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Verified RealEstate™
3/350/2 Mettukuppam,
OMR Thoraipakkam,
Chennai 600 097, India

hello@verified.realestate
+91 9996 12 9996
verified.realestate

DIGITALLY VERIFIED RECORD

DESIGN OF SLAB

Data:

Concrete	M20	Fck		20	N/mm²
Steel	Fe500	fy	=	500	N/mm²
Shorter Span		Lx		2.97	m
Longer Span		Ly	=	5.26	m
Assuming Depth of Slab		D		150	Mm
Assuming Dia of reinf			=	8	mm
Clear Cover			=	20	mm
Eff.Depth of Slab		d	=	126	mm
Eff.Shorter Span		L,	=	2.97	m
Eff.Longer Span		Lt		5.26	m

1.Load Calculations :

Self weight of slab	(0.15 x 20.00)	=	3.00	kN/m²
Ceiling Plastering		=	0.25	kN/m²
Floor Finish				kN/m²
Weathering Course (Weight Not Applicable)		=	0.00	kN/m'
Live load		=	2.00	kN/m²
Total Load		=	7.00	kN/m²
Load Factor		=	1.50	
Factored Load		=	10.50	kN/m²

Span Ratio l_y/l_x = 5.26/2.97

= 1.77

2. Bending Moment Calculation:

Support Condition — Two Adjacent edges discontinuous

continuous)

From IS 456-2000 Table 26

oNx	=	0.086
oPx	=	0.065
oNy	=	0.047
oPy	=	0.035

Shorter Span

Negative Moment (support) Mnx = Nx X Wux L,² = 0.086 x 10.50 x2.97² = 7.97kN.m

Positive Moment (Mid Span) Mpx = ai xW, x L ² = 0.065 x 10.50 x 2.97² = 6.02kN.m

Longer Span:

Negative Moment (Support) MNy = Ny X Wu x Ly² = 0.047 x 10.50 x 2.97² = 4.35kN.m

Positive Moment (Mid span) Mpy = aft x Wu x L ² = 0.035 x 10.50 x 2.97² = 3.24kN.m

Er. S. PRATHABAN, M.E.,Structural
Registered Structural Engineer - Grade-I
Reg.No: SE/Gr-I/006/2022
92A/41A,Bharathi Nagar,S.I.H.S. Colony,
Civil Aerodrome Post,Coimbatore-641 014.
Mobile: 99440 30620.

Reinforcement :

$$Mu = 0.87 \times fy \times Ast \times d \left\{ 1 - \frac{(fy \times Ast)}{fck \times bd} \right\}$$

$$= 0.87 \times 500 \times Ast \times 126 \left\{ 1 - \frac{500 \times Ast}{20 \times 1000 \times 126} \right\}$$

Ast in Shorter Span

Support	=149mm^2
Mid Span	=112mm^2

Ast in Longer Span

Support	=110mm^2
Mid Span	=90mm*

	Reinf Required	Reinf Provided
Shorter Span		
Support	8B @ 340mm c/c	8 dia@ 150 mm c/c
Mid Span	8a @ 320mm c/c	g diap iso mm c/c
Longer Span		
Support	8s @ 380mm c/c	8 dia@ 150 mm c/c
Mid Span	8a @ 270mm c/c	8 dia@ 150 mm c/c

3. Check for deflection

Allowable span / depth Ratio — l/D = 32

32

% of Tension reinforcement — Pt = 0.179

Corresponding Compression reinf.

