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DIGITALLY VERIFIED RECORD

N.KANAGAVEL M.E.,M.B.A.,MIE.,FIV
Chartered Engineer,Structural Consultant and Approved Valuer

CA- 12, Tarangini Complex
Ambattur Industrial Estate, **Chennai -600058**

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29.04.2025

STABILITY CERTIFICATE

1. The detailed engineering and structure design of the proposed building comprising of stilt + five floors Commercial cum Residential Building with 8 dwelling units (Office – 1st Floor, Residential – 2nd to 5th Floor) at New Door No.6, Old Door No.5A, 5B, 5C, 5D, 5E, 5F P T Rajan Salai, Kalinga Colony, K.K. Nagar, Chennai – 600078, Comprised in Old S.No.55/1A Part, 56/1B Part & T.S.No.2/17, Block No.98 of Kodambakkam Village, Mambalam Taluk, Chennai District has been done by me/us based on the report of geotechnical investigation (soil test) done by Nagadi Consultants (P) Ltd., Report No. G©9941 Dated 13.06.2024 and considering the functional requirement of the building.

2. It is certified that among other factors, the proposed building has been designed to resist earthquake. I/We have checked various parameters and found that the proposed building would be safe.

3. I/We further certify that:

(i) The minimum grade of concrete is M25

(ii)The design and analysis has been done using the code of practice for plain and reinforced concrete as per IS456, design loads as per IS Codes No.IS875-1987and design of earthquake resistant structure as per IS Code No. ISt 893 (part1):2016

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

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Stamp and Signature

Encl.: Structural Design Calculation

Design Specifications:

The proposed structure are to be designed for stilt + five floors and to be of framed structure to resist the seismic effect of zone III as per IS 1893 – 2016. The usage of the building is for residential cum commercial purpose.

Soil:

As per Nagadi Consultants (P) Ltd., geo technical report G(C) 9941, the foundation recommendations are:

(i) type of foundation	=	Isolated / combined
(ii) Depth of foundation	=	2.00 m
(ii) SBC @ 2.00 m depth	=	120kn/m^2

Floor Heights Considered:

Foundation depth	=	2.00m
Car parking level	=	0.60m
Stilt and typical floors height	=	3.05m

Analysis and Design:

Analysis part is done using ETAB software and the designing part by manual calculations in accordance with IS 456 – 2000, IS 1893 - 2016 and SP – 16.

Materials:

The following recommendations of materials are to be used

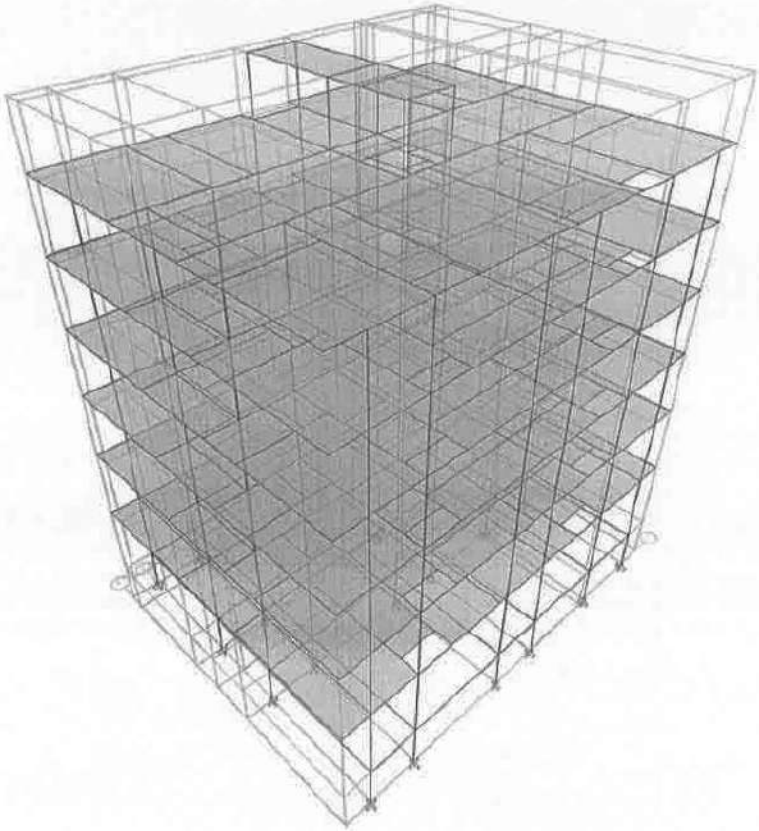
(i) Grade of concrete : M25 grade for all RCC members

(ii) Grade of steel : Fe 500 for all diameter

(iii) Potable quality of water to be used for all construction activities including curing.

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ETABS®



User Report

Model File: stilt+5-09.09.2022,
29-Mar-25

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1 Structure Data

This chapter provides model geometry information, including items such as story levels, point coordinates, and element connectivity.

1.1 Story Data

Table 1.1 - Story Definitions

Tower	Name	Height m	Master Story	Similar To	Splice Story	Color
T1	head room	2.5	No	None	No	Yellow
T1	roof	3.05	No	None	No	Yellow
T1	story5	3.05	No	story2	No	Yellow
T1	story4	3.05	No	story2	No	Yellow
T1	story3	3.05	No	story2	No	Yellow
T1	story2	3.35	Yes	None	No	Gray8Dark
T1	story1	3.6	No	None	No	Blue
T1	plinth beam	2	No	None	No	Green

2 Properties

This chapter provides property information for materials, frame sections, shell sections, and links.

2.1 Materials

Table 2.1 - Material Properties - General

Material	Type	SymType	Grade	Color	Notes
4000Psi	Concrete	Isotropic	fc 4000 psi	Gray8Dark	
A416Gr270	Tendon	Uniaxial	Grade 270	Green	
A615Gr60	Rebar	Uniaxial	Grade 60	Blue	
A992Fy50	Steel	Isotropic	Grade 50	Yellow	
HYSD500	Rebar	Uniaxial	HYSD Grade 500	Cyan	
M25	Concrete	Isotropic	M25	Cyan	

2.2 Frame Sections

Table 2.2 - Frame Section Property Definitions - Summary (Part 1 of 3)

