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02-03-2026

STRUCTURAL STABILITY CERTIFICATE

The detailed engineering and structure design of the proposed construction of stilt + 4 floors (height - 18.20 m) commercial building (office use) at plot no: 35, 36 & 37, new door no: 23, 21 & 19, old door no: 11, 10 & 09, De monte colony street, Demonte colony, Alwarpet, Chennai - 600018. Comprised in R.S. No. 3676, block no. 73 of Mylapore village, Mylapore Taluk, zone ix, division 123 of greater Chennai corporation has been done by me based on the report of geotechnical investigation (soil test) done by geo foundations & structures pvt. Ltd report no. 1713 dated 20.05.2023 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 No.875 and design of earthquake resistant structure as per IS Code No. 1893

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

Stamp and Signature

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March,02'2026

STRUCTURAL STABILITY CERTIFICATE

It is certified that the
PLAN SHOWING THE PROPOSED CONSTRUCTION OF STILT + 4 FLOORS (HEIGHT - 18.20 M) COMMERCIAL BUILDING (OFFICE USE) AT PLOT NO: 35, 36 & 37, NEW DOOR NO: 23, 21 & 19, OLD DOOR NO: 11, 10 & 09, DE MONTE COLONY STREET, DEMONTE COLONY, ALWARPET, CHENNAI - 600018. COMPRISED IN R.S. NO. 3676, BLOCK NO. 73 OF MYLAPORE VILLAGE, MYLAPORE TALUK, ZONE IX, DIVISION 123 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. The Structure is safe and sound.

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PLAN SHOWING THE PROPOSEDPROPOSED OFFICE BUILDING AT MYLAPORE BLOCK NO : 73, MYLAPORE VILLAGE, TRIPLICANE, MYLAPORE TALUK, CHENNAI-600 018

TYPICAL STRUCTURAL DESIGN CALCULATION

1 **General:**

Proposed building Is Stilt +4 for office purpose. Stilt floor is provided for services & car parking.

2 **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 5 stories, wind force is taken into account. Live load reduction factor is applied in design. Pile foundation is proposed as per as per soil report. Fe- 500 steel is used as main steel and minimum concrete grade M25

3 **WIND LOAD**

Vz	=	Vb x K1 x K2 x k3	=	50
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 50.0 x 50		
	=	1500 N/Sq.m		
		150 Kg/Sq.m		

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4 **Earthquake consideration:**

For better stability during earhquake, the columns are braced in both direction with beams. Continuous lintels are specified for outer walls and column ties are closely spaced for better ductility.

EARTHQUAKE LOAD

Design horizontal Seismic coeff. Ag = $\frac{Z}{2} \times \frac{I}{R} \times \frac{Sa}{g}$

Z = Zone Factor = 0.16 for Chennai

I = Importance Factor = 1.0

R = Response reduction Factor = 5

$\frac{Sa}{g}$ = Avg. response acc.coeff. Depends on Ta

Ta = Fundamental natural period

= $\frac{0.09\ h}{\sqrt{d}}$ for infill walls

h = height of the building

d = Width of the building

= 0.075 h (0.75) for office building

= 0.92

W = seismic weight of building

= 100% D.L + 25% L.L for residential <=300

= 100% D.L + 50% L.L for residential >300

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5 **Design Loads:**

Slab thk	250	=	6.25 KN/sq.m
Live load		=	4.00 KN/sq.m
Finishes		=	1.50 KN/sq.m
			11.75 KN/sq.m

Say 11.0 KN/sq.m/floor for slab and beam design
Applying live load reduction of = 0.2 ,

For column and foundation design, 10.95 Kn/sqm is taken.

This value is also taken for frame analysis

Brick work 230 thick for exterior walls

	0.23	x	2.55	x	20			=	12	KN/m/floor
Beams	0.23	x	1.20	x	25			.=	6.90	KN/m/floor
Columns	0.6	x	0.60	x	2.55	x	x 25	.=	22.95	KN/floor
for	5	upper		5	X	x	22.95 KN/floo	.=	115	KN