Bar dia = 8mmd

spacing = 150mm

% of compression reinforcement — pc = 0.179

Modification factor for Tension reinf. F1 = 1.20 (From Fig 4 in IS 456 —2000)

Modification factor for comp.reinf. F2 = 1.00 (From Fig 5 in IS 456 —2000)

Modified span/ depth ratio

l/d xF1 xF2

= 32x1.20x1.00

= 38.40

Actual span / depth ratio

2970/126

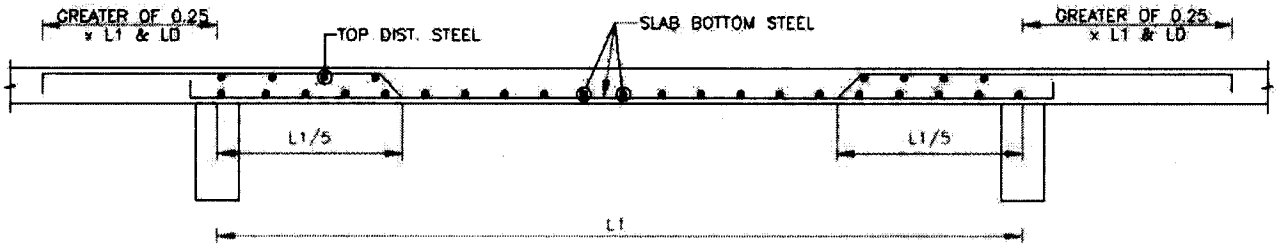
23.57

Actual span / depth ratio < Modified span /depth ratio — 23.57 < 38.40

HENCE SAFE & SOUND

Er. S. PRATHABAN, M.E.,Structural
Registered Structural Engineer - Grade-I
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92A/41A,Bharathi Nagar,S.I.H.S. Colony,
Civil Aerodrome Post,Coimbatore-641 014.
Mobile: 99440 30620.

SCHEDULE OF FLOOR SLAB							
NO.	SLAB	SLAB TYPE	THICKNESS	BOTTOM REINFORCEMENT		EXTRA REINFORCEMENT	
				IN SHORTER DIR.	IN LONGER DIR.	IN SHORTER DIR.	IN LONGER DIR.
1.	S1	REGULAR	5"	10ø @ 6"C/C	8ø@ 6"C/C	10ø @ 6"C/C	8ø@ 6"C/C



TYPICAL SECTION
SHOWING SLAB REINFORCEMENT

Er. S. PRATHABAN, M.E.,Structural
Registered Structural Engineer - Grade-I
Reg.No: SE/Gr-I/006/2022
92A/41A,Bharathi Nagar,S.I.H.S. Colony,
Civil Aerodrome Post,Coimbatore-641 014.
Mobile: 99440 30620.

DESIGN OF BEAM

Data:

Effective length		= 5.11 m
		= 5110 mm
Breadth of Beam		= 230 mm
Overall depth (assumed)		= 350 *mm*
Characteristic strength of steel		
	fy	= 500 N/mm²
	fck	= 20 N/mm²
	Cover	= 25 mm

Total Load

Dead load from slab		=3.75 kN/mm²
Ceiling Plastering		=0.25kN/m²
Floor finish		=1kN/mm²
Total dead load		=5.00 kN/m²
Live load		=1kN/m²
Total Load	=	7.00 kN/m²

Effective Depth = d = 450 - 25 - 25 / 2

= 412.5 mm

Distance of centroid of Compression reinforcement from the extreme compression fibre =

d' = 25 +(25/2)

= 37.5mm

$\frac{d'}{d} = \frac{37.5}{412.5}$

= 0.09

Minimum Reinforcement

The min.area of tension reinforcement shall not be less than the given,

$$\frac{As}{bd} \quad \frac{0.85}{fy}$$

Where,

As = Min.area of tension reinforcement

b = Breadth of the beam or breadth of web of T- beam

d = Effective depth

fy = Characteristic strength of reinforcement

As = $\frac{0.85 \times b \times d}{fy}$

fy

= $\frac{0.85 \times 230 \times 412.5}{500}$

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= 101.29 mm2

Refering Design Aids IS:456,The reinforcement as shown in the sketch

Overall depth of beam = $\frac{1}{12}$ to $\frac{1}{20}$ of the span

Provide over all depth = 350 mm

Width of rib = 2 (depth of rib) = 2(350-150)