Name	Material	Shape	Color	Area cm2	J cm4	I33 cm4	I22 cm4	As2 cm2	As3 cm2	S33Pos cm3	S33Neg cm3
B230x300	M25	Concrete Rectangular	Cyan	690	64595.3	51750	30417.5	575	575	3450	3450
B230x380	M25	Concrete Rectangular	Gray8Dark	874	96005	105171.3	38528.8	728.3	728.3	5535.3	5535.3
B230x450	M25	Concrete Rectangular	Blue	1035	124072.6	174656.3	45626.3	862.5	862.5	7762.5	7762.5
B230x525	M25	Concrete Rectangular	Green	1207.5	154336.3	277347.7	53230.6	1006.2	1006.2	10565.6	10565.6
B230x600	M25	Concrete Rectangular	Magenta	1380	184679.1	414000	60835	1150	1150	13800	13800
C230x230	M25	Concrete Rectangular	Blue	529	39410.9	23320.1	23320.1	440.8	440.8	2027.8	2027.8
C230x300	M25	Concrete Rectangular	Yellow	690	64595.3	51750	30417.5	575	575	3450	3450
C230x450	M25	Concrete Rectangular	Cyan	1035	124072.6	174656.3	45626.3	862.5	862.5	7762.5	7762.5
C230x525	M25	Concrete Rectangular	Cyan	1207.5	154336.3	277347.7	53230.6	1006.2	1006.2	10565.6	10565.6
C230x600	M25	Concrete Rectangular	Blue	1380	184679.1	414000	60835	1150	1150	13800	13800

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Name	Material	Shape	Color	Area cm2	J cm4	I33 cm4	I22 cm4	As2 cm2	As3 cm2	S33Pos cm3	S33Neg cm3
C300x525	M25	Concrete Rectangular	Red	1575	303911.4	361757.8	118125	1312.5	1312.5	13781.3	13781.3
C300x600	M25	Concrete Rectangular	Magenta	1800	370785.9	540000	135000	1500	1500	18000	18000
ConcBm	M25	Concrete Rectangular	Gray8Dark	1875	474572.9	390625	219726.6	1562.5	1562.5	15625	15625
ConcCol	M25	Concrete Rectangular	Yellow	1406.3	278503.4	164794.9	164794.9	1171.9	1171.9	8789.1	8789.1
SteelBm	A992Fy50	Steel I/Wide Flange	Magenta	71.4	25.7	30343.2	965.5	31.3	37.4	1213.7	1213.7
SteelCol	A992Fy50	Steel I/Wide Flange	Red	306.3	551.8	150638	52090.7	63.4	222.5	6025.5	6025.5

Table 2.2 - Frame Section Property Definitions - Summary (Part 2 of 3)

S22Pos cm3	S22Neg cm3	Z33 cm3	Z22 cm3	R33 mm	R22 mm	Cw cm6	CG Offset 3 mm	CG Offset 2 mm	PNA Offset 3 mm	PNA Offset 2 mm	Area Modifier	As2 Modifier
2645	2645	5175	3967.5	86.6	66.4		0	0	0	0	1	1
3350.3	3350.3	6303	5025.5	109.7	66.4		0	0	0	0	1	1
3967.5	3967.5	11643.8	5951.3	129.9	66.4		0	0	0	0	1	1
4628.8	4628.8	15848.4	6943.1	151.6	66.4		0	0	0	0	1	1
5290	5290	20700	7935	173.2	66.4		0	0	0	0	1	1
2027.8	2027.8	3041.8	3041.8	66.4	66.4		0	0	0	0	1	1
2645	2645	5175	3967.5	86.6	66.4		0	0	0	0	1	1
3967.5	3967.5	11643.8	5951.3	129.9	66.4		0	0	0	0	1	1
4628.8	4628.8	15848.4	6943.1	151.6	66.4		0	0	0	0	1	1
5290	5290	20700	7935	173.2	66.4		0	0	0	0	1	1
7875	7875	20671.9	11812.5	151.6	86.6		0	0	0	0	1	1
9000	9000	27000	13500	173.2	86.6		0	0	0	0	1	1
11718.8	11718.8	23437.5	17578.1	144.3	108.3		0	0	0	0	1	1
8789.1	8789.1	13183.6	13183.6	108.3	108.3		0	0	0	0	1	1
115.9	115.9	1368.2	178.2	206.2	36.8	573052.3	0	0	0	0	1	1
2083.6	2083.6	6570.3	3142.6	221.8	130.4	29378235.2	0	0	0	0	1	1

2.3 Shell Sections

Table 2.3 - Area Section Property Definitions - Summary

Name	Type	Element Type	Material	Total Thickness mm	Deck Material	Deck Depth mm
Deck1	Deck	Membrane	4000Psi	182.5	A992Fy50	75
Slab1	Slab	Shell-Thin	M25	125		
Wall1	Wall	Shell-Thin	M25	230		

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3 Loads

This chapter provides loading information as applied to the model.

3.1 Load Patterns

Table 3.1 - Load Pattern Definitions

Name	Is Auto Load	Type	Self Weight Multiplier	Auto Load
EQx	No	Seismic	0	IS 1893:2016
EQy	No	Seismic	0	IS 1893:2016

3.2 Auto Seismic Loading

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

Structural Period

Period Calculation Method = User Specified

User Period — $T = 0.4$ 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] — $I = 1$

Site Type [IS Table 1] = II

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

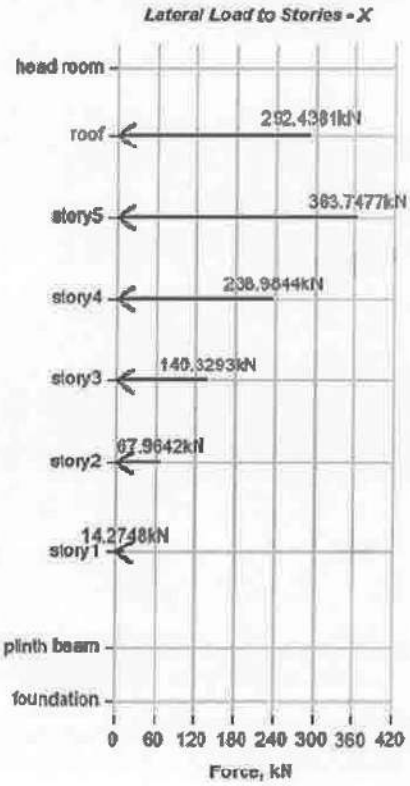
Seismic Coefficient, A_h [IS 6.4.2] $A_h = \frac{ZI\frac{S_a}{g}}{2R}$

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Calculated Base Shear

Direction	Period Used (sec)	W (kN)	V_b (kN)
X	0.4	27943.4623	1117.7385

Applied Story Forces



Story	Elevation	X-Dir	Y-Dir
	m	kN	kN
head room	21.65	0	0
roof	19.15	292.4381	0
story5	16.1	363.7477	0
story4	13.05	238.9844	0
story3	10	140.3293	0
story2	6.95	67.9642	0
story1	3.6	14.2748	0
plinth beam	0	0	0
foundation	-2	0	0

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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

