Project :	**PROPOSED RESIDENTIAL GROUP HOUSING PHASE -10 Coimbatore.**
Structural Consultant	**Mithran Structures Private Limited** Coimbatore - 641043
Architect	**CUBOID ARCHITECTURE, COIMBATORE**
Title :	**ANANYA'S NANA NANI RESIDENTIAL GROUP HOUSING PHASE-10 – Analysis & Design Report**

Dr. L.S. JAYAGOPAL B.E.,M.Tech.,Ph.D.,FIE.,
Chartered Engineer (F12987)
CMDA/SE/GR-I/2019/05/117
No: 1, Jawahar Nagar, SAHS P.O.,
Coimbatore - 641 043.

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Chapter 1 INTRODUCTION

1.1 General

This document details the input data, principles, methods and performance criteria to be used in the structural engineering design of the project.

1.2 Scope

The Proposed Stilt+5 Floors residential group housing is located at Kalappanaickenpalayam, Somayampalayam Village and Panchayat, Coimbatore North Taluk, Coimbatore District in S.F.No 413/1B3 within the limits of Coimbatore Corporation. This report presents the details of structural analysis and design of the building for static loading. The sizes and details of the sections of RC elements are based on detailed analysis, which is elaborated in this report. This report specifies the details of structural layout, mathematical model, material properties, loads and load combinations, static analysis results, design summary for Isolated footings, columns, beams and slabs.

Chapter 2 DESCRIPTION OF BUILDING

The Proposed Building consists of Block-1to4 (Stilt+5 floors), Block-5 (Basement+stilt+5floors), Block-6 (Stilt+4floors). Stilt floor consists of parking space, remaining floors comprises of residential flats. Isolated footings are provided. Safe bearing capacity of the soil for the footings is considered as per Geo-technical Investigation report.

Chapter 3 LOADS & LOAD COMBINATIONS

3.1 General

This chapter discusses applicable loading for structural analysis & design of the proposed building. The loading is classified and described in the following paragraphs

3.2 Description of types of loading & Load calculation

Dead load & Live Loads are considered for analysis and design as per relevant Indian Standards and Specifications applicable to Coimbatore region.

The sizes of members have been fixed based on stiffness criterion and based on compatibility with architectural drawings.

3.2.1 Dead load comprises of self-weight of various structural elements indicated below:

- Self-weight of Columns, beams, slabs, brick walls.
- Floor & roof finishes.

Self-weight of the modeled elements is assigned in Staad.Pro Advanced Software. The applied floor loads are distributed on the beams as trapezoidal or triangular loads in two way slabs and as rectangular loads in one way slab.

Loads from components like brick walls are applied explicitly as member loads and UDL (Uniformly Distributed Load) as applicable.

Component	Unit weight (kN/m^3)	Thickness (mm)	Area load (kN/m^2)
RCC Slab	25	125	3.125
Floor Finish	-	-	1.00
Partition wall load	-	-	0.50
Terrace Floor Finish	-	-	1.50

Calculation of Brick wall load.

Height of brick wall = 2.7m (3.0m - 0.30m)

DL of 230mm tk. Brick wall = 11.8 kN/m. (0.23x2.7x19)

DL of 115mm tk. Brick wall = 5.9 kN/m. (0.115x2.7x19)

FLOOR FINISHES:

Living, Kitchen, Bedroom,Toilet, Parking	-	1 kN/sq.m + 0.5 kN/sq.m (Partition wall Load) = 1.5 kN/sq.m
Terrace	-	1.5 kN/sq.m

3.2.2 Live Loads are considered for the analysis in addition to dead loads as follows,

Living, Kitchen, Bedroom, Toilet	-	2 kN/sq.m
Staircase, Balcony, Corridor	-	3 kN/sq.m
Lift	-	10 kN/sq.m
Terrace	-	2 kN/sq.m

3.3 LOAD COMBINATIONS

STRENGTH LOAD COMBINATIONS

1.5 (DL)

1.5 (DL + LL)

SERVICE LOAD COMBINATIONS

1.0 (DL + LL)

Chapter 4 MATERIAL PROPERTIES

4.1 General

This chapter describes the physical and elastic properties for various materials used. These are used for defining the stiffness calculation of the modeled structural members and lumped mass calculations for static analysis model.

