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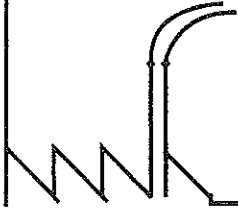
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JAYAM CONSULTANTS PRIVATE LIMITED

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STABILITY CERTIFICATE

It is certified that the plan showing the proposed Stilt +5 floors, 49 dwelling units residential building at Plot B, Door no 51, 9.0m wide road / Parameshwar street, Nerkundram, Chennai-600107. Comprised in Survey No. 268/1 part of Nerkundram village, within the limits of greater Chennai Corporation is designed to resist for earthquake. Check has been made structurally safe and sound I hereby certify that

The minimum grade of concrete is M25

The Minimum column size if 300 mm in stilt areas

The design analysis using the code of practice for loading standards as per BIS-875 and seismic forces as per the latest code BIS- 1893 & BIS- 456.

I.S.456	-	2000 (Code of practice for PCC & RCC)
I.S.875	-	2015 (Code of practice for design loads for buildings & structures)
S.P.16 & S.P.34-		2002 (Code of practice for design and detailing)
I.S.13920	-	2016 (Code of practice for design and detailing for earthquake)
I.S.1893	-	2002 (Criteria for earthquake resistant building)
I.S.4236	-	1993 (Code of practice for design earthquake resistant building)
NBC	-	2005.

Signature of structural engineer,


J.S PADMANABHAN

S. PADMANABHAN

Registered Structural Engineer

Grade - 1 (SE)

Regn. No. SE/GR-I/19/05/123

PLAN SHOWING THE PROPOSED STILT +5 FLOORS, 49 RESIDENTIAL UNITS BUILDING AT PLOT B, DOOR NO 51, 9.0M WIDE ROAD / PARAMESHWAR STREET, NERKUNDRAM, CHENNAI-600107. COMPRISED IN S.NO 268/1 PART OF NERKUNDRAM VILLAGE, WITHIN THE LIMITS OF GREATER CHENNAI CORPORATION

TYPICAL STRUCTURAL DESIGN CALCULATION

01. General

Proposed Building S+5 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. Pile foundation is proposed as per soil report. Fe-550 grade steel is used and 16mm bars for main steel and 8 mm 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

$$V_z = V_b \times K_1 \times K_2 \times K_3$$

$$V_b = 50\text{m/sec in chennai}$$

$$K_1 = \text{Probability Factor} = 1$$

$$K_2 = \text{Terrain, Height Factor} = 1.03$$

$$K_3 = \text{Topography Factor} = 1$$

$$K_4 = \text{Cyclonic Factor} = 1.15$$

$$\begin{aligned} P &= 0.6 \times V_z \times V_z \\ &= 0.6 \times 50 \times 50 \\ &= 1500 \text{ N / Sq.m} \end{aligned}$$

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 four floors = 36.08ton

Roof load = 10.31ton

Beam load = 12.57ton

Brick work load = 37.50ton

Self weight of column assuming (12"x24") = 5.07ton

Total load on column = 110.55ton

Say = 111ton


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Provide 10-Y25

Safe capacity of above section = 178ton

Hence safe

TYPICAL FOUNDATION

SBC of soil = 18 Ton/sqm @ 2.5m depth

As per soil report

Area of footing required = 6.17 sqm

Area of footing provided = 9.0 sqm.

Hence safe.

TYPICAL SLAB

$L_y/L_x = 4.0/3.5 = 1.14$

Hence two way slab

Provide 5'' thk slab

Provide Y8 @ 4'' C/C (shorter direction)

Provide Y8 @ 7'' 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

EARTHQUAKE ANALYSIS


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Calculation of horizontal seismic coefficient

As per code I.S.1893/2016

$$A_h = ZI/2R \times S_a/g$$

Zone factor (Chennai zone)

$$z = 0.16$$

Importance factor

$$I = 1.2$$

Response reduction factor

$$R = 5.0$$

Natural period

Ta

$$= 0.075h$$

$$= 0.075 \times 18.25$$

$$= 1.368 \text{ secs}$$

$$H = (\text{Ht of buildg})$$

$$S_a/g = 1.67/t$$

$$S_a/g = 1.67/1.368 = 1.22$$

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

$$= 0.0233$$

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	
		=	$0.0233 \times 91023.258 = 8.29\text{ton}$	
Seismic force per column		=	$8.29/4$	$=2.07$
Seismic moment per column		=	$2.07 \times 3/2$	$=1.39$

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

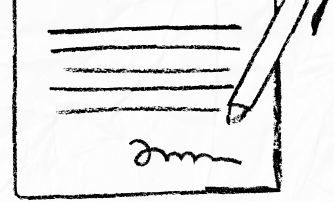
CHECK FOR FOUNDATION

P/A +M/Z

$$\begin{array}{rcl}
 111 & & 1.39 \\
 \hline
 9 & \div & 4.5 \\
 \\
 12.33 & \div & 0.3 \\
 & & =12.64 \\
 & & =1.25 \times 18 \\
 & & =22.5\text{ton Hence safe}
 \end{array}$$



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our services doesn't just end there



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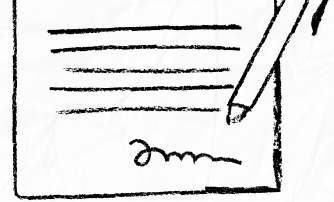
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