3 3

= 200 mm

Loading on the beam

From the Slab $\frac{Wl_x}{6}\left[3 - \left(\frac{lx}{ly}\right)^2\right]$

$= \frac{7x3.2}{6}\left[3 - \left(\frac{3.2}{\quad}\right)^2\right]$

=9.74 kN/m

D.L of the rib = 0.23 x 0.3 x 25 kN/m

= 1.8 kN/m

Total = 8.54 kN/m

Providing 16 mm dia bars at clear cover 25 mm

Effective cover = 25 + 8

= 33 mm

Effective depth d = 417 mm

Center to center bearing= 5.11 m

Effective span = 5.11 m

Max. BM $\frac{11.54 \times 3.2 \times 3.2}{8}$

= 10.77 kN.m

Req.depth d = $\left\{\frac{1.5 \times 14.77 \times 10 \wedge 6}{2.75 \times 230}\right\}^{1/2}$

= 187.16 mm

Provided depth, D = 450 mm

$\frac{Mu}{bd^2} = \left\{\frac{1.5 \times 14.77 \times 10 \wedge 6}{230x417x417}\right\}^2$

= 0.75

pt2 x fy $= \frac{fck}{2 \times fy}\left(1 - \left(SQRT\left(1 - \frac{4 \times (Mu/b \times d^2)}{0.87 \times fck}\right)\right)\right)$ X 100

=0.18%

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$$Ast = \left\{ \frac{0.18 \times 230 \times 417}{100} \right\}$$

$$2884 \text{ mm}^2$$

Provided 6— Y12

Check for Shear

$$V = \frac{1.5 \times 11.54 \times 5.11}{2}$$

$$= 32.22 \text{ kN}$$

$$T_c = 0.54 \text{ N/mm}^2$$

$$V_{uc} = \frac{0.48 \times 230 \times 417}{1000}$$

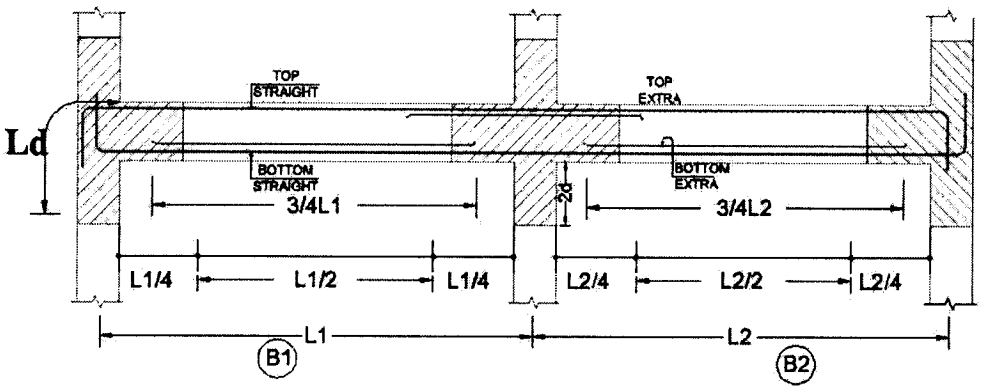
$$= 46.1 \text{ kN}$$

Vuc > Shear at support

Provide Y8 @ 150 c / c (stirrups)

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Mobile: 99440 30620.

SCHEDULE OF ROOF BEAM						
NAME	SIZE	REINFORCEMENT: MAIN BAR		EXTRA REINFORCEMENT		SHEAR REINFORCEMENT
		TOP	BOTTOM	TOP	BOTTOM	
RB1	8"X12"	2-10Ø	2-10Ø	1-10Ø	1-10Ø	8Ø @ 6" C/C
RB2	8"X12"	2-12Ø	2-12Ø	1-12Ø	1-12Ø	8Ø @ 6" C/C



TYPICAL ARRANGEMENT OF BEAM REINFORCEMENT

SHEAR REIN. UNLESS OTHERWISE STATED

I.) SHEAR REIN. FOR ALL THE BEAMS SHALL BE 8mm @ 4" C/C IN L/4

II.) SHEAR REIN. FOR ALL THE BEAMS SHALL BE 8mm @ 6" C/C IN L/2

DUCTILE DETAILING FOR COLUMN AND BEAM JUNCTION IS SHOWN IN HATCHED AREA

SHEAR REINFORCEMENT IN HATCHED AREA @ d/4 mm c/c,(MINIMUM. 4" C/C)

WHERE ' d ' is the Effective Depth of the Beam.