4.2 Elastic & Physical Properties

The elastic properties of materials used are tabulated below in Table 1

Table.1 – **Elastic properties of materials**

S.No.	Material	Elastic Modulus (MPa)	Poisson's Ratio
1	Normal density reinforced concrete (M25 Grade)	25000.00 calculated using $5000\sqrt{fck}$	0.15

4.3 Grade of Reinforcement

Reinforcement of Fe-550 is used for RCC design.

4.4 Unit Weight of Materials

Unit weight of various materials used are given below

Reinforced cement concrete = 25 kN/m^3

Brick Weight = 19 kN/m^3

Chapter 5 **ANALYSIS**

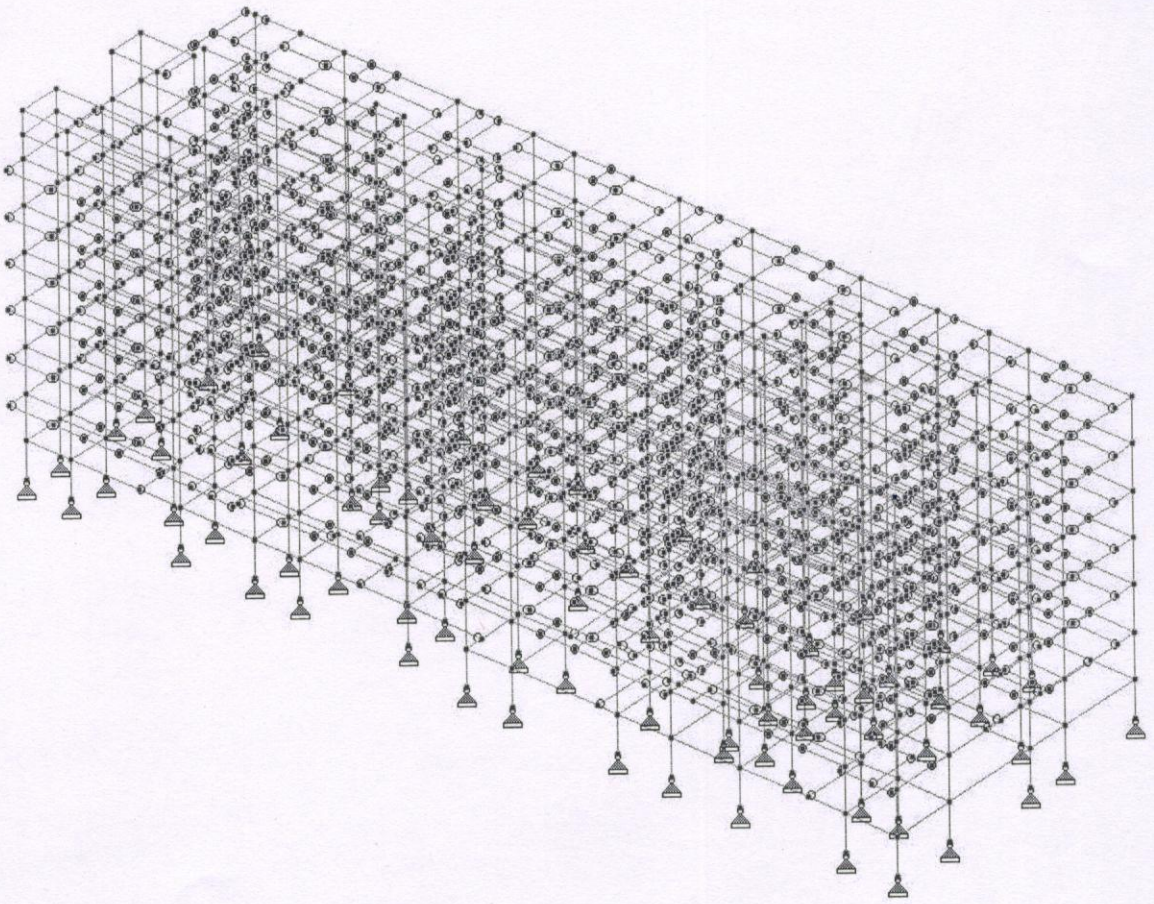
5.1 General

The analysis of the structure is carried out by mathematical modelling of the structure in Staad.Pro Advanced Software and performing an analysis run.

5.2 Mathematical Modeling of Structure

The Proposed building is modeled and analyzed using Staad.Pro Advanced Software. The physical structure of building is transformed into a mathematical model for structural analysis using 3D frame elements. Entire structure is composed of integrated three dimensional structure of columns and beams forming frames tied together to act as one unit responding to the loading on the structure. The discretization of the structure involves structural components such as Isolated Footings & columns, RC beams and RC slabs.

Fig. 1 – 3D Model of the Structure



5.3 Approximations in Modelling

Following approximations are made in the modelling of the building:

1. Offset eccentricities between centre-line of column & beams are ignored. Accordingly, nodal co-ordinates are fixed.
2. The components such as slabs and brick walls are neglected in modelling, but their loading effect on the structure is accounted.
