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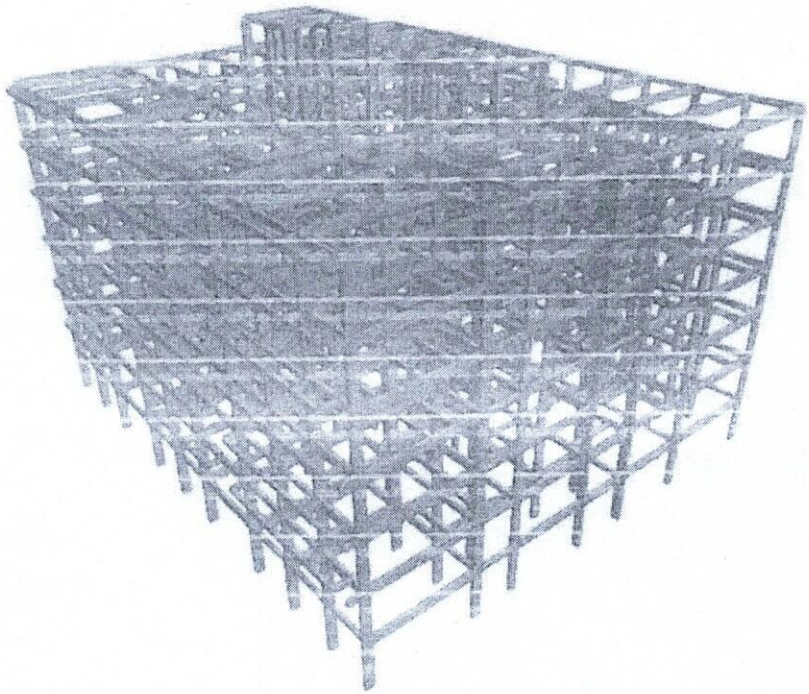
DIGITALLY VERIFIED RECORD

PROPOSED CONSTRUCTION OF APARTMENT BUILDING AT COIMBATORE DISTRICT

FOR

STRUCTURAL DESIGNBASIS

REPORT



DIMENSIONS
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DIMENSIONS Coimbatore

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STRUCTURAL DESIGN BASIS REPORT

1. INTRODUCTION

Project Name	Proposed Construction of Apartment Building at Saravanampatti, Coimbatore district.
Client	N. Sivaprakasham R. Dharmambal B. B. Balasrivatsen
Building	Apartment Building
Consultant	Dimensions, Coimbatore
Location of the project	Saravanampatti, Coimbatore

2. SOIL CHARACTERISTICS

S.No	Description	Comments
1.	Type of Soil	Soft Disintegrated Rock
2.	Recommended Safe Bearing Capacity	360.8 kN/m²
3.	Depth of Foundation	4 m
4.	Recommended Soil Stabilization Techniques	Nil

3. STRUCTURAL SYSTEMRF

S. No	Description	Comments
1.	Type of Structure	RCC Structure
2.	Type of Foundation	Isolated Footing
3.	Length of Structure	34.45 m
4.	Breadth of Structure	29.57 m
5.	Height of Structure	18.29m
6.	No. of Storeys	S+5
7.	Structural System	Framed

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4. MATERIAL SPECIFICATIONS

4.1 Grade of Concrete

The following were the grade of concrete used for various structural elements.

S.NO	Elements	Grade of Concrete
1.	Foundation	M30
2.	Plinth Beam	M30
3.	Column	M30
4.	Super Structure	M30

4.2 Reinforcement

Steel reinforcements used for all structural elements shall be High Yield Strength Deformed Thermo-Mechanically treated bars with yield stress of 500Mpa and minimum elongation of 18.0% confirming to IS:1786-1985.

4.3 Cover to Reinforcements

Clear cover to main reinforcement for various structural elements shall be confirming to IS:456-2000.

The Environmental Conditions considered for design are

S.No	Structure	Exposure Condition
1.	Sub-Structure	Mild
2.	Super-Structure	Mild

Clear cover to main reinforcement are provided based on the above criteria

S.No	Structural Elements	Values
1.	Footing (Bottom C Top)	50mm
	Footing (side)	75mm
2.	Columns	40mm
3.	Beams	25 mm or diameter of bar (whichever is greater)
4.	Slabs	20mm

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5.	Staircase Waist Slabs	20mm

5. LOADS

5.1 Dead Load

The following are the unit weight of building materials that have been considered in accordance with IS:875(Part I)-1987 and IS:1911.