NOTE :-

THE SHEAR REIN. IN L/4 SHOULD BE AS I.) OR D/4 mm C/C
WHICH EVER IS LESS FOR REST OF THE BEAM
PROVIDE SHEAR REIN. AS IN II.)

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DESIGN OF COLUMN

Data:

Total No. of floors			= 2
Total No. of Roof			= 2
Storey height			= 3 m
Breadth of column	b		= 230 m
			= 0.23 m
Depth of column	D		= 300 mm
			= 0.30 m
	fck		= 20 N/mm^2

Total axial load

Dead load & live load from one floor		=	280 kN
Total axial load all floors		=	2 x 280
		=	540 kN
Column dimension		=	230 x 600 mm
Self weight of column			0.23 x 0.30 x 2 x 20 x 3
		=	8 kN
Total load			(540 + 8.28) x 1.5
	Pu	=	818.28 kN

Area of Reinforcement

$\frac{d'}{D}$ = 0.80

d' = 50 *mm*

$\frac{Pu}{fck \times b \times D} = \frac{818.28 \times 10^3}{20 \times 230 \times 300}$

= 0.95

$\frac{Mu}{fck \times b \times D2} = \frac{1.S \times 30.48 \times 10^6}{20 \times 230 \times 600^2}$

= 0.02

Refering to chart in SP : 16 for values

$\frac{Pu}{fck.b.D}$ 0.95 $\frac{Mu}{fck.b.D^2}$ = 0.02

The value of $\frac{P}{fck}$ 0.05

P 0.05 x

= 1.0

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Mobile: 99440 30620.

$$As = \frac{p \times b \times D}{100}$$

$$\frac{1.6 \times 230 \times 600}{100}$$

$$2208 \text{ mm}^2$$

Provide 6 — Y12 bars.

Design of Lateral Ties

Dia of lateral ties = $\frac{1}{4} \times 12 = 4$ mm

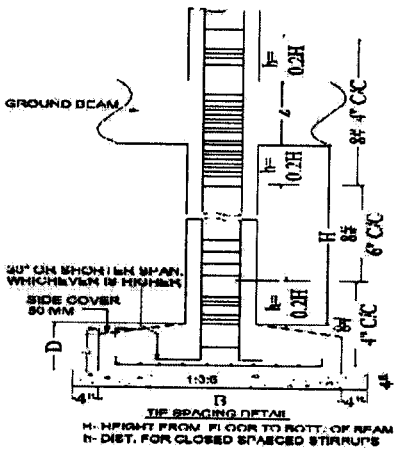
Hence 8mm dia bar is adopted

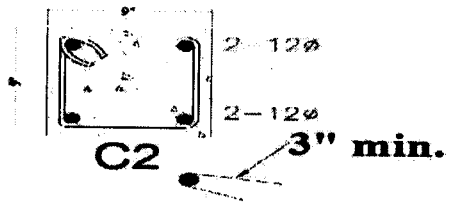
Pitch is min. of the following —(as per IS: 456)

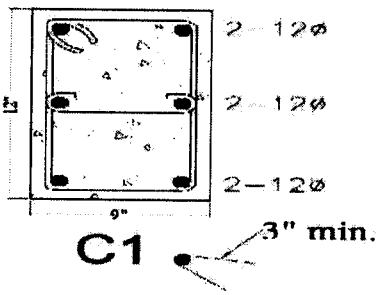
a. Least lateral dimension = 300 mm
b. 12 x dia of bar
c. 300 mm

Hence provide Y8 @ 150mm c/c
Similarly other columns are calculated.

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Mobile: 99440 30620.