3. Column positions are shifted marginally for aligning them along the grid lines.

5.4. Boundary Conditions

For the purpose of analysis and design, the bottoms of the columns are fixed at the footing level.

5.5 Analysis for Static Loading

The static analysis is carried out to obtain the internal forces and moments on all the member of the structure under static loads. Analysis is performed for each of the load cases mentioned below.

1. Dead load
2. Live load

Chapter 6 DESIGN OF RC MEMBERS

6.1 General

Limit State design using IS: 456-2000 is carried out for RC beams and columns using the forces obtained from the critical combination of loads from the analysis results in Staad.Pro Advanced Software. Other components like Isolated footings and Slabs are designed using simplified provisions as per applicable codes with the help of spread sheets developed in-house.

6.2 Nominal Clear Cover to Reinforcement

Nominal clear cover used for various elements are listed below:

Isolated Footing	:	50mm
Column	:	40mm
Roof beam	:	25mm
Slab	:	20mm

6.3 Foundation Parameters

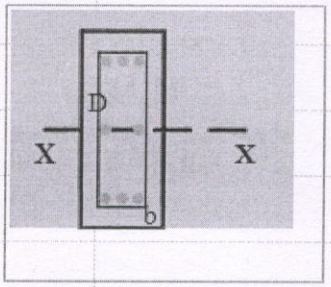
The following parameters are used in the design of Isolated footing.

Safe baring capacity of soil	=	20 T/m^2
Footing depth from GL	=	3.0m

DESIGN OF COLUMN

COLUMN ID : C6 (230 x 450) STILT - TERRACE FLOOR (GRID 1A-A2)

Column Dimensions:						
Breadth, 'b' =	230	mm				
Depth, 'D' =	450	mm				
Concrete Grade =	M	25				
Yield Strength of Steel, fy =	550	N/mm2				
Concrete Cover to main bars =	40	mm				
Details of Reinforcement:						
Diameter of bars =	16	mm				
No. of bars on 230 mm face =	2					
No. of bars on 450 mm face =	4		# 8 -16			
Total number of bars =	8					
Total A_{st} =	1608	mm2				
Percentage of Reinforcement =	1.554	< 4% O.K.				