Structural Period

Period Calculation Method = User Specified

User Period — T = 0.4 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

Site Type [IS Table 1] = II

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

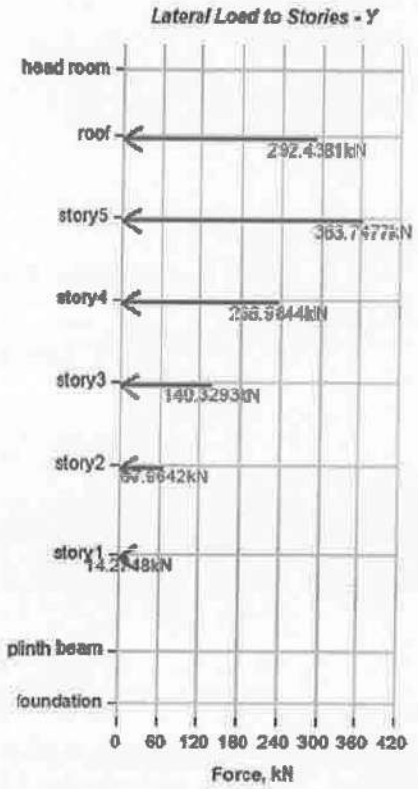
Seismic Coefficient, A_h [IS 6.4.2] $A_h = \frac{ZI\frac{S_a}{g}}{2R}$

Calculated Base Shear

Direction	Period Used (sec)	W (kN)	V_b (kN)
Y	0.4	27943.4823	1117.7385

Applied Story Forces

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Story	Elevation	X-Dir	Y-Dir
	m	kN	kN
head room	21.65	0	0
roof	19.15	0	292.4381
story5	16.1	0	363.7477
story4	13.05	0	238.9844
story3	10	0	140.3293
story2	6.95	0	67.9642
story1	3.8	0	14.2748
plinth beam	0	0	0
foundation	-2	0	0

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3.4 Load Combinations

Table 3.5 - Load Combination Definitions

Name	Type	Is Auto	Load Name	SF	Notes
0.9DL-1.5EQx	Linear Add	No	Dead	0.9	
0.9DL-1.5EQx			floor finish	0.9	
0.9DL-1.5EQx			sunken filling	0.9	
0.9DL-1.5EQx			wall load	0.9	
0.9DL-1.5EQx			EQx	-1.5	
0.9DL-1.5EQy	Linear Add	No	Dead	0.9	
0.9DL-1.5EQy			floor finish	0.9	
0.9DL-1.5EQy			sunken filling	0.9	
0.9DL-1.5EQy			wall load	0.9	
0.9DL-1.5EQy			EQy	-1.5	
0.9DL+1.5EQx	Linear Add	No	Dead	0.9	
0.9DL+1.5EQx			floor finish	0.9	
0.9DL+1.5EQx			sunken filling	0.9	
0.9DL+1.5EQx			wall load	0.9	
0.9DL+1.5EQx			EQx	1.5	
0.9DL+1.5EQy	Linear Add	No	Dead	0.9	
0.9DL+1.5EQy			floor finish	0.9	
0.9DL+1.5EQy			sunken filling	0.9	
0.9DL+1.5EQy			wall load	0.9	
0.9DL+1.5EQy			EQy	1.5	
1.2(DL+LL+EQx)	Linear Add	No	Dead	1.2	
1.2(DL+LL+EQx)			floor finish	1.2	
1.2(DL+LL+EQx)			sunken filling	1.2	
1.2(DL+LL+EQx)			wall load	1.2	
1.2(DL+LL+EQx)			Live	1.2	
1.2(DL+LL+EQx)			EQx	1.2	
1.2(DL+LL+EQy)	Linear Add	No	Dead	1.2	
1.2(DL+LL+EQy)			floor finish	1.2	
1.2(DL+LL+EQy)			sunken filling	1.2	
1.2(DL+LL+EQy)			wall load	1.2	
1.2(DL+LL+EQy)			Live	1.2	
1.2(DL+LL+EQy)			EQy	1.2	
1.2(DL+LL-EQx)	Linear Add	No	Dead	1.2	
1.2(DL+LL-EQx)			floor finish	1.2	
1.2(DL+LL-EQx)			sunken filling	1.2	
1.2(DL+LL-EQx)			wall load	1.2	
1.2(DL+LL-EQx)			Live	1.2	
1.2(DL+LL-EQx)			EQx	-1.2	
1.2(DL+LL-EQy)	Linear Add	No	Dead	1.2	
1.2(DL+LL-EQy)			floor finish	1.2	
1.2(DL+LL-EQy)			sunken filling	1.2	
1.2(DL+LL-EQy)			wall load	1.2	
1.2(DL+LL-EQy)			Live	1.2	
1.2(DL+LL-EQy)			EQy	-1.2	
1.5(DL+EQx)	Linear Add	No	Dead	1.5	
1.5(DL+EQx)			floor finish	1.5	
1.5(DL+EQx)			sunken filling	1.5	
1.5(DL+EQx)			wall load	1.5	
1.5(DL+EQx)			EQx	1.5	
1.5(DL+EQy)	Linear Add	No	Dead	1.5	
1.5(DL+EQy)			floor finish	1.5	
1.5(DL+EQy)			sunken filling	1.5	
1.5(DL+EQy)			wall load	1.5	

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Name	Type	Is Auto	Load Name	SF	Notes
1.5(DL+EQy)			EQy	1.5	
1.5(DL+LL)	Linear Add	No	Dead	1.5	
1.5(DL+LL)			Live	1.5	
1.5(DL+LL)			floor finish	1.5	
1.5(DL+LL)			sunken filling	1.5	
1.5(DL+LL)			wall load	1.5	
1.5(DL-EQx)	Linear Add	No	Dead	1.5	
1.5(DL-EQx)			floor finish	1.5	
1.5(DL-EQx)			sunken filling	1.5	
1.5(DL-EQx)			wall load	1.5	
1.5(DL-EQx)			EQx	-1.5	
1.5(DL-EQy)	Linear Add	No	Dead	1.5	
1.5(DL-EQy)			floor finish	1.5	
1.5(DL-EQy)			sunken filling	1.5	
1.5(DL-EQy)			wall load	1.5	
1.5(DL-EQy)			EQy	-1.5	
DL+0.8LL-0.8EQx	Linear Add	No	Dead	1	
DL+0.8LL-0.8EQx			floor finish	1	
DL+0.8LL-0.8EQx			sunken filling	1	
DL+0.8LL-0.8EQx			wall load	1	
DL+0.8LL-0.8EQx			Live	0.8	
DL+0.8LL-0.8EQx			EQx	-0.8	
DL+0.8LL-0.8EQy	Linear Add	No	Dead	1	
DL+0.8LL-0.8EQy			floor finish	1	
DL+0.8LL-0.8EQy			sunken filling	1	
DL+0.8LL-0.8EQy			wall load	1	
DL+0.8LL-0.8EQy			Live	0.8	
DL+0.8LL-0.8EQy			EQy	-0.8	
DL+0.8LL+0.8EQx	Linear Add	No	Dead	1	
DL+0.8LL+0.8EQx			floor finish	1	
DL+0.8LL+0.8EQx			sunken filling	1	
DL+0.8LL+0.8EQx			wall load	1	
DL+0.8LL+0.8EQx			Live	0.8	
DL+0.8LL+0.8EQx			EQx	0.8	
DL+0.8LL+0.8EQy	Linear Add	No	Dead	1	
DL+0.8LL+0.8EQy			floor finish	1	
DL+0.8LL+0.8EQy			sunken filling	1	
DL+0.8LL+0.8EQy			wall load	1	
DL+0.8LL+0.8EQy			Live	0.8	
DL+0.8LL+0.8EQy			EQy	0.8	
DL+EQx	Linear Add	No	Dead	1	
DL+EQx			floor finish	1	
DL+EQx			sunken filling	1	
DL+EQx			wall load	1	
DL+EQx			EQx	1	
DL+EQy	Linear Add	No	Dead	1	
DL+EQy			floor finish	1	
DL+EQy			sunken filling	1	
DL+EQy			wall load	1	
DL+EQy			EQy	1	
DL+LL	Linear Add	No	Dead	1	
DL+LL			Live	1	
DL+LL			floor finish	1	
DL+LL			sunken filling	1	
DL+LL			wall load	1	