COLUMN DETAILS

S.NO	COLUMN NO.	SIZE	REINFORCEMENT	STIRRUPS	STIRRUPS AT JOINT
1	C1	9" x 12"	4-12ø	8 MM @4"C/C	8 MM @4"C/C
2	C2	9" x 9"	4-12ø	8 MM @4"C/C	8 MM @4"C/C

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DESIGN OF FOUNDATION

Design of Isolated footing for Intermediate column

Data :

Column Size	L		230 mm
	B		300 mm
Size of footing	L	=	2.5 m
	B		2.5 m
Safe Bearing capacity of soil	SBC	=	450 kN/m^2
Depth of footing below GL			2 m
Density of soil	g		18 kN/m^3
Characteristic strength of concrete	fck		20 N/mm^2
Characteristic strength of Steel	fy	=	500 N/mm^2
Depth of footing provided	D		1.2m
Cover	d'	=	50mm

1. Loading on footing

Axial load on column = 2595 kN

Self weight of footing (10%) 131 kN

Total load on footing = 2726 kN

Adpot size of footing 2.5 x 2.5 m

6.25 m

Soil pressure $\frac{P}{A} = \frac{2726}{6.25}$

= 436 kN/m^2

Gross safe bearing capacity 450 kN/m^2

Hence safe & sound

2. Moment Calculation

Face of the column $\frac{2.5 - 0.60}{2}$

0.95 m

Design pressure = 436 kN/m^2

Moment M $\frac{436 \times (0.95)^2}{2}$

196.75 kN.m

Factored moment 295.12 kN.m

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3. Area of Reinforcement

Effective Depth	d	620mm	(or)	0.62 m
Dia of bar provided	e	20 mm		

Provided spacing 100mm

$$\frac{Mu}{b \times d^2} = \frac{295.12 \times 10^6}{1000 \times 620 \times 620}$$

0.77

Percentage of tension reinforcement

$$pt = \frac{fck}{2 \times fy}\left\{1-\left[SQRT\left[1-\frac{4 \times (Mu/b \times d^2)}{0.87 \times fck}\right]\right]\right\} \times 100$$

0.51 %

Required, Ast $\frac{0.51 \times 1000 \times 620}{100}$

3162 mm^2

Hence safe & sound

4. Check for One way shear

Vu 1.5 x 254 x 3 x 0.5 x 0.30 x 0.5 — 0.62

160 kN

Permissible shear stress $\frac{160 \times 1000}{1000 \times 620}$

0.26 N/mm^2

Allowable shear stress = 0.49 N/mm^2

Hence safe & sound

5. Check for punching shear

Punching force Pf $\left(254 \times 608 - ((0.23 + 0.62) \times (0.60 + 0.62))\right) \times 1.5$

= 2187 kN

Punching shear stress $\frac{2,187 \times 1000}{620 \times 2 \times (230 + 6000 + (2 \times 620))}$

0.85 N/mm^2

Allowable shear stress = 1.25 N/mm^2

Hence safe & sound

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EARTH QUAKE ANALYSIS

1. Calculation of horizontal seismic Coefficient As per IS 1893 —2002

Ah $\frac{zx1xSa}{2 \times R \times g}$

Zone factor	Z	=	0.16	
Importance factor	I		1	(As per table 7)
Response reduction factor,	R	=	5	
	Sa / a		2.5	