COLUMN SECTION

(Max. nos. of bar that can be shown in the section at each face =6 only)

Col. Mk.	Applied Ultimate Loads: Axial Load Pu (kN)	Initial Moment Mu-ix(kN.m) M^*_{uix1}(+ or -)	Initial Moment Mu-ix(kN.m) M_{uix2} (+ only)	Initial Moment M_{uiy}(kN.m) M^*_{uiy1}(+ or -)	Initial Moment M_{uiy}(kN.m) M_{uiy2} (+ only)	Effective Length L_{ex}, l_{ey} (m)	Un-Supported Length (m)	Braced / Unbraced Column	I/R	Status
656	1053.13	7.47		4.367		2.593	3.050	braced	0.320	Section O.K.
	1045.814		26.271		10.51	2.593	3.050	Braced	0.343	Section O.K.
657	1068.7	0		0		2.593	3.050	Braced	0.331	Section O.K.
	1062.604		0.484		1.922	2.593	3.050	Braced	0.327	Section

										O.K.
658	867.191	37.317		13.671		2.593	3.050	Braced	0.361	Section O.K.
	859.875		35.226		12.965	2.593	3.050	Braced	0.344	Section O.K.
659	678.633	36.16		12.561		2.593	3.050	Braced	0.331	Section O.K.
	671.317		36.964		12.536	2.593	3.050	Braced	0.336	Section O.K.
660	492.825	37.567		12.96		2.593	3.050	Braced	0.398	Section O.K.
	485.509		38.079		12.957	2.593	3.050	Braced	0.405	Section O.K.
661	306.433	37.667		13.005		2.593	3.050	Braced	0.484	Section O.K.
	299.117		36.843		13.133	2.593	3.050	Braced	0.480	Section O.K.
662	115.975	40.225		13.688		2.593	3.050	Braced	0.567	Section O.K.
	108.659		45.428		15.202	2.593	3.050	Braced	0.639	Section O.K.

PROVIDED

STILT - TERRACE FLOOR

MAIN REINFORCEMENT : 8-Y16

STIRRUPS : 4 legged Y8 stirrups @ 7" c/c

DESIGN OF BEAM

BEAM IA : RB1 (230 x 530) FIRST FLOOR

Input data :		
Overall Depth	**Depth**	530
Breadth	**Breadth**	230
Factored Moment	**(Mu) kN.m**	169
Torsion	**(Tu) kN.m**	0
Equivalent Moment	**(Me) kN.m**	169
Grade of Steel (fy) Mpa		550
Grade of Concrete (fck) Mpa		25
Effective cover Bottom(d')		57
Effective cover Top(dc)		41
Amount of redistribution (%)		0
Solution :		
WITH OUT REDISTRIBUTION		
eff.depth(d)		473
Xu.max		215.7
Ku.max		0.456
Mu1		170.7
ast1		1016.0
ast2		0.0
Ast		1016.0

Cl Cover	:	25
Dia of stirrups	:	8
Dia of bar	:	16
No of layers	:	3
Eff Cover	:	41

B	:	230
D	:	530
Pt	:	0.93
V	:	92
Torsion	:	0
Resultant V	:	92
no of legs	:	2
Dia of stirrups	:	8

Provide 8 dia @ 300 c/c

pt		0.93		Section	**Ok**
d'/d		0.1			
fsc		353.5			
Asc		0.0			

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TOP REINFORCEMENT : 3-Y16+3-Y16

BOTTOM REINFORCEMENT : 3-Y16

SHEAR REINFORCEMENT : 2 legged Y8 stirrups @ 7" c/c

DESIGN OF SLAB

Design of Slab

1	Size of the slab				
	Breadth of the slab	l_x	=	4.63	m
	Length of the slab	l_y	=	4.78	m
2	Assumed thickness of slab	D	=	125	mm
3	Grade of concrete	f_{ck}	=	25	N/mm^2
4	Grade of steel	f_y	=	550	N/mm^2
5	Condition of slab		=	Interior panels	
6	Load considerations :				