S.No	Materials	Unit weight (kN/m^3)
1.	Reinforced Cement Concrete	25
2.	Plain Cement Concrete	24
3.	Brick Masonry	19
4.	Cement Mortar/Plaster	20
5.	Floor Finish	20
6.	Brickbat Coba for Terrace	20

5.2 Live Load

The following are the live loads that have been considered in accordance with IS:875(Part II)-1987.

S.No	Specifications	Live Load (KN/m^2)
1.	Residential Building	3
2.	Corridor	3

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6. LOAD COMBINATIONS

The structure has been analyzed for the following load combinations as indicated in IS:456-2000. Whenever Dead and Imposed Load is combined with Earthquake Load, the appropriate part of imposed load as specified in IS:1893-2016 is adopted for evaluating both Earthquake effects and Combined Load effects.

S.No	Load Combinations
1.	1.0 x (Dead load + Live load)
2.	1.5 x (Dead load + Live load)
3.	1.5 x (Dead load + Live load + Self weight of beam and column ± Earthquake load)
4.	1.5 x (Dead load + Live load + Self weight of beam and column ± wind load)
5.	1.2 x (Dead load + Live load + Self weight of beam and column ± wind load)
6.	1.2 x (Dead load + Live load + Self weight of beam and column ± Earthquake load)
7.	(0.9xDead load + Self weight of beam and column ± 1.5xEarthquake Load)
8.	(0.9xDead load + Self weight of beam and column ± 1.5xWind Load)
9.	(1.5xDead load + 1.5xLive load + Self weight of beam and column ± 1xEarthquake Load)
10.	1.5xDead load + 1.5xLive load+ Self weight of beam and column + 1xWind Load)

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7. ANALYSIS PROCEDURE

The framing systems (including the sizes of various structural elements) have been worked out, based on a preliminary structural analysis and in co-ordination with relevant architectural C services requirements. Plane frame analysis using Staad Pro software has been undertaken to obtain refined results for all load combinations.

8. SERVICEABILITY REQUIREMENTS (Deflection Control)

S.No	Description		Codal Value	Ref. Code Book
1.	Total deflection due to all loads incl. the effects of temperature creep and shrinkage (as-cast level)	<	L/250	IS:456 2000
2.	Total deflection due to all loads incl. the effects of temperature creep and shrinkage (after erection)	<	L/350 or 20mm (which ever is less)	IS:456 2000

G. DESIGN METHODOLOGY

Structural design for typical members has been done for the combination of loads that produces maximum stress in the structural elements and in turn requires maximum reinforcing steel provisions. The design of Beams and Columns taken from Staad results. The design of Slabs, Footing, Column and Beam are done in Excel Worksheets with the results obtained from Staad.

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10. LIST OF CODES REFERED

10.1 Loading Standards

S.No	Code Number	Title of the Code
1.	IS:875(Part I)	Code of Practice for Design Loads (Other than Earthquake) for Buildings and Structures: Part I, Dead Loads-Unit weights of Building materials and stored material.
2.	IS:875(Part II)	Code of Practice for Design Loads (Other than Earthquake) for Buildings and Structures: Part II, Imposed Loads.

10.2 Concrete

S.No	Code Number	Title of the Code
1.	SP:16	Design Aids for Reinforced Concrete.
2.	SP:34	Handbook of Concrete Reinforcement and Detailing.
3.	IS:456	Code of Practice for Plain and Reinforced Concrete.

10.3 Reinforcement

S.No	Code Number	Title of the Code
1.	IS:432(Part I)	Specification for Mild Steel and Medium Tensile Steel bars and hard-drawn Steel wire for Concrete Reinforcement: Part I, Mild Steel and Medium Tensile Steel bars.
2.	IS:1786	High Strength Deformed Steel bars and Wires for Concrete Reinforcement-Specification.

