A20, 100 Feet Road, Hindu Colony,
Nanganallur, Chennai - 600 061.
Mail : chandrun23@gmail.com
Mobile : 9840767380



COLUMN LAYOUT

NOTES:
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2. REINFORCEMENT SHOULD BE OF GRADE **Fe500**
3. CLEAR COVER TO THE MAIN REINFORCEMENT FOR

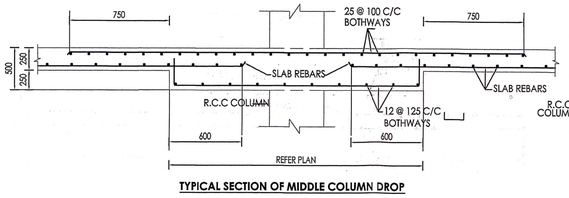
MEMBER	COVER
COLUMN	40

TITLE :
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COLUMN LAYOUT

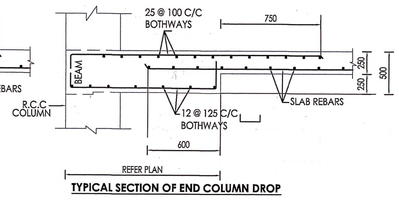
DATE	09-10-2024
DRAWN	G.P
SCALE	1 : 150
DESIGN	N.C
NORTH POINT:	

STRUCTURAL ENGINEER:

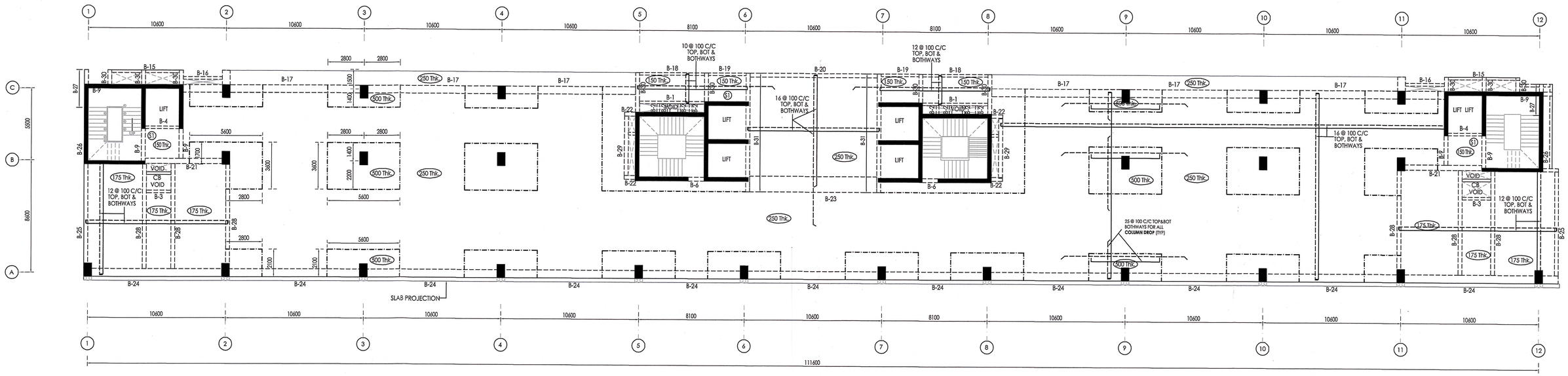
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TYPICAL SECTION OF MIDDLE COLUMN DROP



TYPICAL SECTION OF END COLUMN DROP



TYPICAL FLOOR LEVEL BEAM LAYOUT (1st TO 7th Floor)

NOTES:
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2. ALL MIX GRADE **M-30**
3. REINFORCEMENT SHOULD BE OF GRADE **Fe500**
4. CLEAR COVER TO THE MAIN REINFORCEMENT FOR

MEMBER	COVER
BEAM	30
SLAB	25
COLUMN	40
R.C.C WALL	30

TITLE :

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TERRACE LEVEL BEAM LAYOUT & SLAB DETAILS

DATE	09-10-2024
DRAWN	G.P
SCALE	1 : 150
DESIGN	N.C

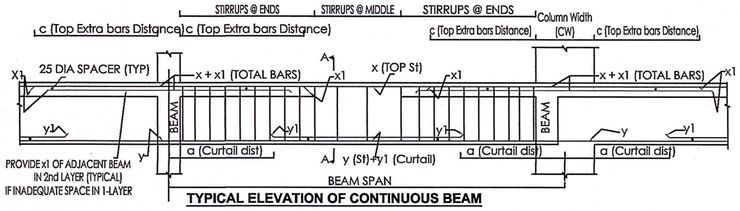
NORTH POINT:

STRUCTURAL ENGINEER:

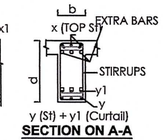
N. CHANDRU, M.E., M.I.E.,
Structural Engineer
CMDA REG. No: SE/GR-J/19/04/090
GCC REG No : RSE 101062019
A20, 100 Feet Road, Hindu Colony,
Nanganallur, Chennai - 600 061.
Mail : chandrun23@gmail.com
Mobile : 9840767380

BEAM SCHEDULE

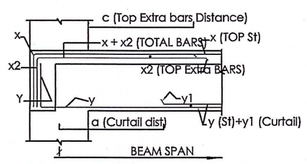
BEAM NO:	SECTION b x d	REINFORCEMENT										WEB BARS	STIRRUPS			REMARKS
		BOTTOM BARS			TOP x (St)	TOP EXTRA BAR										
						CONTINUOUS BEAM AT SUPPORT TOP		DISCONTINUOUS BEAM AT SUPPORT TOP		CANTILEVER BEAM AT SUPPORT TOP						
		BOTTOM y (St)	BOTTOM y1 (Curtail)	CURTAIL Dist AT (a)		(x1)	c + Column Width (CW) + c	(x2)	c	(x3)	CANTILEVER DISTANCE +c		BOTH NEAR SUPPORTS	MID SPAN	CANTILEVER PORTIONS	
B-1	200 x 450	2-25	2-25	1000	2-20	-	-	-	-	-	-	-	10 @ 125 C/C	10 @ 125 C/C	-	-
B-2	200 x 450	2-16	-	-	2-16	-	-	-	-	-	-	-	8 @ 110 C/C	8 @ 110 C/C	-	-
B-3	200 x 450	2-16	-	-	3-20	-	-	-	-	-	-	-	10 @ 100 C/C	10 @ 100 C/C	10 @ 100 C/C	-
B-4	200 x 450	3-20	-	-	3-20+2-20	-	-	-	-	-	-	-	8 @ 100 C/C	8 @ 125 C/C	10 @ 100 C/C	-
B-5	300 X 750	3-25	3-25	2100	2-20	-	-	1st LAYER 1-25 + 2nd LAYER 3-25 (TOTAL = 4-25)	2700	-	-	-	10 @ 100 C/C	10 @ 150 C/C	-	-
B-6	300 X 600	3-20	-	-	3-20	-	-	-	-	-	-	-	8 @ 100 C/C	8 @ 100 C/C	-	-
B-7	300 X 750	3-25	2-25	1600	2-20	-	-	1st LAYER 1-25 + 2nd LAYER 3-25 (TOTAL = 4-25)	2100	-	-	-	8 @ 100 C/C	8 @ 150 C/C	-	-
B-8	600 X 750	6-25	4-25	2100	6-20	-	-	4-25	2700	-	-	-	4L-10@ 110 C/C	4L-10 @ 150 C/C	-	-
B-9	300 X 600	3-20	-	-	3-20	-	-	-	-	-	-	-	8 @ 100 C/C	8 @ 100 C/C		-
B-10	200 x 450	2-20+1-25	-	-	2-20+1-25	-	-	-	-	-	-	-	8 @ 100 C/C	8 @ 100 C/C	-	-
B-11	200 x 450	3-20	-	-	3-20	-	-	-	-	-	-	-	8 @ 100 C/C	8 @ 100 C/C	-	-
B-12	600 x 750	6-25	-	-	6-25	-	-	-	-	-	-	-	4L-8@ 100 C/C	4L-8 @ 100 C/C	-	-
B-13	600 x 750	6-25	4-25	1500	6-20	-	-	4-25	1900	-	-	-	4L-10@ 100 C/C	4L-10 @ 150 C/C	-	-
B-14	200 x 450	3-16	-	-	3-16	-	-	-	-	-	-	-	10 @ 100 C/C	10 @ 100 C/C	-	-
B-15	200 x 450	3-20	2-16	1100	2-16	1st LAYER 1-20 + 2nd LAYER 2-20 (TOTAL = 3-20)	1500+CW+1500	2-20	1500	-	-	-	8 @ 110 C/C	8 @ 150 C/C	-	-
B-16	200 x 550	3-20	-	-	2-12	-	-	1-20	900	-	-	-	8 @ 100 C/C	8 @ 150 C/C	-	-
B-17	600 X 750	7-25	7-25	2100	6-20	6-25	2700+CW+2700	6-25	2700	-	-	-	4L-12 @ 100 C/C	4L-12 @ 150 C/C	-	-
B-18	200 x 450	2-25	1-20	1000	2-25	2-25	1500+CW+1500	-	-	-	-	-	8 @ 100 C/C	8 @ 150 C/C	-	-
B-19	200 x 450	2-25	1-20	600	2-25	2-25	800+CW+800	-	-	-	-	-	8 @ 100 C/C	8 @ 150 C/C	-	-
