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PLAN SHOWING THE PROPOSED STILT +5 FLOORS RESIDENTIAL BUILDING COMPRISED IN S.NO 42/1,41/3A,41/3B1 OTTIYAMBAKKAM SITHALAPAKKAM ROAD, ARASANKAZHANI, CHENGALPATTU-629378

TYPICAL STRUCTURAL DESIGN CALCULATION

01. General

Proposed Building S+5 upper floors for residential purpose. Stilt Floor is provided for car parking.

02. Design Basis :

Latest Design codes of BIS-456, 875 AND 1893 are followed with SP-16. Design Aid book. A Typical Frame was taken for analysis to arrive at the bending moment for column design, since the building is S+5 stories, wind force is taken in to account. Live Load reduction factor is applied in design. Isolated and combined foundation is proposed as per soil report. Fe-550 grade steel of 16mm dia bars is used as main steel and 8 mm dia bars for distributors.

03. Earthquake consideration.

For better stability during earthquake, the columns are braced in both directions with beams, continuous lintels are specified for outer walls and column ties are closely spaced for better ductility. For Building on stilt, Minimum size is taken as 300 mm (12")

04. WIND LOAD

Vz = Vb x K1 x K2 X K3
Vb = 50m/sec in chennai
K1 = Probability Factor = 1
K2 = Terrain, Height Factor = 1.03
K3 = Topography Factor = 1
K4 = Cyclonic Factor = 1.15

P = 0.6 x Vz x Vz
= 0.6 x 50 x 50
= 1500 N / Sq.m

FLOOR LOADS :

DEAD LOADS

Assuming 5"thk slab dead load	=	313 kg/sqm
Weight of floor finish, partitions etc.,	=	131 kg/sqm
Total dead load	=	444 kg/sqm

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LIVE LOADS

Live load on typical floor	=	200 kg/sqm
Total load on typical floor	=	644 kg/sqm

ROOF LOADS

Assuming 5''thk slab dead load	=	313 kg/sqm
Weight of weathering course	=	273 kg/sqm
Total dead load	=	586 kg/sqm
Live load on roof with success assumed	=	150 kg/sqm
Total roof load	=	736 kg/sqm
Staircase loading liable to overcrowding	=	500 kg/sqm
Wind load considering height of building	=	200 kg/sqm

BRICK LOADS

Weight of brick per sqm	=	1890 kg/cum
Assuming beam size of 9''x24''	=	335 kg/rm
R.C.C Mix to be adopted	=	M25

LOAD ON TYPICAL COLUMN

Slab load of stilt floor	=	9.02 ton
Slab load for five floors	=	36.08ton
Roof load	=	10.31ton
Beam load	=	12.57ton
Brick work load	=	37.50ton
Self weight of column assuming (12''x18'')	=	5.07ton
Total load on column	=	110.55ton
Say	=	111ton

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Provide 10-Y25

Safe capacity of above section = 184ton

Hence safe

TYPICAL FOUNDATION

SBC of soil = 22 Mt/sqm.
As per soil report

Area of footing required = 5.04 sqm.

Area of footing provided = 9.0 sqm.

Hence safe

TYPICAL SLAB Ly/Lx = 4.0/3.5 =1.14

Hence two way slab

Provide 5''thk slab

Provide Y10 @ 5'' C/C (shorter direction)

Provide Y10 @ 6'' C/C (longer direction)

TYPICAL BEAM

Span	=	5.965m
Slab load	=	1805kg/m
Self weight	=	350 kg/m
Total load	=	2155kg/m
Bending moment	=	8028.01kg-m
B.M due to conc 1	=	6545.3kg-m
B.M due to conc 2	=	3145.00kg-m
Total bending moment	=	17718.31kg-m

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EARTHQUAKE ANALYSIS

Calculation of horizontal seismic coefficient
As per code I.S.1893/2016

	Ah	=	ZI/2R x Sa/g
Zone factor (Chennai zone)	z	=	0.16
Importance factor	I	=	1.2
Response reduction factor	R	=	5.0

Natural period

Ta = 0.075h

= 0.075x18.25

= 1.368secs

H = (Ht of buildg)

Sa/g = 1.67/t

Sa/g = 1.67/1.368 = 1.22

$$Sa/g = \frac{0.16 \times 1.2}{2 \times 5.0} \times 1.22$$

= 0.0233

CALCULATION OF BASE SHEAR/SEISMIC FORCES

Floor	Wi	Hi	Wi x Hi^2	Qi
Terrace	87.108	18.25	29012.08	11.825
5	113.483	15.25	26391.89	11.825
4	113.483	12.25	20258.05	11.825
3	113.483	9.15	9501.08	1.8718

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2	113.483	6.3	4504.14	0.887
1	113.483	3.45	1350.73	0.266
Stilt	14.691	0.6	5.288	1.04×10^{-3}
EWI	442.248		E 91023.258	

Base shear V = Ah EWI

= 0.0233 x 91023.258 = 8.29ton

Seismic force per column = 8.29/4 =2.07

Seismic moment per column = 2.07x3/2 =1.39

Column provided is safe against the additional seismic moment of 1.39mt.

CHECK FOR FOUNDATION

P/a+M/Z

$$\frac{111}{9} \pm \frac{1.39}{(3 \times 3^{2})/6}$$

12.33 ± 0.31

=12.64

=1.25 x 22

=27.5ton

Hence safe

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