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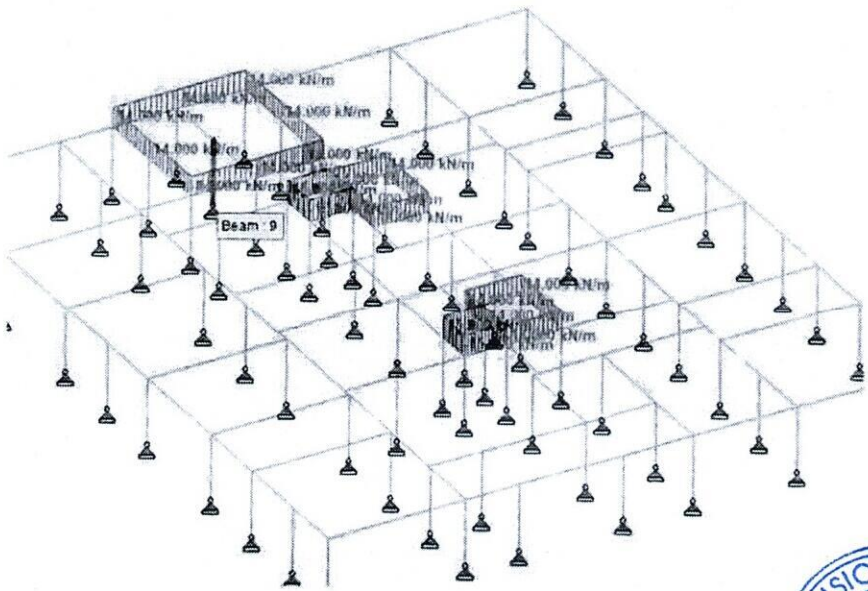
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WALL LOAD:

Wall load (Common Brick)		
8" thk wall(230)		
clear heig	3.05	m
Deduct be	0	m
height	3.05	m
width	0.2	m
Load	14.0	KN/m

Width of wall = 0.20 m + 0.03 m (plastering thickness) = 0.26 m.
Height of wall = 3.05 m.
Unit weight of brick = 20 kN/m^3.
Load = Width of wall x Height of wall x Unit weight of brick
= 0.23 m x 3.05 m x 20 kN/m^3
= 14 kN/m.



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Coimbatore

LIVE LOAD:

Live load assigned as 3 kN/m² as per IS 875 - 2 - imposed loads

Assumed highest load 3 kN/m² for all the rooms.

1) RESIDENTIAL BUILDINS

a) Dwelling houses:

1)	All rooms and kitchens	2·0	1·8
2)	Toilet and bath rooms	2·0	—
3)	Corridors, passages, staircases including fire escapes and store rooms	3·0	4.5
4)	Balconies	3.0	1·5 per metre run concentrated at the outer edge

DEAD LOAD:

Unit weight of tile: 24 kN/m³

Thickness of tile = 0.05 m

Load = 0.05 x 24 = 1.2 kN/m².

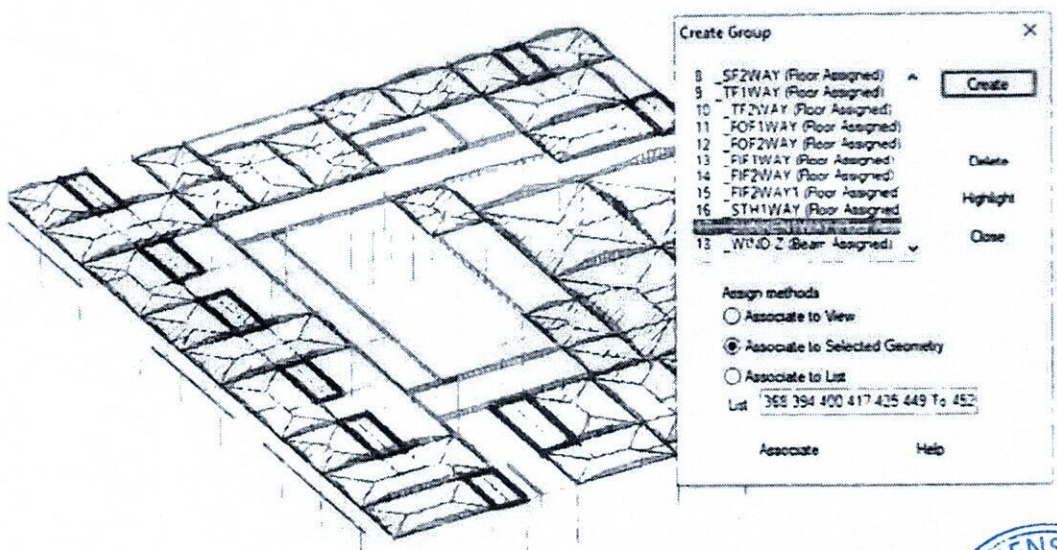
SUNKEN LOAD:

Depth = 0.23m

Here we consider filling material as a brick

Unit weight of brick = 20 kN/m³

Load = 0.23 m x 20 kN/m³ = 4.5 kN/m²



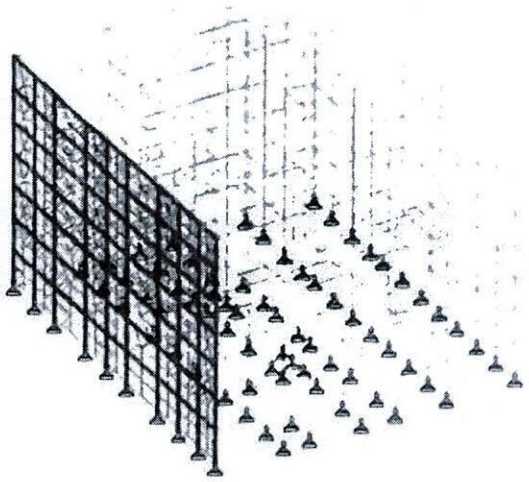
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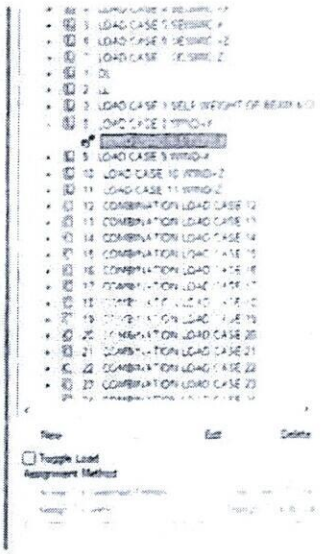
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WIND LOAD:

Wind load added as per IS- 875 - 2015





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SLAB DESIGN

DESIGN OF TWO WAY SLAB

Design Data

Dimensions of the slab (c/c distance b/w supports),

Length of short span,	L_x	= 2.9	m
Length of long span,	L_y	= 3.5	m

f_{ck}	=	30	N/mm²
f_y	=	500	N/mm²

less than 2 1.2

Width of the supporting beam,	= 200	mm
Clear cover to main reinforcement	= 20	mm
Assume dia of reinforcement steel	= 12	mm

Calculations

Assume the thickness of slab as 150 mm, Effective depth, d = 124 mm

Effective span, l_x = 2.88 m (or) 2.804 m whichever is less, d = 2.804 m

l_y = 3.5 m (or) 3.424 m whichever is less, d = 3.424 m

(l_y / l_x) = 1.22 < 2. Here, (l_y / l_x) is less than 2. Hence design the slab as two way slab

Load Calculations

Dead Load of slab = 0.15 x 25	=	3.75	KN/m²
Finishes load on slab	=	1.20	KN/m²
Live Load on slab	=	3.0	KN/m²
Total Dead load acting on the Structure	=	4.95	KN/m²
Total live load acting on the Structure	=	3.0	KN/m²
Factored Design Load w	=	11.93	KN/m²

Support Condition (Type of panel according to support condition)

Three Edges Discontinuous (One Long Edge Continuous) For this support condition,

Short span coefficient for (l_y / l_x) = 1.22.

