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SAFE STRUCTURAL CONSULTANCY
REGISTERED STRUCTURAL ENGINEER GRADE-1

STRUCTURAL STABILITY CERTIFICATE

(To be furnished while filing application for Registration of Building)

1.The Detailed Engineering and Structure Design of the Proposed Building Comprising of Stilt+5 floors at Door No 13/7 Thiruvengadam street, Raja Annamalai puram, Mandaveli, Chennai 600028.

S. No4119/8 Block 89 of Mylapore village has been done by me based on the report of geotechnical investigation (soil test) done by Er.S.Ravichandran., M.E ,PhD. Report No. REPORT NO. JCEIG EOTE CW2A22I 119 Dated 4 January 2022. 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 have checked various parameters and found that the proposed building would be **Safe**.

3. I further certify that:

(i) The minimum grade of concrete is **M25**

(ii) The design and analysis have been done using the code of practice for plain

and reinforced concrete as per **IS 456**, design loads as per IS Codes IS 875 (Part1-Dead Load), (Part 2-Live Load) and Design of Earthquake Resistant Structure. and design of earthquake resistant structure as per IS Code No 1893 Part1, IS13920 are carried out.

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

Encl.: Structural Design Calculation

R. RAVIKUMAR
STRUCTURAL ENGINEER GRADE - 1 (SE)
M.E (Structural Engg)
Reg. No - SE/GR-1/19/12/231 (CMDA)

Date : 22-02-2025

Registration No : SE/GR-1/19/12/231 (CMDA)

Address : New No 3/56, Old No 2/1466, 200 Feet Road, Eachankadu, Annanagar, Kovilambakkam, Chennai-600 117.

Adm: SN Junction, Thripunithura
Cochin– 682 301

E-mail – safestructuralchennai@gmail.com
Cell - +90877 25267

CHENNAI METROPOLITAN DEVELOPMENT AUTHORITY
'Thalamuthu Natarajan Building', No.1, Gandhi Irwin Road,
Egmore, Chennai-600 008.

PROFESSIONAL REGISTRATION CERTIFICATE

This is to certify that the Thiru. **R. RAVI KUMAR** enrolled as **Registered Structural Engineer Grade-I (SE)** with Chennai Metropolitan Development Authority (CMDA) who has the qualification of **M.E., (Structural Engg.)** and experience in the relevant field for **5 years.**

He has been given the Registration No.**SE/GR-I/2019/12/231 Renewed** on **20.12.2024.** He shall be required to comply with the duties and responsibilities 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 MAWS (MA1) Dept. dated 04.02.2019.

This Registration is valid upto **19.12.2029.**



M. K. ASHA PARVEEN
Superintendent

R. RAVIKUMAR
STRUCTURAL ENGINEER GRADE - 1 (SE)
M.E (Structural Engg)
Reg. No - SE/GR-I/19/12/231 (CMDA)

SAFE Structural Consultancy	Proposed Residential Building at Plot No 8, New Door No 13, Old Door No 7, Thiruvengadam Street, Raja Annamalaipuram, Mandavelipakkam, Chennai-600 028	
	Revision 00	Date 07-01-2025

PLAN SHOWING THE PROPOSED CONSTRUCTION OF STILT FLOOR + 5 FLOORS (18.0M HEIGHT) RESIDENTIAL BUILDING WITH 10 DWELLING UNITS AVAILING PREMIUM FSI WITH TOD BENEFITS AT NEW DOOR NO.13, OLD DOOR NO.7, THIRUVENKADAM STREET, RAJA ANNAMALAIPURAM, CHENNAI 600028 COMPRISED IN R.S.NO.4119/8, BLOCK NO.89 OF MYLAPORE VILLAGE WITHIN THE LIMITS OF GREATER CHENNAI CORPORATION

TYPICAL STRUCTURAL DESIGN CALCULATION

1 General:

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

Stilt is used for car parking. Floor height is 3.05m

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 taken into account. And live load reduction factor is applied

Strip foundation is proposed as per soil report recommendation.

Fe- 500 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

R. RAVIKUMAR
STRUCTURAL ENGINEER GRADE - 1 (SE)
M.E (Structural Engg)
Reg. No - SE/GR-1/[illegible]12/231 (CMDA)

SAFE Structural Consultancy	Proposed Residential Building at Plot No.8, New Door No.13, Old Door No: 7, Thiruvengadam Street, Raja Annamalaipuram, Mandavelipakkam, Chennai-600 028	
	Revision: 00	Date:07-01-2025

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 130 avg	=	3.25 KN/sq.m
Live load	=	2.00 KN/sq.m
Finishes	=	1.25 KN/sq.m
		6.50 KN/sq m

Applying live load reduction of = 0.1 ,
For column and foundation design, 6.5 Kn/sqm is taken.
This value is also taken for frame analysis

