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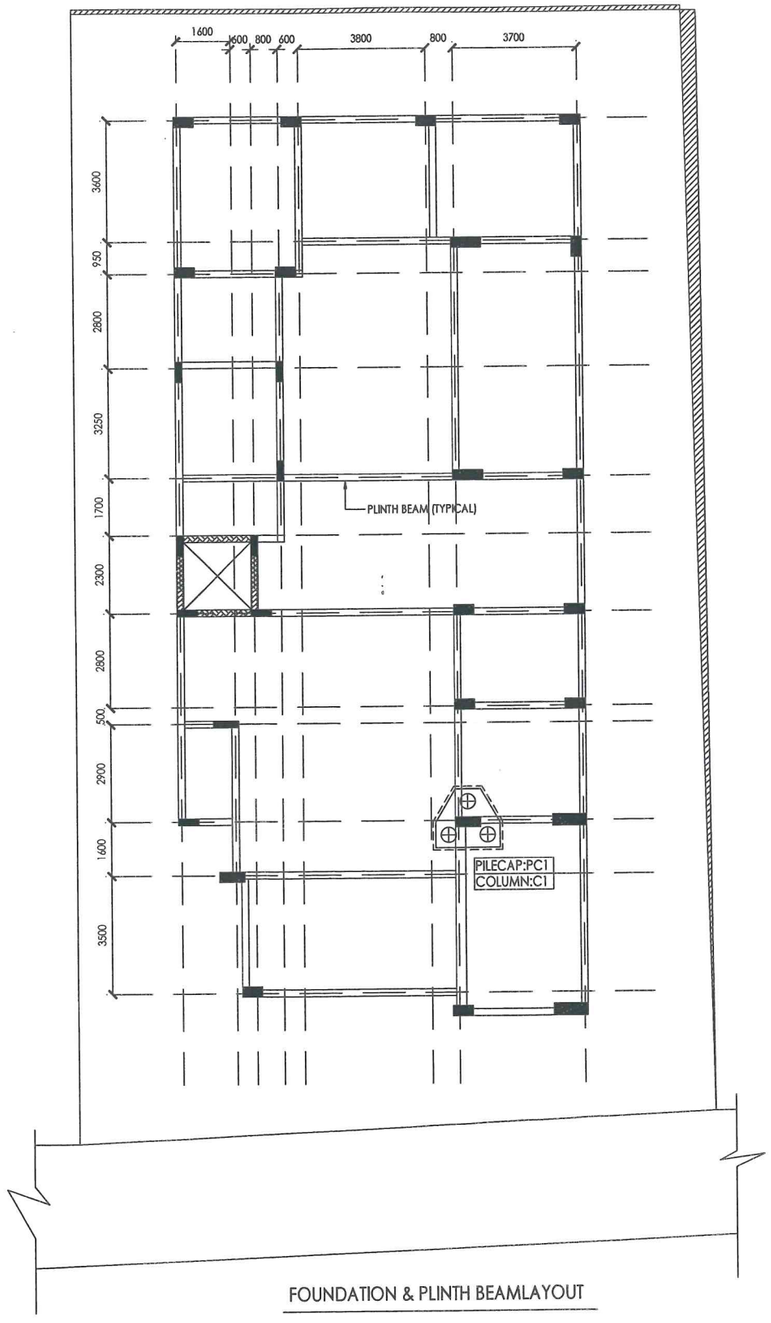
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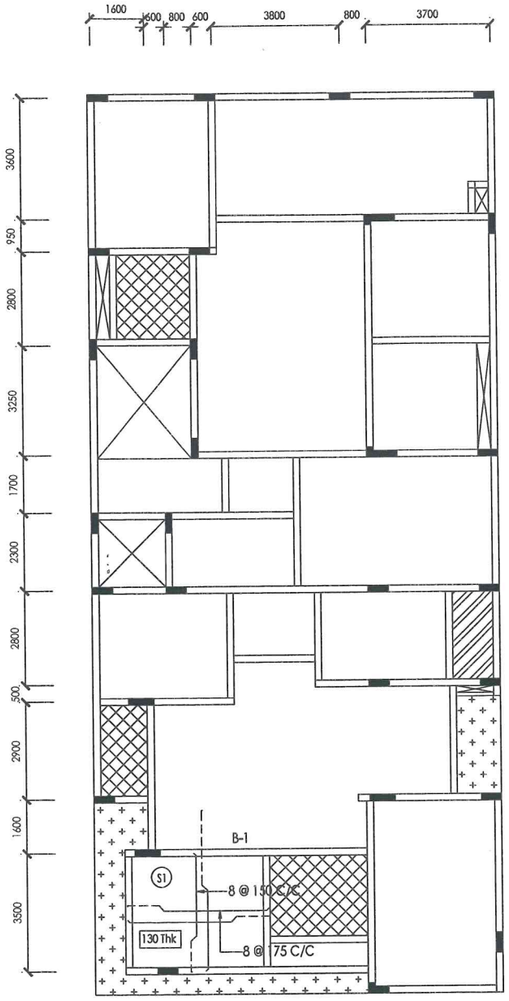
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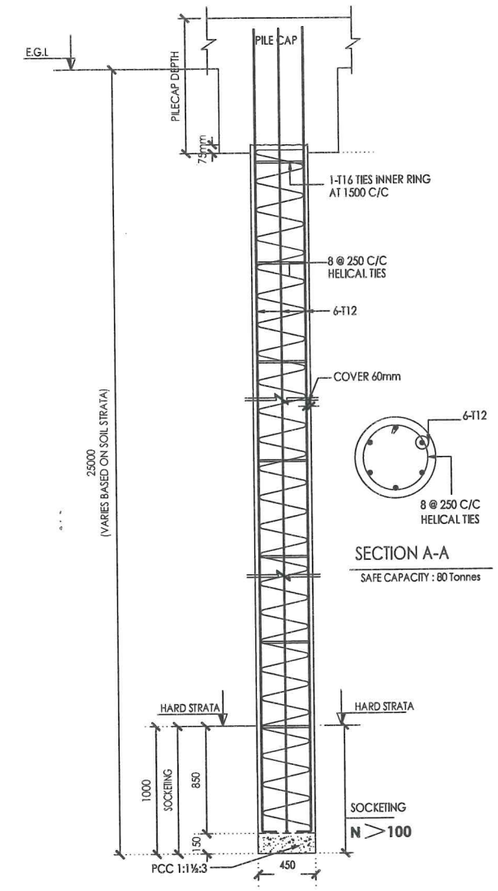