For negative moment, a_x = 0.0720

For positive moment, a_x = 0.0538

Long span coefficient,

For negative moment, a_y = 0

For positive moment, a_y = 0.043

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Moment Calculation

Max. BM per unit width, $M_x = a_x w l_x^2$ & $M_y = a_y w l_x^2$

$A_{st,min}$ = (0.12/100) bD = 180 mm^2

Reinforcement details

Provide 10 mm @ 150 mm c/c at midspan & supports for short span (A_{st} pro = 524 mm^2)

Provide 10 mm @ 150 mm c/c at midspan & supports for long span (A_{st} pro = 524 mm^2)

Hence OK

Hence OK

Check for Deflection

Percentage of tension reinforcement = 0.42 %

$f_s = 0.58 f_y (A_{st\,req} / A_{st\,pro})$ = 64

Refer Fig. 4 pg 38 of IS 456.

Modification factor = 1.6 pc 0.42

Allowable (Span / d_{eff}) ratio = 34 k2 1.075

Effective depth required = 82 mm

< d prov.

Hence OK

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BEAM DESIGN (RB1)

Beam Identification		8"X12"
Beam num		
Beam Type		RB1
Parameter	Unit	
Fck	mPa	30
Fy	mPa	500
Breadth "b"	mm	200
Depth "D"	mm	300
Clear Cover	mm	25
Dia of stirrups	mm	8
Dia of Max size bottom bar	mm	16
Dia of Max size top bar	mm	12
Area of Max size bottom bar	sq.mm	200.960
Area of Max size top bar	sq.mm	113.040
Factored moment "Mz"	kN-m	99
Shear force Vu	KN	76
effective depth(calculated)	mm	259
effective depth override	mm	259
effective depth (Final)	mm	259
Xu max / d	mm	0.46
Mu Lim	kN-m	53.77457671
Type of Beam		Doubly Reinforced
Mu/b	kN-m / m	495.00
Pt from Charts (for Sing.Reinf)	%	0.615
Mu/bd^2	N/mm^2	5.50
d' / d		0.16
From Tables of SP16 Pt	%	1.567
From Tables of SP16 Pc	%	0.528

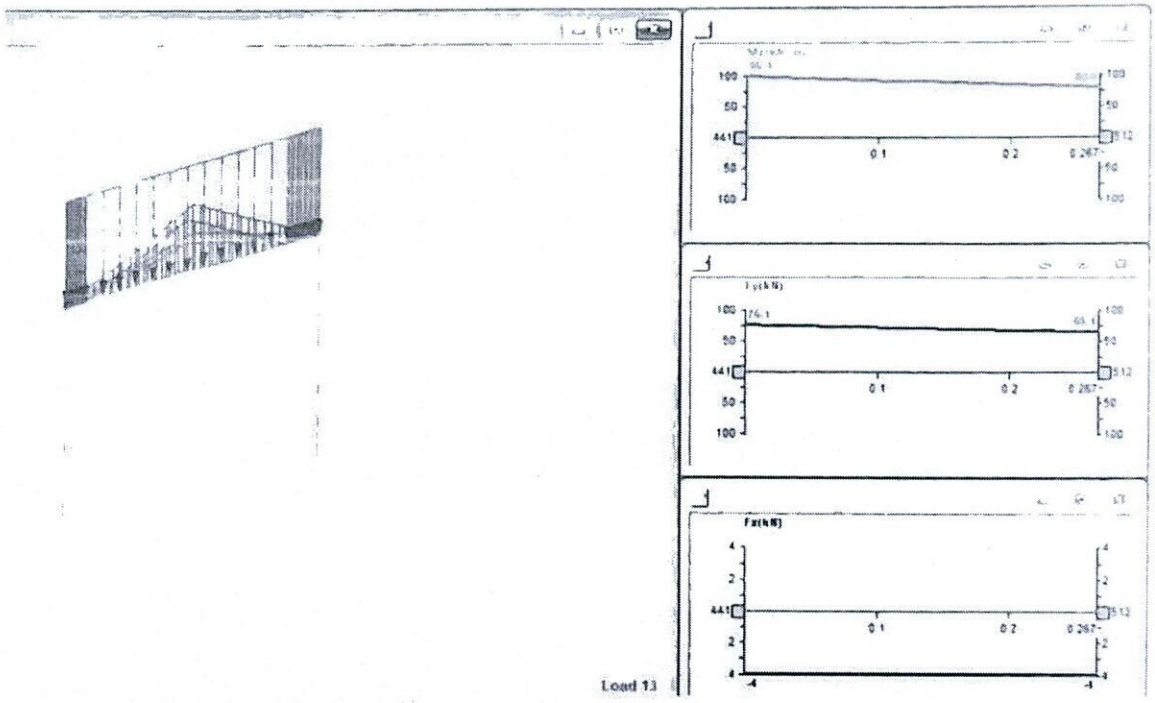
Ast	Sq.mm	811.706
Asc	Sq.mm	273.504
Ast provided	Sq.mm	828.96
Asc provided	Sq.mm	828.960
		PROVIDE Ast SATISFIED