Brick work 230 thick for exterior walls

	0.23	x	3	x	20		=	14 KN/m/floor
	0.12	X	3	x	20		=	6.9 KN/m/floor
Beams	0.23	x	0.60	x	25		.=	3.45 KN/m/floor
Columns	0.45	x	0.45	x	3.00	x 25	.=	15.2 KN/floor

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

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	Revision: 00	Date:07-01-2025

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

Thickness = 130 mm Fck = M 30 N/sq.mm
Cover = 25 mm Fy =Fe 500 N/sq.mm
Eff.Depth = 105 mm

Panel (3.14 x 5.50) m

Twoway slab Ly / Lx = 5.50 / 3.14 .= 1.8
Support condition - One long edge continous

Designed for 0.069 co.efficient

Mu .= 0.069 x 7.3 1.5 x 3.14 x 3.14 = 7.40 KNm/m

$$Mu / b.d.d = \frac{7.40 \times 1000 \times 1000}{1000 \times 105 \times 105} = 0.67 \text{ N/sq.mm}$$

From Table-3 of SP-16, Pt 0.230 %
Minimum Pt = 0.12 % as per code,

At = 0.230 x 1000 105 ./ 100 = **242** sq.mm/m

Provide 8 dia @ 130 = **386.66** sq.mm/m Short span

Provide 8 dia @ 180 = **279.25** sq.mm/m Long span

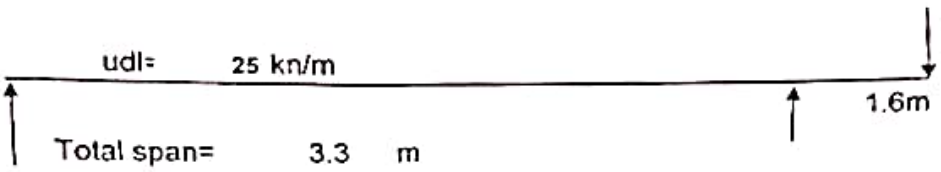
R. RAVIKUMAR
STRUCTURAL ENGINEER GRADE - 1 (SE)
M.E (Structural Engg)
Reg. No - SE/GR-1/15/12/231 (CMDA)

SAFE Structural Consultancy	Proposed Residential Building at Plot No.8, New Door No.13, Old Door No: 7, Thiruvengadam Street, Raja Annamalaipuram, Mandavelipakkam, Chennai-600 028	
	Revision: 00 B1 in drawing	Date:07-01-2025

7 **Beam design:**

Beam size 230 x 750

Fck = M 30 d = 710 mm



Max. UDL Bending Moment at support top = **1102.0 Kn.m**

Mu = 1102 x 1.5 x 10-e6

1653 x 10-e6 Nmm

$Mu/b.d.d = \frac{1653 \times 10\text{-e6}}{230 \times 710 \times 710} = 14.3$ N/sq.mm

From table 56,SP-16 for d'/d = 40 / 750 = 0.05

Pt = 1.232 % Pc = 0.30 %

At = 1.232 x 230 x 750 / 100 = **2125** sq.mm

Ac = 0.300 x 230 x 750 / 100 = **517.5** sq.mm

provided 3 No 20 = 942 sq.mm

\+ 3 No 20 = 942

1885 sq.mm at top

Shear Design:

Shear force 963 KN

Factored shear force = 1.5 x 963 = 1445 KN

for 1.23 % steel Shear resisted by concrete section

from table-61 0.59 x 230 x 710 / 1000 = 96 KN

Balance shear (Vus) = 1445 - 96 = 1348 KN

Vus/d = 1348 / 71 = 19.0 KN/cm

from table 62 of SP-16

Required legged 10 stirrups @ 150 mm c/c

Provided 2 legged 10 stirrups @ 125 mm c/c

R. RAVIKUMAR
STRUCTURAL ENGINEER GRADE - 1 (SE)
M.E (Structural Engg)
Reg. No - SE/GR-1/13012/231 (CMDA)

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	Revision: 00	Date:07-01-2025

8

COLUMN DESIGN: COL-C1 COL SIZE 300 X 600

Maximum load P = 105 t

Pu = 1.5 x 105 x10 = 1575 KN

Max.Bending Moment = 95 t.m Mu = 1.5 x 95.0 x10= 1425 Kn.m

Cover = 40 mm

d'/d = 0.07

Fck = 35 N/sq.mm

Provide bars equaly all sides

Refer chart 48 of SP-16

$$\frac{Pu}{Fck\ b\ d^2} = \frac{1575 \times 1000}{35 \times 300 \times 600} = 0.25$$

$$\frac{Mu}{Fck\ b\ d^2} = \frac{1425 \times 10^6}{35 \times 300 \times 600} = 0.38$$

