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DIGITALLY VERIFIED RECORD

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Date: 04TH JUNE. 2025

STABILITY CERTIFICATE

The Proposed Stilt + 5 FLOORS Residential Building (HEIGHT-18.30M) with 20 Dwelling Units at NEW DOOR NO: 3, 8th street **GOPALAPURAM** ,CHENNAI-600086, WITHIN THE LIMITS OF GREATER CHENNAI CORPORATION will be designed to resist for wind & earthquake loads, a check has been made and found safe and I hereby certify that

1. The least dimension of the column is 230mm. in all floors.
2. The min grade of concrete is M25.for all RCC Works.
3. Foundation is designed for Stilt plus Five Upper Floors.
4. SBC of 13T/m^2 at 3 meter from E.G.L level Considered as per Nagadi Soil Consultants Report No – G(C)10042. (Dated: 05:05:25)
5. The design /analysis using the code of practice,
   - For loading Standards as per IS – 875 part-2 seismic force as per the - code IS 1893.
   -The building is designed and Detailing as per IS 456 and IS 13920.

We certify that the structural plan and details of the building submitted for approval satisfy the structural safety requirements for all situations including natural disasters as applicable and as stipulated under part-6 structural design of the national building code of India and other relevant codes; and the information given therein is factually correct to the best of our knowledge and understanding structurally Safe and Sound.

V.PRASANTH PARTHASARATHY
(Structural Engineer)

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DESIGN BASIS REPORT

STRUCTURAL SYSTEM

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1.1 FOREWORD

1.1.1 – DESCRIPTION OF PROJECT

Proposed Construction of Stilt + 05 Story Residential Building at GOPALAPURAM for M/S Fourcee Housing at Chennai , Structural Engineering done by M/s Prasanth Design Consultants Chennai.

Project consists of STILT + 5 Upper Floors.

1.1.2 – OBJECTIVE OF THE REPORT

The objective of the report is to identify and record all the pertinent input requirements, analysis & design criteria for structural design of the various buildings. It is aimed at consolidating the basis of the work that the structural designer is going to carry out in delivering the structural framework of the buildings which will be compatible with the architectural theme, satisfy the functional needs, adhering to the building norms and Indian Standards provisions and which will be safe, stable, strong and yet optimally economical. Since the parameters adopted in this report are going to be the basis of the structural design calculations, it is expected that the planning and design team members – architects, services consultants and project management team – give their feedback and approval to the parameters, suggestions, recommendations and queries mentioned in the report.

This report covers the minimum design requirement to establish the unified design basis that will form the overall design philosophy to be adopted in the structural design.

The design basis will aim to achieve:

- Structural & functional integrity.
    - Desirable Structural performance under characteristic service design loadings.
    - Ability to sustain design basis loads due to natural phenomena such as wind, earthquakes, seasonal variation in ground water table and thermal effects.
    - Structural durability & maintainability.

1.1.3 – SCOPE OF THE REPORT

The Structural Report covers the complete Structural Elements design methodology with model analysis.

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 -1997Code of Practice for design loads for Buildings and structure (Part- 1,2,4 & 5) IS:875 -2015Code of Practice for design loads for Buildings and structure (Part-3 – Wind Loads)
IS:1893-2016 Criteria for earthquake resistant design of structure (Part-1)

Foundations:

IS:1080-1997 Code of Practice for design and construction of shallow foundations on soils (other than raft, ring and shell)
IS:1904-1995 Code of Practice for design and construction of foundations in soils general requirement IS:2950-1998 Code of Practice for design and construction of raft foundations
IS:2974-1998 Code of Practice for design and construction of machine foundations (All parts) IS:8009-1998 Code of Practice for calculation of settlement of foundations (All parts)

RCC:
IS:456 -2000 Code of Practice for plain and reinforced concrete IS:16700 -2017 Criteria for structural safety of tall concrete buildings 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:4326-1993 Code of Practice for earthquake resistant design and construction of buildings
IS:5525-1999 Recommendation for detailing of reinforced concrete works
IS:1786-2008 Specification for high strength deformed steel bars and wires for concrete reinforcement IS:10262-1999 Recommended guidelines for concrete mix design
IS:13920-2016 Code of Practice for ductile design & detailing of reinforced concrete structures subjected to seismic forces.

Structural steel:

IS:800 -2007 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 -1996 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)-1995Specification 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 -2016 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)
Wherever appropriate Indian Regulation does not exist for any particular item, appropriate British standards or American will be used.

Material :

IS: 269 -1998 Specification for Ordinary, rapid hardening and low heat Portland cement. IS: 455 -1995 Specification for Portland blast furnace slag cement.
IS: 1489-1991 Specification for Portland pozzolana cement IS: 4031-1991 Method of physical tests for Portland cement.
IS: 383 - 1997 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 – Location

M/S Fourcee Housing Residential Project at Gopalapuram Chennai District.

1.3.2 – Building Description.

Project consists of:

Stilt + 5 Upper Floors

Floors	Details
Stilt floor	Bike Parking, Car parking & Services
5 Typical Floors	Residential Space
Terrace	Space for Lift machine room, Overhead tank , Stair case head room ,

Plan Dimensions:

Width of the building	-	**19.01/21.09**	**m**
Length of the building (excluding non-tower area)	-	32.95	m
Height of building from Stilt to Roof level	-	18.3	m

Storey data:

Stilt floor	=	**3.05**	**m**
1st to 5th Residential floors	=	3.05	m

1.3.3 – Structural Arrangement:

- The Structural System for the M/s Fourcee Housing Residential Building at Gopalapuram comprises of RCC slabs supported by RC columns & RC beams.
- Floor slabs are considered to act as a rigid diaphragm to transfer the lateral forces to the lateral load resisting elements.
- The cutouts in slab are based on the provisions given in Clause 31.8 of IS 456-2000. Core cutting/sleeves shall be considered to accommodate utility services if any. Staircases are provided with mid-landing between the floors as per architectural layout.

	Description	Gopalapuram Residential Building
a)	Column	Varies as per Architectural drawing
b)	Structural system	Reinforced columns, beams & slabs
c)	Slab thickness	Varies as per design requirement
e)	Beams	Varies as per design requirement
f)	Column size	Varies as per design requirement

1.3.4 – **Water Proofing:**

The below mentioned water proofing is adopted.

a) **Lift Pit wall:** Acrylic polymer based water proofing or equivalent if required

b) **Terrace/Roof:** Cement based water proofing using brick bat or equivalent type

c) **Toilets, balcony, utility:** Acrylic polymer based water proofing or equivalent type

d) **Overhead tank:** Cement based water proofing or equivalent type

1.4 DESIGN APPROACH:

1.4.1 Site Survey Plan:

1.4.2 Design Brief:

This structure has physical interface with almost all the disciplines like Geotechnical, MEP Services and Landscape etc. The Structure proposed is of cast in-situ concrete construction with walls/columns suitably placed. The Structural design of the proposed project is based on Indian Standard Codes and is analyzed for Dead, Live, Wind and Seismic Load conditions taking into relevant load combinations recommended by the codes. The Vertical Loads including the dead and super imposed loads are transferred to the soil through columns, RC walls 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. The Lateral loads due to wind and seismic forces are dissipated to soil through the proposed Reinforced Concrete columns.

1.4.3 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 is required for all replaceable material for longer life.

1.4.4 Material Properties.

Materials specified will confirm 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 M50 to M25 N/sq.mm at 28 days.
- Plain cement concrete shall have cube crushing strength of 15 N/sq.mm (M15) at 28 days.

Concrete Mix

Concrete item	Grade	Max. Size of Aggregate (mm)	Type of cement	Other Ingredient
Isolated footing	M25	20	OPC/PPC	
Columns	M30	20	OPC/PPC	
RC Slab & beams	M30	20	OPC/PPC	
Water Tank	M30	20	OPC/PPC	
Grade Slab	M20	20	OPC/PPC	

Note: Grade of concrete for beam/column junction shall be same as column concrete grade.

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

Mechanical Splicing Material:

Moment Coupler of threaded type as per IS-16172 Shall be used for diameter of reinforcement 16mm and higher size for extending the bars. If lapping of the bars is required in exceptional case, relevant clauses of IS-13920 shall be followed.

1.4.5 Foundation:

Foundations are designed depending upon Geo technical investigation report and will dissipate all the vertical and horizontal loads safely to the soil. As per the soil investigation report received from geotechnical consultants **ISOLATED FOOTING** are designed for foundation using Excel sheet design.

Net Allowable Bearing Pressure of 13t/m² for widths of footings > 1.5m for an allowable settlement for 50mm. **Water Table Level is at 3.5 m Level.**

1.4.6 Design 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.

- Self-weight of RCC : 2500 kg/cu.m (25 kN/cu.m)
- Light weight block masonry : 800 kg/cu.m (8 kN/cu.m)
- Water : 1000 kg/cu.m (10 kN/cu.m)

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.

Residential space

Load Component	Thickness (mm)	UDL (kN/m²)
Finishes	75	1.5
*Live load		2.0

**Reducible live load.*

Lobby / Passage

Load Component	Thickness (mm)	UDL (kN/m²)
Finishes	75	1.5
*Live Load		3.0

*Reducible live load

Toilets

Load Component	Thickness (mm)	UDL (kN/m²)
Finishes	75	1.5
Sunk & Filled	75	1.5
*Live Load		3.0

*Reducible live load

Parking

Load Component	Thickness (mm)	UDL (kN/m²)
Finishes	75	1.5
*Live Load		4.0

*Non-reducible live load

Staircases

Load Component	Thickness (mm)	UDL (kN/m²)
Steps	150 (Riser) / 300 (Tread)	1.875
Finishes	75	1.5
*Live Load		3.0

*Reducible live load

Actual loading due to lifts loads shall be ascertained and design live loads are suitably modified (if required) and considered.

The following reductions in total live load on floors are made in designing of columns, walls and foundation as per IS-875(part-2)-1987.