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

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DESIGN OF FLAT SLAB

INPUT

SIZE OF COLUMN	=	600 mm	
LONG SPAN OF THE FLAT SLAB (L1)	=	9.2 m	
SHORT SPAN OF THE FLAT SLAB (L2)	=	10.6 m	
Grade of Concrete	=	35 N/ Sq.mm	
Grade of Steel	=	500 N/ Sq.mm	
Assumed Thickness of slab	=	250 mm	
Dead load of Slab	=	6.25 KN/Sq.m	
Floor Finish	=	3 KN/Sq.m	
Design Live Load on slab	=	4 KN/Sq.m	
Design Dead load	=	9.25	
Ratio	=	0.43	OK
TOTAL DESIGN LOAD	=	13.25 KN/Sq.m	

DESIGN

LONGER SPAN

COLUMN STRIP	=	2.65 m	
Middle Strip	=	5.3 m	

Dimensions of Drop

LONGER SPAN	=	3.07 m	
SHORTER SPAN	=	3.53 m	
LENGTH OF DROP	=	3.5 m	
BREADTH OF DROP	=	3.6 m	
DEPTH OF DROP	=	450 mm	
COLUMN (B)	=	0.6 m	
COLUMN (D)	=	0.6 m	
DEPTH OF THE FLAT SLAB	=	215.00 mm	OK
COVER	=	25 mm	
OVERALL DEPTH	=	275 mm	OK
CLEAR LONG SPAN	=	6.9 m	OK
CLEAR SHORT SPAN	=	6.9 m	OK
TOTAL DESIGN LOAD LONG SPAN	=	969.11 KN	
TOTAL DESIGN LOAD SHORT SPAN	=	841.11 KN	
ABSOLUTE SUM OF "+" & "-" Moment LONG SPAN	=	835.85 KN.m	
ABSOLUTE SUM OF "+" & "-" Moment SHORT SPAN	=	725.46 KN.m	
Negetive design Moments LONG SPAN	=	543.3044906 KN.m	
Positive design Moments LONG SPAN	=	292.5485719 KN.m	

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Negetive design Moments SHORT SPAN	=	471.5472938 KN.m	
Positive design Moments SHORT SPAN	=	253.9100813 KN.m	

COLUMN STRIP

POSITIVE MOMENT	=	92.15280014 KN.m	
NEGETIVE MOMENT	=	399.3288006 KN.m	

MIDDLE STRIP

POSITIVE MOMENT	=	53.32111706 KN.m	
NEGETIVE MOMENT	=	113.1713505 KN.m	

CHECK FOR DEPTH

DEPTH OF SLAB (d) Using Max. +ve BM	=	65.63702309	OK
DEPTH OF drop (d) Using Max. +ve BM	=	127.2919401	OK

CHECK FOR SHEAR (SLAB)

Perimeter of critical section	=	14860 mm	
SHEAR	=	2130.58 KN	
τv	=	0.67 N/ Sq.mm	
τc	=	1.48 N/ Sq.mm	OK

CHECK FOR SHEAR (DROP)

Perimeter of critical section	=	4400 m	
SHEAR	=	2380.83 KN	
τv	=	1.20 N/ Sq.mm	
τc	=	1.48 N/ Sq.mm	OK

Reinforment Percentage (Pt)

COLUMN STRIP

AST positive moment	=	964.8638985 Sq.mm	12 @ 125 c/c
AST negetive moment	=	2555.102546 Sq.mm	25 @ 100 c/c

MIDDLE STRIP

AST positive moment	=	558.2860293 Sq.mm	12 @ 125 c/c
AST negetive moment	=	1184.933613 Sq.mm	16 @ 125 c/c

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7 **Beam design:**

Effective span = 9.5 m Beam size 600 x 600

d = 560 mm

Fck = M 35

In design of beams, No Liveload reduction is taken

Load from slabs	=	11.75	x	3.23	=	37.95 Kn/m
Load from 230 b.w.					=	12.00
Beam self weight					=	6.90 Kn/m
						56.85 Kn/m
					Say	**57.0** Kn/m

BM at support = $\frac{w \times l \times l}{12}$

= $\frac{57 \times 10.4 \times 10.4}{12}$ = 429 Kn.m

Max. B.M = 429 Knm (top of support)

This is taken for design

Mu = 429 x 1.5 x 10-e6

643.0 x **10-e6** Nmm

Mu/b.d.d = $\frac{643.0 \times 10\text{-}e6}{600 \times 560 \times 560}$ = 3.42 N/sq.mm

From table-51 SP-16 for d'/d = 40 / 600 = 0.07

Pt = **1.250** % Pc = **0.050** %

At = 1.250 x 600 x 600 / 100 = **4500** sq.mm (top)

