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"ELANZA" PROPOSED CONSTRUCTION OF STILT + 5FLOORS (HEIGHT 18.00M) RESIDENTIAL BUILDING WITH 35 DWELLING UNIT, AFFORDABLE HOUSING AT DOOR NO.35/2, SEEMATHAMMAN NAGAR, METTUKUPPAM ROAD, MADURAVOYAL, CHENNAI COMPRISED IN OLD S.NO 265/1A & 266 PART, NEW S.NO.266/6A1 & 266/6A2 OF MADURAVOYAL VILLAGE, WITHIN THE LIMITS OF GREATER CHENNAI COROPARTION. 9600 SQ.FT

STRUCTURAL ANALYSIS REPORT PREPARED BY

Mr. Khadeer Ahmed B.E Civil Engg

Registered structural engineer Grade – II

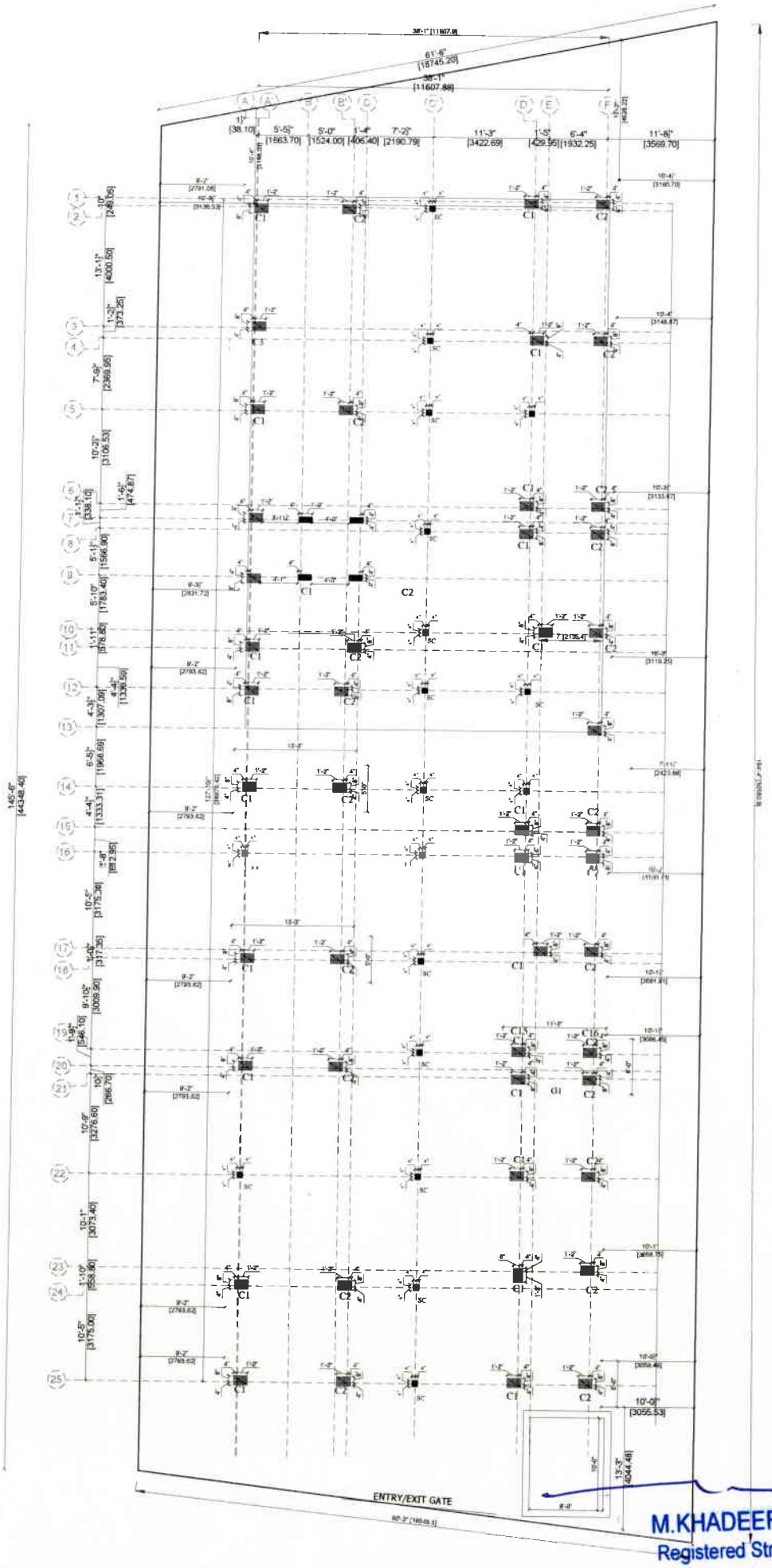
CMDA Registration No.SE/GR-II/19/05/070

no.2C Latha Apartment, 2nd floor, no. 3/6

Dr. Radhakrishnan 6th street mylapore