	Self weight of the slab	W_{se}	=	3.13	kN/m^2	Loads as per IS 875-1987
	Floor finish loads on slab	W_{ff}	=	1.00	kN/m^2	Part I & II
	Live load on slab	W_{LL}	=	2.00	kN/m^2	
	Total dead load on slab	W_{td}	=	4.13	kN/m^2	
	Total live load on slab	W_{tL}	=	2.00	kN/m^2	
	Total Factored load on slab	TL	=	9.19	kN/m^2	

7 Bending moment & A_{st} Calculations :

Edge condition of the slab	=	Interior panels	BM coefficients as per
Shorter direction steel requirements :			IS 456-2000, Table 26

Support condition	Coeff a	BM M_u	M_u/bd^2	P_t % A_{st}	A_{st} mm^2	Bar spacing (mm) 8Ø	10Ø	12Ø
Continues supp.	0.034	6.6	0.6	0.14	150.0	315	315	315
Span moment	0.025	5.0	0.45	0.11	150.0	315	315	315
Discont. Support	0.042	8.2	0.74	0.18	186.4	270	315	315

Longer direction steel requirements :

Support condition	Coeff a	BM M_u	M_u/bd^2	P_t % A_{st}	A_{st} mm^2	Bar spacing (mm) 8Ø	10Ø	12Ø
Continues supp.	0.032	6.3	0.57	0.14	150.0	315	315	315

Span moment	0.024	4.7	0.43	0.10	150.0	315	315	315
Discont. Support	0.042	8.2	0.74	0.18	186.4	270	315	315

8 Check for under reinforced section :

Limiting moment of resistance	$M_{u\,lim}$	=	$0.138 \times f_{ck} \times bd^2$					As per IS 456-2000, Cl.38
		=	38.0	KN.m	>	8.2	KN.m	Under reinforced section
Depth required for flexure	d	=	48.8	mm	<	105	mm	Depth is sufficient

9 Check the depth for deflection :

Diameter of the rod used provided spacing	f	=	8	mm	As per,IS 456-2000, clause 23.2.1
			150	mm	
Percentage of steel	$\%A_{st}$	=	0.32%		
MF due to effect of tension steel	MF	=	3		
Depth required for deflection	d	=	59 mm	< 105 mm	Slab safe for deflection

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SLAB THICKNESS : **125mm**

TOP REINFORCEMENT : SHORTER - Y8 @ 150mm, LONGER - Y8 @ 150mm

BOTTOM REINFORCEMENT : SHORTER - Y8 @ 150mm, LONGER - Y8 @ 150mm

DESIGN OF ISOLATED FOOTING

Design of Isolated Footing : C6-F5

	Design of Isolated square footing					
1	Factored load on the column		P_u	=	957	kN
2	Safe bearing capacity of soil		SBC	=	200	kN/m^2
3	Grade of concrete		f_{ck}	=	25	N/mm^2
4	Grade of steel		f_y	=	550	N/mm^2
5	Size of column					
			b	=	230	mm
			D	=	450	mm
6	Area of footing		A	=	3.5	m^2
7	Footing dimensions		l	=	1.90	m
			b	=	1.90	m
	Ultimate pressure below foundation			=	265.1	kN/m^2
8	**Depth for Punching shear**					
	Design shear strength		t_c	=	1.25	N/mm^2
9	Actual punching shear equation	=	d^2		d	const
			-0.3		-180.27	929562.47
	Allowable punching shear equation	=	d^2		d	const
			5.0		1700.0	0
	Depth required for punching shear		d	=	***278.0***	mm
10	***Depth for Bending moment***					
	BM about minor axis of column		m_u	=	92.4	kN.m
	Depth required for bending moment		d	=	***166.7***	mm
	Depth taken for iteration calculations		D	=	350.0	mm

11	***Depth for one-way shear***				
	Iterated Percentage of steel	p_t	=	0.12	%
	Design shear strength	t_c	=	0.27	N/mm^2
	Depth required for One way shear	d	=	***361.1***	mm
		D	=	425.0	mm
	Governing depth of footing	D	=	*450*	mm
	Size of footing to provide	=		*1.9m x 1.9m x 0.450m*	