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Name	Type	Is Auto	Load Name	SF	Notes
DL-EQx	Linear Add	No	Dead	1	
DL-EQx			floor finish	1	
DL-EQx			sunken filling	1	
DL-EQx			wall load	1	
DL-EQx			EQx	-1	
DL-EQy	Linear Add	No	Dead	1	
DL-EQy			floor finish	1	
DL-EQy			sunken filling	1	
DL-EQy			wall load	1	
DL-EQy			EQy	-1	
envelope	Envelope	No	1.5(DL+LL)	1	
envelope			1.2(DL+LL+EQx)	1	
envelope			1.2(DL+LL-EQx)	1	
envelope			1.2(DL+LL+EQy)	1	
envelope			1.2(DL+LL-EQy)	1	
envelope			1.5(DL+EQx)	1	
envelope			1.5(DL-EQx)	1	
envelope			1.5(DL+EQy)	1	
envelope			1.5(DL-EQy)	1	
envelope			0.9DL+1.5EQx	1	
envelope			0.9DL-1.5EQx	1	
envelope			0.9DL+1.5EQy	1	
envelope			0.9DL-1.5EQy	1	

4 Analysis Results

This chapter provides analysis results.

4.1 Structure Results

Table 4.1 - Base Reactions

Output Case	Case Type	Step Type	FX kN	FY kN	FZ kN	MX kN-m	MY kN-m	MZ kN-m	X m	Y m	Z m
Dead	LinStatic		0	0	10996.7827	530360.9277	60867.5109	0	0	0	-2
Live	LinStatic		0	0	3511.6408	170220.4537	25726.4984	0	0	0	-2
floor finish	LinStatic		0	0	5217.4137	25 679.4431	38354.898	0	0	0	-2
sunken filling	LinStatic		0	0	1271.8425	86359.209	8701.4223	0	0	0	-2
wall load	LinStatic		0	0	11409.8269	550076.1785	83778.2262	0	0	0	-2
EQx	LinStatic		-1117.7385	0	0	0	-18737.7835	53870.172	0	0	-2
EQy	LinStatic		0	-1117.7385	0	18737.7835	0	8164.296	0	0	-2
roof	LinStatic		0	0	565.1036	27240.053	4229.0526	0	0	0	-2
DL+LL	Combination		0	0	32406.7066	1562996.3019	237428.5564	0	0	0	-2
1.5(DL+LL)	Combination		0	0	48610.0598	2344494.4529	356142.8345	0	0	0	-2
1.2(DL+LL+EQx)	Combination		-1341.2862	0	38888.0479	1875595.5623	262428.9274	64644.2064	0	0	-2
1.2(DL+LL-EQx)	Combination		1341.2862	0	38888.0479	1875595.5623	307399.6078	-64644.2064	0	0	-2
1.2(DL+LL+EQy)	Combination		0	-1341.2862	38888.0479	1898080.9025	284914.2676	9797.1552	0	0	-2
1.2(DL+LL-EQy)	Combination		0	1341.2862	38888.0479	1853110.2221	284914.2676	-9797.1552	0	0	-2

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Output Case	Case Type	Step Type	FX kN	FY kN	FZ kN	MX kN-m	MY kN-m	MZ kN-m	X m	Y m	Z m
1.5(DL+EQx)	Combination		-1676.6077	0	43342.5987	2089163.7723	289446.4116	80805.2581	0	0	-2
1.5(DL-EQx)	Combination		1676.6077	0	43342.5987	2089163.7723	345559.7922	-80805.2581	0	0	-2
1.5(DL+EQy)	Combination		0	-1676.6077	43342.5987	2117270.4476	317553.0869	12246.444	0	0	-2
1.5(DL-EQy)	Combination		0	1676.6077	43342.5987	2061057.097	317553.0869	-12246.444	0	0	-2
0.9DL+1.5EQx	Combination		-1676.6077	0	26005.5592	1253498.2634	162425.1769	80805.2581	0	0	-2
0.9DL-1.5EQx	Combination		1676.6077	0	26005.5592	1253498.2634	218638.5274	-80805.2581	0	0	-2
0.9DL+1.5EQy	Combination		0	-1676.6077	26005.5592	1281604.9387	190531.8521	12246.444	0	0	-2
0.9DL-1.5EQy	Combination		0	1676.6077	26005.5592	1225391.5881	190531.8521	-12246.444	0	0	-2
DL+EQx	Combination		-1117.7385	0	28895.0658	1392775.8482	192964.2744	53870.172	0	0	-2
DL-EQx	Combination		1117.7385	0	28895.0658	1392775.8482	230439.8415	-53870.172	0	0	-2
DL+EQy	Combination		0	-1117.7385	28895.0658	1411513.6317	211702.0579	8164.296	0	0	-2
DL-EQy	Combination		0	1117.7385	28895.0658	1374038.0647	211702.0579	-8164.296	0	0	-2
DL+0.8LL+0.8EQx	Combination		-894.1908	0	31704.3784	1528952.2112	217293.0299	43096.1376	0	0	-2
DL+0.8LL-0.8EQx	Combination		894.1908	0	31704.3784	1528952.2112	247273.4835	-43096.1376	0	0	-2
DL+0.8LL+0.8EQy	Combination		0	-894.1908	31704.3784	1543942.438	232283.2567	6531.4368	0	0	-2
DL+0.8LL-0.8EQy	Combination		0	894.1908	31704.3784	1513961.9844	232283.2567	-6531.4368	0	0	-2
envelope	Combination	Max	1676.6077	1676.6077	48610.0598	2344494.4529	356142.8345	80805.2581	0	0	-2
envelope	Combination	Min	-1676.6077	-1676.6077	26005.5592	1225391.5881	162425.1769	-80805.2581	0	0	-2

