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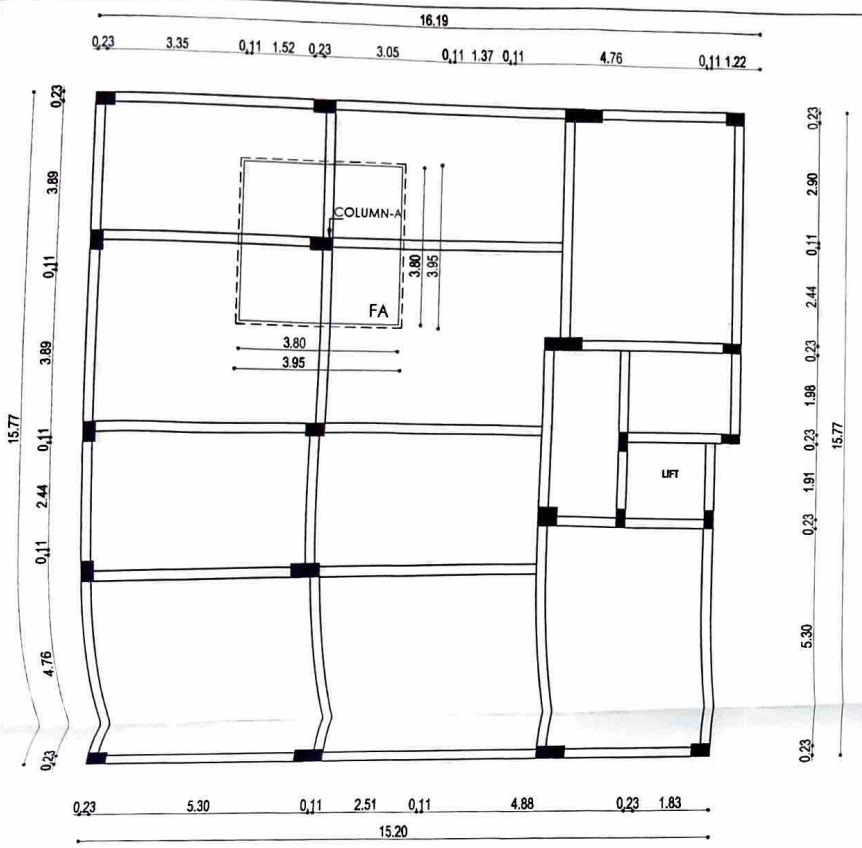
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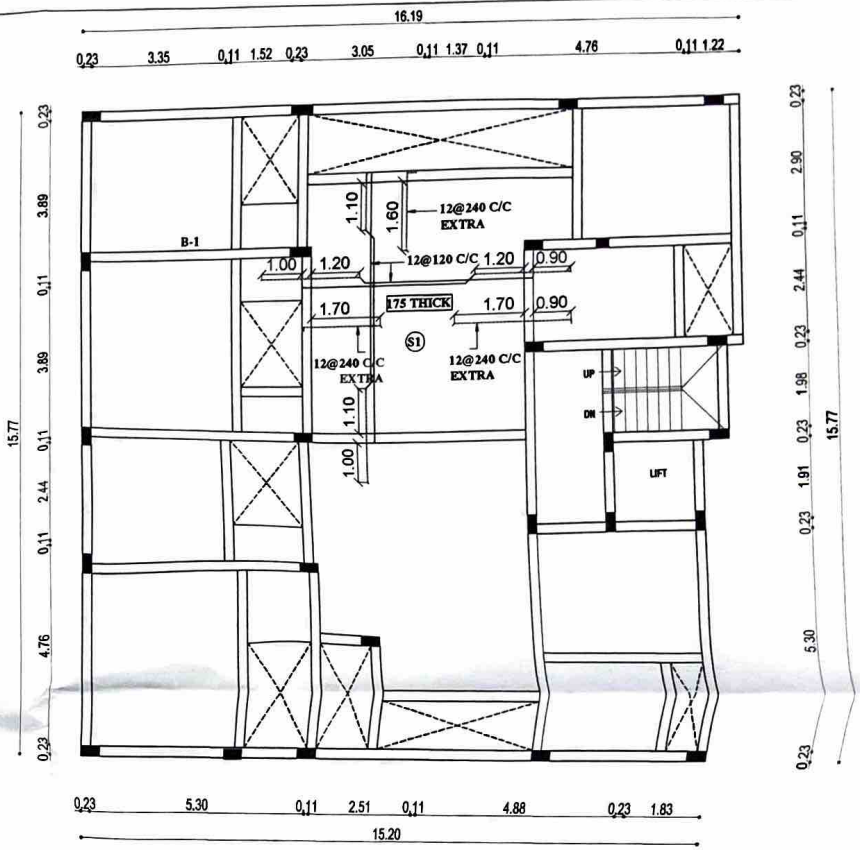
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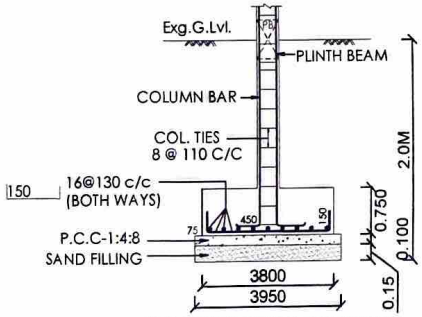




