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DIGITALLY VERIFIED RECORD

PLAN SHOWING PROPOSED APARTMENT BUILDING AT PLOT NO.1 & 2, S.Nos.60/2A 1B. AS PER PATTA NO:1275 SITUATED AT NINNAIKARAI VILLAGE, CHENGALPATTU TALUK, CHENGELPET DISTRICT-603203

TYPICAL STRUCTURAL DESIGN CALCULATION

1 **General:**

Proposed building is S+ 5 upper floors for residential purpose. Stilt floor is used for car parking. The floor height is 3.05 m in upper floors

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 6 stories, wind force is taken into account. Live load reduction factor is applied in design. isolated foundation is proposed. Fe-500 steel is used as main steel and M25 grade concrete.

3 **Earthquake consideration:**

For better stability during earhquake, the columns are tied with plinth beams. Continuous lintels are specified for outer walls and column ties are closely spaced for better ductility. For building on stilt, minimum size of column is taken as 300 mm(12")

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
K3	=	Topography Factor = 1
p	=	0.6 x Vz x Vz
	=	0.6 x 50 x 50
	=	1500 N/Sq.m

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5 **Design Loads:**

Slab thk	130	=	3.25 KN/sq.m
Live load		=	2.00 KN/sq.m
Finishes		=	1.25 KN/sq.m
			6.50 KN/sq.m

Say 6.50 KN/sq.m/floor for slab and beam design
Applying live load reduction of = 0.3 ,
For column and foundation design, 6.00 Kn/sqm is taken.

This value is also taken for frame analysis

Brick work 230 thick for exterior walls

	0.23	x	2.45	x	20		=	11 KN/m/floor
Beams	0.23	x	0.60	x	25		.=	3.5 KN/m/floor
Columns	0.3	x	0.60	x	2.45	x 25	.=	11.0 KN/floor

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

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6 **SLAB DESIGN:**

Thickness	=	130 mm	Concrete mix	Fck	= M	25	N/sq.mm
Cover	=	20 mm	Steel Grade	Fy	=Fe	500	N/sq.mm
Eff.Depth	=	105 mm					

Panel (3.8 x 6.2) m

=

Two way slab Ly / Lx 6.2 / 3.8 .= 1.6

Support condition - One short edge discontinuous

short span=	α_x	=	0.060	(- BM at continuous edge)	Table:26
		=	0.045	(+ BM at midspan)	in IS-456-2000
long span=	α_y	=	0.037	(+ BM at continuous edge)	
		=	0.028	(+ BM at midspan)	

Designed for 0.060 co.efficient

Mu .= 0.060 x 6.5 x 1.5 x 3.8 x 3.8 = 8.45 knm/m

$$\text{Mu / b.d.d} = \frac{8.45 \times 1000 \times 1000}{1000 \times 105 \times 105} = 0.77 \text{ N/sq.mm}$$

From Table-3 of SP-16, Pt .= 0.190 %

Minimum Pt = 0.12 % as per code, for Fe-500

At = 0.190 x 1000 x 105 ./ 100 = **200** sq.mm/m

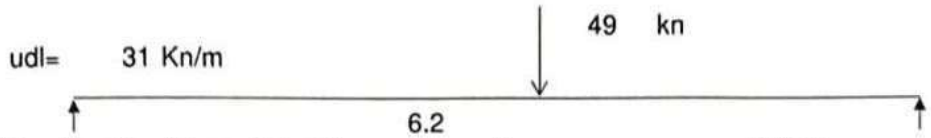
Provide 10 dia @ 180 c/c = **436** sq.mm/m Short span

Provide 8 dia @ 200 c/c = **251** sq.mm/m Long span

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7 **Beam design:**

Effective span = 6.2 m Beam size 230 x 600
Fck = M 25 d = 560 mm



Max. Bending Moment at mid span udl = w.l.l / 12 + pl/8

$$= \frac{31 \times 6.20 \times 6.20}{12} + \frac{49 \times 6.2}{8} = 137 \text{ Knm}$$