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		PROVIDE Ast SATISFIED
Nominal Shear Stress τv	N/mm^2	1.467181467
Maximum Shear Stress τc max	N/mm^2	3.5
Shear Stress in concrete τc	N/mm^2	**0.701048105**
Comment on Section		OK
Comment on Stirrups		Design Stirrups
Shear on Reinforcement Vus	kN	39.68570817
Dia of Stirrups	mm	8
Type of stirrups (2leg / 4 Leg)		2
Design Spacing	mm	285.26
0.75d	mm	194.25
max spacing	mm	300
min shear reinforcement spacin	mm	553.28
spacing to be Provided	mm	**194**
provide #8 2 legged stirrups @	150	mm c/c



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COLUMN DESIGN

Element Identification (Grid)		
Element Designation		
Parameter	Unit	Value
Fck	mPa	30
Fy	mPa	500
Assumed % of steel	%	2.5
BREADTH (local x axis) b	mm	200
DEPTH (local Y axis) D	mm	450
Unsupported length Lx	mm	2520
Unsupported length Ly	mm	2520
FACTORED Pu	kN	966
Factored Mx	kN-m	10
Factored My	kN-m	10
Max Dia of Bar used	mm	20
End Condition		Both Fixed
allowable unsupported length	mm	No Restriction
maximum unsupported length	mm	2520.00
Check on Unsupported length		OK
Lex	mm	2016
Ley	mm	2016
Classification wrt Local X		Short Col
Classification wrt Local Y		Short Col
Geometric Adequacy		DEPTH OK
		BREADTH OK
Moment Due to eccentricity wrt Local X	kN-m	21.74
Moment Due to eccentricity wrt Local Y	kN-m	19.32
Moment due to long Column(Max)_	kN-m	0.00
Moment due to long Column(May)	kN-m	0.00
Design Moment Mux	kN-m	21.74
Design Moment Muy	kN-m	19.32
d'/D		0.08
Pu/Fck*b*d		0.36
p/Fck		0.08
From Chart, Mu/Fck bD^2		0.135
Mux1	kN-m	164.03
d'/b		0.18
Pu/Fck*b*d		0.36
p/Fck		0.08
From Chart, Mu/Fck bD^2		0.11
Remarks		ok

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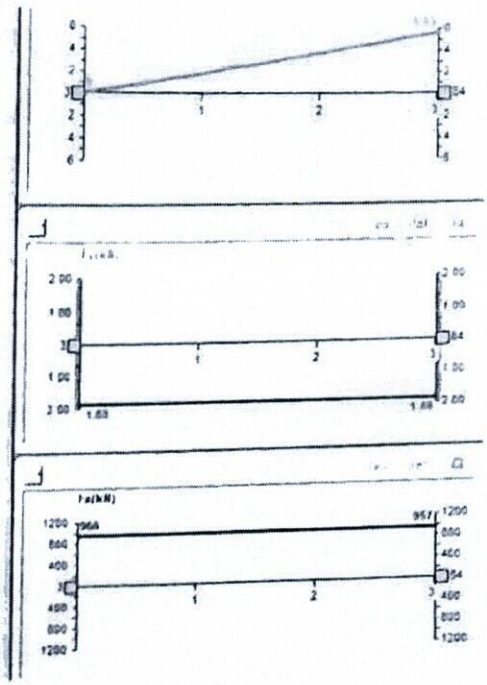
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Remarks		ok
Percentage steel assumed initially	%	2.5
from chart 63 (P_{uz}/A_c)	mPa	22.5
P_{uz}		2025
P_u/P_{uz}		0.477
Muy/Muy1		0.33
From Chart 64 (Mux / Mux1)		0.67
comment on assumption of % steel		safe
Ast to Provide	Sq mm	2250
nominal number of max dia bars (Approx)	nos	7.16
32 dia (803)	nos	0
25 dia (490)	nos	0
20 dia (314)	nos	4
16 dia (200)	nos	6
12 dia (113)	nos	0
Ast Provided	Sq mm	2462
minimum bar dia used	mm	12
Check on Ast		OK
Mx at top of column (local x)	kN-m	10
Mx at bottom of column (local x)	kN-m	10
My at top of column (local y)	kN-m	10
My at bottom of column (local y)	kN-m	10
Factored Shear Force from analysis Fx (local)	kN	10
Factored Shear Force from analysis FY(local)	kN	10
Check forNominal Shear		Nominal Ties
Check for Maximum Shear		Ok
Type of Ties (number of legs)	nos	2
Dia of Ties	mm	8
Spacing calculated wrt Vus	mm	300
least lateral dimension	mm	200
16*least dia of long bars	mm	192
nominal spacing	mm	300
Final Spacing to be provided	mm	125
Ties recommended		#8 @0'5" c/c

