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J.PRABAKARAN ,M.E
STRUCTURAL ENGINEER
No. 1/4, PIDARIAMMAN KOIL ST
UTHANDI
CHENNAI- 600119.

prabakaran_j@yahoo.co.in
Mobile: 9841757884

Date: 14-06-2024

STRUCTURAL STABLITY CERTIFICATE

It is certified that the
PLAN SHOWING THE PROPOSED CONSTRUCTION OF STILT FLOOR PARKING + 5 FLOORS RESIDENTIAL BUILDING (18.29m HEIGHT) WITH 17 DWELLING UNITS (WITH ONE DUPLEX IN FIRST AND SECOND FLOOR AND ONE DUPLEX IN THIRD AND FOURTH FLOOR) AVAILING PREMIUM FSI AT OLD NO:236,NEW NO:37, KILPAUL GARDEN ROAD, KILPAUK, CHENNAI-600010, COMPRISED IN R.S.NO:143/25, BLOCK NO:11 OF EGMORE VILLAGE WITHIN THE LIMITS OF GREATER CHENNAI CORPORATION is designed to resist for earthquake. Check has been made and found safe and I hereby certify that

1. The minimum grade of concrete is M25
2. 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
3. Least dimension of column is 300mm in stilt floor.
4. Proposed structure will structurally safe and sound.

J. Prabakaran

J. PRABAKARAN, M.E.,
Structural Engineer
CMDA REG. No: SE/GR-I/2020/03/263
GCC REG No : RSE 101182020
No:1/4, Pidariamman Kovil Street,
Uthandi, Chennai - 600 119.
Mail : prabakaran_j@yahoo.co.in
Mobile : 9841757884

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TYPICAL STRUCTURAL DESIGN CALCULATION

1 **General:**

Proposed building is Stilt + 5 upper floors for residential purpose.

Stilt is used for car parking

2 **Design Basis:**

Latest Design codes of BIS-456, 875 and 1893 are followed with SP-16 Design Aid book. A typical 2-D Frame was taken for analysis to arrive at the bending moment for column design. Since the building is 6 stories, wind force is not taken into account. And live load reduction factor is applied

Independent foundation is proposed as per soil report recommendation.

Fe- 500D steel is used as main steel and M25 concrete adopted

3 **Earthquake consideration:**

For better stability during earhquake, the columns are tied with plinth beams. Continuous lintels are specified for outer walls and column ties are closely spaced for better ductility. For building on stilt, minimum size of column is taken as 300 mm and 230 thick shear wall.

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No:1/4, Pidariamman Kovil Street,
Uthandi, Chennai - 600 119.
Mail : prabakaran_j@yahoo.co.in
Mobile : 9841757858

4

WIND LOAD

Vz = Vb x K1 x K2 x k3

Vb = 50 m/sec in Chennai

K1 = Probability Factor = 1

K2 = Terrain, Height Factor = 1

K3 = Topography Factor = 1

p = 0.6 x Vz x Vz

= 0.6 x 50 x 50

= 1500 N/Sq.m

150 Kg/Sq.m

5 **Design Loads:**

Slab	thk	140	avg				=	3.50	KN/sq.m
Live load							=	2.00	KN/sq.m
Finishes							=	1.50	KN/sq.m
								7.00	KN/sq.m

Applying live load reduction of = 0 ,

For column and foundation design, 7 Kn/sqm is taken.

This value is also taken for frame analysis

Aerocon work 230 thick for exterior walls

	0.23	x	2.59	x	10			=	5.96	KN/m/floor
	0.12	X	2.59	x	11			=	3.28	KN/m/floor
Beams	0.23	x	0.60	x	25			.=	3.45	KN/m/floor
Columns	0.23	x	1.22	x	3.00	x	25	.=	21.0	KN/floor

These are taken for analysis with WL+LL+DL combination.

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6 **SLAB DESIGN:** Refer drawing SLAB - S1

Thickness = 140 mm Fck = M 30 N/sq.mm
Cover = 25 mm Fy =Fe 500 N/sq.mm
Eff.Depth = 115 mm

Panel (3.89 x 4.70) m

Twoway slab Ly / Lx = 3.89 / 4.70 .= 1.2
Support condition - 3 sides countinous Two way slab

Designed for 0.048 co.efficient

Mu .= 0.048 x 7.0 1.5 x 3.89 x 3.89 = 7.63 KNm/m

$$\text{Mu / b.d.d} = \frac{7.63 \times 1000 \times 1000}{1000 \times 115 \times 115} = 0.58 \text{ N/sq.mm}$$

From Table-3 of SP-16, Pt 0.141 %
Minimum Pt = 0.12 % as per code,

At = 0.141 x 1000 115 ./ 100 = **162** sq.mm/m

Provide 8 dia @ 150 = **335.1** sq.mm/m Short span

Provide 8 dia @ 170 = **295.7** sq.mm/m Long span

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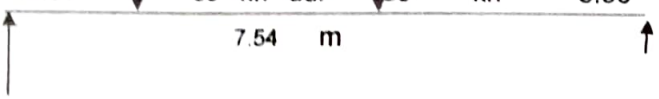
7 **Beam design:**