No. of floors (including the roof) to be carried by member under consideration	Reduction in total distributed live load on all floors to be carried by member under consideration (percent)
1	0
2	10
3	20
4	30
5 to 10	40
Over 10	50

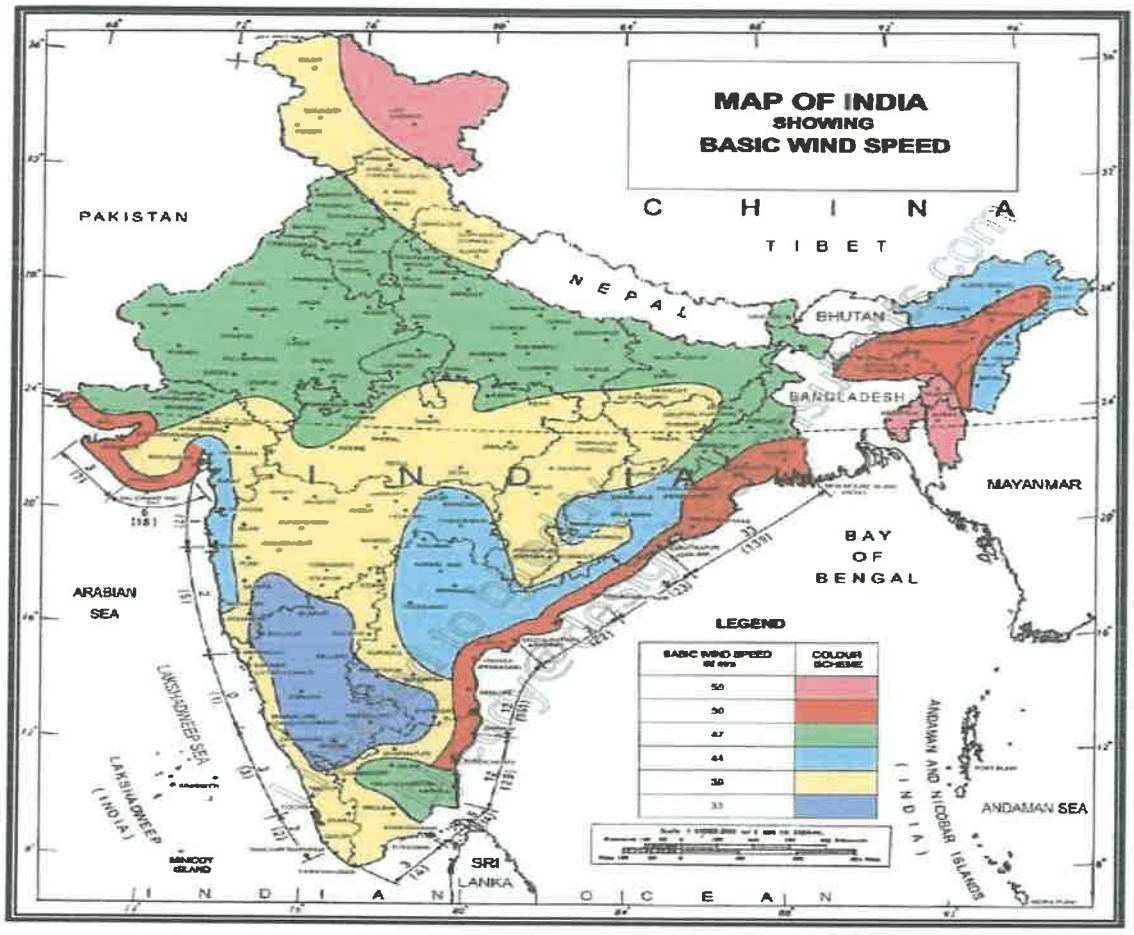
Wind Loads:

The Wind pressure shall be calculated in accordance with IS: 875 (Part-3)-2015. Basic wind speed for chennai is 50 m/s.

Basic Wind Speed Vb : 50 m/s

Terrain Category 2

Risk Coefficient k1: 1.00 (k1 corresponds to 50 years Mean Probable Design Life of Structure)
Factor k2 : Variation of wind speed with heights in different terrains as per Table -02.
Topography factor k3 : 1.00
Importance factor Cyclone region k4: 1.00 Design
wind speed Vz: Vb × k1 × k2 × k3 X k4
Design wind pressure pz: $0.6 \times Vz^2$



Based upon Survey of India Outline Map printed in 1963.

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The territorial waters of India extend into the sea to a distance of twelve nautical miles measured from the appropriate base line.
The boundary of Meghalaya shown on this map is as interpreted from the North-Eastern Areas (Reorganisation) Act, 1971, but has yet to be verified.
Responsibility for correctness of internal details shown on the map rests with the publisher.
The state boundaries between Uttaranchal & Uttar Pradesh, Bihar & Jharkhand and Chhattisgarh & Madhya Pradesh have not been verified by Governments concerned.

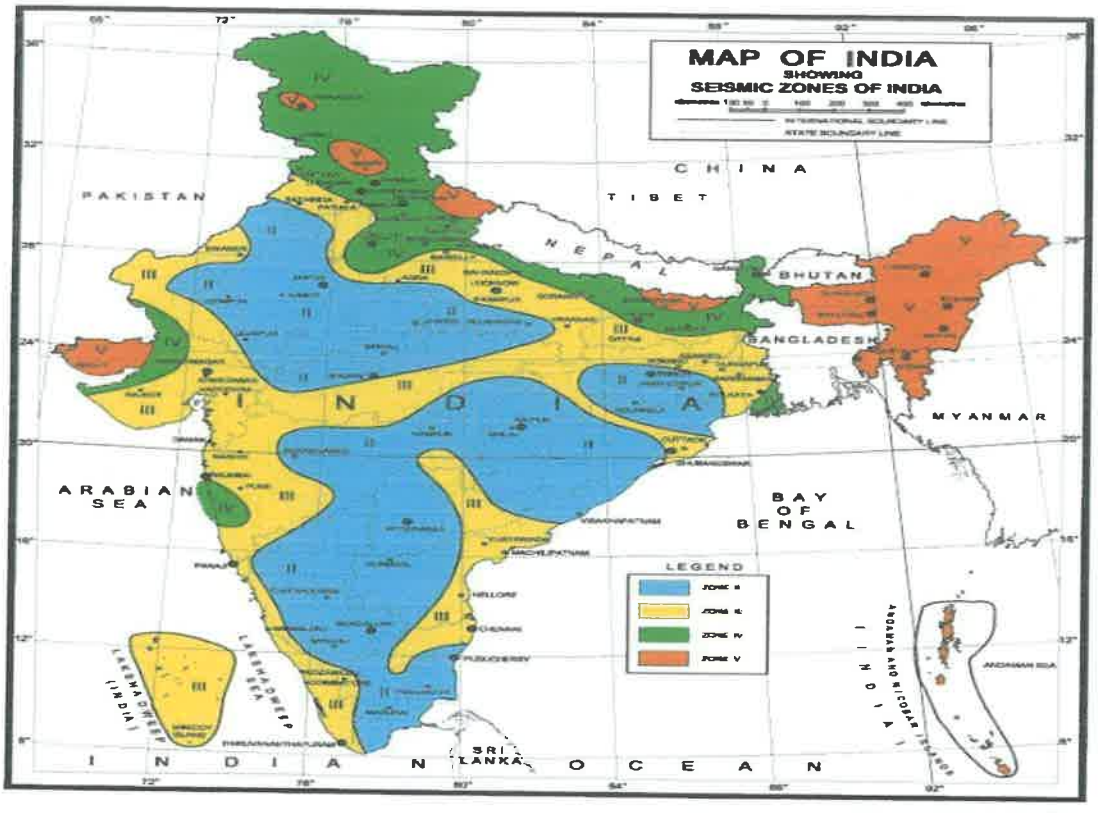
FIG. 1 BASIC WIND SPEED IN M/S (BASED ON 50-YEARS RETURN PERIOD)

Seismic Forces:

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

Seismic Zone : III
Seismic Zone factor, Z : 0.16 (As per Table 3-IS: 1893-2016) Design horizontal seismic coefficient (Ah) : (Z/2)*(Sa/g)*(I/R)
I -Importance factor : 1.2 (Ref Table 8-IS: 1893-2016)
Response reduction Factor : 5 (Building with SMRF)
Soil type : II (Weighted average of N value of all soil layers along the depth (10meters)
Damping Ratio for RCC : 5 %
R as per Table 9 of IS: 1893-2016 is based on building with ductile RC structural walls.
Sa/g – Design acceleration coefficient for soil type as per Fig.2 of IS: 1893-2016 and it is arrived based on appropriate fundamental natural period of structure using program calculated time period.

Design horizontal seismic coefficient (Ah) : (Z/2)*(I/R)*(Sa/g)
: (0.16/2)*(1.2/4) * (Sa/g)
Ah : 0.024 * (Sa/g)
Design seismic base shear, Vb : Ah * W where, W - seismic weight of building Dynamic Analysis : Considered in the analysis



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Table No: 03

Zone Factor, Z				
Seismic Zone	II	III	IV	V
Z	0.10	0.16	0.24	0.36

1.4.7 Durability Considerations:

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

- Environment : Moderate
- Exposure conditions : Concrete surfaces sheltered from severe rain or freezing whilst wet environment.
- Minimum grade of concrete for RCC : Moderate exposure – M25
- Minimum grade of concrete for PCC : Moderate exposure – M15
- Nominal cover to reinforcement : For moderate Exposure Nominal cover should not be less Than 40 mm for columns & 50mm for footings.

1.4.8 Fire Rating: 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

Minimum dimensions of all structural RCC members will be followed as per IS-456: 2000 for 2 hours fire resistance.

1.5 ANALYSIS METHODOLOGY:

This structure has physical interface with almost all the disciplines like Geotechnical, MEP Services and Landscape etc. The Structure proposed is of cast in-situ concrete construction with Columns suitably placed. The Structural design of the proposed project is based on Indian Standard Codes and is analyzed for Dead, Live, Wind and Seismic Load conditions taking into relevant load combinations recommended by the codes.

The Vertical Loads including the dead and super imposed loads are transferred to the soil through slabs, beams, columns, 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. The Lateral loads due to wind and seismic forces are dissipated to soil through the proposed Reinforced Concrete columns.

1.5.1 Assumptions:

- The structure is idealized as 3D space frame and analyzed using ETABS software package (Version 20.0.0) 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.