4.4 Modal Results

Table 4.4 - Modal Participating Mass Ratios (Part 1 of 2)

Case	Mode	Period sec	UX	UY	UZ	SumUX	SumUY	SumUZ	RX	RY	RZ	SumRX
Modal	1	1.796	0.0002	0.8659	0	0.0002	0.8659	0	0.1262	4.753E-05	0.0068	0.1262
Modal	2	1.675	0.0561	0.0061	0	0.0563	0.872	0	0.0012	0.0118	0.8183	0.1274
Modal	3	1.381	0.8298	3.039E-05	0	0.8861	0.872	0	1.014E-05	0.1017	0.0598	0.1274
Modal	4	0.553	1.899E-06	0.0723	0	0.8861	0.9443	0	0.6489	1.201E-05	0.0001	0.7763
Modal	5	0.514	0.0055	5.484E-07	0	0.8917	0.9443	0	0.0003	0.0423	0.0053	0.7765
Modal	6	0.416	0.0594	8.657E-07	0	0.9511	0.9443	0	0	0.6365	0.0037	0.7765
Modal	7	0.302	7.302E-06	0.0188	0	0.9511	0.9631	0	0.0409	3.551E-05	0.0002	0.8175
Modal	8	0.279	0.0012	0.0001	0	0.9522	0.9632	0	0.0002	0.0042	0.0152	0.8176
Modal	9	0.227	0.013	8.201E-07	0	0.9652	0.9632	0	6.231E-06	0.03	0.0012	0.8176
Modal	10	0.206	1.551E-05	0.0079	0	0.9652	0.9711	0	0.0532	4.743E-05	3.903E-05	0.8708
Modal	11	0.194	0.0014	0.0001	0	0.9666	0.9712	0	0.0004	0.0064	0.0051	0.8712
Modal	12	0.168	0.003	5.654E-07	0	0.9697	0.9712	0	3.332E-06	0.0237	0.0011	0.8712
Modal	13	0.155	0	0.0028	0	0.9697	0.974	0	0.0076	1.787E-06	0	0.8789
Modal	14	0.149	0.0028	6.807E-07	0	0.9724	0.974	0	6.401E-07	0.0177	0.0007	0.8789
Modal	15	0.141	0.0011	1.717E-06	0	0.9735	0.974	0	5.537E-06	0.0054	0.0008	0.8789

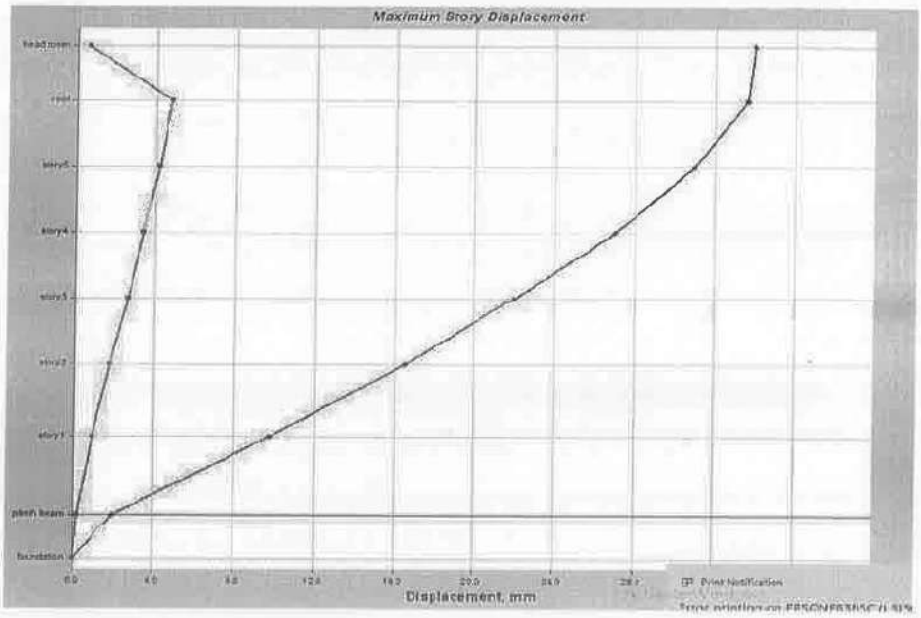
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Table 4.4 - Modal Participating Mass Ratios (Part 2 of 2)

SumRY	SumRZ
4.753E-05	0.0068
0.0118	0.8251
0.1135	0.8849
0.1135	0.885
0.1558	0.9503
0.7924	0.954
0.7924	0.9542
0.7966	0.9694
0.8265	0.9706
0.8266	0.9707
0.833	0.9758
0.8567	0.9769
0.8567	0.9769
0.8744	0.9777
0.8797	0.9785

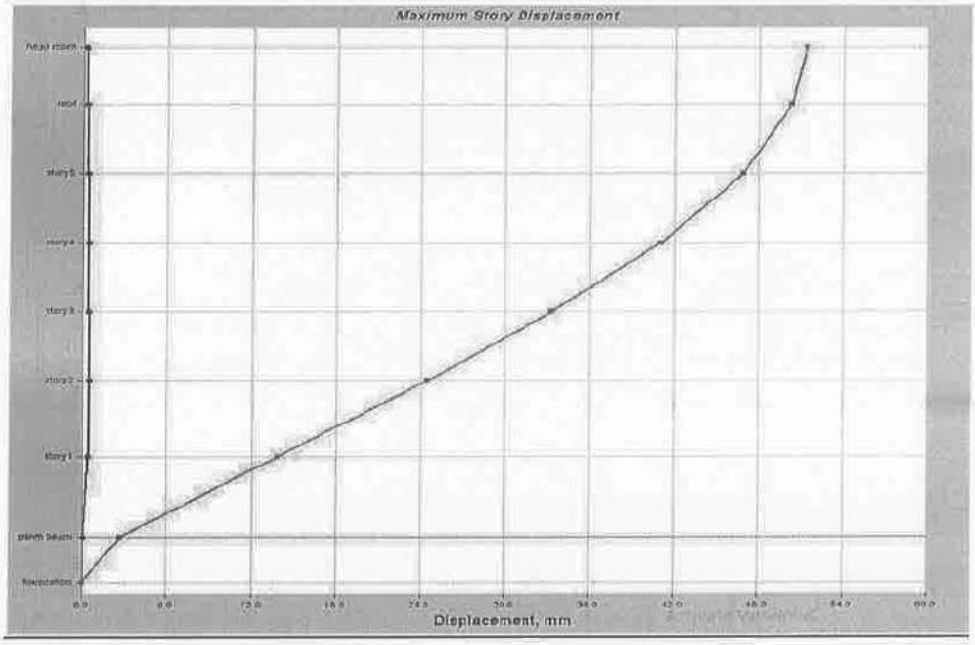
Table 4.5 - Modal Load Participation Ratios