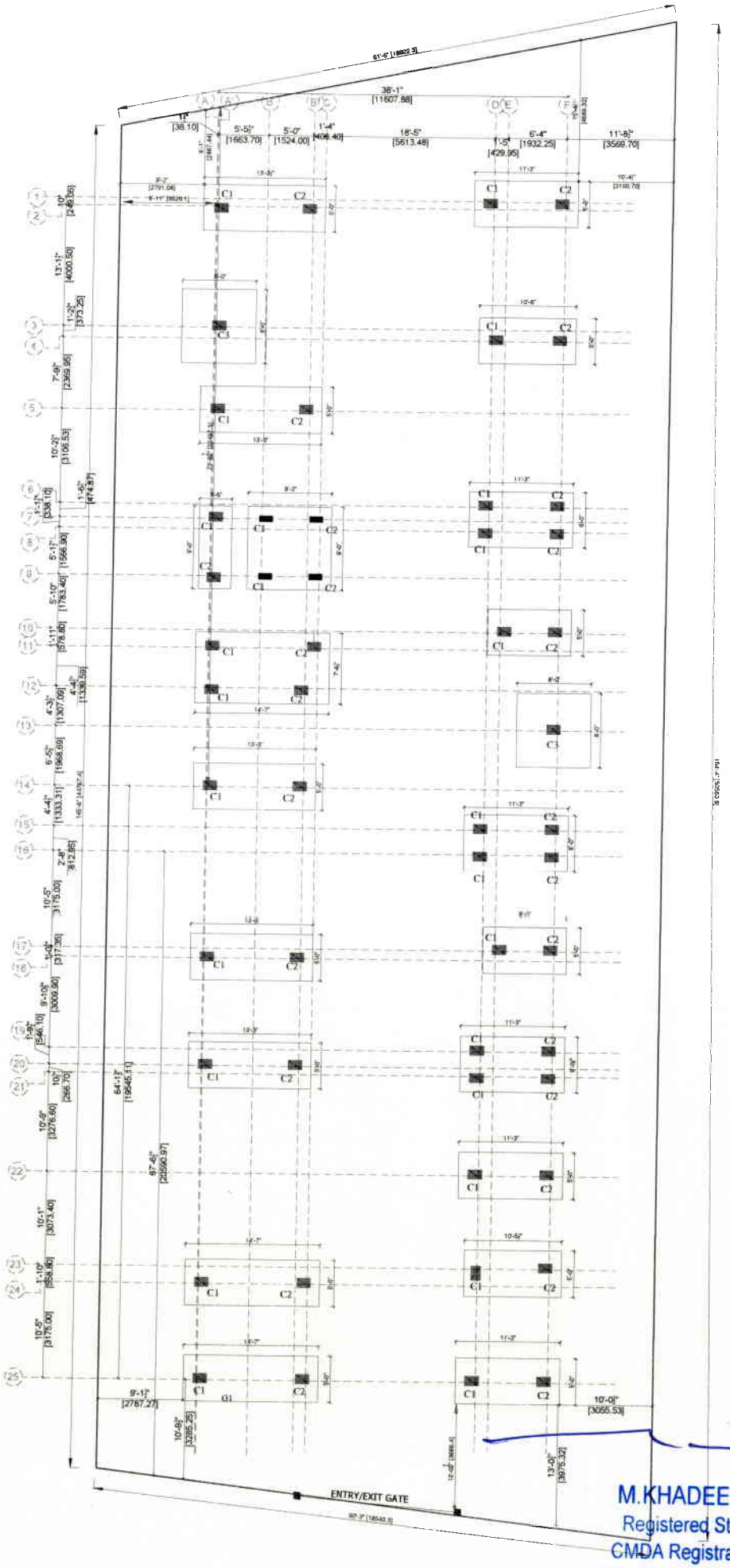
Chennai – 600004

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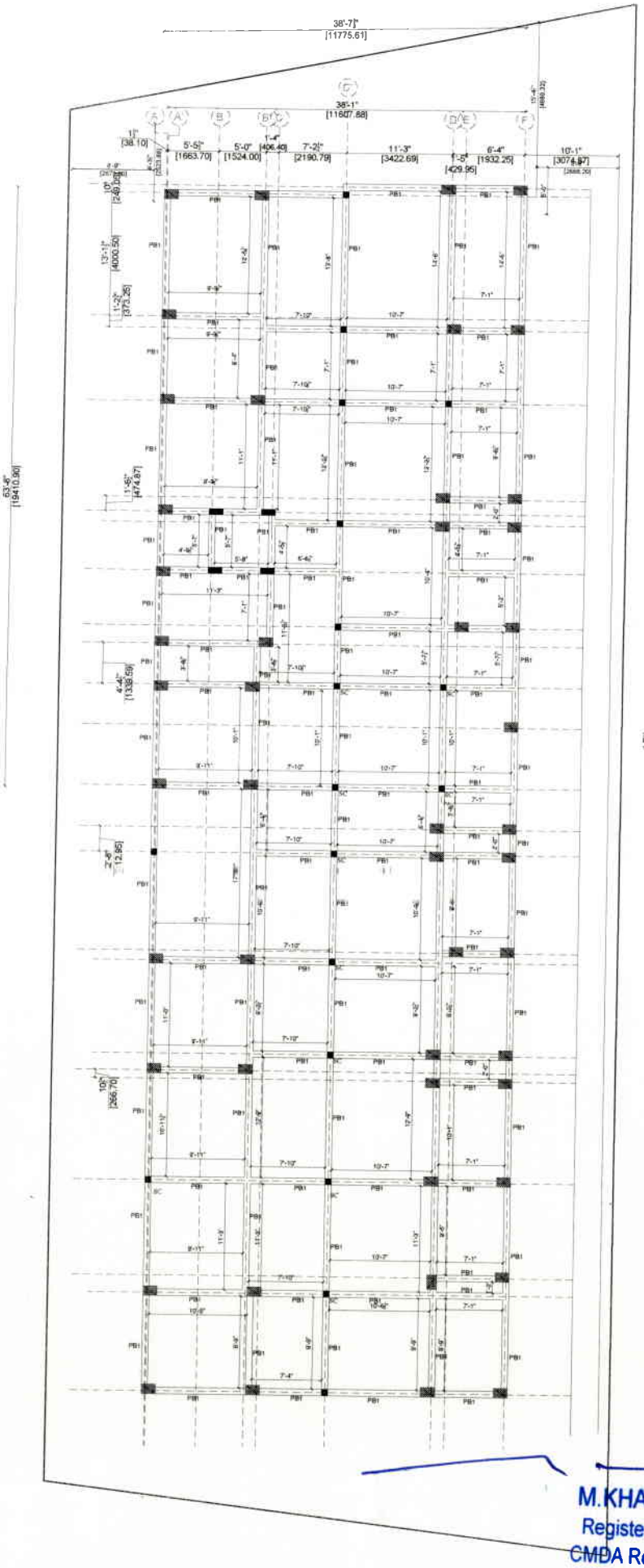
REINFORCEMENT DETAIL OF COLUMN CENTER LINE PLAN

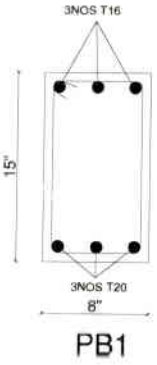
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REINFORCEMENT DETAIL OF COLUMN FOOTING