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Load 13

X = 1.876 kN
Y = 966.081 kN
Z = 1.098 kN
MX = FREE
MY = FREE
MZ = FREE

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Design of Isolated Footing

Isolated Footing

1 **Footing Size Design**

Footing Identification	F2
Grid Location	
Column Size	200*450
Column Type	
Load Pu	793 KN
Design Load (P)	551 KN
Moment in x dir (Mux)	
Moment in y dir (Muy)	0 KNm
Column size (cx)	230 mm
cy	300 mm
SBC (q)	150 KN/sqm
Footing Size required (Areq)	1.53 sqmm
Footing Size Provided :	
L	1.98 meters
B	1.96 meters
Area Provided (Aprov)	3.92 meters
Zx	1.28
Zy	1.29
Net upward pressure (Nup)	140 KN/m2

Recommended Size of Footing -

1.61 meters

0.95 meters

Footing Size OK

2 **Slab Design**

width x	1980 mm	width y	1980 mm
lx	0.975		
ly	0.840		
Bending Moment in x dir (Mx)	81 KN-m		
Bending Moment in y dir (My)	74 KN-m		
Concrete (fck)	30 MPa		
Steel (fy)	500 MPa		
Minimum Depth Required (dmin)	142		
Overall Depth Provided (D)	600 mm	Dia of Bar x dir	12 mm dia
Clear Cover	75 mm	Dia of Bar y dir	12 mm dia
Effective Cover (d')	81 mm		
Effective Depth (d")	519 mm		

Area of Steel	Spacing c/c in mm			
	12#	16#	20#	10#
1233 sqmm	182 c/c	323 c/c	504 c/c	126 c/c
1233 sqmm	182 c/c	323 c/c	504 c/c	126 c/c

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	12#	16#	20#	10#
1233 sqmm	162 c/c	323 c/c	504 c/c	126 c/c
1233 sqmm	161 c/c	323 c/c	504 c/c	126 c/c

Minimum Ast required across x direction

Minimum Ast required across y direction

BOTTOM MAT

Ast across x direction	12 mm dia	@ 150 mm c/c	1493 sqmm
Ast across y direction	12 mm dia	@ 150 mm c/c	1493 sqmm

TOP MAT

Ast across x direction	10 mm dia	@ 175 mm c/c	889 sqmm
Ast across y direction	10 mm dia	@ 175 mm c/c	889 sqmm

3 **One Way Shear along x direction**

Vu1	149 kN
ζv	0.145 MPa
ζc	0.479 MPa
Vc1	492 KN

One Way Shear Check OK

4 **One Way Shear along y direction**

Vu1	134 kN
ζv	0.130 MPa
ζc	0.479 MPa
Vc1	492 KN

One Way Shear Check OK

5 **Two Way Shear**

Vu2	697 KN
ζv	0.428 MPa
ks*ζc	1.369 MPa
Vc1	2229 KN

Two Way Shear Check OK

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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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