Mu = 137 x 1.5 x 10-e6 = 205.9 x 10-e6 Nmm

$$Mu/b.d.d = \frac{206 \times 10\text{-e6}}{230 \times 560 \times 560} = 2.85 \text{ N/sq.mm}$$

From table-3 SP-16 d'/d = 40 / 560 = 0.07
Pt = **0.777** % for Pc = **0.000** %
At = 0.777 x 230 x 560 / 100 = **1001** sq.mm (bot)
Ac = 0.000 x 230 x 560 / 100 = **0** sq.mm (top)

provided 2 No 20 = **628** sq.mm
\+ 2 No 20 = 628 sq.mm
1257 sqmm bot

provided 2 No 20 = 628 sq.mm
\+ 2 No 20 = 628 sq.mm

1257 sqmm top of support

Shear Design:

$$\text{Shear force} = \frac{31 \times 6.2}{2} + \frac{49}{2} = 121 \text{ KN}$$

Factored shear force = 1.5 x 121 = 181 KN

for 0.78 % steel Shear resisted by concrete section

from table-61 0.59 x 230 x 560 / 1000 = 76 KN
Balance shear (Vus) = 180.9 - 76 = 105 KN
Vus/d = 105 / 41 = 2.6 KN/cm

from table 62 of SP-16
Required 2 legged 10 stirrups @ 200 mm c/c
Provided 2 legged **10** stirrups @ **150** mm c/c

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8 **COLUMN DESIGN:** **COL SIZE 300 X 600**

Maximum load on column in basement P = 180 t

Pu = 1.5 x 180 x10 = 2700 KN

Max.Bending Moment = 9 t.m Mu = 1.5 x 9.0 x10= 135 Kn.m

Cover = 40 mm

d'/d = 0.07

Fck = M 35 = 35 N/sq.mm Fy = Fe500

Provide bars equaly all sides

Refer chart 48 of SP-16

$$\frac{Pu}{Fck\ b\ d} = \frac{2700 \times 1000}{35 \times 300 \times 600} = 0.43$$

$$\frac{Mu}{Fck\ b\ d^2} = \frac{135 \times 10^6}{35 \times 300 \times 600 \times 600} = 0.04$$

$$\frac{p}{Fck} = 0.03\ p\% = 0.03 \times 35 = 1.05\ \%$$

Minimum steel = 0.8 %

$$As = \frac{1.05 \times 300 \times 600}{100} = 1890\ sq.mm$$

Provided 8 Nos 25 dia = 3927 sq.mm

3927 sq.mm

Ties 8 @ 110c/c and 8 @ 190c/c

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9 **FOOTING DESIGN**

Maximum load on column P = 180 t Fck = M25
Add 10% footing load = 198 t
Max.Bending Moment = 9 t.m

S.B.C of Soil at 25 t/sqm at depth = 2.5 m
Assume footing base of 3 X 3 m and depth = 750 mm
So pressure on soil is Eff. Depth = 700 mm