FOUNDATION & PLINTH BEAMLAYOUT



TYPICAL FLOOR ROOF LAYOUT

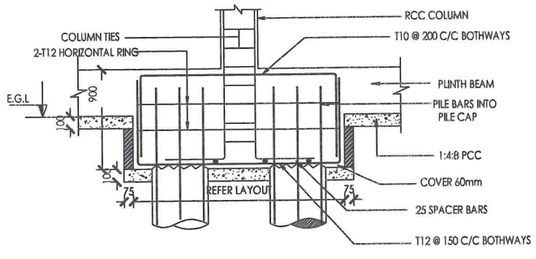


SECTION A-A

SAFE CAPACITY : 80 Tonnes

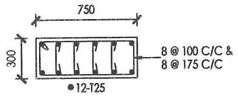
*CONCRETE GRADE M-30 WITH 400 Kg/cu.m POZZALONA OR SLAG CEMENT

TYPICAL CROSS SECTION OF BORED CAST INSITU PILE



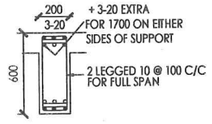
DETAILS OF PC1 PILE CAP

CONCRETE GRADE M-30



C1 COLUMN DETAILS

M35 CONCRETE GRADE



3-20 St. + 3-20 CURTAIL AT 1350 FROM CENTRE OF SUPPORT

B1 BEAM DETAILS

NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETERS EXCEPT FOR GRID DIMENSIONS, WHICH ARE IN METRES
2. THIS DRAWING SHOULD BE READ IN CONJUNCTION WITH ARCHITECTURAL DRAWING
3. ANY DISCREPANCY/DOUBT WHILE EXECUTING SHOULD BE BROUGHT TO NOTICE OF THE STRUCTURAL CONSULTANT
4. DO NOT SCALE THE DRAWING, FOLLOW SPECIFIED DIMENSIONS
5. CONDUIT PIPES SHOULD NOT GO THROUGH COLUMNS BOTH IN TRANSVERSE OR LONGITUDINAL DIRECTIONS
6. STEEL REINFORCEMENT SHOULD BE Fe500
7. CONCRETE GRADE SHOULD BE AS SPECIFIED

MEMBER	CONCRETE GRADE	COVER
PILE	M-30	60mm
PILECAP	M-30	50mm
COLUMN	M-35	40mm
ROOF BEAM	M-25	30mm
ROOF SLAB	M-25	25mm

ABBREVIATION	DESCRIPTION
E.G.L	EXISTING/NATURAL GROUND LEVEL
F.G.L	FORMED GROUND LEVEL
S.F.L	STILT FLOOR LEVEL
G.F.L	GROUND FLOOR LEVEL
F.C	FLOATING COLUMN
Thk	THICKNESS
C/C	CENTRE TO CENTRE
Lvl	LEVEL
T.O.B	TOP OF BEAM
B.O.B	BOTTOM OF BEAM
T.O.S	TOP OF SLAB
B.O.S	BOTTOM OF SLAB
St	STRAIGHT/THROUGH
Ct	CURTAIL

