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DIGITALLY VERIFIED RECORD

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07-11-2025

STRUCTURAL STABILITY CERTIFICATE

The detailed engineering and structure design of REVISED PLAN SHOWING THE PROPOSED ADDITIONAL CONSTRUCTION OF (ESCALATOR) TO THE EXISTING EARLIER APPROVED BASEMENT + GROUND FLOOR + 3 FLOORS COMMERCIAL BUILDING (OFFICE - 18.30M HEIGHT) AT PLOT NO.2, 3, 4 & 5 (IN CMDA APPROVED SUBDIVISION PPD/L.O.NO.37/2022), MMRD ROAD, KOVILAMBAKKAM, CHENNAI COMPRISED IN S.NOS.45/2A2, 45/2A3, 45/5A1, 45/5A2, 45/5A3, 45/5A4, 45/5B, 45/6B1B, 45/7B & 46/1B OF KOVILAMBAKKAM VILLAGE WITHIN THE LIMIT OF ST. THOMAS MOUNT PANCHAYAT UNION has been done by me based on the report of geotechnical investigation (soil test) done by GLOBE GEOTECHNIQUES. GS_MAY22_CTN_017_KOVILAMBAKKAM Dated 16/05/2022 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 furthér certify that:

(i) The minimum grade of concrete is M25

(ii) The design and analysis has been done using the code of practice for plain and reinforced concrete as per IS 456, design loads as per IS875 and design of earthquake resistant structure as per IS 1893

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

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ENCL: Structural Design Calculations

REVISED PLAN SHOWING THE PROPOSED ADDITIONAL CONSTRUCTION OF (ESCALATOR) TO THE EXISTING EARLIER APPROVED BASEMENT + GROUND FLOOR + 3 FLOORS COMMERCIAL BUILDING (OFFICE - 18.30M HEIGHT) AT PLOT NO.2, 3, 4 & 5 (IN CMDA APPROVED SUBDIVISION PPD/L.O.NO.37/2022), MMRD ROAD, KOVILAMBAKKAM, CHENNAI COMPRISED IN S.NOS.45/2A2, 45/2A3, 45/5A1, 45/5A2, 45/5A3, 45/5A4, 45/5B, 45/6B1B, 45/7B & 46/1B OF KOVILAMBAKKAM VILLAGE WITHIN THE LIMIT OF ST. THOMAS MOUNT PANCHAYAT UNION.

TYPICAL STRUCTURAL DESIGN CALCULATION

1 **General:**

Proposed building is **B+ GF + 3** upper floors for office purpose.

Basement is used for car parking, and Upper floors are for office purpose

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 not taken into account. Live load reduction factor is applied in design. Footing with raft foundation as per soil report. Fe-500 steel is used as main steel and 8 mm bars for distributors. Minimum grade of concrete is M25

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3 **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. For building on stilt, minimum size is taken as 300 mm(12")

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

= 0.09x30/ sqrt 20

= 0.60

= $0.075\ h^{0.75}$ for office building

W = seismic weight of building

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

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

Base Seismic Shear Vb = Ag x W

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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 = 1.02

K3 = Topography Factor = 1

p = 0.6 x Vz x Vz

= 0.6 x 51 x 51

= 1560.6 N/Sq.m

156 Kg/Sq.m

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5 **Design Loads:**

Slab 250 mm thk	=	6.3	KN/sq.m
Live load avg	=	2.5	KN/sq.m
Finishes	=	1.3	KN/sq.m
		10.0	KN/sq.m

Say 8.5 KN/sq.m/floor for slab and beam design

Applying live load reduction of = 0.5 ,

For column and foundation design, 8.75 Kn/sqm is taken.

This value is also taken for frame analysis

200 thick AAC blocks for exterior walls

0.2 x 2.55 x 10 = 5 KN/m/floor

100 thk AAC blocks for interior panels

0.100 X 2.55 x 10 = 2.55 KN/m/floor

Beams 0.2 x 0.90 x 25 .= 4.50 KN/m/floor

Columns 0.75 x 0.75 x 3.00 x 25 .= 42.2 KN/floor

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

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6 **SLAB DESIGN:** S1

Thickness = 250 mm Fck = M 30 N/sq.mm
Cover = 20 mm Fy =Fe 500 N/sq.mm
Eff.Depth = 225 mm

