Verified RealEstate™

RE REGULATORY RECORD

RERA Document

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DIGITALLY VERIFIED RECORD

STRUCTURAL DESIGN CALCULATIONS

(LOAD CALCULATIONS)

STRUCTURE:

The proposed Building has been envisaged as R.C Framed Structure with STILT + 5 Upper floors. STILT Floor is for Car Parking Utility.1st to 5TH floors are intended for Residential Utility.

ANALYSIS & DESIGN:

The Structure has been idealized as 3D Frame, with R.C Slab & Beam. All Beams are interconnecting with Columns. The design of all R.C components is done using Limit State Method.

The following codes of the Indian Standards are adopted in the Structural Design:

IS: 456-2000	-	Plain and Reinforced Concrete-code of Practice (Fourth Revision)
IS: 875-1987	-	Code of Practice for Design loads (other than Earthquake) for Buildings and Structures.
		Part (1) - Dead Loads-Unit Weights of Building Materials and Stored Materials (second revision)
		Part (2) - Impact Loads (second revision)
		Part (3) - Wind Loads (second revision)
		Part (4) - Snow Loads (second revision)

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		Part (5) - Special Loads and Load Combinations.
IS: 1893-2002	-	Criteria for Earthquake Resistant Design of Structures (Fifth Revision).
IS: 13920-1993	-	Ductile Detailing of Reinforced Concrete Structures Subjected to Seismic Forces-Code of Practice.
SP7:1983	-	National Building Code of India 1983.
SP: 34(S&T)-1987	-	Hand Book on Concrete Reinforcement and Detailing.
SP: 23(S&T)-1982	-	Hand Book on Concrete Mixes.
SP: 16(S&T)-1980	-	Design Aids for Reinforced Concrete to IS: 456-1978.

The concrete grade used for all R.C members is M 25. The Steel grade used in the building is Fe 500.

FOUNDATION:

The columns are supported on Isolated footings at 2.0.m below NGL and the allowable SBC of soil is taken as 16 Tonne/ m2

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TYPICAL FLOOR LOADS:

Self Wt. Of the slab = 0.115m x 25 KN/m^3	=	2.875 KN/m^2
Floor Finish	=	1.0 KN/m^2
Ceiling Plastering	=	0.5 KN/m^2
Live Load	=	2.0 KN/m^2
		6.375 KN/m^2

Say 6.5 KN/ m^2 (DL-4.5 KN/m^2+ LL-2 KN/m^2)

TERRACE SLAB:

Self Wt. Of the slab = 0.115m x 25 KN/m^3	=	2.875 KN/m^2
Weathering Course = 0.1m x 20 KN/m^3	=	2.00 KN/m^2
Ceiling Plastering	=	0.5 KN/m^2
Live Load	=	1.50 KN/m^2
		6.875 KN/m^2

Say 7.0 KN/ m^2 (DL-5.5 KN/m^2+ LL-1.5 KN/m^2)

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TOILET SLAB:

Self Wt. Of the slab	= 0.125m x 25 KN/m^3	=	3.125 KN/m^2
Filling load	= 0.25m x 20 KN/m^3	=	5.0 KN/m^2
Ceiling Plastering		=	0.5 KN/m^2
Live Load		=	1.50 KN/m^2
			10.125 KN/m^2

Say 10.5 KN/ m^2 (DL-9 KN/m^2+ LL-1.5 KN/m^2)

STRUCTURAL MATERIALS:

Concrete Grade	M25 (1:1:2)
Steel Grade	Fe500.

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DESIGN OF CRITICAL COLUMN:

Maximum axial load on column P =800 kN

M_X =30 kN-m

M_Z =10 kN-m

Factored loads P_U =1200 kN

M_{UX} =45 kN-m

M_{UY} =15 kN-m

Assume column size as 230mm x 600mm

fck – 25N/mm^2

fy-500N/mm^2

$$d'/D = \frac{48\text{mm}}{600\text{mm}} = 0.0866$$

$$d'/D = \frac{48\text{mm}}{230\text{mm}} = 0.21$$

$$\frac{P_U}{fckbD} = \frac{1200\text{ kN} \times 1000}{25\text{N/mm}^2 \times 230\text{mm} \times 600\text{mm}} = 0.34$$

assume Pt = 2%

Pt/fck = 2/25 = 0.08

We shall refer chart 45, SP 16

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$$\frac{M_u}{f_{ck} b D^2} = 0.11$$

$$M_{UX1} = \frac{0.11 \times 25 N/mm^2 \times 230mm \times (600mm)^2}{1 \times 10^6}$$