FOUNDATION AND PLINTH BEAM LAYOUT

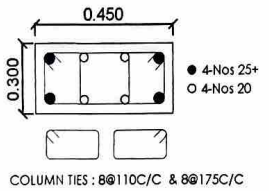


TYPICAL FLOOR ROOF BEAM LAYOUT



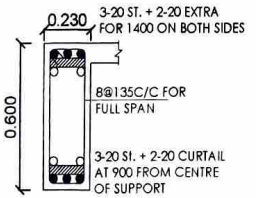
FOUNDATION DETAIL -A

M-30



COLUMN - A (300 x 450)

M-30



B-1 (230 x 600)

M-30

SUBMISSION DRAWING

NOTES:

* CONCRETE MIX SHOULD BE M-30 WITH MINIMUM CEMENT CONTENT 380 Kg/Cu.m. FOR FOOTING AND FOR COLUMN REFER COLUMN SCHEDULE.
* IF M-SAND IS USED, IT SHOULD BE TESTED AS PER IS 383 BEFORE USING IT INTO CONCRETE. IF THE QUALITY IS LESS CEMENT CONTENT SHOULD BE INCREASED BY 10 Kg/Cu.m. FROM THE ABOVE SPECIFICATION.
* CLEAR COVER TO THE MAIN REINFORCEMENT FOR FOUNDATION - 60MM, COLUMN - 40MM, R.C.C. WALL - 30MM, PLINTH BEAM-30MM, ROOF BEAM - 30MM, ROOF SLAB - 25MM.
* STEEL SHOULD BE OF GRADE Fe500.
* LAP LENGTH FOR REINFORCEMENT : COLUMN - 40d, PLINTH BEAM - 50d, NO LAP FOR FOOTINGS.
* NOT MORE THAN 50% OF BARS LAPPED AT ONE POINT.
* CONDUIT PIPES SHOULD NOT GO THROUGH COLUMNS HORIZONTALLY & VERTICALLY.
* ONLY WRITTEN DIMENSIONS TO BE FOLLOW. DO NOT SCALE THE DRAWING.

* S.B.C = 12 tons / Sq.m. AT 2.0m AS PER M/S. NAGADI CONSULTANTS.
* S.B.C. TO BE CONFIRMED AT SITE AFTER EXCAVATION.
* DESIGNED FOR SEISMIC ZONE - III.
* FOUNDATION DESIGNED FOR STILT+5 FLOORS.
* BUILDING DESIGNED FOR 9" THICK BRICK WORK.
* BRICK WORK NOT MORE THAN 13'-0" (4 METRE) FROM GROUND FLOOR

REVISION:

NO:	DESCRIPTION	DATE

FOUNDATION, PLINTH BEAM AND TYPICAL FLOOR ROOF LAYOUT AND DETAILS

North

DATE : 16-10-2023 | SCALE : ***

DRAWN : S.USHA RANI | DRG NO :***** | SHEET NO : 1

TITLE:

PLAN SHOWING THE PROPOSED CONSTRUCTION OF STILT FLOOR (PARKING) + 5 FLOORS RESIDENTIAL BUILDING WITH 10 DWELLING UNITS (BUILDING HEIGHT 18.30M) AVAILING PREMIUM FSI AT DOOR NO.2, KASTURBAI NAGAR 2ND MAIN ROAD, ADYAR, CHENNAI - 600020. COMPRISED T.S.NO.11/1, BLOCK NO.39, OF KOTTURI VILLAGE, MYLAPORE-TRIPLICANE TALUK, WITHIN GREATER CHENNAI. CORPORATION. ZONE:13 DIVISION:175