Case	ItemType	Item	Static %	Dynamic %
Modal	Acceleration	UX	99.99	97.35
Modal	Acceleration	UY	100	97.4
Modal	Acceleration	UZ	0	0



Displacement in X – direction

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Displacement in Y – direction

DESIGN OF ISOLATED SQUARE FOOTING: C15

Load in kn (P)	1730	Breadth of pedestal	380
SBC in kn/m^2	120	Length of pedestal	600
Size of the footing required (B)	3.796929	Free end thickness	230
Net upward pressure (q)	119.8061	Size provided in m	3.8
Maximum bending moment @ face of the column (Mu)	998.4263	Size in feet	12.46
Depth required (d)	752.1387	Depth provided (d)	750
K	3.349019		
Pt	0.942		
Ast in mm^2	3744.45		
Spacing of 10mm dia	79.70516		
Spacing of 12mm dia	114.7779		
Spacing of 16mm dia	204.0428		

Check for one way shear:

Shear force (V)	655.5789		
Eff. Depth (d')	535.3211		
Top width	2030		
Tv	0.603274	Tc from table-19	0.612
Pt	0.85		Safe in SHEAR

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Ast in mm^2	9236.966
Spacing of 10mm dia	32.31061
Spacing of 12mm dia	46.52827
Spacing of 16mm dia	82.71418

Check for two way shear:

Punching shear (Vp)	2320.854		
Perimeter of the critical section	4960		
Eff. Depth (d')	654.5872		
Tv	0.714823		
Tc	1.25	Punching Ratio	0.57

Check for transfer of load @ the column base: Safe in punching

Permissible bearing stress	22.5
Actual bearing stress	7.587719

Design of short column with bi axial bending: C15

Description	FF
Axial load in Kn	1124
Moment in Knm (Mux)	26
Moment in Knm (Muy)	110
Assumed length of column in mm (D)	525
Assumed breadth of column in mm (B)	300
Assumed % of steel	3.3
Grade of concrete	25
p/fck	0.132
d'/D	0.095238095
d'/B	0.166666667
Pu/(fck*B*D)	0.428190476
Referring to chart in SP-16	chart-48
Value from chart	0.15
Mux1 in Knm	310.078125
Referring to chart in SP-16	chart-50
Value from chart	0.145
Muy1 in Knm	171.28125
Referring to chart-63 of SP-16	
Puz/ Ag	23
Puz in Kn	3622.5
Pu/Puz	0.465424431
Mux/Mux1	0.125774754
Muy/Muy1	0.96332786
Referring to chart-64 of SP-16	
Permissible Muy/Muy1	0.97
Check	safe and assumed % of steel is correct
Ast required	5197.5
Provide steel	

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Dia of lateral ties:		
Dia of main rod provided	20	
6mm	6mm	
1/4 times Dia of main rod	6.25mm	
Dia of lateral ties choosen	8mm	
Spacing of lateral ties:		
16 times the dia of main rod		320
Least lateral dimension of column		300
Provide 8mm dia 2 legged lateral ties @	175 mm c/c	

Design of Floor Slab:

Assume the slab thickness as 150 mm

Dead load of slab (0.15 x 25) = 3.75 kn/m^2

Live load = 3.00 kn/m^2

Partition wall load = 1.00 kn/m^2

Floor finish load = 1.00 kn/m^2

8.75 kn/m^2

Say w = 9.0 kn/m^2

Long span L_y = 6.78 m

Short span L_x = 3.62 m

L_y / L_x = 1.87 < 2.0

To design as two way slab with two long edges as continuous & slab thickness as 125mm

Positive moment @ mid span = 0.069 x 1.5 x 9 x 3.62^2

= 12.20knm

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Negative moment @ edges = $0.035 \times 1.5 \times 9 \times 3.62^2$

= 6.20knm

Referring to the table – 37 of SP – 16 and the slab thickness as 125mm, provide 8mm dia @ 120mm c/c along shorter span and 8mm dia @ 150mm c/c along the longer span with alternate rods cranked @ 0.2 times of respective span

Check for deflection:

Permissible span / depth = 22.5 x 1.3 (referring to chart 22)

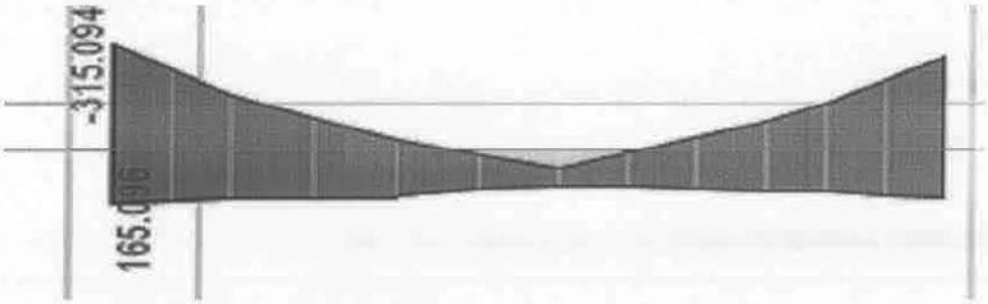
= 29.30

Actual deflection = 3620 / 125

= 28.96 < 29.30

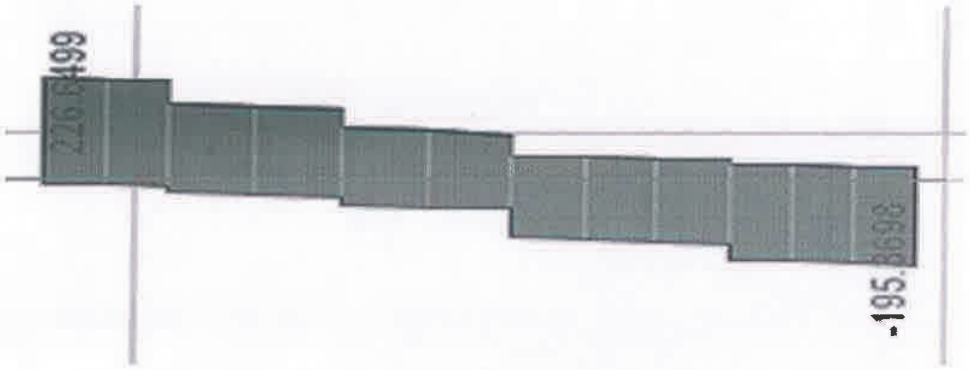
Hence safe

Design of critical floor beam:



Critical Bending Moment Diagram

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Critical Shear Force Diagram

Assume beam size as 230mm x 525mm

Max factored B.M @ top of support = 315knm

K = 5.47, Pt= 1.470, Pc = 0.555

A_{st} = 1691 mm^2 A_{sc} = 639 mm^2

Therefore provide 3-20+3-20mm dia@ top of support

Max factored moment @ bottom = 165knm

K = 2.87, Pt = 0.794, Pc = 0.0

A_{st} = 913 mm^2 A_{sc} = 00 mm^2

Therefore provide 3-20mm dia @ bottom

Factored shear force @ support = 227kn

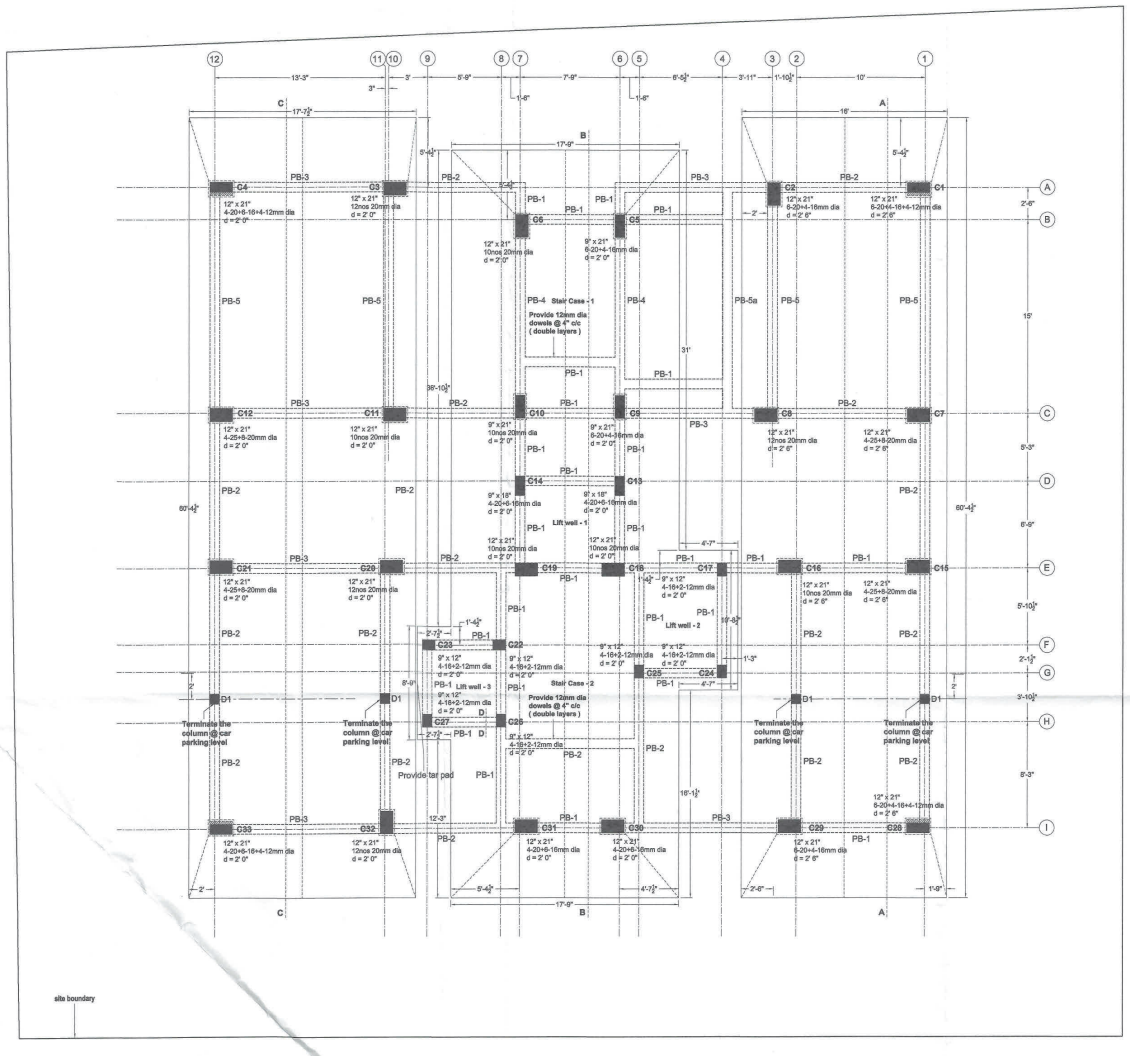
V_{us} = 227000 – (0.74 x 230 x 550)

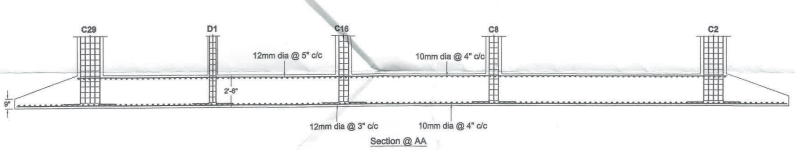
V_{us}/d = 2.84kn/cm

Referring to Table – 62 of SP-16, provide 8mm dia stirrups @ 120mm c/c

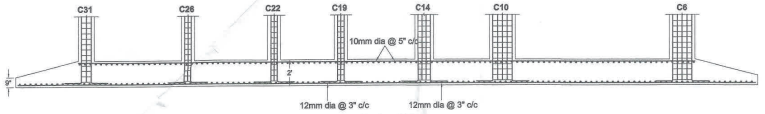
end of report

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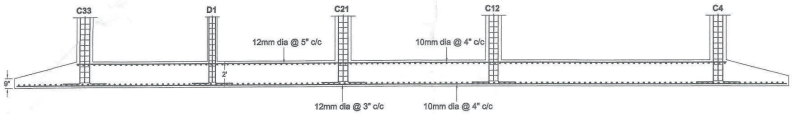




Section @ AA

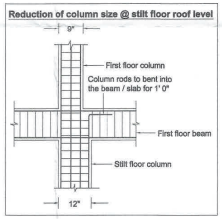


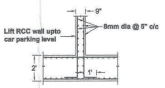
Section @ BB



Section @ CC

Reduction of column size @ stilt floor roof level



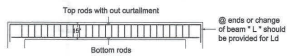


Section @ DD

Column Details:

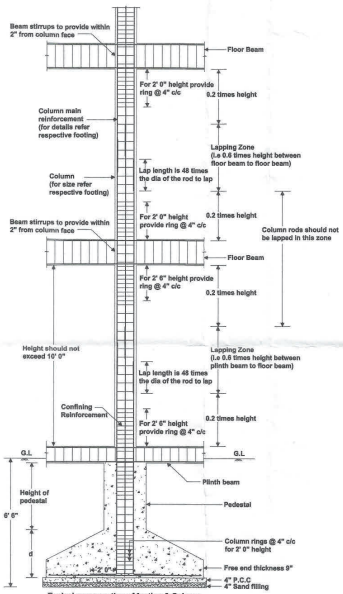
Column no.	Column Size	Pedestal Size	Stilt Floor	First & Second floors	Third, Fourth & Fifth Floors	Maximum Spacing of Rings / Confining Rings
C7, C12, C15 & C21	1' 9" x 1' 0"	2' 0" x 1' 3"	4-25 + 8-20	4-25 + 8-20	4-20 + 8-16	6- legged 8mm dia @ 6" c/c / 8mm dia @ 4" c/c
C3, C8, C20 & C32	1' 9" x 1' 0"	2' 0" x 1' 3"	12nos 20mm	12nos 20mm	4-20 + 8-16	6- legged 8mm dia @ 6" c/c / 8mm dia @ 4" c/c
C6, C11, & C16	1' 9" x 1' 0"	2' 0" x 1' 3"	10nos 20mm	10nos 20mm	4-20 + 6-16	6- legged 8mm dia @ 6" c/c / 8mm dia @ 4" c/c
C18 & C19	1' 9" x 1' 0"	1' 9" x 1' 0"	10nos 20mm	10nos 20mm	4-20 + 6-16	6- legged 8mm dia @ 6" c/c / 8mm dia @ 4" c/c
C2 & C29	1' 9" x 1' 0"	2' 0" x 1' 3"	6-20 + 4-16	6-20 + 4-16	10nos 16mm	6- legged 8mm dia @ 6" c/c / 8mm dia @ 4" c/c
C30 & C31	1' 9" x 1' 0"	2' 0" x 1' 3"	4-20 + 6-16	4-20 + 6-16	10nos 16mm	6- legged 8mm dia @ 6" c/c / 8mm dia @ 4" c/c
C1 & C28	1' 9" x 1' 0" & 1' 9" x 9"	2' 0" x 1' 3"	4nos 12mm + 6-20 + 4-16	6-20 + 4-16	10nos 16mm	6- legged 8mm dia @ 6" c/c / 8mm dia @ 4" c/c
C4 & C33	1' 9" x 1' 0" & 1' 9" x 9"	2' 0" x 1' 3"	4nos 12mm + 4-20 + 6-16	4-20 + 6-16	10nos 16mm	6- legged 8mm dia @ 6" c/c / 8mm dia @ 4" c/c
C10	1' 9" x 9"	2' 0" x 1' 0"	10nos 20mm	10nos 20mm	4-20 + 6-16	6- legged 8mm dia @ 6" c/c / 8mm dia @ 4" c/c
C5 & C9	1' 9" x 9"	2' 0" x 1' 0"	6-20 + 4-16	6-20 + 4-16	10nos 16mm	6- legged 8mm dia @ 6" c/c / 8mm dia @ 4" c/c
C13, & C14	1' 6" x 9"	1' 6" x 9"	4-20 + 6-16	4-20 + 6-16	10nos 16mm	2- legged 8mm dia @ 6" c/c / 8mm dia @ 4" c/c
C17, C22, C23, C24, C25, C26 & C27 (terminate the column @ first floor roof level)	1' 0" x 9"	1' 0" x 9"	4-16 + 2-12	4-16 + 2-12	6nos 12mm	2- legged 8mm dia @ 6" c/c / 8mm dia @ 4" c/c
D1 (terminate the column @ car parking level)	9" x 9"	9" x 9"	4nos 12mm			2- legged 8mm dia @ 6" c/c

LS of Plinth Beam:



Plinth Beam Details: (beam bottom @ 3" below original Ground level)

PB NO	Size	Top rods	Bottom rods	Stirrups spacing
PB- 1	9" x 15"	3-12mm dia	3-12 mm dia	8mm dia @ 5" c/c
PB- 2	9" x 15"	3 -12 mm dia	2-12+1-16 mm dia	8mm dia @ 5" c/c
PB- 3	9" x 15"	2 -12+1-16 mm dia	2-16+1-12 mm dia	8mm dia @ 5" c/c
PB- 4	9" x 15"	2-16+1-12 mm dia	2-16+1-20 mm dia	8mm dia @ 4" c/c
PB- 5	9" x 15"	2-16+1-20 mm dia	2-20+1-16 mm dia	8mm dia @ 4" c/c
PB- 5a	9" x 15"	3-12 mm dia	2-20+1-16 mm dia	8mm dia @ 5" c/c



Typical cross section of footing & Column

Revision	
29.03.2025	Column center line revised w.r to revised working dwg dated
29.10.2024	Column center line revised w.r to revised working dwg dated 10.10.2024

Notes:

1. Foundation and column are designed for seismic load of stilt + five floors as per IS1893(part-1):2016
2. Cover & grade of concrete

	Cover	Grade of concrete
Footing	2"	M25
Column	1½"	M25
Plinth beam	1"	M25

3. Grade of steel to be used is Fe 500
4. Lap length for column rods is 48 times dia of the bar
5. Depth of foundation and SBC considered are as per Nagadi Consultants (P) Ltd., soil report no: G(C) 9941 dated 11.06.2024
6. Plinth beam bottom level is to be @ 3" below original ground level
7. Designing is done based on the details shown in drawing dated
8. Footing side shuttering should be done
9. Use potable water for all construction activities including curing
10. Column rods lapping should be done only @ mid height between floors
11. Do not provide pedestal for columns C13, C14, C17, C18, C19, C22, C23, C24, C25, C26 & C27

Project Title:

Proposed Residential / Commercial Apartment Building @ Block-05, Kalinga Colony, P.T Rajan Salai, K.K Nagar, Chennai - 600 078

Drawing Title:

Foundation, Column and Plinth Beam Details

Scale: N.T.S | Date: 16.10.2024 | N

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CMDA Reg.No. SE/GR-I/19/03/049
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CA-12, Tarangini Complex,
Ambattur Industrial Estate
Mogappair West, Chennai-600 058

Promoter:

KCee Properties
Door No: 8 / 19, Second Street,
Ragavan Colony, Ashok Nagar,
Chennai - 600 083

Structural Consultant:

N. Kanagavel M.E., M.B.A., MIE., F.I.V
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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

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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

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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
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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.