1.5.2 Mathematica

I model: Mass Modelling:

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

(i) Mass source considered for LL <= 3

kN/m2 is Mass source = DL+SDL+

0.25LL

(ii) Mass source considered for LL > 3

kN/m2 is Mass source = DL+SDL+

0.5LL

Where DL - Dead Load;
SDL – Super Imposed Dead Load; LL - Live Load

Table 6 Cracked RC Section Properties
(*Clause* 7.2)

Sl No.	Structural Element	Un-factored Loads		Factored Loads	
		Area	Moment of Inertia	Area	Moment of Inertia
(1)	(2)	(3)	(4)	(5)	(6)
i)	Slabs	1.0 A_g	0.35 I_g	1.00 A_g	0.25 I_g
ii)	Beams	1.0 A_g	0.7 I_g	1.00 A_g	0.35 I_g
iii)	Columns	1.0 A_g	0.9 I_g	1.00 A_g	0.70 I_g
iv)	Walls	1.0 A_g	0.9 I_g	1.00 A_g	0.70 I_g

1.5.3 Static Analysis:

Following Static loads cases are considered in the

analysis DL - Dead Load: Includes self-weight of the

structure.
SDL – Super Imposed Dead Load: Includes Finishes, wall Loads, Soil filling loads etc... LL - Live Load: Includes Live loads based on functionality as per IS: 875 (Part-2)

1.5.4 Dynamic Analysis:

1.5.4.1 Earthquake:

Response spectrum method of Dynamic Analysis is considered. Following are the details pertaining to dynamic analysis.

Base Shear Enhancement : Initial Scale factor of Ig/2R is used to enhance the base shear. Number of modes Considered : Number of modes considered should be enough to obtain 90%
mass participation in each principle plan direction.
Modal Combination Method Used:Complete Quadratic combination (CQC).
Spatial Combination Method used: Square root of the sum of Square (SRSS).
Modal case type : Ritz vector Method
Orthogonal directional seismic effect : Not applicable
Accidental torsion considered : 5% of the building plan dimension
Missing mass correction : Missing mass correction is taken care with Ritz vector method.

1.5.4.2 Wind:

Dynamic wind response – Along wind response (Gust Factor Analysis) and Across wind response as per Clause 10 of IS 875 (part 3)-2015 shall be followed. if

Case (i) – Ratio of height of the building to minimum lateral dimension is

exceeding 5 Case

(ii) – Fundamental natural frequency in first mode is less than 1.0Hz

For the given building heights & size, Dynamic Effects of wind need not be considered in the analysis. Also, Time period is marginally exceeding the above frequency limit, hence it is ok.

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 (X/Y)	1.5	1.5	—	—	1	1	—
DL ± WL (X/Y)	1.5 or 0.9*	—	1.5	—	1	—	1
DL ± EL (X/Y)	1.5 or 0.9*	—	1.5	—	1	—	1
DL ± TL (X/Y)	1.4	—	—	1.4	1	—	1
DL+LL±WL (X/Y)	1.2	1.2	1.2	—	1	0.8	0.8
DL+LL±EL (X/Y)	1.2	1.2	1.2	—	1	0.8	0.8
DL+LL±TL (X/Y)	1.05	1.28	—	1.05	1	1	1
DL+WL±TL (X/Y)	1.05	—	1.28	1.05	1	—	1
DL±EL±TL (X/Y)	1.05	—	1.28	1.05	1	—	1
DL+LL±WL(X/Y)±TL (X/Y)	1.05	1.28	1.28	1.05	1	1	1
DL+LL± EL(x/y)±TL (X/Y)	1.05	1.28	1.28	1.05	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,

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 7.3.1 of seismic code will be used both for evaluating earthquake effect and for combined load effects used in such combination. Load combinations with suitable live load reduction factors as per IS: 875(Part-2) will be used for design of columns &foundations.

1.7 DESIGN METHODOLOGY:

- All R.C.C structures shall be designed according to the Limit State Method as specified in IS: 456 – 2000.
- Forces and moments from the 3D analysis output for the worst combinations are used for the design of the structure.
- The foundations are designed for critical load combination.
- The structure is analyzed for specific loads like dead load, live load, wind and seismic loads and for the load combinations as given in the relevant codes.
- The slab is analyzed as two-way and one-way slabs.
- Design of special members like retaining wall, water tanks will be done in accordance with the relevant IS Codes.

1.8 ACCEPTANCE CRITERIA:

1.8.1 Deflection Limits:

For Reinforced concrete works:

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

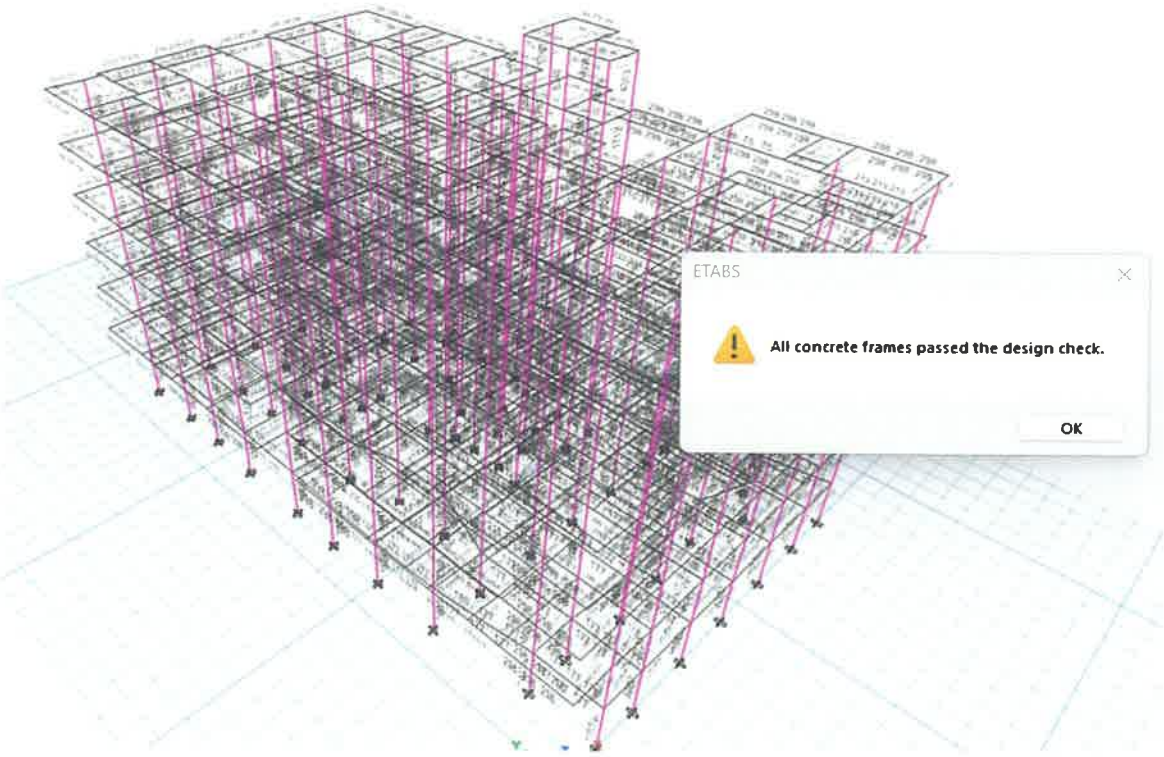
- Limiting values of crack width as per clause 35.3 of IS: 456-2000 is followed in the design.
- In general, for slabs and beams, the crack width is limited to 0.3mm.
- For basement retaining wall and water retaining structures, crack width is limited to 0.2mm.

DYNAMIC ANALYSIS:

TABLE: Modal Participating Mass Ratios

Case	Mode	Period	UX	UY	UZ	RX	RY	RZ
		sec						
Modal	1	1.937	0.0002	0.8241	0	0.0248	0.00003677	0.0565
Modal	2	1.728	0.0193	0.0535	0	0.0029	0.0015	0.8051
Modal	3	1.531	0.8669	0.0003	0.00001144	0.0001	0.057	0.0203
Modal	4	0.631	0.00002758	0.0798	0	0.1536	0.00003008	0.0006
Modal	5	0.549	0.0049	0.0004	0	0.0017	0.0189	0.0746
Modal	6	0.493	0.0761	0.000001239	0.0001	0.0001	0.3492	0.0039
Modal	7	0.4	0.00002862	0.017	0	0.0092	0.0002	0.0024
Modal	8	0.279	0.0156	0.0002	0.00003858	0.0002	0.0141	0.001
Modal	9	0.251	0.0002	0.0174	0.00001746	0.0149	0.0002	0.0003
Modal	10	0.184	0.0001	0.000002238	0.1432	0.0171	0.0334	0.0001
Modal	11	0.159	0.0106	0.0000224	0.0028	0.0001	0.0526	0.0011
Modal	12	0.115	0.00001715	0	0.7243	0.0024	0.0068	0.0001

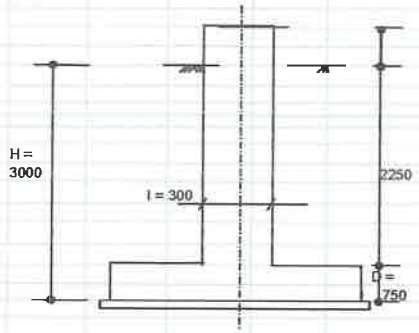
CONCRETE MEMBERS



PRASANTH DESIGN CONSULTANTS

PROJECT:	M/S FOURCEE HOUSING AT GOPALAPURAM	DOCUMENT NO.	DATE 01 06 25
TITLE:	DESIGN OF FOOTINGS	DESIGNED PRASANTH / CHECKED	SHEET 1

DESIGN OF ISOLATED FOOTING MARKED: F2

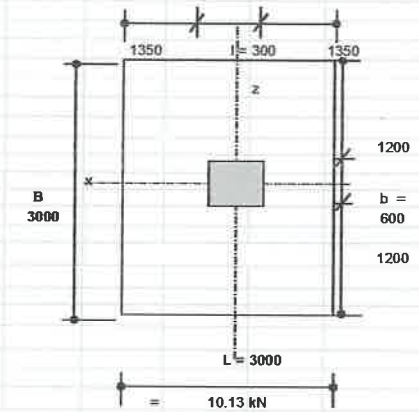


Design Parameters :