STRUCTURAL ENGINEER

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Date : 16, OCT 2023

STRUCTURAL STABILITY CERTIFICATE

It is certified that the

Plan Showing the proposed construction of stilt floor (parking) + 5 floors Residential Building with 10 Dwelling Units (Building height 18.30m) Availing Premium FSI at Door No.2, Kasturbai Nagar 2nd Main Road, Adyar, Chennai - 600020. Comprised T.s.no.11/1, Block No.39, of Kotturi Village, T.s.no.11/1, Block No.39, of Kotturi Village, Mylapore-Triplicane Taluk, Within Greater Chennai Corporation. Zone:13. Division:175

is designed to resist for earthquake. Check has been made

1. The minimum grade of concrete is M30
2. The design analysis using the code of practice for loading . standards as per BIS-875 and Seismic forces as per the latest code BIS-1893 & BIS-456
3. Least dimension of column is 300mm in stilt floor.
4. Proposed structure will be structurally safe and sound.

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Plan Showing the proposed construction of stilt floor (parking) + 5 floors Residential Building with 10 Dwelling Units (Building height 18.30m) Availing Premium FSI at Door No.2, Kasturbai Nagar 2nd Main Road, Adyar, Chennai - 600020. Comprised T.s.no.11/1, Block No.39, of Kotturi Village, T.s.no.11/1, Block No.39, of Kotturi Village, Mylapore-Triplicane Taluk, Within Greater Chennai Corporation. Zone:13. Division:175

16, OCT 2023

TYPICAL STRUCTURAL DESIGN CALCULATION

1 **General:**

Proposed building is S+ 5 floors
Stilt floor is used for car parking. Other floors for residential purpose. Floor height is 3.00m 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 5 stories, wind force is not taken into account. Live load reduction factor is applied in design. Isolated foundation is proposed as per soil test report. Fe- 500steel is used as main steel and M30 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	150	=	3.75 KN/sq.m
Live load		=	2.00 KN/sq.m
Finishes		=	1.25 KN/sq.m
			7.00 KN/sq.m

Say 7.00 KN/sq.m/floor for slab and beam design
Applying live load reduction of = 0.1 ,
For column and foundation design, 6.80 Kn/sqm is taken.

This value is also taken for frame analysis

230mm thick brick work used for exterior walls, 115mm thick brick works used for internal partitions

	0.23	x	2.75	x	20			=	13 KN/m/floor
Beams	0.23	x	0.60	x	25			.=	3.45 KN/m/floor
Columns	0.3	x	0.60	x	2.75	x	25	.=	12.38 KN/floor

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

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6 **SLAB DESIGN:** **S1**

Thickness	=	175 mm	Concrete mix	Fck	= M	30 N/sq.mm
Cover	=	20 mm	Steel Grade	Fy	= Fe	500 N/sq.mm
Eff.Depth	=	150 mm				

Panel (6.2 x 6.9) m

=

Twoway slab Ly / Lx 6.9 / 6.2 .= 1.1

Support condition - Two adjacent edges discontinues

short span=	α x	=	0.043	(- BM at continuous edge)	Table:26
		=	'-	(+ BM at midspan)	in IS-456-2000
long span=	α y	=	0.045	(- BM at continuous edge)	
		=	0.035	(+ BM at midspan)	

Designed for 0.045 co.efficient

Mu .= 0.045 x 7.0 x 1.5 x 6.2 x 6.2 = 18.16 knm/m

$$\text{Mu / b.d.d} = \frac{18.16 \times 1000 \times 1000}{1000 \times 150 \times 150} = 0.81 \text{ N/sq.mm}$$

From Table-3 of SP-16, Pt .= 0.620 %

Minimum Pt = 0.22 % as per code, for Fe-415

At = 0.620 x 1000 x 150 ./ 100 = **930** sq.mm/m

Provide 12 dia @ 120 c/c = **942.48** sq.mm/m Short span

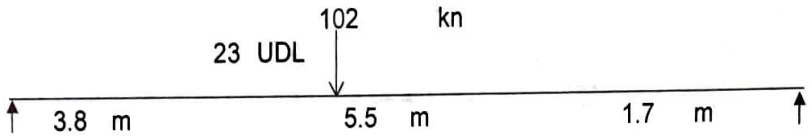
Provide 12 dia @ 120 c/c = **942.48** sq.mm/m Long span