12	***Area of steel calculation***	A_{st}^2	A_{st}	Const
		10.5	-191400	92416111

		A_{st}	=	***943***	mm^2
13	***Size of footing to provide***	=	*1.9m x1.9m x 0450m*		

14	***Reinforcement to provide***	=	Dia	no. bar	Spacing	c/c
			10.0	13	135.00	mm
			12.0	8	200.00	mm
			16.0	5	360.00	mm

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FOOTING SIZE : **1.98m x 1.98m x** 0.45m

BOTTOM REINFORCEMENT : Y12 @ 125mm c/c

Annexure – XIV

[See rule 51 (3)]

Form 1

Structural Design Basis Report

(1) This report to accompany the application for Building Developments

Part1	General Data		
S.No.	**Description**	**Information**	**Notes**
1.	Site Address	413/1B3, SOMAYAMPALAYAM VILLAGE, COIMBATORE NORTH TALUK, COIMBATORE DISTRICT.	
2	Name of Owner	Keartiman skills private Limited	
3	Name of Registered Developer along with the Registration Number	Nil	
4	Name of Registered Architect/Engineer along with the Registration Number	Ar. John Antony J.R (CA/2004/33239)	
5	Name of Registered Structural engineer along with the Registration Number	Dr. L.S.Jayagopal (SE/GR-I/2019/05/117)	
6	Use of the building	Residential	
7	Number of stories above ground level (including storey to be added later, if any)	Block-1to 4 (Ground+5floors) Block-5 (Basement+Ground+ 5floors) Block-6 (Ground+4floors)	
8	Number of basements below ground level	1	
9	Type of structure Load bearing walls R.C.C. frame R.C.C. frame and Shear Walls Steel frame	R.C.C Frame and shear walls	
10	Soil data Type of soil Design safe bearing capacity	• REDDISH SAND WITH FINES • 200kN/m2 @ 3m depth	IS:1893 C1.6.3.5.2 IS: 1904 IS: 1892 IS: 2131 IS: 2720

11	Dead loads (unit weight • adopted) Earth • Water • Brick masonry • Plain cement concrete • Reinforced cement • concrete Floor finish • Other fill materials	 18 kN/m3 10 kN/m3 18.85 kN/m3 24 kN/m3 25 kN/m3 1.5 kN/m2	IS: 875 Part 1
12	Imposed (live) loads		IS: 875 Part 2
	Floor loads	2 kN/m2	
	Roof loads	2 kN/m2	
13	Cyclone/Wind • Speed • Design pressure intensity		IS: 875 Part 3

14	Seismic zone		IS: 1893 (2002)
15	Importance factor		IS:1893(2002) Table 6
16	Seismic zone factor (Z)		IS:1893 Table 2
17	Response reduction factor		IS:1893 Table 7
18	Fundamental natural period – approx.		IS:1893 C1.7.6
19	Design horizontal acceleration spectrum value (A_h)		IS: 1893 C1.6.4.2
20	♥ Expansion/Separation Joints		
21	Building is regular/irregular		IS 1893

♥ Enclose detailed drawings drawn to scale for each floor

♦ In case terrace garden is provided, indicate additional fill load and live load along with the detailed drawings drawn to scale