Grade of concrete	=	M 25
Grade of reinforcement	=	Fe 550
Clear cover to main reinf.	=	50 mm
Safe bearing capacity	=	130 kN/m^2
Density of concrete	=	25 kN/m^3

Dimensional details :

Length of column along x-axis, l =	300 mm
Length of column along z-axis, b =	600 mm
Length of footing along z-axis, B =	3000 mm
Length of footing along x-axis, L =	3000 mm
Thk. of footing at face of column, D =	750 mm
Depth of foundation(below G.L) , H =	3000 mm
Surcharge =	10 kN/m^2
Unit weight of soil =	18 kN/m^3



Footing Parameters :

Proposed dia of reinf.along Z-axis=	12 mm
Proposed dia of reinf.along X-axis =	12 mm
Eff. depth at face of column in X ,d_x =	694 mm
Eff. depth at face of column in Z ,d_z =	682 mm

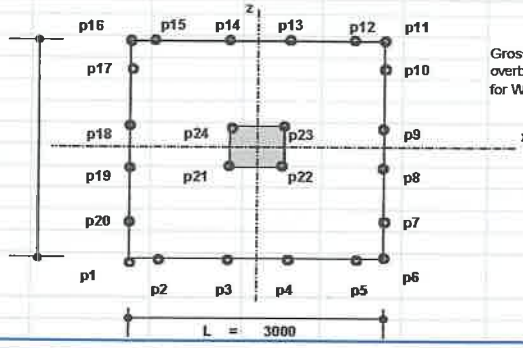
Selfweight of substructure & Overburden Soil:

Weight of column =	0.3 x 0.6 x 2.25 x 25	= 10.13 kN
Weight of footing =	3 x 3 x 0.75 x 25	= 168.75 kN
Weight of overburden soil =	(3 x 3 - 0.3 x 0.6) x (3 - 0.75) x 18 =	357.21 kN
	Total load	= 536.09 kN

Computation of gross pressure & check against gross safe bearing capacity :

L/C	Load factor	P (kN)	Mx (kN.m)	Mz (kN.m)	Total P (kN)	P1 (kN/m^2)	P6 (kN/m^2)	P11 (kN/m^2)	P16 (kN/m^2)	Gross SBC (kN/m^2)	Check for SBC
34	1.5	1000	20	34	1536.09	167.57	182.68	173.79	158.68	189.57	OK
38	1.5	990	21	35	1526.09	166.46	182.01	172.68	157.13	189.57	OK
35	1.5	1010	19	33	1546.09	168.68	183.35	174.9	160.24	189.57	OK

All pressures are in kN/m^2



Gross SBC is (1.25xNet SBC+pressure due to overburden pressure). 1.25factor is considered for WL combinations

L/C	p2 =	p3 =	p4 =	p5=	p7 =	p8 =	p9 =	p10 =	p12=	p13 =
34	171	174	176	179	181	179	177	175	170	167
38	170	173	175	179	180	178	176	174	169	166
35	172	175	177	180	182	180	178	176	172	168

L/C	p14 =	p15=	p17 =	p18 =	p19 =	p20 =	p21 =	p22 =	p23 =	p24 =
34	165	162	160	162	164	166	170	172	171	169
38	164	161	159	161	163	165	169	171	170	168
35	167	163	162	164	165	167	172	173	172	170

Downward pressure due to substructure load = 536.09 / (3 x 3) 69.57 kN/m^2

Bottom Reinforcement in Z-Direction

	+ve Z-Direction			-ve Z-Direction		
L/C	Pr at col face	Pr at edge	Mu,z at col face (kN.m)	Pr at col face	Pr at edge	Mu,z at col face (kN.m)
34	172.00	176.00	340.515	171.00	167.00	324.315
38	171.00	175.00	337.275	170.00	166.00	321.075
35	173.00	177.00	343.755	172.00	168.00	327.555

L/C	Design Mu	Eff width (mm)	Ast,z (mm^2)	Ast,min (mm^2)	Ast req	Spacing req	Bar dia	Spacing pro	Ast provided	Check
34	340.515	3000	1055	2700	2700	125.66	12	100	3392.92	OK
38	337.275	3000	1045	2700	2700	125.66	12	100	3392.92	OK
35	343.755	3000	1066	2700	2700	125.66	12	100	3392.92	OK

Bottom Reinforcement in X-Direction

	+ve X-Direction			-ve X-Direction		
L/C	Pr at col face	Pr at edge	Mu,x at col face (kN.m)	Pr at col face	Pr at edge	Mu,z at col face (kN.m)
34	172	179	439.17	170.00	164.00	403.62
38	171	178	435.06	169.00	163.00	399.525
35	173	180	443.265	172.00	165.00	410.46

L/C	Design Mu	Eff width (mm)	Ast,x (mm^2)	Ast,min (mm^2)	Ast req	Spacing req	Bar dia	Spacing pro	Ast provided	Check
34	439.17	3000	1342	2700	2700	125.66	12	100	3392.92	OK
38	435.06	3000	1329	2700	2700	125.66	12	100	3392.92	OK
35	443.265	3000	1354	2700	2700	125.66	12	100	3392.92	OK

Top Reinforcement

Mu,z at col face (kN.m)	Ast,z (mm^2)	Ast,z,min (mm^2)	Bar dia	Spacing req (mm)	Mu,x at col face (kN.m)	Ast,x (mm^2)	Ast,x,min (mm^2)	Bar dia	Spacing req (mm)	Check
0	0	1350	10	175	0	0	1350	10	175	OK
									Spacing pro	Ast pro
									100	2356.19

Check for One Way Shear

L/C	Vu,z (kN)	Vu,x (kN)	Max Vu (kN)	d at sec (mm)	τ_v (N/mm^2)	τ_c (N/mm^2)	Check
34	238.5	315.27	315.27	694	0.151	0.3	OK
38	236.35	313.21	313.21	694	0.15	0.3	OK
35	240.65	318.79	318.79	694	0.153	0.3	OK