A. FOUNDATION DESIGNED FOR STILT + 5 UPPER FLOORS

B. PILE FOUNDATION IS PROVIDED AS PER SOIL REPORT

STRUCTURAL REFERENCE DRAWINGS:

KEY PLAN:

REV.	DESCRIPTION	BY	DATE
6			
5			
4			
3			
2			
1			

PROJECT TITLE:

PLAN SHOWING THE PROPOSED CONSTRUCTION OF STILT FLOOR + 5 FLOORS (HEIGHT 18.30 M) RESIDENTIAL BUILDING WITH 9 DWELLING UNITS AVAILING PREMIUM FSI OLD DOOR NO:15 NEW DOOR NO:5, VISWESVARAPURAM, MYLAPORE, CHENNAI 600 004. COMPRISED IN R.S.NO:1648/12 AND R.S.NO:1648/26, BLOCK NO.34, OF MYLAPORE VILLAGE, GREATER CHENNAI CORPORATION, DIVISION 123, ZONE -9.

STRUCTURAL CONSULTANT:

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DRAWING TITLE:

FOUNDATION LAYOUT & TYPICAL LAYOUT WITH DETAILS

ISSUE: SUBMISSION DRAWING

DRAWING No: SN-BHA-VIS-PRE-COR-001-R0			
SCALE	1:100	SHEET SIZE	A2
DRAWN	Y.N	DESIGN	Y.N
NORTH POINT:		CHECKED	-
		SHEET No	01/01
		DATE	24.05.24
		REVISION	R0

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PLAN SHOWING THE PROPOSED CONSTRUCTION OF STILT FLOOR + 5 FLOORS (HEIGHT 18.30 M) RESIDENTIAL BUILDING WITH 9 DWELLING UNITS AVAILING PREMIUM FSI OLD DOOR NO:15 NEW DOOR NO:5, VISWESVARAPURAM, MYLAPORE CHENNAI 600 004. COMPRISED IN R.S.NO:1648/12 AND R.S.NO:1648/26, BLOCK NO.34, OF MYLAPORE VILLAGE, GREATER CHENNAI CORPORATION. DIVISION 123, ZONE -9.

TYPICAL STRUCTURAL DESIGN CALCULATION

1 **General:**

Proposed buildings are **S+5** floors. Stilt floor is used for car parking. Upper floors are for residential purpose.

2 **Design Basis:**

Latest Design codes of BIS-456, 875 and 1893 are followed with SP-16 Design Aid book. A typical 2-D 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. Also a live load reduction factor of 0.5 is taken for foundation and column design.

Pile foundation is proposed as per as per soil report.

Fe-500 steel is used as main steel

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")

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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

= 0.09x18/ sqrt 23.7

= 0.33

= $0.075\ h^{0.75}$ 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

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

150 Kg/Sq.m

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5 **Design Loads:**

Slab 150mm thk	=	3.75 KN/sq.m
Live load	=	2.00 KN/sq.m
Finishes	=	1.50 KN/sq.m
		7.25 KN/sq.m

Say 7KN/sq.m/floor for slab and beam design
Applying live load reduction of = 0.5 ,
For column and foundation design, 6.25 Kn/sqm is taken.
This value is also taken for frame analysis

Blockwork 200 thick for exterior walls

0.2 x 2.4 x 20 = 10 KN/m/floor

Blockwork 100 thick for interior walls

0.100 X 2.4 x 20 = 4.8 KN/m/floor

Beam 0.2 x 0.60 x 25 .= 3.00 KN/m/floor

Columns 0.3 x 0.60 x 3.00 x 25 .= 13.5 KN/floor

for 6 upper 6 X 13.5 KN/floo .= 81 KN

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

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6 **SLAB DESIGN:** Refer sheet-1 SLAB - S1

Thickness	=	130 mm		Fck	= M 25	N/sq.mm
Cover	=	25 mm		Fy	=Fe 500	N/sq.mm
Eff.Depth	=	100 mm				

Panel (3.5 X 4.1) m

Twoway slab Ly / Lx = 4.1 / 3.5 .= 1.17

Support condition - One long edge continuous

short span=	α x	= 0.052	(- BM at continuous edge)	Table:26
		= 0.069	(+ BM at midspan)	in IS-456-2000
short span=	α y	= 0.043	(+ BM at midspan)	
		= 0.000	(- BM at continuous edge)	

Designed for 0.069 co.efficient

Mu .= 0.069 x 7.5 1.5 x 3.5 x 3.5 = 9.51 KNm/m

$$\text{Mu / b.d.d} = \frac{9.51 \times 1000 \times 1000}{1000 \times 100 \times 100} = 0.95 \text{ N/sq.mm}$$