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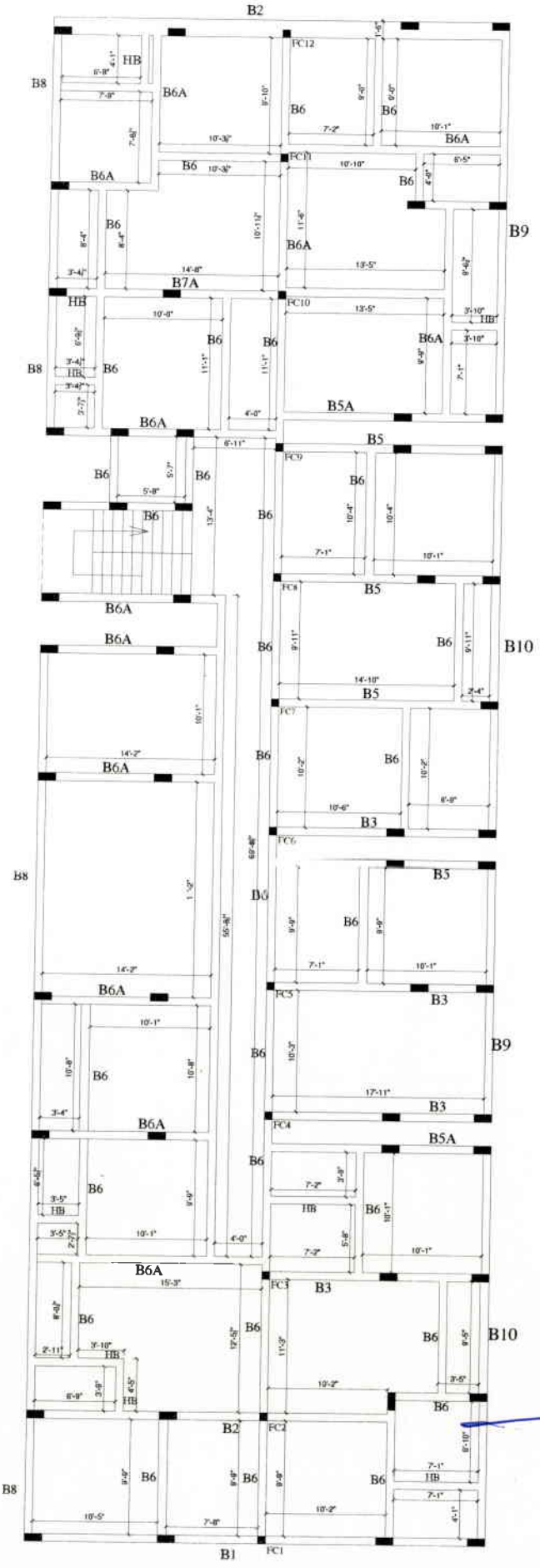




PB1

REINFORCEMENT DETAIL OF PLINTH BEAM

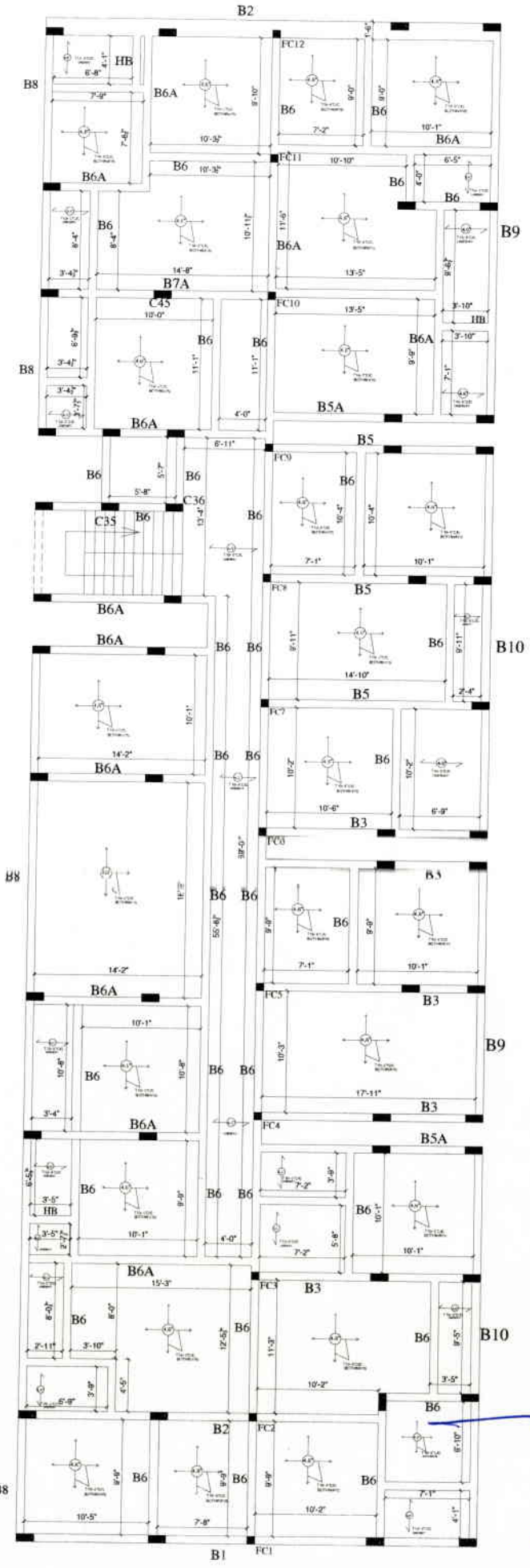
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REINFORCEMENT DETAIL OF STILT TO FIFTH FLOOR BEAMS