$$\frac{198}{2.85 \times 2.85} = 24.38 \text{ t/sqm} < 25 \text{ t/sqm}$$

Cantilever projection of footing = $\frac{2.85 - 1.00}{2} = 0.93$ m

B.M on footing at face of column pedestal

BM = $24.38 \times 0.93 \times \frac{0.93}{2} = 10.43$ tm

Mu = 10.43 x 1.5= 15.64 tm

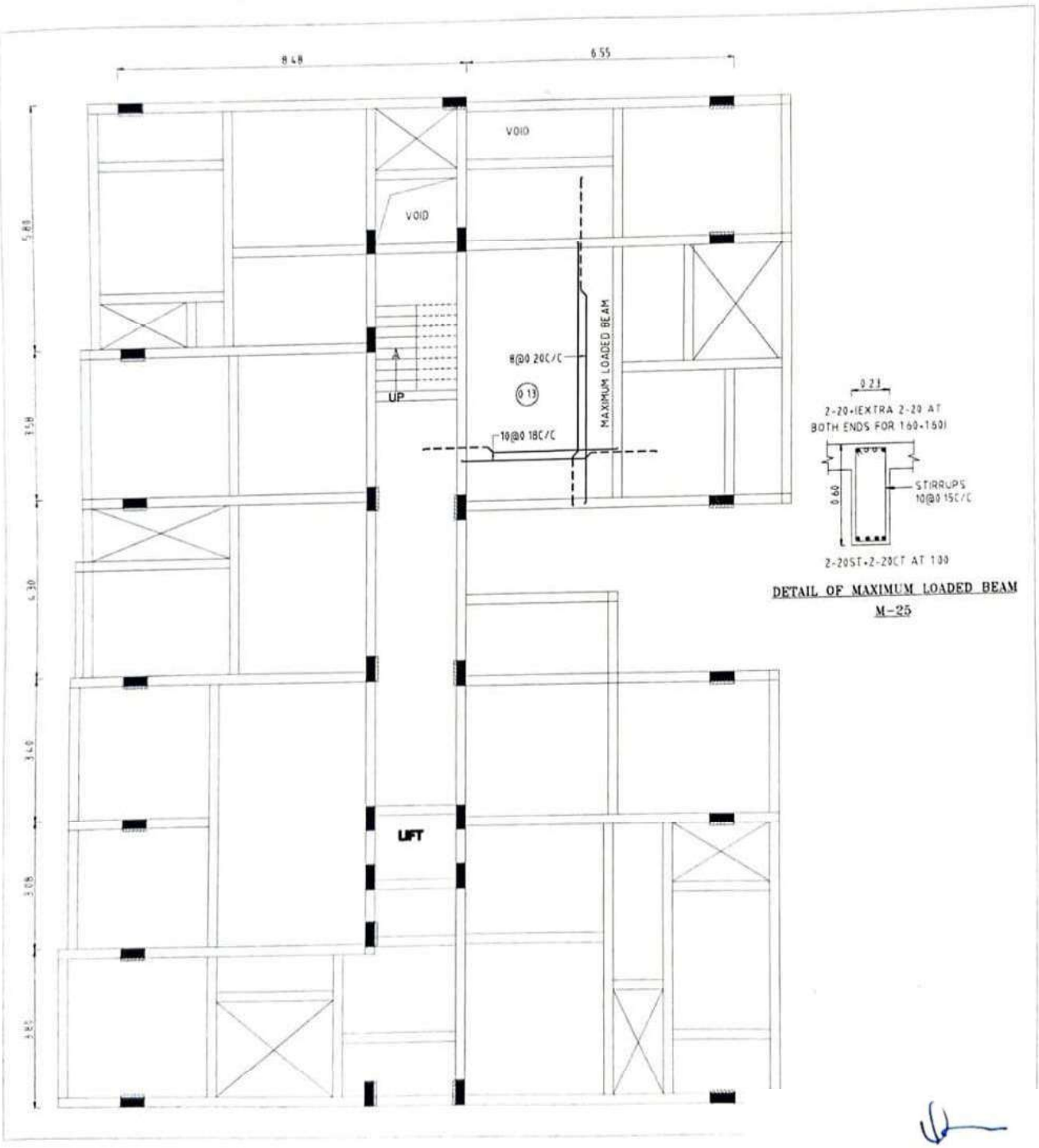
Mu/b.d.d = $\frac{15.64}{1000} \times \frac{1000}{700} \times \frac{10000}{700} = 0.32$ N/sqm