$$\frac{p}{Fck} = \frac{0.05}{p\% = 0.05 \times 600 \times 35} = 1.75\ \%$$

Minimum steel 0.8%

$$As = \frac{1.75 \times 300 \times 600}{100} = 3150 \text{ sq.mm}$$

Provided 4 Nos 25 dia = 1964 sq.mm

Provided 6 Nos 20 dia = 1885 sq.mm

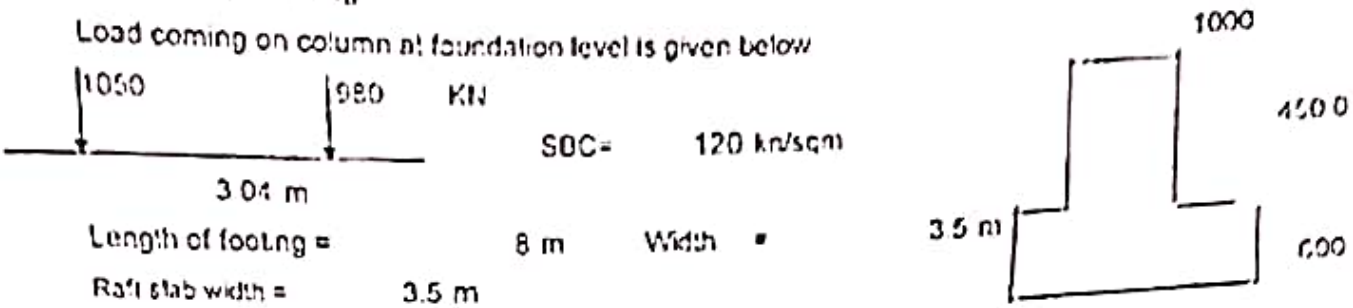
Ties 8 @ 110 c/c & 175 c/c Total = 3848 sq.mm

R. RAVIKUMAR
STRUCTURAL ENGINEER GRADE - 1 (SE)
M.E (Structural Engg)
Reg. No - SE/GR-1/13 12/231 (CMDA)

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M.E (Structural Engg)
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9 **Strip Footing**

Load coming on column at foundation level is given below



Length of footing = 8 m Width = 3.5 m

Raft slab width = 3.5 m

Thickness = 600 mm

Concrete Fck = 30 N/sq mm Steel = 500 N/sq mm

Cover = 50 mm

Eff.Depth = 542 mm

Design of Raft slab

Cantilever projection = 1.25

Max Bending Moment = wl^2/2 = $\frac{448 \times 1.25 \times 0.50}{2}$ = 140 kN-m

Mu = 1.50 X 140.00 = 210 kN-m/m

Mu / b.d.d = $\frac{210.0 \times 10^{6}}{1000.0 \times 542.0 \times 542.0}$ = 0.714859547 N/sq mm

From Table-3 of SP-16, pt = 0.120 %

At = 0.1 x 1000 x 1.100 = 650.4 sq mm/m

Provide 12.0 dia @ 100 c/c = 1131 sq mm/m

Provide 10.0 dia @ 170 c/c = 462 sq mm/m distributer

Strip footing and Raft slab:

To minimize the depth of the footing under ream pile of 300 mm with a bulb of 1000mm dia introduced withhold friction load of 40 MT per pile as per IS code.

Strip Beam design

UDL on beam = 420 kN/m

Cantilever span = 1.6 m Between supports = 3.1 m

M= 537.6 Kn-m M= 279.1 Kn-m

Max Moment = 537.6 Kn-m

Beam Size = 1000.0 mm X 1200.0 mm

Effective depth = 1100.0 mm

RK
R. RAVIKUMAR
STRUCTURAL ENGINEER GRADE - 1 (SE)
M.E (Structural Engg)
Reg. No - SE/GR-1/13/12/231 (CMDA)

Mu = 538 x 1.5 = 806 x 10e^6 N/sqmm

Mu/b d d = $\frac{806.4 \times 10^{6}}{1000.0 \times 1100.0 \times 1100.0}$ = 0.666

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From table-3 SP-16

Pt = 0.31 % Pc= 0.170 %

At = 0.0031 x 1000.0 x 1100 = 3410 sq mm

Ac = 0.0017 X 1000.0 1100 = 1870 sq mm

Provide 8 No.s 25 Dia = 3927 sq.mm

Shear Design:

Factored shear force = 960.75 kN

for 0.31 % steel Shear resisted by concrete section is

from table-61 0.64 X 1000.0 X 1100 = 704 kN

Balance shear (Vus) = 256.75 kN

Vus/d = 2.3 KN/cm

from table 62 of SP-16 stirrups

Required 6 Legged 10 at 175 C/C

Provided 6 Legged 10 at 125 C/C

R. RAVIKUMAR
STRUCTURAL ENGINEER GRADE - I (SE)
M.E.(Structural Engg.)
Reg. No - SE/GR-I/12/12231 (CMDA)



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