Beam 3 , refer drawing — Beam size 230 x 750

110 kn 1.07 — Fck = M 30 — d = 680 mm

2.57 | 30 kn udl | 85 kn | 3.90 — d' = 70 mm

7.54 m



Bending moment for UDL = w*l*l / 10 = 170.55 kn.m

BM for point load-1 = p*a*b*b / l/l = 122.83

BM for point load-2 = 82.78

376.16

Mu = 376 x 1.5 x 10-e6 — d'/d= 0.10

564 x 10-e6 Nmm

Mu/b.d.d = 564 x 10-e6 / (230 x 680 x 680) = 5.3 N/sq.mm

From table 3,SP-16 for d'/d = 40 / 750 = 0.05

Pt = **1.467** % Pc = **0.365** %

At = 1.467 x 230 x 680 / 100 = **2294** sq.mm

Ac = 0.365 x 230 x 680 / 100 = **571** sq.mm

provided 3 No 25 = 1473 **sq.mm**

\+ 2 No 25 = 982

2454 sq.mm at top

Shear Design:

S = 113.10 kn

72.51 kn

43.97 kn

229.57 kn

Shear force 229.57 KN

Factored shear force = 1.5 x 229.57 = 344 KN

%age of steel = 3*491*100/230/680 = 0.94

for 0.94 % steel Shear resisted by concrete section

from table-61 0.64 x 230 x 680 / 1000 = 100 KN

Balance shear (Vus) = 344 - 100 = 244 KN

Vus/d = 244 / 68 = 3.6 KN/cm

from table 62 of SP-16

Required 2 legged 10 stirrups @ 150 mm c/c

Provided 2 legged **10** stirrups @ **130** mm c/c

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8 **COLUMN DESIGN:** **COL-A** **COL SIZE** **1220 X 230**

Maximum load P = 330 t

Pu = 1.5 x 330 x10 = 4950 KN

Max.Bending Moment = 5 t.m Mu = 1.5 x 5.0 x10= 75 Kn.m

Cover = 30 mm

d'/d = 0.13

Fck = 35 N/sq.mm

Provide bars equaly all sides

Refer chart 48 of SP-16

$$\frac{Pu}{Fck\ b\ d} = \frac{4950 \times 1000}{35 \times 1220 \times 230} = 0.50$$

$$\frac{Mu}{Fck\ b\ d^2} = \frac{75 \times 10^6}{35 \times 1220 \times 230} = 0.03$$

$$\frac{p}{Fck} = \frac{0.035}{p\% = 0.04 \times 35} = 1.23\ \%$$

Minimum steel 0.8%

$$As = \frac{1.225 \times 1220 \times 230}{100} = 3437.4 \text{ sq.mm}$$

Provided 20 Nos 20 dia = **6283** sq.mm

Ties 8 @ 120 c/c & 180 c/c

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9 **FOOTING DESIGN** F1 refer sheet - 1 of drawing

Maximum load on column type " A P = 330 t

Add 10% footing load = 363 t

S.B.C of Soil at 3 m depth = 22.5 t/sqm

Assume square base of 4.05 m x 4.05 m. footing

So pressure on soil is and depth = 900 mm

Eff. Depth = 840 mm

$$\frac{363}{4.05 \times 4.05} = 22.1 \text{ t/sqm} < \mathbf{22.5} \text{ t/sqm}$$

Pedestal size = 1.22 x 0.9

Cantilever projection of footing = $\frac{4.05 - 0.9}{2}$ = 1.58 m

(One side)

B.M on footing at face of column

BM = $22.1 \times 1.58 \times \frac{1.58}{2}$ = **27.4** tm/m

Mu = 27.45 x 1.5= 41.17 tm

Mu/b.d.d = $\frac{41.17 \times 1000 \times 10000}{1000 \times 840 \times 840}$ = 0.58 N/sqm

Fck = 30 n/sqmm

From Table-4of SP-16, pt% .= **0.14** %

At = **0.141** x 840 X 3900 /100 = **1184** sq.mm

Provide 12 dia @ 130 c/c = **8.69** sq.mm/m bothways

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Uthandi, Chennai - 600 119.
Mail : prabakaran_j@yahoo.co.in
Mobile : 9841757884

GREATER CHENNAI CORPORATION
WORKS DEPARTMENT

PROFESSIONAL REGISTRATION CERTIFICATE

This is to certify that **Thiru. Prabakaran J** has been enrolled as **Registered Structural Engineer Grade- I (RSE)** in Greater Chennai Corporation (GCC) who has the qualification of **M.E.,(Structural Engg.,)** with minimum of **5 years** experience in the relevant field.

The Registration No. is **RSE101182020** dated **01.10.2020.** It is informed herewith to comply with the scope of work, duties and responsibilities as prescribed by the Government of Tamil Nadu in Part – V, "Registration of Professionals", Tamil Nadu Combined Development and Building Rules, 2019 approved vide G.O. (Ms) No.18 MA&WS (MA1) Dept. dated 04.02.2019. and as amended in G.O.(MS) No.16 MA&WS (MA1) Dept, dated 31.01.2020.

This Registration is valid upto **30.09.2025.**



Superintending Engineer (Works)
Greater Chennai Corporation.

RGN No: RSE101182020
Dated: 01.10.2020

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