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7 **Beam design:** **B-1**

Effective span = 5.5 m Beam size 230 x 600

Fck = M 30 d = 520 mm



Max. Bending Moment at column support = w*l*l/10+w*a*b^2/l^2

= 153 Knm

Mu = 153.0 x 1.5 x 10-e6 = 230 x 10-e6 Nmm

$$Mu/b.d.d = \frac{230 \times 10\text{-e6}}{230 \times 520 \times 520} = 3.69 \text{ N/sq.mm}$$

From table-53 SP-16 for d'/d = 40 / 520 = 0.08

Pt = **1.040** % Pc = **0.104** %

At = 1.040 x 230 x 520 / 100 = **1244** sq.mm (bot)

Ac = 0.104 x 230 x 520 / 100 = **124** sq.mm (top)

provided 3 No 20 = 942 sq.mm

\+ 2 No 20 = 628 sq.mm

= **1571** sqmm Top of support

Shear Design:

Shear force = 134 Kn

Factored shear force = 1.5 x 133.723 = 200.584 KN

for 1.04 % steel Shear resisted by concrete section

from table-61 0.63 x 230 x 520 / 1000 = 75 KN

Balance shear (Vus) = 200.58 - 75 = 125 KN

Vus/d = 125 / 56 = 2.2 KN/cm

from table 62 of SP-16

Required 2 legged 8 stirrups @ 150 mm c/c

Provided 2 legged **8** stirrups @ **120** mm c/c

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8 **COLUMN DESIGN:** Column A **COL SIZE** **300 X 450**

Maximum load on column at foundation P = 150 t

Pu = 1.5 x 150 x10 = 2250 KN

Max.Bending Moment = 7 t.m Mu = 1.5 x 7.0 x10= 105 Kn.m

Cover = 40 mm

d'/d = 0.09

Fck = 30 N/sq.mm

Provide bars equaly all sides

Refer chart 44 of SP-16

$$\frac{Pu}{Fck\ b\ d} = \frac{2250 \times 1000}{30 \times 300 \times 450} = 0.56$$

$$\frac{Mu}{Fck\ b\ d^2} = \frac{105 \times 10^6}{30 \times 300 \times 450 \times 450} = 0.06$$

$$\frac{p}{Fck} = 0.07 \quad p\% = 0.07 \times 30 = 2.1\ \%$$

Minimum steel = 0.8 %

$$As = \frac{2.1 \times 300 \times 450}{100} = 2835 \text{ sq.mm}$$

Provided	4	Nos	25 dia =	1964	**sq.mm**
	4	Nos	20 dia =	1257	**sq.mm**
			TOTAL =	3220	**sq.mm**

Col. Ties 8 @ 110 C/C and 8@ 175 c/c

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9 **FOOTING DESIGN** for Refer sheet - 1 of drawing

Maximum load on column type " A P = 150 t
Add 10% footing load = 165 t
S.B.C of Soil at 2 m depth = 12 t/sqm
Assume footing base 3.8 x 3.8 m footing.
and depth = 750 mm
Eff. Depth = 680 mm

So pressure on soil is

$$\frac{165}{3.8 \times 3.8} = 11.4 \text{ t/sqm}$$

11.4 < 12 t/sqm

Cantilever projection of footing = $\frac{3.8 - 0.45}{2} = 1.68$ m

B.M on footing at face of column

$$BM = \frac{11.4 \times 1.68 \times 1.675 \times 3.8}{2} = 60.9 \text{ tm}$$

Mu = 60.9 x 1.5= 91.37 tm

$$Mu/b.d.d = \frac{91.4 \times 1000 \times 1000}{3800 \times 680 \times 680} = 0.52 \text{ N/sqmm}$$

Fck = 25 N/sqmm

From Table-4 of SP-16, Pt 0.13 pt% .= 0.12 %

At = 0.13 x 1000 x 1000 /100 = 1300 sq.mm

Provide 16 dia @ 130 c/c for shorter and longer span BOTHWAYS

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