ALL SLAB 120 THICK [UNLESS OTHERWISE SPECIFIED]

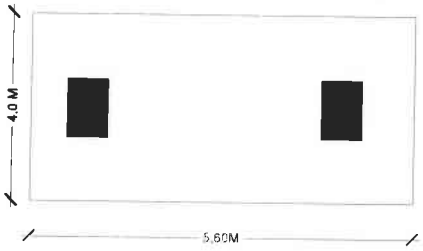
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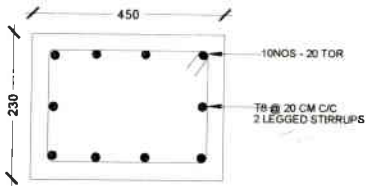


REINFORCEMENT DETAIL OF STILT TO FIFTH SLAB

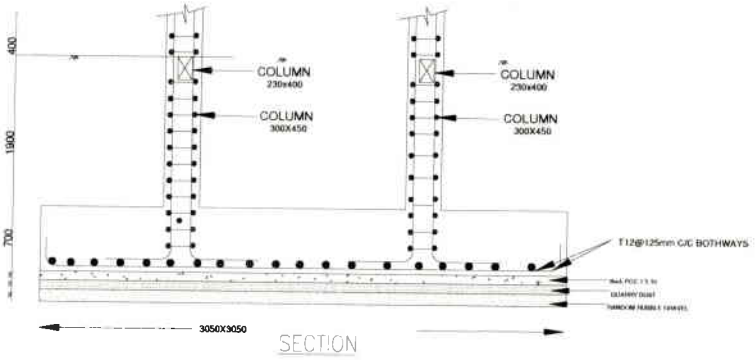
ALL SLAB 115 THICK [UNLESS OTHERWISE SPECIFIED]

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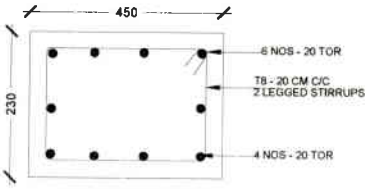




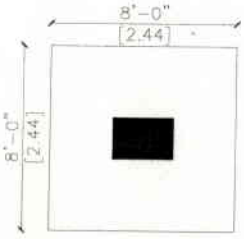
C.S OF COLUMN (C1)

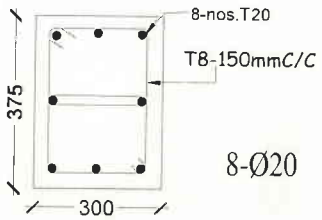


SECTION

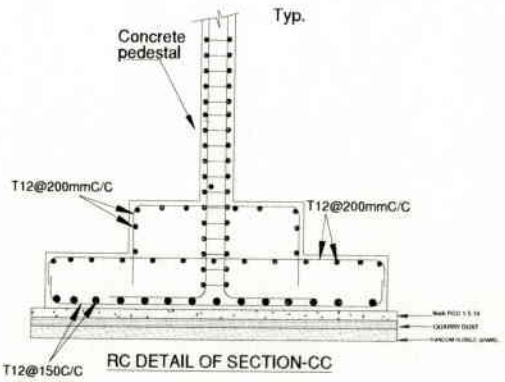


C.S OF COLUMN (C2)