Part 2	Load bearing masonry buildings		
Sl.No.	**Description**	**Information**	**Notes**
1	Building category		IS: 4326 C1.7 Read with IS:1893 Zone / Bldg. — II III IV V Ordinary — B C D E Important — C D E E
2	Basement Provided		
3	Number of floors including Ground Floor (all floors including stepped floors in hill slopes)		
4	Type of wall masonry		
5	Type and mix of Mortar		IS: 4326 C1.8.1.2
6	Re: size and position of openings (See note No.[i]) • Minimum distance (b5) • Ratio $(b_1+b_2+b_3)/1_1$ or $(b_6+b_7)/1_2$ • Minimum pier width between consequent opening (b_4) • Vertical distance (h_3) • Ratio of wall height to thickness 4 Ratio of wall length between cross wall to thickness		IS: 4326 Table 4, Fig.7
7	Horizontal seismic band • at plinth level • at window sill level • at lintel level • at ceiling level	P IP NA ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐	(see note No.2) IS:4326 C1 8.4.6 IS: 4326 C1 8.3 IS: 4326 C1 8.4.2 IS: 4326 C1 8.4.3 IS: 4326 C1 8.4.3

	• at eave level of sloping roof • at top of gable walls • at top of ridge walls	□ □ □ □ □ □ □ □ □	IS: 4326 C1 8.4.3 IS: 4326 C1 8.4.4
8	Vertical reinforcing bar at corners and T junction of walls at jambs of doors and window openings	□ □ □ □ □ □	IS: 4326 C1 8.4.8. IS: 4326 C1 8.4.9
9	Integration of prefab roofing/flooring elements through reinforced concrete screed.	□ □ □	IS:4326 C1 9.1.4
10	Horizontal bracings in pitched truss in horizontal plane at the level of ties in the slopes of pitched roofs	□ □ □ □ □ □	

Notes: (i) Information in Item 6 should be given on separate A4 sheets for all walls with large number of openings

(ii) IP indicated ❽nformation Provided❾

IP indicates ❽nformation to be provided❾NA

indicates ❽Not Applicable❾

Tick mark one box

Part 3	Reinforced concrete framed buildings		
Sl. No.	**Description**	**Information**	**Notes**
1	Type of building • Regular frames • Regular frames with Shear Walls • Irregular frames • Irregular frames with Shear Walls • Soft storey	Regular frames	IS: 1893 C1 7.1
2	Number of basements	NIL	
3	Number of floors including ground floor	G+2	
4	Horizontal floor system • Beams and slabs • Waffles • Ribbed floor • Flat slab with drops • Flat plate without drops	Beams and slabs	
5	Soil data • Type of soil • Recommended type of foundation -Independent footings -Raft -Piles • Recommended bearing capacity of soil	1.Reddish sand with fines 2.Isolated footings 3. 20 Ton/m2	IS: 1498

	• Recommended type, length, diameter and load capacity of piles • Depth of water table • Chemical analysis of ground water • Chemical analysis of soil		
6	Foundations Depth below ground level Type Independent Interconnected Raft Piles	Independent	
7	System of interconnecting foundations Plinth beams Foundation beams	Plinth beams	IS: 1893 C1 7.12.1
8	Grades if concrete used in different parts of building	M25	
9	Method of analysis used	Finite Element Method	
10	Computer software used	STAAD Pro	
11	Torsion included	Yes	IS: 1893 C1 7.9
12	Base shear a. Based on approximate fundamental period b. Based on dynamic analysis c. Ratio of a/b		IS: 1893 Cl. 7.5.3
13	Distribution of seismic forces along the height of the building.		IS:1893 Cl.7.7 (Provide sketch)
14	The Column of soft ground storey specially designed.		IS: 1893 Cl.7.10
15	Clear minimum cover provided in • Footing • Column • Beams • Slabs • Walls	50mm 40mm 25mm 15mm 25mm	IS: 456 Cl. 26.4
16	Ductile detailing of RC frame • Type of reinforcement used • Minimum dimension of beams • Minimum dimension of columns • Minimum percentage of reinforcement of beams at any cross section • Maximum percentage of reinforcement at any section of beam • Spacing of transverse reinforcement in 2-d length of beams near the ends • Ratio of capacity of beams in shear to capacity of beams in flexure • Maximum percentage of reinforcement in column	• TMT 550 • 230 mm • 230 mm • 0.8% • 0.85bd/fy • 150mm • 4%	IS: 456 Cl. 5.6 IS: 13920 Cl.6.1 IS: 13920 Cl.7.1.2 IS: 456 Cl.26.5.1(a) IS: 13920 Cl.6.2.1 IS: 456 Cl.26.5.1.1(b) IS: 13920 Cl.6.2.2 IS: 13920 Cl.6.3.5 IS: 456 Cl.26.5.3.1 IS: 13920 Cl. 7.4