B-20	300 X 750	3-25	3-25	2100	2-25	1st LAYER 1-25 + 2nd LAYER 3-25	2700+CW+2700	1st LAYER 1-25 + 2nd LAYER 3-25	2700	-	-	-	10 @ 100 C/C	10 @ 100 C/C	-	-
B-21	300 X 600	3-25	3-25	1200	2-20	1st LAYER 1-25 + 2nd LAYER 3-25	1600+CW+1600	1st LAYER 1-25 + 2nd LAYER 3-25	1600	-	-	-	10 @ 100 C/C	10 @ 100 C/C	-	-
B-22	300 X 600	3-25	-	-	1st LAYER 3-25 + 2nd LAYER 2-25	-	-	-	-	-	-	-	10 @ 100 C/C	10 @ 100 C/C	12 @ 100 C/C	-
B-23	1200 x 500	12-25	8-25	2100	12-25	8-25	2700+CW+2700	8-25	2700	-	-	-	4L-12 @ 100 C/C	4L-12 @ 150 C/C	-	-
B-24	600 X 750	7-25	7-25	2100	6-25	6-25	2700+CW+2700	6-25	2700	-	-		4L-12 @ 100 C/C	4L-12 @ 150 C/C	-	-
B-25	300 X 600	3-25	2-25	1700	3-25	3-25	2200+CW+2200	2-25	2200	-	-	-	10 @ 110 C/C	10 @ 150 C/C	-	-
B-26	300 X 600	3-25	-	-	3-25+2-25	-	-	-	-	-	-	-	8 @ 100 C/C	8 @ 100 C/C	-	-
B-27	300 x 600	3-25	-	-	3-25+3-25	-	-	-	-	-	-	-	12 @ 100 C/C	12 @ 100 C/C	-	-
B-28	300 x 600	3-25	2-25	1700	2-20	1st LAYER 1-25 + 2nd LAYER 3-25	2200+CW+2200	1st LAYER 1-25 + 2nd LAYER 2-25	2200	-	-	-	12 @ 110 C/C	12 @ 110 C/C	-	-
B-29	300 x 600	3-25	2-25	1000	2-25	1st LAYER 1-25 + 2nd LAYER 2-25	1300+CW+1300	1st LAYER 1-25 + 2nd LAYER 2-25	1300	-	-	-	10 @ 100 C/C	10 @ 100 C/C	-	-
B-30	300 x 600	1st LAYER 2-25 + 2nd LAYER 2-25	-	-	1st LAYER 3-25 + 2nd LAYER 2-25	-	-	-	-	-	-	-	10 @ 100 C/C	10 @ 100 C/C	12 @ 100 C/C	-
B-31	300 x 750	1st LAYER 2-25 + 2nd LAYER 2-25	-	-	1st LAYER 3-25 + 2nd LAYER 3-25	-	-	-	-	-	-	-	10 @ 100 C/C	10 @ 100C/C	12 @ 100 C/C	-



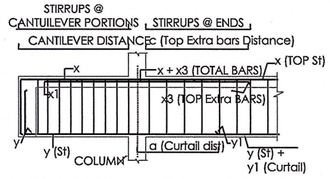
TYPICAL ELEVATION OF CONTINUOUS BEAM



SECTION ON A-A



TYPICAL PART ELEVATION OF DISCONTINUOUS BEAM



TYPICAL ELEVATION OF CANTILEVER PORTIONS (PART)

NOTES:
1. ALL DIMENSIONS ARE IN MILLIMETERS
2. ALL MIX GRADE **M-30**
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4. CLEAR COVER TO THE MAIN REINFORCEMENT FOR

MEMBER	COVER
BEAM	30

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ALL FLOOR BEAM DETAILS

DATE	09-10-2024
DRAWN	G.P
SCALE	1 : 150
DESIGN	N.C

NORTH POINT:

STRUCTURAL ENGINEER:

N. CHANDRU, M.E., M.I.E.,
Structural Engineer
CMDA REG. No: SE/GR-I/19/04/090
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Certified EC, Patta, legal opinions, property verification, due diligence, litigation solutions, and legal heir certificates.

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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

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Forms & Templates, Document Generator, Document Translation, Dictionary

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