$$= 227.5 \text{ kN-m}$$

from chart 46, SP16

$$\frac{M_u}{f_{ck} b D^2} = 0.09$$

$$M_{UY1} = \frac{0.09 \times 25 N/mm^2 \times 600mm \times (230mm)^2}{1 \times 10^6}$$

$$= 71.4 \text{ kN-m}$$

from chart 63, P_{UZ}

$$P_{UZ}/Ag = 14.5 N/mm^2$$

$$P_{UZ} = \frac{14.5 N/mm^2 \times 230mm \times 600mm}{1000}$$

$$= 2001.5 kN$$

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P_U 1200 kN

--- = ---------- = 0.6

P_{UZ} 2001.5kN

M_{UX} 45 kN-m

------ = ---------- = 0.2

M_{UX1} 227 kN-m

M_{UY} 15 kN-m

----- = ---------- = 0.21

M_{UY1} 71.4 kN-m

From char 64, SP 16

Allowable $\frac{M_{UX}}{M_{UX1}}$ = 0.89

$\frac{M_{UY}}{M_{UY1}}$ = 0.91

Hence 0.k & safe

So, for critical column, we shall adopt the following

Size -230mm x 600mm

M25, Fe 500

Reinf. verticals – 8-25Y +3-12Y

Ties – 10y@ 175mm c/c (4 LEGGED)

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CRITICAL COLUMN FOOTING DESIGN:

Maximum Axial Load on column	=	800 KN
SBC of soil	=	160 KN/ m2
Area of Footing spread	=	800 x 1.05
		----------
		160 KN/ m2
	=	5.25 m2

We shall adopt footing size of 2440 x 2440

Provided area	=	5.95 m2

Hence for critical Column Footing

We shall adopt size	=	2440 mm x 2440 mm
Overall Depth	=	600 mm

Flat projection beyond column footing 100mm alround

Reinforcement

Bottom	=	12 Y @ 125 c/c B/w

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DESIGN OF SLAB:

Self-Wt. Of the slab = 0.115m x 25 KN/m3	=	2.875 KN/m2
Floor Finish	=	1.0 KN/m2
Partition Load	=	1.0 KN/m2
Ceiling Plastering	=	0.5 KN/m2
Live Load	=	2.0 KN/m2
Total	=	7.375 KN/m2

Say 7.5 KN/ m2

Negative Moment for the Shorter Span = 0.0751 x 11.75 x 3.5 x 3.5 x 1.5

= 16.214 kNm

MUx

------ short = $16.214 \times 10^6 / (1000 \times 105^2)$ = 1.47

bD2 Table 2 of SP 16 Pt

MUy

------ long = $10.2 \times 10^6 / (1000 \times 105^2)$ = 0.92

bD2 Table 2 of SP 16 Pt

Ast = Along Shorter direction – 0.714 x 1000 x 105/100

= 751 mm2

Reinf. Provided - 10Y@ 125mm c/c (Shorter Direction)

Distributor – 10Y@ 135mm c/c (Longer Direction)

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DESIGN OF BEAM

Clear span = 6.1 m

Effective span = 6.33 m

Load from slab = 850 x (6.33 / 2)

= 2690 Kg/m

Load from 5.5cm partition wall = 0.055 x 2.70 x 6.1 x 1920

= 1739 Kg/m

Total = 4440 Kg/m

Maximum bending moment = (4440 x (6.33)²) / 10

= 17791Kgm

M ultimate = 1.5 x 17791

= 26686 Kg/m

= 277.3 KNm

Size of beam = 23cm x 60.0 cm (effective depth 57cm)

Mu/bd² = (277.3 x 1000) / (23 x57 x 57)

= 3.71 N/mm²

From table 50;

d' / d = 0.1

pt = 1.3 pc = 1.1

Ast = (1.3 / 100) x 23 x 57 = 17.0 sq.cm

Asc = (1.1 x 23 x 57) / 100

= 14.42 Sq cm

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Area of steel provided:

Bottom 3nos of 20mm +3nos of 20mm

area provided 18.84Sq cm which is more than 17.0 Sq cm.

Top 3nos of 20mm +3nos of 20mm.

Hence safe.

CHECK FOR SHEAR

Maximum shear force (V) = (4440 x 6.1) / 2

= 13542 kg

141.0 KN

V ultimate = (141 X 1.50)

= 211.5 KN

(τv) = Vu / bd

=211.5 x 10 /(23 x57)

= 1.61 N/mm²

Which is less than (τc) max 2.80 N/mm² for M25 concrete.

Hence safe

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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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