Panel (7.2 X 13) m

Twoway slab Ly / Lx = 13 / 7.2 .= 1.8
Support condition - 2 adjacent side discontionous

short span= α x = 0.087 (- BM at continuous edge) Table:26
= 0.066 (+ BM at midspan) in IS-456-2000
Longrt span= α y = 0.047 (+ BM at midspan)
0.035 (-) at support
Designed for 0.087 co.efficient

Mu .= 0.087 x 10.0 1.5 x 7.2 x 7.2 = 67.65 KNm/m

$$\text{Mu / b.d.d} = \frac{67.65 \times 1000 \times 1000}{1000 \times 225 \times 225} = 1.34 \text{ N/sq.mm}$$

From Table-2 of SP-16, Pt 0.390 %
Minimum Pt = 0.12 % as per code, for Fe-415

At = 0.390 x 1000 225 ./ 100 = **878** sq.mm/m

Provide 12 dia @ 125 = **905** sq.mm/m Short span

Provide 10 dia @ 125 = **628** sq.mm/m Long span

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7 **Beam design:** Beam-1

span = 7.4 m Beam size 200 x 900

d = 860 mm

Fck = M 30



Bending moment at support= **247** knm

Mu = 247 x 1.5 x 10-e6

370.5 x **10-e6** Nmm

Mu/b.d.d = **370.5** x 10-e6 / (200 x 860 x 860) = 2.50 N/sq.mm

From table-3 SP-16 for d'/d = 40 / **900** = 0.04

Pt = **0.663** % Pc = **0.20** %

At = 0.663 x 200 x 900 / 100 = **1193** sq.mm (top)

Ac = 0.200 x 200 x 900 / 100 = **360** sq.mm (bot)

provided 3 No 20 = **942** sq.mm +

3 No 20 = **942**

1885 **sq.mm** at support top

Shear Design:

Shear force 244 KN

Factored shear force = 1.5 x 244 = 366 KN

for 0.66 % steel Shear resisted by concrete section

from table-61 0.74 x 200 x 860 / 1000 = 127 KN

Balance shear (Vus) = 366 - 127 = 239 KN

Vus/d = 239 / 86 = 2.78 KN/cm

from table 62 of SP-16

Required 2 legged 8 stirrups @ 130 mm c/c

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

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8 **COLUMN DESIGN:** **COL-1** **COL SIZE** **750 X 750**

Maximum load is P = 930 t

Pu = 1.5 x 930 x10 = **13950** KN

Max.Bending Moment = 30 t.m Mu = 1.5 x 30.0 x10= 450 Kn.m

Cover = 25 mm

d'/d = 0.05

Fck = 50 N/sq.mm

Provide bars equaly all sides

Refer chart 44 of SP-16

$$\frac{Pu}{Fck\ b\ d} = \frac{13950 \times 1000}{50 \times 750 \times 750} = 0.50$$

$$\frac{Mu}{Fck\ b\ d^2} = \frac{450 \times 10^6}{50 \times 750 \times 750 \times 750} = 0.02$$

$$\frac{p}{Fck} = 0.06 \qquad p\% = 0.06 \times 50 = 3\ \%$$

Minimum %age of steel is 0.8 %

$$As = \frac{3 \times 750 \times 750}{100} = \mathbf{16875}\ \text{sq.mm}$$

Provided 16 Nos 32 dia + = **12868** sq.mm

16 Nos 25 dia = **7854** sq.mm

= 20722

Ties 8 @ 100 & 8@ 175

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9 **FOOTING DESIGN** for **COL-1** refer sheet - 1 of drawing

Maximum load on column type " A P = 930 t

Add 10% footing load = 1023 t

S.B.C of Soil at 1 m depth = 20 t/sqm

Assume base of 6.7 x 6.7 m Depth = 1400 mm

So pressure on soil is Eff. Depth = 1345 mm

Cantilever projection of footing = $\frac{6.7 - 0.345 - 0.345}{2}$ = 3.03 m

B.M on footing at face of column pedestal

BM = 20.0 X 3.03 X $\frac{3.03}{2}$ = 92.0 tm

Mu = 92.0 x 1.5= 138.0 tm

Mu/b.d.d = $\frac{138 \times 10000 \times 1000}{1000 \times 1345 \times 1345}$ = 0.7630 N/mm^2

Fck = 30 n/sqmm

From Table-4 of SP-16, pt% .= 0.191 %

At = 0.191 x 1345 1000 /100 = **2569** sq.mm

Provide 25 @ 150 C/C = **3272** sq.mm

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10 RAFT SLAB DESIGN:

Thickness	=	550 mm		Fck	= M 30	N/sq.mm
Cover	=	50 mm		Fy	=Fe 500	N/sq.mm
Eff.Depth	=	495 mm				

Net upward thrust on raft= 19 kn/sqm

As per analysis the moment = 122 Knm
Factored moment = 183 Knm

$$\text{Mu / b.d.d} = \frac{183.00 \times 1000 \times 1000}{1000 \times 495 \times 495} = 0.75 \text{ N/sq.mm}$$

From Table-4 of SP-16, Pt **0.179** %
Minimum Pt = 0.13 % as per code, for Fe-415

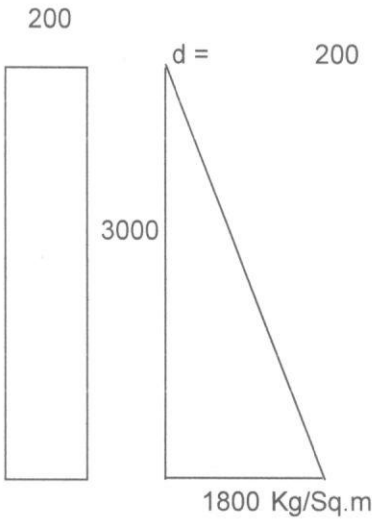
At = 0.179 x 1000 495 ./ 100 = **886** sq.mm/m

Provide 12 dia @ 125 = **905** sq.mm/m Short span

Provide 12 dia @ 125 = **905** sq.mm/m Long span

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11 Design of R.C.Wall



Pressure at the base = Kr x r x h

Kr = 0.3

= 0.3 x 2000 x 3

= 1800 Kg/Sq.m

Bending Moment = 1/2 x 1800 x 2.52 x 2.52 / 3

= 2700 Kg.m

= 27 Kn.m

$$\frac{Mu}{b \times d \times d} = \frac{1.5 \times 27.00 \times 1E+06}{1000 \times 200 \times 200}$$

= 1.01 N/Sq.mm

From table-4SP-16 for d'/d = 30 / 200 = 0.15

Pt = **0.130** % Pc = **0.0** %

At = 0.130 x 1000 x 200 / 100 = **260** sq.mm

Ac = 0.000 x 1000 x 200 / 100 = **0** sq.mm

Provided 10 dia @ 130 c/c for earth side = **604** sq.mm/m

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THE LANDLENS SUITE

Eight ways to know a piece of land before you pay for it.

This report covers one part of the picture. These cover the rest, drawn from the same government records, for any property in Tamil Nadu.

LandLens One
Ask anything about a property and get an answer grounded in live government records, with the sources shown.
/landlens/one

Verify My Land
Every record check run on one property and returned as a single report.
/landlens/verify-my-land

Legal Opinion
An advocate's written opinion on the title, built on the records we pull for it.
/landlens

One Map
Every layer on one map: the parcel, its boundary, zoning, water bodies and what sits around it.
/landlens/one/map

PriceMap
What land actually changed hands for around this plot, taken from the registered deeds.
/landlens/pricemap

Build Scope
What you are allowed to build here: floor space, height, coverage and setbacks.
/landlens/build-scope

Property Tracker
Watch a property and hear about it when something new is registered against it.
/landlens/property-tracker

Deal Room
Run the transaction in one place: documents, stamping, signatures and the parties.
/landlens/deal-room

FREE TOOLS · NO ACCOUNT NEEDED

Twenty-four checks you can run yourself, at no cost.

Records and verification

The registers themselves, read for you.

- Encumbrance Certificate
- Patta and Chitta
- Field Measurement Sketch
- EC Analyzer
- Bank charge check
- Court case search
- Seller background check
- Approval check by survey

Value and duty

What it is worth and what it costs to register.

- Guideline value by street
- Guideline value by survey
- Stamp duty and registration fees
- Capital gains
- Floor space index
- Area unit converter

Zoning and land use

What the plan says can happen on this land.

- Land use zone finder
- CMDA land use check
- Coastal regulation zone
- Master plan check
- Water bodies finder
- Airport height clearance

Registers and directories

Who holds it, and which office keeps the record.

- Find your registering office
- Temple property check
- Waqf property check
- RERA register

Every free tool
/tools

Services we run for you
/services

The LandLens suite
/landlens/one

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Every claim in this document traces back to a government record.

- Legal opinions, due diligence and title verification
- Building plan, layout and sub-division approvals
- Completion and occupancy certificates, regularisation
- Escrow, negotiation and NRI property management
- Land survey, soil testing, architecture and construction

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