C.S OF COLUMN (C3)

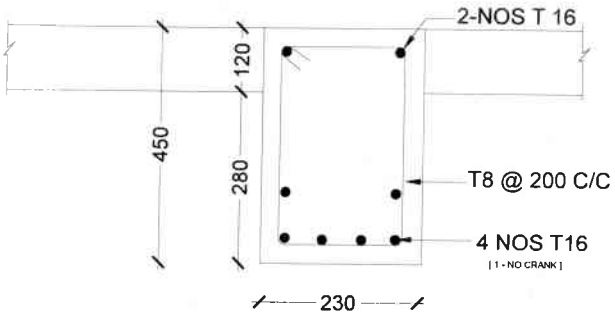


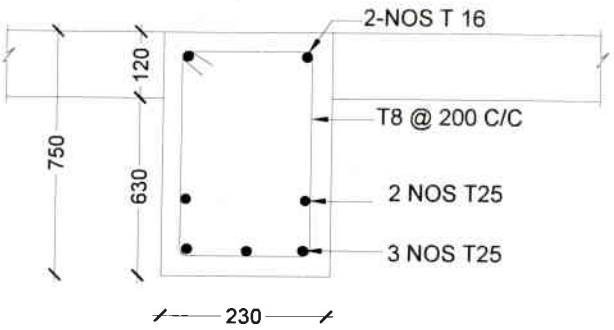
RC DETAIL OF SECTION-CC

COLUMN PLAN

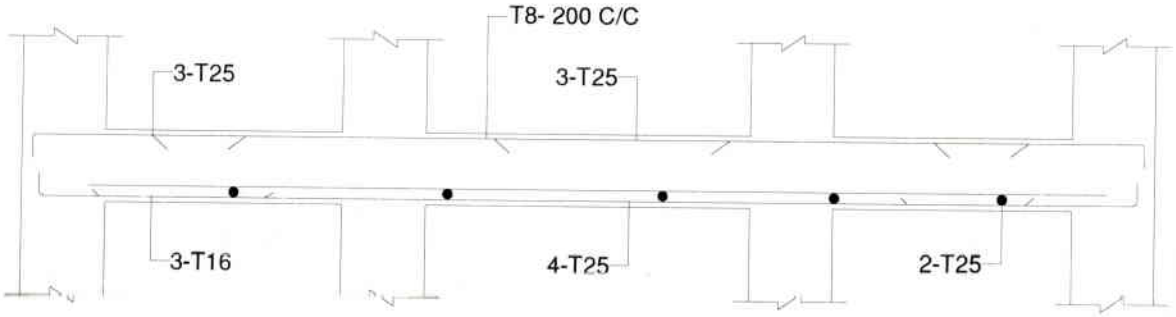
TYPICAL FOUNDATION DETAIL

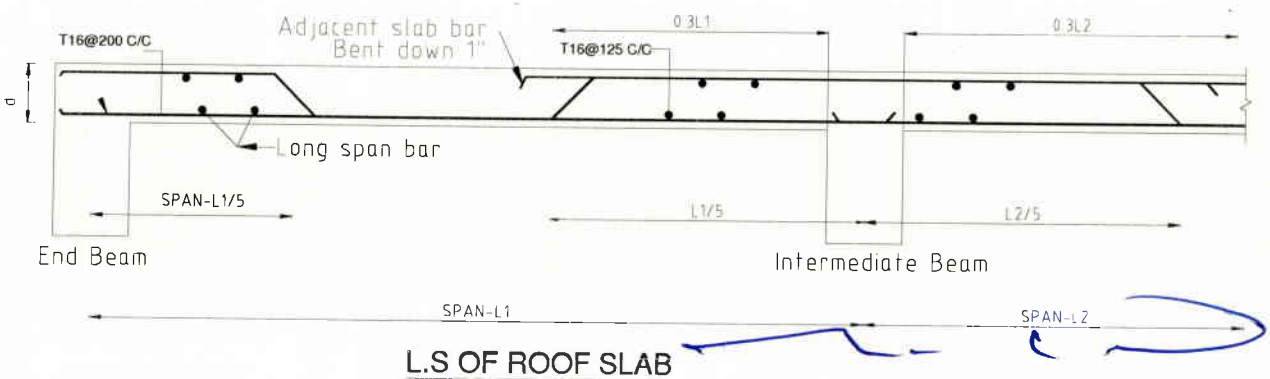
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