From Table-2 of SP-16, Pt 0.230 %

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

At = 0.230 x 1000 100 ./ 100 = **230** sq.mm/m

Provide 8 dia @ 150 = **335** sq.mm/m Short span

Provide 8 dia @ 175 = **287** sq.mm/m Long span

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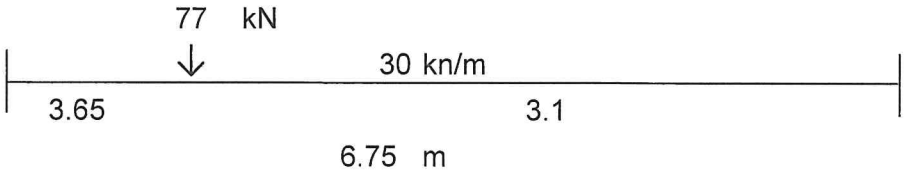
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7 **Beam design:** Beam-1 (Refer sheet -01)

span = 6.75 m Beam size 200 x 600

d = 560 mm

Fck = M 25



Bending moment for UDL load = 227.00 Kn.m

Max. B.M = 227.0 Knm (top of support)

This is taken for design

Mu = 227.0 x 1.5 x 10-e6

340.5 x **10-e6** Nmm

$$Mu/b.d.d = \frac{340.5 \times 10\text{-}e6}{200 \times 560 \times 560} = 5.43 \text{ N/sq.mm}$$

From table-2 SP-16 for d'/d = 40 / 600 = 0.07

Pt = **1.500** % Pc = **0.250** %

At = 1.500 x 200 x 560 / 100 = **1680** sq.mm (Bot)

Ac = 0.250 x 200 x 560 / 100 = **280** sq.mm (Top)

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

3 No 20 = **942**

1885 sq.mm

No of bars at top of support = **3 Nos** **20** dia + **3 Nos** **20** dia

%age of steel at top of support = 1.7 %

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Shear Design:

Shear force 215 KN

Factored shear force = 1.5 x 215 = 323 KN

for 1.68 % steel Shear resisted by concrete section

from table-61 0.76 x 200 x 560 / 1000 = 85 KN

Balance shear (Vus) = 323 - 85 = 237 KN

Vus/d = 237 / 56 = 4.24 KN/cm

from table 62 of SP-16

Required 2 legged 10 stirrups @ 130 mm c/c

Provided 2 legged **10** stirrups @ **100** mm c/c

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8 **COLUMN DESIGN:** **COL-C1** **COL SIZE** **750 X 300**

Maximum load is with wind force — P = 220 t

Pu = 1.5 x 220 x10 = 3300 KN

Max.Bending Moment = 10 t.m — Mu = 1.5 x 10.0 x10= 150 Kn.m

Cover = 40 mm

d'/d = 0.05

Fck = **M35** = 35 N/sq.mm

Provide bars equaly all sides

Refer chart 44 of SP-16

$$\frac{Pu}{Fck\ b\ d} = \frac{3300 \times 1000}{35 \times 750 \times 260} = 0.42$$

$$\frac{Mu}{Fck\ b\ d^2} = \frac{150 \times 10^6}{35 \times 750 \times 260 \times 260} = 0.08$$

$$\frac{p}{Fck} = 0.06 \qquad p\% = 0.06 \times 35 \quad 2.1\ \%$$

Minimum %age of steel is 0.8 %

$$As = \frac{2.1 \times 750 \times 300}{100} = 4725 \text{ sq.mm}$$

Provided	12	Nos	25 dia	+	=	5891 sq.mr +
	0	Nos	0 dia		=	0 sq.mm
		TOTAL PROVIDED			=	5891 sq.mm

Ties 8 @ 100 C/C & 8 @ 175 C/C

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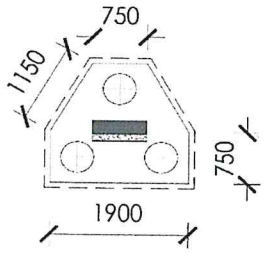
9 **Pile cap and pile**

As per soil report, 25 m bored cast-in-situ pile can be adopted.

450 dia pile safe capacity	=	80	t	
Col-A carries maximum load of (P)	=	220	t	
So No of piles provided	=	3	Nos	
Pile cap size	=	1900 x 1750 X	900	mm
M-30 grade	=	30	N/sq.mm	
Pile to pile distance(L)	=	1.15	m	

Tension Force = $\frac{N \times L}{9 \times d}$

= 514227 N



Pile Cap in plan

D = 0.9 m

d = 0.84 m

Rebar required = $\frac{514227}{0.87 \times 500}$ = 1182.131 sq.mm

Provided bottom = **16 @ 150mm C/C**

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