Fck = 25 n/sqmm
From Table-3 of SP-16, Pt 0.082 % min pt% .= 0.120 %

At = $\frac{0.120 \times 1000 \times 700}{100}$ = **840** sq.mm

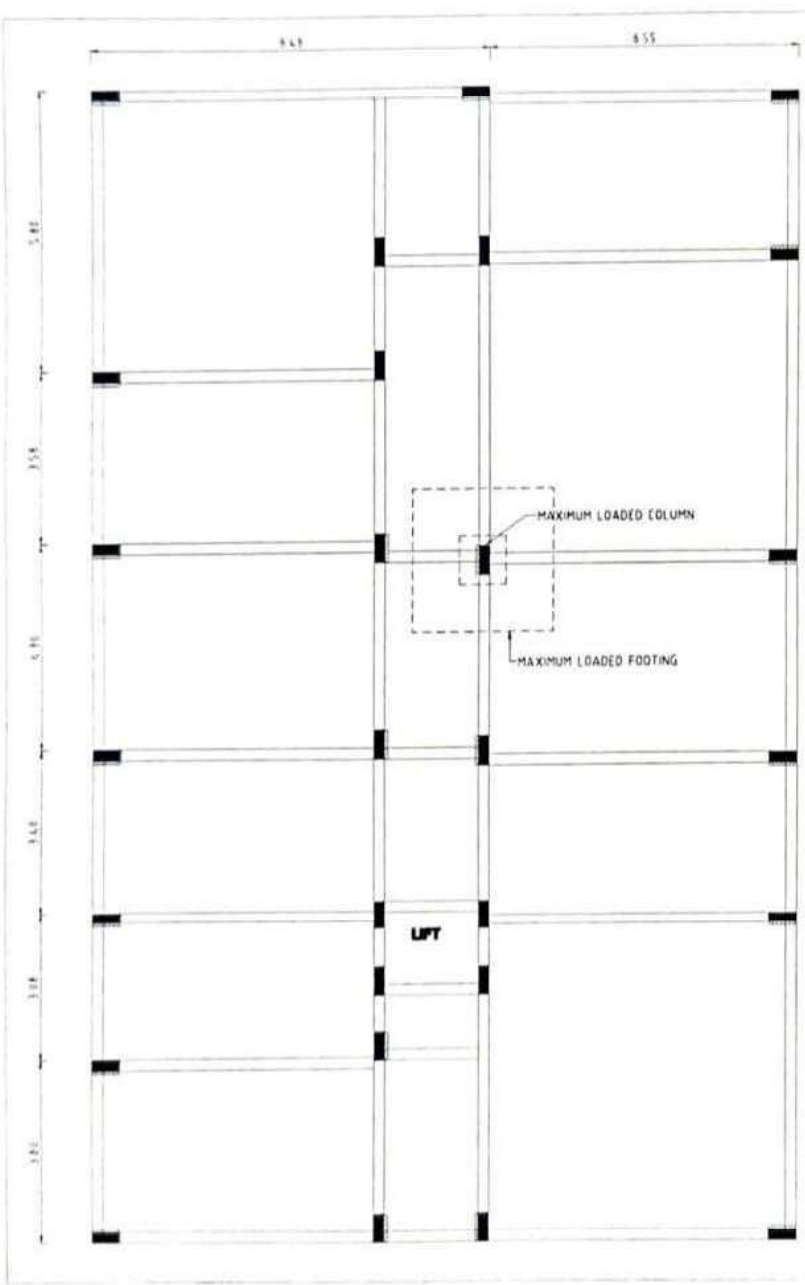
Provide 12 dia @ 130 c/c = **2410** sq.mm

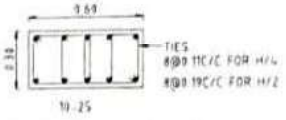
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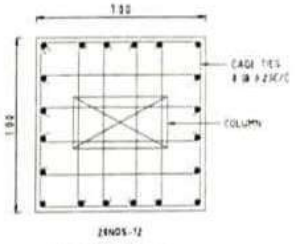
DETAIL OF MAXIMUM LOADED BEAM
M-25

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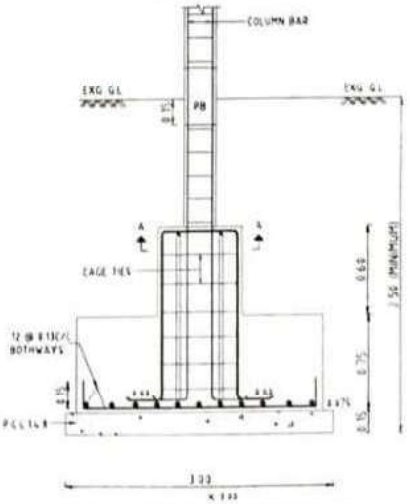




DETAIL OF MAXIMUM LOADED COLUMN
M-35



SECTION OF AA



DETAIL OF MAXIMUM LOADED FOOTING
M-25

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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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