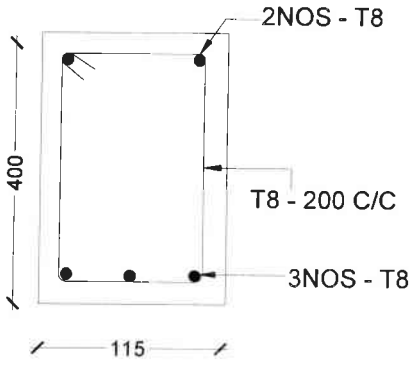
DETAIL OF MAIN BEAM (MB)



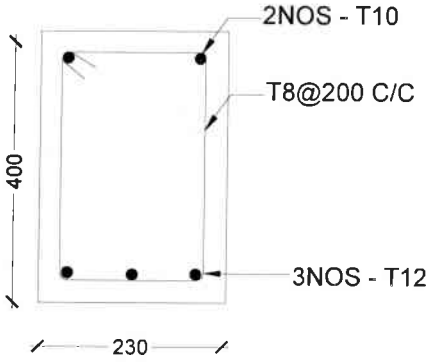


L.S OF ROOF SLAB

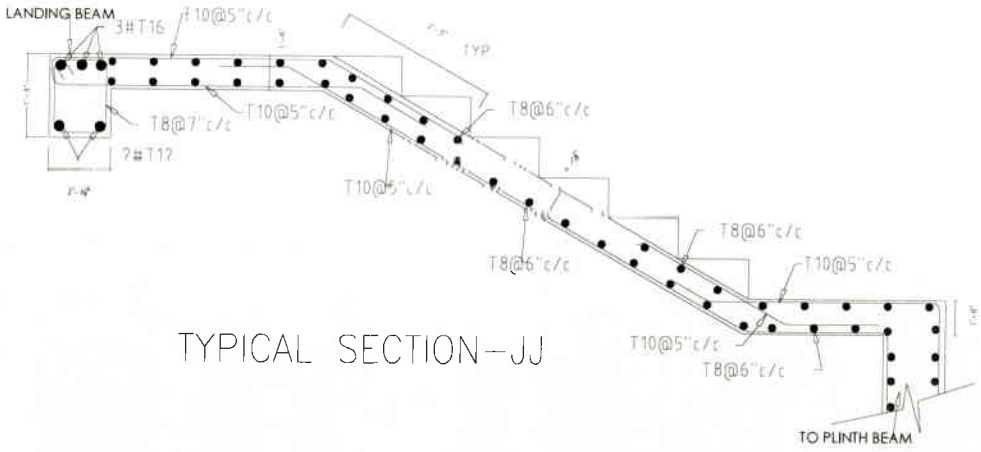
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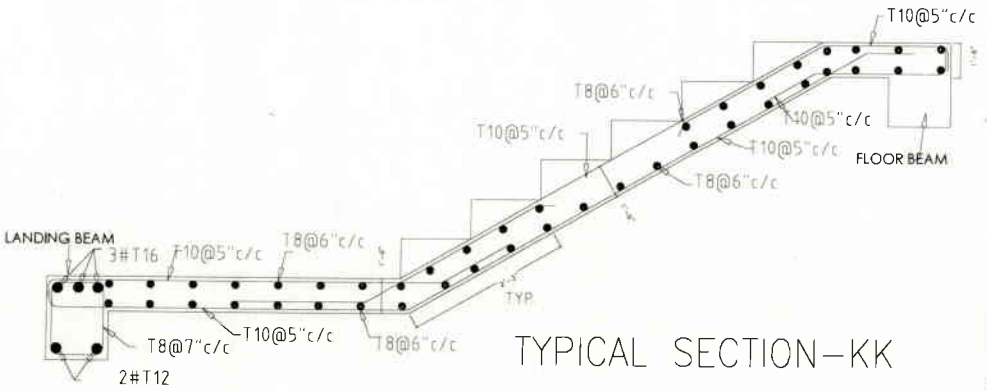
C.S OF 115 THK LINTEL