Check for Punching Shear

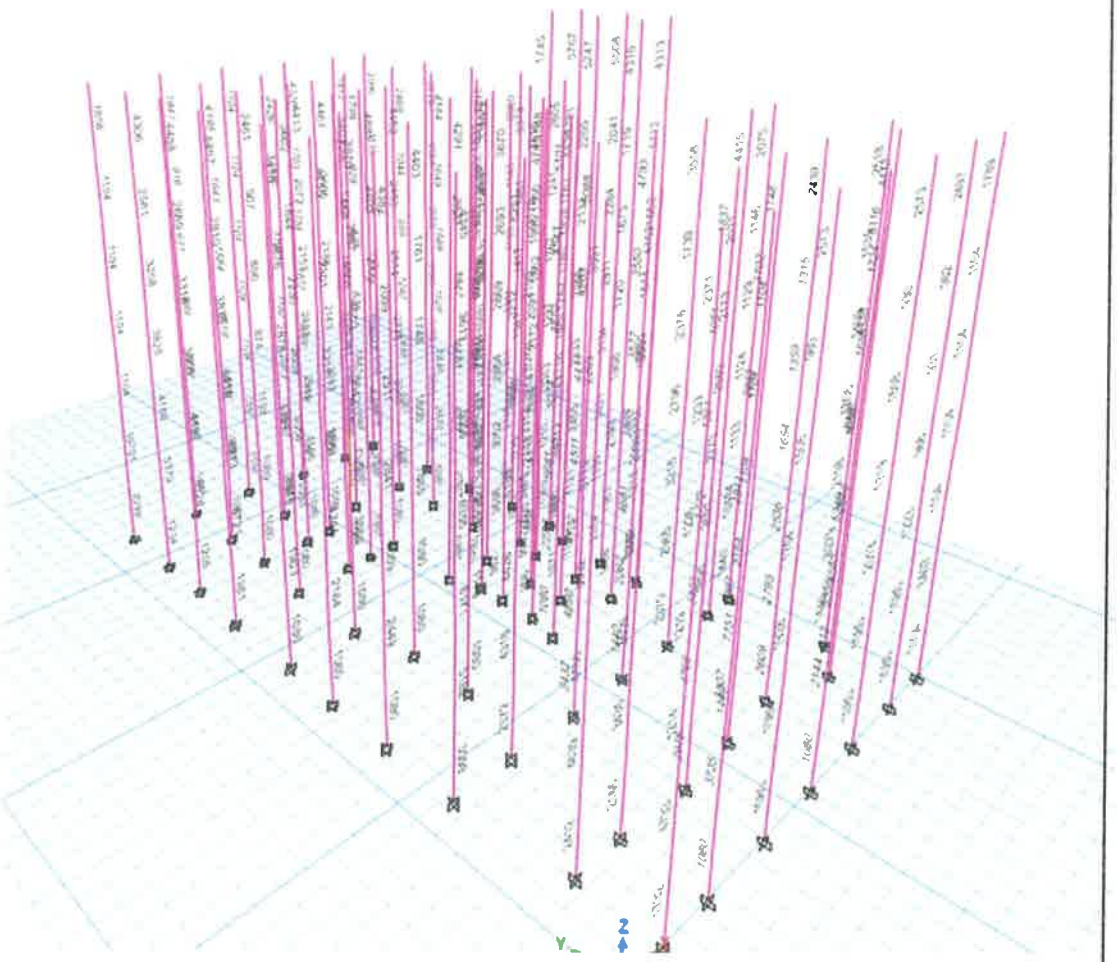
Punching area Ap = 9 - 1.29 = 7.71 m^2

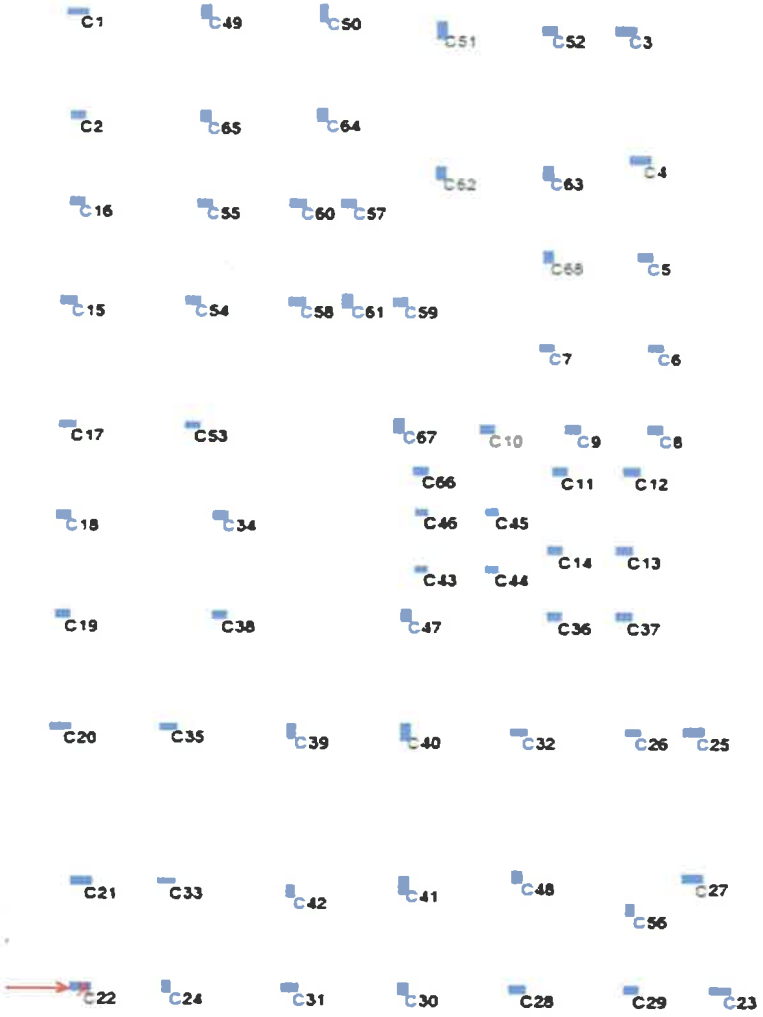
Avg depth at d/2 from face = 694 mm

Area resisting punching shear, Aps = 3.176 m^2

L/C	Vup (kN)	τ_{cp} (N/mm^2)	τ_{c_all} (N/mm^2)	Check
34	1169.34	0.368	1.25	OK
38	1156.5	0.364	1.25	OK
35	1182.21	0.372	1.25	OK

COLUMN DESIGN:



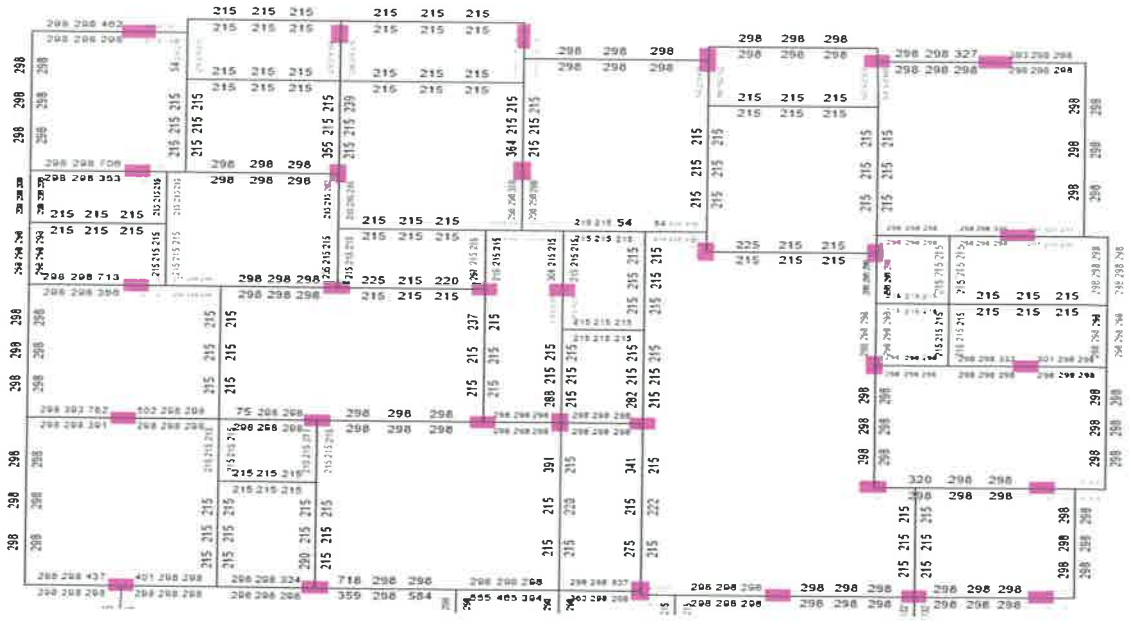


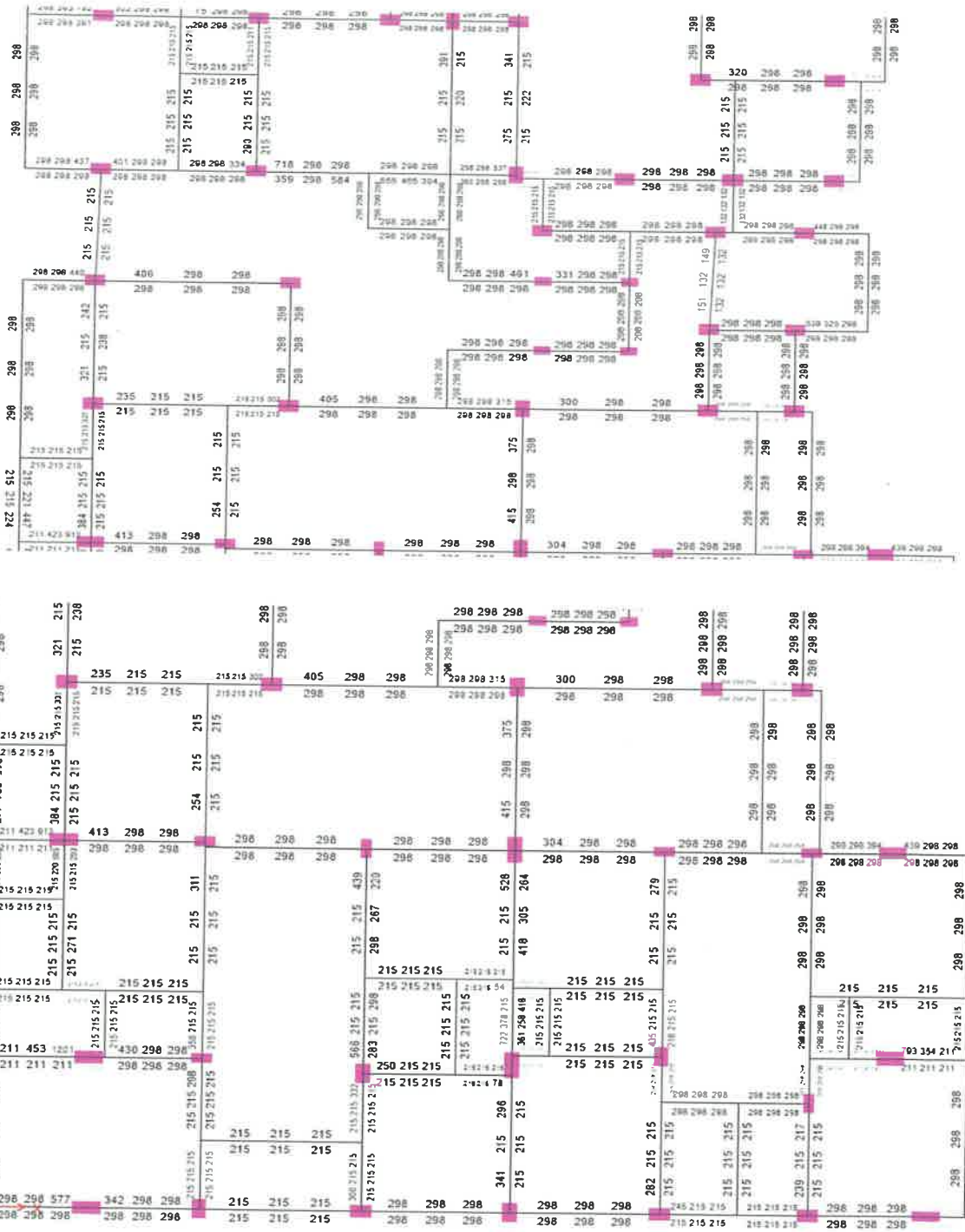
C25 LABEL COLUMN REBAR SUMMARY

TABLE: Concrete Column Design Summary - IS 456-2000

Story	Label	DesignSect	Station	PMMCombo	AsMin	As	Mid Bar As	CornerBarAs	VMajCombo	VMajRebar	VMinCombo	VMinRebar
			mm		mm²	mm²	mm²	mm²		mm²/m		mm²/m
TERRACE	C25	C1A 230x600	0	0.9DL+1.5SY-	1104	1183	99	99	0.9DL+1.5SX+	327.46	0.9DL+1.5SY-	665.06
TERRACE	C25	C1A 230x600	1200	1.5(DL+LL)	1104	1104	92	92	0.9DL+1.5SX+	339.15	0.9DL+1.5SY-	665.06
TERRACE	C25	C1A 230x600	2400	0.9DL+1.5SY-	1104	2075	173	173	0.9DL+1.5SY-	254.94	0.9DL+1.5SY-	665.06
FIFTH	C25	C1A 230x600	0	0.9DL+1.5SX-	1104	1141	95	95	0.9DL+1.5SY-	254.94	0.9DL+1.5SY-	665.06
FIFTH	C25	C1A 230x600	1200	1.5(DL+LL)	1104	1104	92	92	0.9DL+1.5SY-	254.94	0.9DL+1.5SY-	665.06
FIFTH	C25	C1A 230x600	2400	0.9DL+1.5SX-	1104	1146	95	95	0.9DL+1.5SY-	254.94	0.9DL+1.5SY-	665.06
FOURTH	C25	C1A 230x600	0	0.9DL+1.5SX-	1104	1124	94	94	0.9DL+1.5SY-	254.94	0.9DL+1.5SY-	665.06
FOURTH	C25	C1A 230x600	1200	1.5(DL+LL)	1104	1104	92	92	0.9DL+1.5SY-	254.94	0.9DL+1.5SY-	665.06
FOURTH	C25	C1A 230x600	2400	0.9DL+1.5SX-	1104	1129	94	94	0.9DL+1.5SY-	254.94	0.9DL+1.5SY-	665.06
THIRD	C25	C1A 230x600	0	0.9DL+1.5SX-	1104	1119	93	93	0.9DL+1.5SY-	254.94	0.9DL+1.5SY-	665.06
THIRD	C25	C1A 230x600	1200	1.5(DL+LL)	1104	1104	92	92	0.9DL+1.5SY-	254.94	0.9DL+1.5SY-	665.06
THIRD	C25	C1A 230x600	2400	0.9DL+1.5SX-	1104	1124	94	94	0.9DL+1.5SY-	254.94	0.9DL+1.5SY-	665.06
SECOND	C25	C1A 230x600	0	0.9DL+1.5SX-	1104	1122	94	94	0.9DL+1.5SY-	254.94	0.9DL+1.5SY-	665.06
SECOND	C25	C1A 230x600	1200	1.5(DL+SX+)	1104	1104	92	92	0.9DL+1.5SY-	254.94	0.9DL+1.5SY-	665.06
SECOND	C25	C1A 230x600	2400	0.9DL+1.5SX-	1104	1133	94	94	0.9DL+1.5SY-	254.94	0.9DL+1.5SY-	665.06
FIRST	C25	C1 300x600	0	1.5(DL+SX+)	1440	10494	874	874	0.9DL+1.5SY-	332.53	0.9DL+1.5SY-	665.06
FIRST	C25	C1 300x600	1200	1.5(DL+SX+)	1440	10286	857	857	0.9DL+1.5SY-	332.53	0.9DL+1.5SY-	665.06
FIRST	C25	C1 300x600	2400	1.5(DL+SX+)	1440	10346	862	862	0.9DL+1.5SY-	332.53	0.9DL+1.5SY-	665.06
STILT	C25	C1 300x600	0	1.5(DL+SX+)	1440	1440	120	120	0.9DL+1.5SY-	332.53	0.9DL+1.5SY-	665.06
STILT	C25	C1 300x600	1310	1.5(DL+SX+)	1440	1440	120	120	0.9DL+1.5SY-	332.53	0.9DL+1.5SY-	665.06
STILT	C25	C1 300x600	2620	1.5(DL+SX+)	1440	1440	120	120	0.9DL+1.5SY-	332.53	0.9DL+1.5SY-	665.06

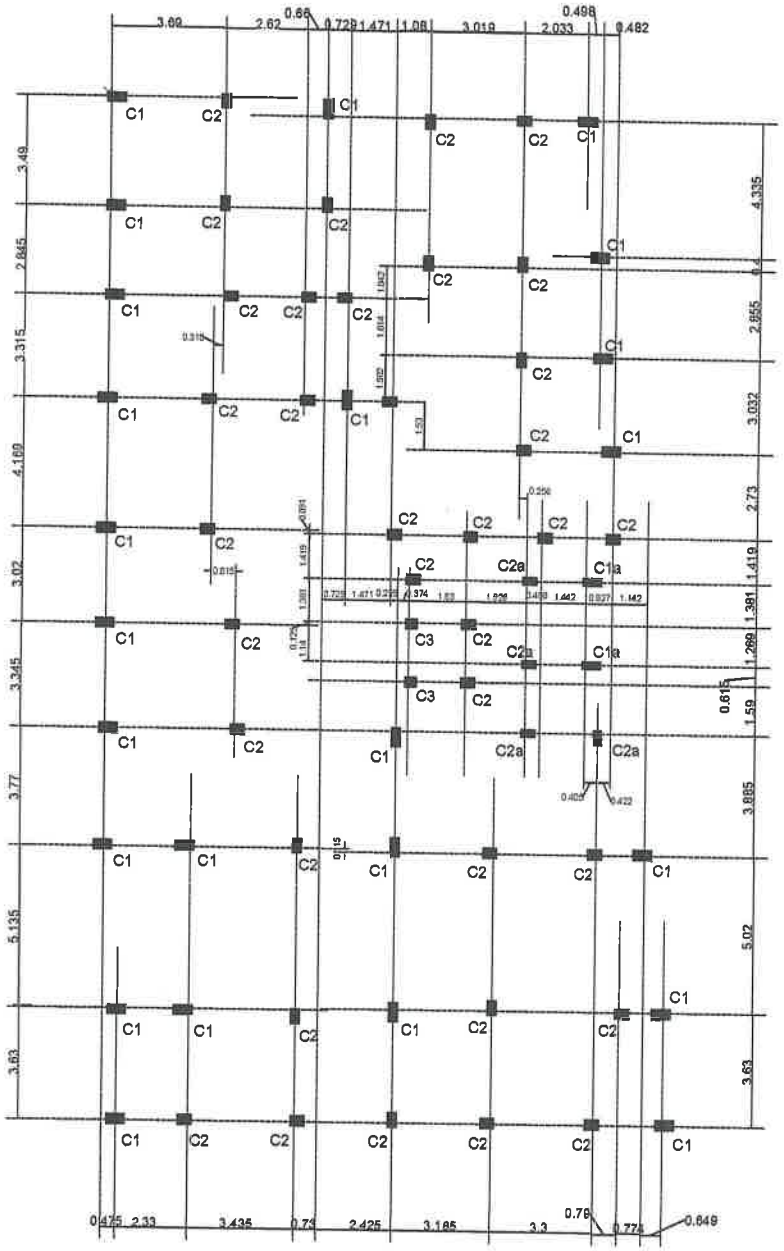
BEAM DESIGN:



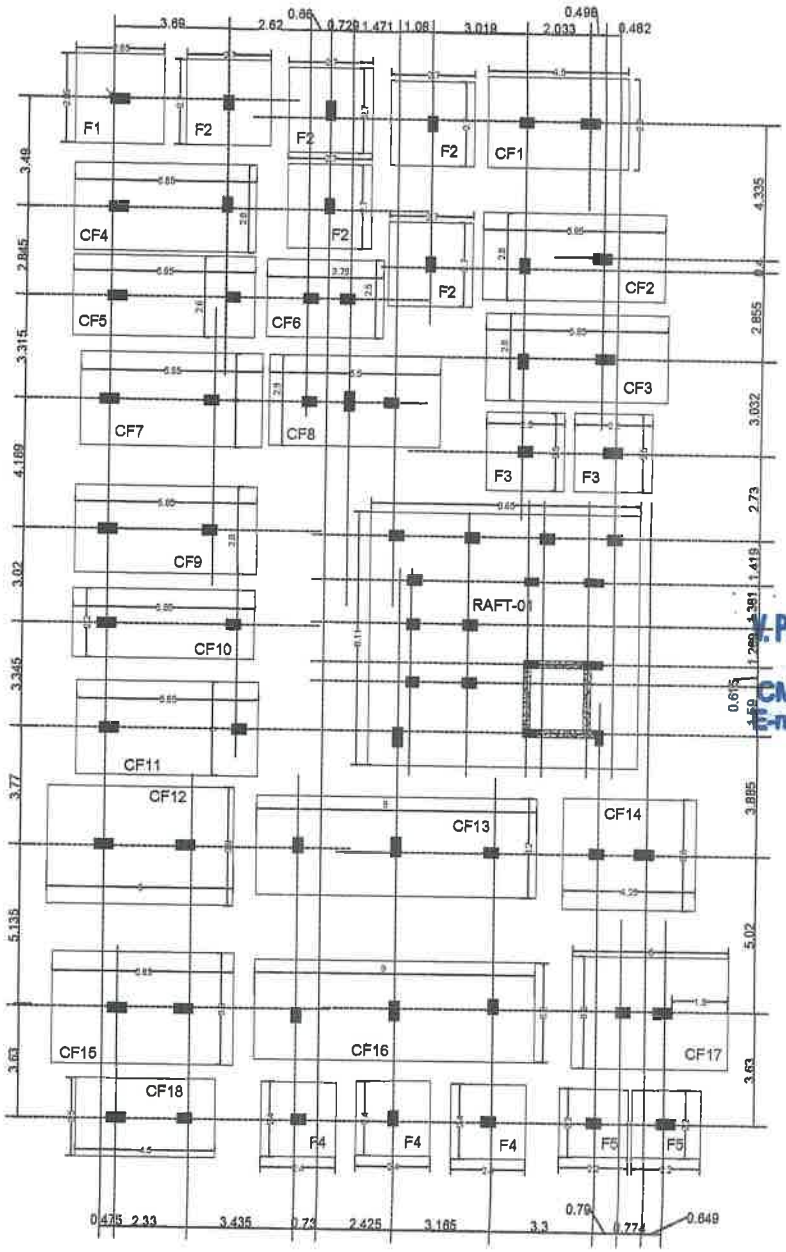


FIRST FLOOR LEVEL BEAM LONGITUDINAL REINFORCEMENT

PRASANTH DESIGN CONSULTANTS	**M/S FOURCEE HOUSING**	JOB ID-0S - 010625	**Rev.**
	Design Basis Report	**Sheet 23**	0



COLUMN LAYOUT



FOOTING LAYOUT

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ARCHITECT

PROJECT:
GOPALAPURAM

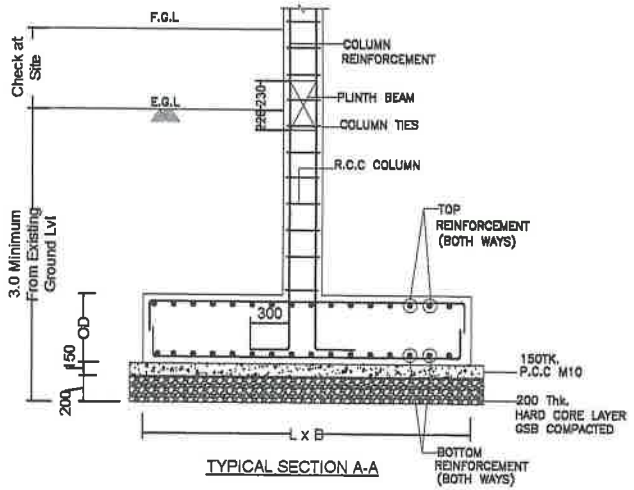
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STEEL GRADE - FE500
CEMENT : OPC 53 /PPC