Natural period, Ta = $0.075\ h^{3/4}$

(Clause 7.6) h = height of the building

$= 0.075 \times 13.1^{0.7\wedge}$

0.52 sec

$$Ah = \frac{0.16 \times 1 \times 2.5}{2 \times 5}$$

$= 0.04$

2. Calculation of Base shear & seismic forces

Base shear V = Aha Wi

$= 0.040 \times 1316$

$= 52.64$ kN

Total no of columns = 21

Shear per column $= \frac{25.64}{21}$

Seismic moment per column $= \frac{1.22 \times 3}{4}$

$= 0.92$T-m

Column provided 230 x 600 mm with 12 —Y16

Hence safe & sound

3. Checking for footing

SBC = 35T/m^2

Soil pressure = 25.4T/m^2

$$\frac{P}{A} \quad 1 \quad \frac{1.40 \times 6}{12}$$

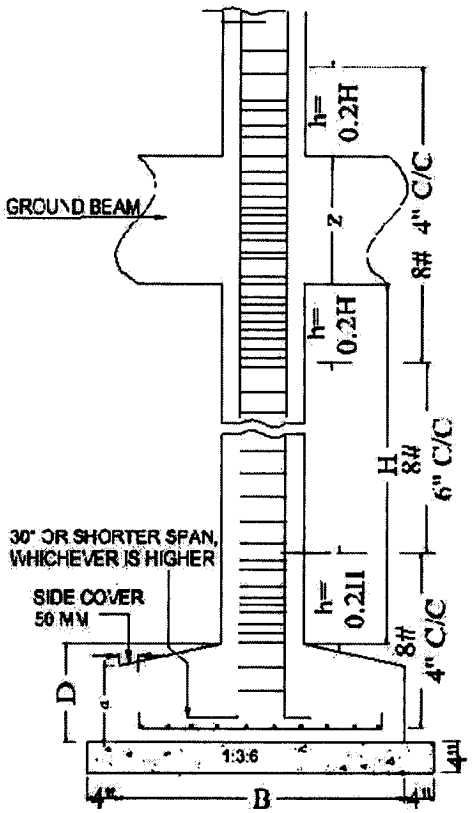
$$25.4 \quad z \quad 0.7$$

$$26.1$$

$= 15.7\ \text{T/m}^2 \quad < 25.00\ \text{T/m}^2$

Hence safe & sound

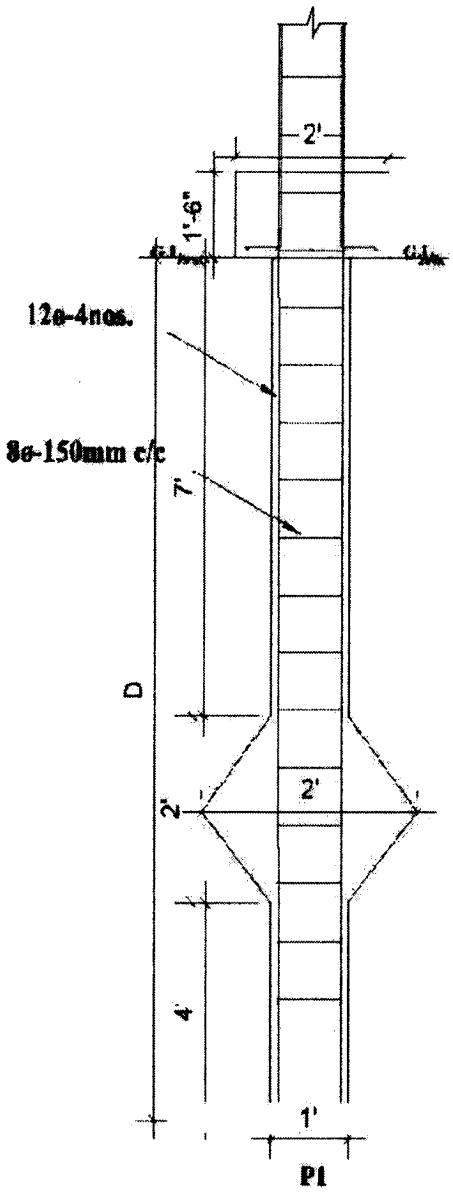
Er. S. PRATHABAN, M.E.,Structural
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TIE SPACING DETAIL

H- HEIGHT FROM FLOOR TO BOTT. OF BEAM

F- D ST. FOR CLOSED SPACED STIRRUPS



FOOTING SCHEDULE

S. NO.	FOOTING NO.	SIZE			THICKNESS	DEPTH	REINFORCEMENT (PILE CAP)	COVER	NO.OF BARS
		F. DIA.	DIM.	PCC	T	D	Rx - Ry	BOTH DIRECTION	PILE
1	P1	12'Ø	4'0"X4'0"	2'3"X2'6"	18"	15"	12 Ø @ 6" C/C	2"	4 - 12Ø

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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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3/350/2 Mettukuppam,
OMR Thoraipakkam,
Chennai 600 097, India
hello@verified.realestate
+91 9996 12 9996

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