Ac = 0.050 x 600 x 600 / 100 = **180** sq.mm (bot)

provided	6	No	20	= 1885 sq.mm	+
	6	No	25	= 2945 sq.mm	
				4830 sq.mm	

Shear Design:

Shear force w x l / 2 = 271 KN

Factored shear force = 1.5 x 271 = 406 KN

for 1.25 % steel Shear resisted by concrete section

from table-61 0.7 x 600 x 560 / 1000 = 235 KN

Balance shear (Vus) = 406 - 235 = 171 KN

Vus/d = 171 / 56 = 3.05 KN/cm

from table 62 of SP-16

Required 4 legged	8 stirrups	@	120 mm	c/c
Provided 4 legged	**10** stirrups	@	**100** mm	c/c

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8 **COLUMN DESIGN:** **COL SIZE 600 X 600**

Maximum load on column in basement P = 495 t

Pu = 1.5 x 495 x10 = 7425 KN

Max.Bending Moment = 12 t.m Mu = 1.5 x 12.0 x10= 180 Kn.m

Cover = 40 mm

d'/d = 0.07

Fck = M35 = 35 N/sq.mm

Provide bars equaly all sides

Refer chart 44 of SP-16

$$\frac{Pu}{Fck\ b\ d} = \frac{7425 \times 1000}{35 \times 600 \times 600} = 0.589$$

$$\frac{Mu}{Fck\ b\ d^2} = \frac{180 \times 10^6}{35 \times 600 \times 600} = 0.024$$

$$\frac{p}{Fck} = \frac{0.07}{35} \times 600 \qquad p\% = 0.07 \times 600 = 2.45\ \%$$

Minimum steel = 0.8 %

$$As = \frac{2.45 \times 600 \times 600}{100} = 8820 \text{ sq.mm}$$

Provided	8	Nos	32 dia =	6434 sq.mm
	8	Nos	25 dia =	3927 sq.mm
				10361 sq.mm

Ties 8 @ 100c/c and 8 @ 170c/c

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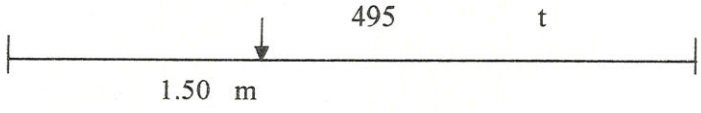
9 **Pile cap and pile**

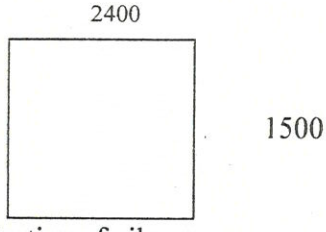
32 m bored cast-in-situ pile is adopted.

600 dia pile safe capacity	=	140	t	
Col-A carries a maximum load	=	495	t	
So No of piles provided	=	4	Nos	

Pile cap size = 2400 x 2400

M-30 grade = 30 N/sq.mm





Section of pile cap

Pile to pile distance = 1.88 m

Tensile Force = $\frac{W \times l}{8 \times d} = \frac{495 \times 1.5}{8 \times 1.4} =$ 67 t

Tensile stress in steel = 2 t/sq.cm

Area of steel = $\frac{67}{2} =$ 33.5 Sq.cm

Provided at bottom =	16	dia @	110	c\c =	**3927**	sq.mm/m	
Provided at top =	12	dia @	110	c\c =	**904**	sq.mm/m	

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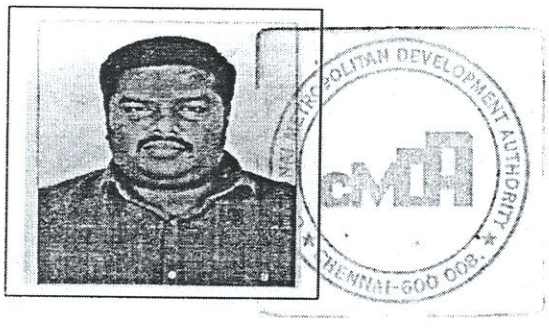
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PROFESSIONAL REGISTRATION CERTIFICATE

This is to certify that the **Thiru. N. CHANDRU** has 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 **8 years**.

He has been given the Registration No.**SE/GR-I/2019/04/090** Renewed on **12.04.2024.** 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 **11.04.2029**.



12/4/2024

(A. MEGANATHAN)
Superintendent

For SIR JOHN DE MONTE TRUST

PoA HOLDER