DRG TITLE
COLUMN & FOOTING LAYOUT

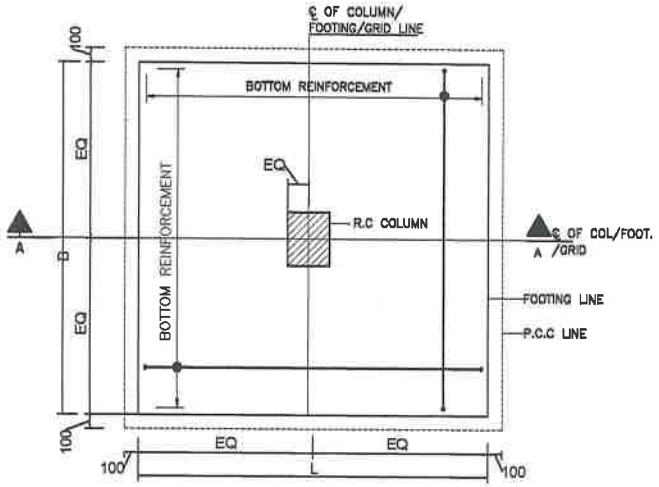
DRAWN -	DATE - 04/06/2025
ALL DIMENSIONS ARE IN MM	
PROJECT NO - 05010/2025	SCALE-1:50 (A1)
DRG NO - S-01	

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TYPICAL SECTION A-A

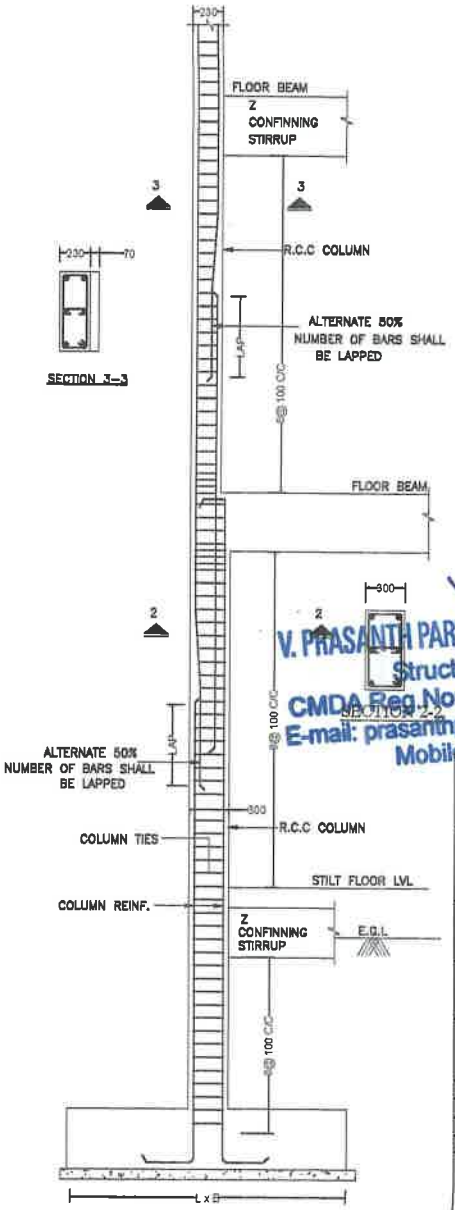


TYPICAL FOOTING PLAN

FOOTING SCHEDULE						
S.NO	F. TYPE	FOOTING SIZE			MAIN REINFORCEMENT	
		L	B	OD	BOTTOM (BOTH WAYS)B/W	TOP (BOTH WAYS)B/W
1.	F1	2850	2850	700	10Y@100C/C B/W	8Y@200C/C B/W
2.	F2	2700	2700	600	10Y@100C/C B/W	8Y@200C/C B/W
3.	F3	2500	2500	550	10Y@100 C/C B/W	8Y@200C/C B/W
4.	F4	2400	2400	500	10Y@100 C/C B/W	–
5.	F5	2200	2200	450	10Y@100 C/C B/W	–

COLUMN SCHEDULE @ STILT FLOOR LVL				
CONCRETE GRADE – M30				
S.NO	COLUMN TYPE	COLUMN SIZE	STILT COLUMN SHAPE	COLUMN TIES
1	C1	300 x 600	300 / 600 — 6–32Y(a) + 8–Y25(b)	10Y @ 100 C/C
2	C1a	230 x 600	230 / 600 — 12Nos – 20Y (c)	8Y @ 100 C/C
3	C2	300 x 450	300 / 450 — 12Nos – 20Y (c)	8Y @ 100 C/C
4	C2a	230 x 450	230 / 450 — 10Nos – 20Y (c)	8Y @ 100 C/C
5	C3	230 x 380	230 / 380 — 6–25Y(b) + 8–Y25(c)	8Y @ 100 C/C

COMBINED FOOTING SCHEDULE						
S.NO	F. TYPE	FOOTING SIZE			MAIN REINFORCEMENT	
		L	B	OD	BOTTOM (BOTH WAYS)B/W	TOP (BOTH WAYS)B/W
1.	CF1	2900	4500	600	12Y@100C/C B/W	12Y@200C/C B/W
2.	CF2	2800	5850	600	16Y@100C/C B/W	16Y@200C/C B/W
3.	CF3	2800	5850	600	16Y@100C/C B/W	16Y@200C/C B/W
4.	CF4	2800	5850	500	12Y@100 C/C B/W	12Y@200 C/C B/W
5.	CF5	2600	5850	500	12Y@100 C/C B/W	12Y@200 C/C B/W
6.	CF6	2500	3750	500	12Y@100 C/C B/W	12Y@200 C/C B/W
7.	CF7	3000	5850	600	12Y@100 C/C B/W	12Y@200 C/C B/W
8.	CF8	2900	6500	600	12Y@100 C/C B/W	12Y@200 C/C B/W
9.	CF9	2800	5850	600	12Y@100 C/C B/W	12Y@200 C/C B/W
10.	CF10	2200	5850	600	12Y@100 C/C B/W	12Y@200 C/C B/W
11.	CF11	3000	5850	600	12Y@100 C/C B/W	12Y@200 C/C B/W
12.	CF12	3800	6000	600	16Y@100C/C B/W	16Y@200C/C B/W
13.	CF13	3200	9000	600	16Y@100C/C B/W	16Y@200C/C B/W
14.	CF14	3800	4250	600	16Y@100C/C B/W	16Y@200C/C B/W
15.	CF15	3600	5850	600	16Y@100C/C B/W	16Y@200C/C B/W
16.	CF16	3200	9000	600	16Y@100C/C B/W	16Y@200C/C B/W
17.	CF17	3600	5000	600	16Y@100C/C B/W	16Y@200C/C B/W
18.	CF18	2600	4500	450	12Y@100 C/C B/W	12Y@200 C/C B/W



TYPICAL COLUMN TIES ARRANGEMENT (FOR SINGLE SIDE OFFSET COLUMN)

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M/S FOURCEE HOUSING

ARCHITECT:

PROJECT:
GOPALAPURAM

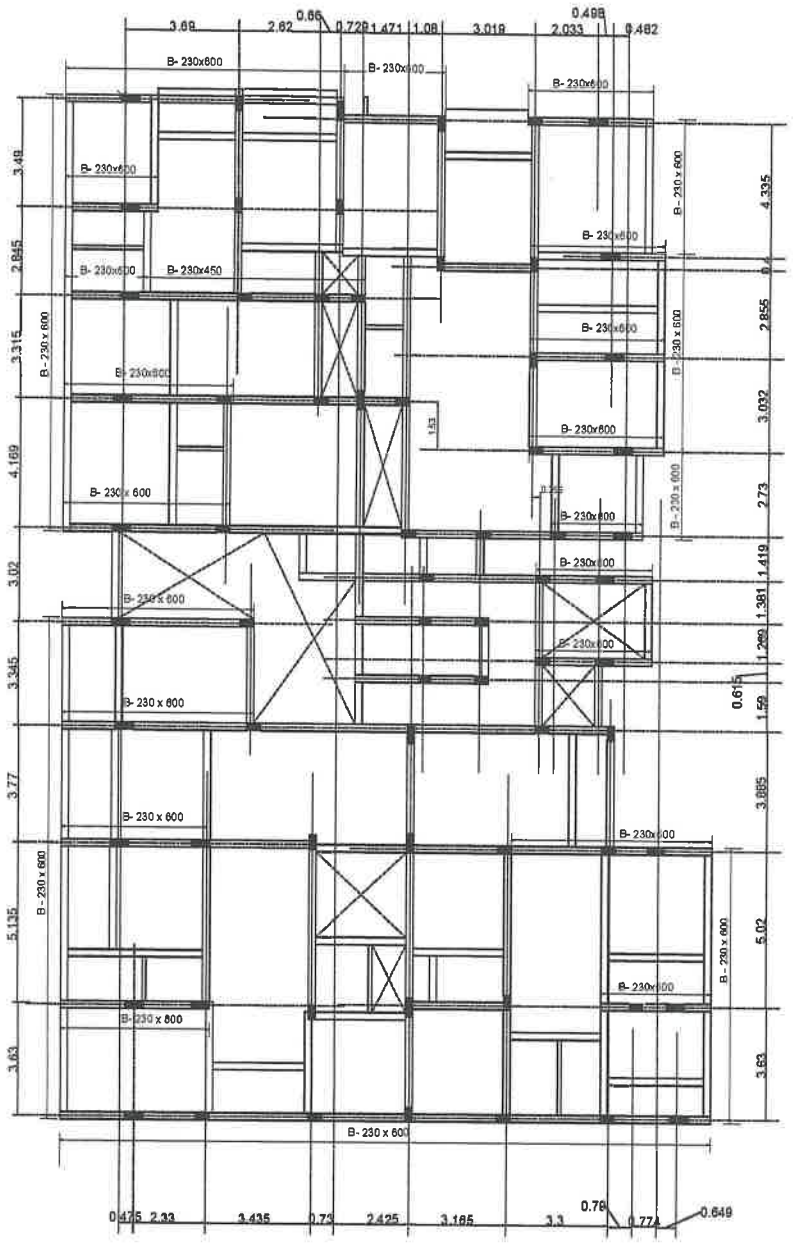
M25 GRADE / CONCRETE MIX - 1:2:3
STEEL GRADE - FE500
CEMENT : OPC 53 /PPC