	• Confining stirrups near ends of columns and in beam-column joints Diameter Spacing • Ratio of shear capacity of columns to maximum seismic shear in the storey.	8 or 10 mm 100mm	
17	Does the features require clearance by SDRP Example: High rise building Prefab building Building in hazard prone areas		

Foundation

i. In case raft foundation has been adopted, indicate K value used for analysis of the raft.

ii. Incase pile foundations have been used, give full particulars of the piles, type, dia, length, capacity

iii. In case of high water table, indicate system of countering water pressure, and indicate the existing water table, and that assumed to design foundations.

Idealization for Earthquake analysis

i. In case of composite system of shear walls and rigid frames, give distribution of base shear in the two systems on the basis of analysis, and that used for design of each system

ii. Indicate the idealization of frames and shear walls adopted in the analysis with the help of sketches.

iii. Submit framing plans of each floor

iv. In case of basements, indicate the system used to contain earth pressures.

Part 4	**Buildings in structural steel**		
1	Adopted method of design	o Simple o Semi-rigid o Rigid	IS:800 Cl 3.4.4 IS:800 Cl.3.4.5 IS:800 Cl.3.5.6
2	Design based on	o Elastic analysis o Plastic analysis	IS: 800 Section-9 SP;6 (6)
3	Floor construction	o Composite o Non composite o Boarded	
4	Roof construction	o Composite o Non composite o Metal o Any other	
5	Horizontal force resisting system adopted	Frames Braced frames Frames & shear walls	Note: Seismic force As per IS:1893 Would depend on system
6	Slenderness ratios maintained	Members defined in Table 3.1, IS:800	IS 800; Cl.3.7
7	Member deflection	Beams, Rafters	IS:800 Cl.3.13

	limited to	Crane Girders, Purlins Top of columns	
8	Structural members	o Encased in concrete Not encased	IS: 800 Section-10
9	Proposed material	o General weld-able o High strength o Cold formed o Tubular	IS: 2062 IS: 8500 IS: 801, 811 IS: 806
10.	Minimum metal thickness Specified for corrosion protection	o Hot rolled sections o Cold formed sections o Tubes	IS: 800, Cl.3.8 Cl.3.8.1 to Cl.3.8.4 Cl.3.8.5
11	Structural connections	o Rivets o CT Bolts o S H F G Bolts o Black Bolts o Welding field Shop (Specify welding type proposed) Composite o	IS: 800, Section-8 IS: 1929, 2155, 1149 IS 6639, 1367 IS 3757, 4000 IS: 1363, 1367 IS: 816, 814,1395, 7280, 3613, 6419, 6560, 813, 9595
12	Minimum Fire rating proposed, with method	Rating 99999hour s o Method proposed. -In tumescent painting -Spraying -Quilting -Fire retardant boarding	IS: 1641, 1642, 1643

Part-5

Any special weakness in the building making it vulnerable for stability related failure and the precaution to be taken during execution/completion and finishing to be indicated.

Part-6

Recommendations of structural Engineer with respect to special requirements needed with respect to structural safety and stability to be taken note of by competent authority feature like incorporation of swimming pool, heavy load on roof ,prefabricated structure or any other hazardous features should be included.

Date :17-02-2026

Signature of Structural Engineer

Dr. L.S. JAYAGOPAL B.E.,M.Tech.,Ph.D.,FIE.,
Chartered Engineer (F12987)
CMDA/SE/GR-I/2019/05/117
No: 1, Jawahar Nagar, SAHS P.O.,
Coimbatore - 641 043.