DRG TITLE
COLUMN & FOOTING LAYOUT

DRAWN - | DATE - 04/08/2025
ALL DIMENSIONS ARE IN MM
PROJECT NO - OS01052025 | SCALE-1:50 (A1)
DRG NO - S-02

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LEED AP BD+C - 11647362



BEAM & SLAB LAYOUT AT FIRST FLOOR LEVEL

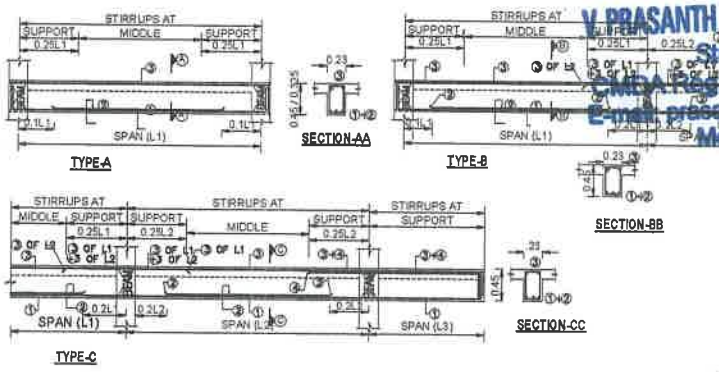
ALL OTHER BEAMS ARE 230x460 UNLESS SPECIFIED

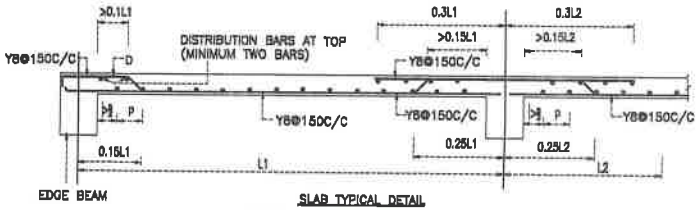
ALL SLABS ARE 125 THICK UNLESS SPECIFIED

ALL SLAB BARS REINFORCEMENTS Y8@150 C/C BOTTOM & TOP BOTHWAYS

SCHEDULE OF BEAMS

BEAM NO	SPAN (CENTER TO CENTER SUPPORT)	REINFORCEMENT (1)	(2)	(3)	(4)	STIRRUPS NEAR SUPPORT	STIRRUPS MID SPAN	IF CANTILEVER (REFER PLAN)
BEAM-01	BELOW - 2.1	2-10Ø	-	2-10Ø	1-10Ø	8Ø @ 100 Crs	8Ø @ 200 Crs	8Ø @ 100 Crs
BEAM-01A	BELOW - 2.1	2-16Ø	1-16Ø	2-16Ø	-	8Ø @ 100 Crs	8Ø @ 100 Crs	8Ø @ 100 Crs
BEAM-02	2.1 - 2.7	2-10Ø	1-10Ø	2-10Ø	1-10Ø	8Ø @ 100 Crs	8Ø @ 200 Crs	8Ø @ 100 Crs
BEAM-02A	2.1 - 2.7	2-16Ø	1-16Ø	2-16Ø	1-16Ø	8Ø @ 100 Crs	8Ø @ 100 Crs	8Ø @ 100 Crs
BEAM-03	2.7 - 3.3	2-12Ø	1-12Ø	2-12Ø	1-12Ø	8Ø @ 100 Crs	8Ø @ 200 Crs	8Ø @ 100 Crs
BEAM-03A	2.7 - 3.3	2-16Ø	2-16Ø	2-16Ø	1-16Ø	8Ø @ 100 Crs	8Ø @ 100 Crs	8Ø @ 100 Crs
BEAM-04	3.3 - 3.9	2-12Ø	2-12Ø	2-12Ø	2-12Ø	8Ø @ 100 Crs	8Ø @ 200 Crs	8Ø @ 100 Crs
BEAM-04A	3.3 - 3.9	2-20Ø	2-20Ø	2-20Ø	1-20Ø	8Ø @ 100 Crs	8Ø @ 100 Crs	8Ø @ 100 Crs
BEAM-05	3.9 - 4.5	2-16Ø	2-12Ø	2-16Ø	2-12Ø	8Ø @ 100 Crs	8Ø @ 200 Crs	8Ø @ 100 Crs
BEAM-05A	3.9 - 4.5	3-20Ø	2-20Ø (II LAYER)	3-20Ø	2-20Ø	8Ø @ 100 Crs	8Ø @ 100 Crs	8Ø @ 100 Crs
BEAM-06	4.5 - 5.1	2-16Ø	2-16Ø	2-16Ø	2-16Ø	8Ø @ 100 Crs	8Ø @ 200 Crs	8Ø @ 100 Crs
BEAM-06A	4.5 - 5.1	2-25Ø	2-25Ø (II LAYER)	2-25Ø	3-20Ø	8Ø @ 100 Crs	8Ø @ 100 Crs	8Ø @ 100 Crs
BEAM-07	5.1 - 5.7	2-20Ø	2-16Ø	2-20Ø	2-16Ø	8Ø @ 100 Crs	8Ø @ 200 Crs	8Ø @ 100 Crs
BEAM-07A	5.1 - 5.7	2-25Ø	2-25Ø	2-25Ø	2-20Ø	8Ø @ 100 Crs	8Ø @ 100 Crs	8Ø @ 100 Crs
BEAM-08	5.7 - 6.3	2-25Ø	1-25Ø	2-25Ø	2-20Ø	8Ø @ 100 Crs	8Ø @ 200 Crs	8Ø @ 100 Crs
BEAM-08A	5.7 - 6.3	3-20Ø	3-20Ø	3-20Ø	3-20Ø	8Ø @ 100 Crs	8Ø @ 100 Crs	8Ø @ 100 Crs
BEAM-09	6.3 - 7.2	3-25Ø	2-25Ø	2-25Ø	3-20Ø	8Ø @ 100 Crs	8Ø @ 200 Crs	8Ø @ 100 Crs
BEAM-09A	6.3 - 7.2	3-25Ø	2-25Ø	2-25Ø	3-20Ø	8Ø @ 100 Crs	8Ø @ 100 Crs	8Ø @ 100 Crs





SLAB TYPICAL DETAIL

PROVIDE DISTIBUTOR BARS 8@200C/C

V. PRASANTH PARTHASARATHY, B.E.(Civil),M.Tech.,
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Civil(A) Reg. No: SE/GR-II/2021/02/247
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M/S FOURCEE HOUSING

ARCHITECT:

PROJECT:

GOPALAPURAM

M25 GRADE / CONCRETE MIX - 1:2:3
STEEL GRADE - FE600
CEMENT : OPC 53 /PPC

DRG TITLE

FIRST FLOOR LEVEL BEAM & SLAB LAYOUT

DRAWN - | DATE - 04/06/2026

ALL DIMENSIONS ARE IN MM

PROJECT NO - C561063026 | SCALE-1:50 (A1)

DRG NO - S-03

STRUCTURAL CONSULTANTS:
PRASANTH DESIGN CONSULTANT
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Moovarasampet,
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Ph. no: +91 9176522658 / +91 8778592897
Mail id: prasanth.capital@gmail.com

V. PRASANTH PARTHASARATHY
CHARTERED ENGINEER -AM3125710
LEED AP BD+C - 11647662

THE LANDLENS SUITE

Eight ways to know a piece of land before you pay for it.

This report covers one part of the picture. These cover the rest, drawn from the same government records, for any property in Tamil Nadu.

LandLens One
Ask anything about a property and get an answer grounded in live government records, with the sources shown.
/landlens/one

Verify My Land
Every record check run on one property and returned as a single report.
/landlens/verify-my-land

Legal Opinion
An advocate's written opinion on the title, built on the records we pull for it.
/landlens

One Map
Every layer on one map: the parcel, its boundary, zoning, water bodies and what sits around it.
/landlens/one/map

PriceMap
What land actually changed hands for around this plot, taken from the registered deeds.
/landlens/pricemap

Build Scope
What you are allowed to build here: floor space, height, coverage and setbacks.
/landlens/build-scope

Property Tracker
Watch a property and hear about it when something new is registered against it.
/landlens/property-tracker

Deal Room
Run the transaction in one place: documents, stamping, signatures and the parties.
/landlens/deal-room

FREE TOOLS · NO ACCOUNT NEEDED

Twenty-four checks you can run yourself, at no cost.

Records and verification

The registers themselves, read for you.

- Encumbrance Certificate
- Patta and Chitta
- Field Measurement Sketch
- EC Analyzer
- Bank charge check
- Court case search
- Seller background check
- Approval check by survey

Value and duty

What it is worth and what it costs to register.

- Guideline value by street
- Guideline value by survey
- Stamp duty and registration fees
- Capital gains
- Floor space index
- Area unit converter

Zoning and land use

What the plan says can happen on this land.

- Land use zone finder
- CMDA land use check
- Coastal regulation zone
- Master plan check
- Water bodies finder
- Airport height clearance

Registers and directories

Who holds it, and which office keeps the record.

- Find your registering office
- Temple property check
- Waqf property check
- RERA register

Every free tool
/tools

Services we run for you
/services

The LandLens suite
/landlens/one

Verified RealEstate™

Every claim in this document traces back to a government record.

- Legal opinions, due diligence and title verification
- Building plan, layout and sub-division approvals
- Completion and occupancy certificates, regularisation
- Escrow, negotiation and NRI property management
- Land survey, soil testing, architecture and construction

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