C.S OF 230 THK LINTEL



TYPICAL SECTION–JJ



TYPICAL SECTION–KK

TREAD - 12"

RISER - 6 $\frac{1}{2}$"

WIDTH - 3'0"

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Date:07-05-2024

STRUCTURAL STABILITY CERTIFICATE

I hereby certify that the proposed construction of Residential flats. The "ELANZA" Proposed Construction of Stilt +5 Floors (Height 18.00M) Residential Building with 35 Dwelling Unit, Affordable Housing at Door No.35/2, Seemathamman Nagar, Mettukuppam Road, Maduravoyal, Chennai comprised in Old S.No.265/1A & 266 Part, New S.No.266/6A1 & 266/6A2 of Maduravoyal Village, Within the Limits of Greater Chennai Corporation. measuring 9600 Sq.ft., is designed with other loads and also to resist earthquake forces, also check has been made and found safe.

I hereby certify that

1. The least dimension of the column for Stilt Floor is 300mm and Other Floor is 230 mm.
2. The minimum grade of concrete is M25
3. safe bearing capacity of soil at site is 17 ton/m^2
4. The design analysis using the code of practice forloading standards as per IS 875, IS 432 IS 456 and Seismic forces as per the code IS 1893

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STRUCTURAL DESIGN ANALYSIS
FOR PROPOSED BUILDING

Name of work : Proposed construction of Residential flats. The design consists of All that piece and parcel of land and building situated "ELANZA" Proposed Construction of Stilt +5 Floors (Height 18.00M) Residential Building with 35 Dwelling Unit, Affordable Housing at Door No.35/2, Seemathamman Nagar, Mettukuppam Road, Maduravoyal, Chennai comprised in Old S.No.265/1A & 266 Part, New S.No.266/6A1 & 266/6A2 of Maduravoyal Village, Within the Limits of Greater Chennai Corporation.Preamble

: 1. This Project consist of stilt + 5 floors

: 2. I hereby certify that the structural design is done by working stress method, as per section 6 of 1S456.

: 3. I hereby certify that the structural design sheet is done for critical column, beam, slab and footing for the proposed building.

: 4. The usage of the building for the car parking in stilt Floor and fully residential in First Floor to Fifth Floor.

: 5. The building consist of Stilt + 5 Floors

: 6. The building consist of RCC framed structure

: 7. The soil is ordinary soil mixed with stiff clay and sand in layers.(x)

: 8. The safe bearing capacity of soil is 17 ton/m²

: 9. All concrete for all proposed RCC members in Stilt + 5 Floors are RCC mix (M25 concrete)

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: 10. The structural design includes the earthquake Criteria as per the IS 1893

I.S Code : IS 456 for concrete
IS 875 for design load
IS 432 for steel reinforcement
1893 for earthquake resistant design

Preamble

DESIGN SHEET

: 1. This block consist of Stilt Parking + 5 Floors
2. The usage of the building is car parking in stilt Floor and fully residential in First Floor to Fifth Floor.
: 3. The superstructure is built on 230 mm thick outer walls and 115 mm thick inner walls.
: 4 All concrete for all proposed RCC members in Stilt + 5 Floor are RCC 1:1:2 mix (M25 concrete)
: 5 The footing is individual RCC footing and the structure is RCC framed structure.

Load on Slab:

Live load	= 225 Kg/m2
Dead load 0.12x 1.0x2500	= 300 Kg/m2
Floor finish	= 150 Kg/m2
Total	= 675 Kg/m'

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I. DESIGN OF SLAB:

a) One Way Slab:

Span = 3.31 m

Load on slab w Sending moment = 675 Kg/m2

$$= \frac{W1^2}{10} \times 100 \text{ Kg cm}$$

$$= \frac{675 \times (3.31)2 \times 100}{10}$$

= 73594 Kg cm

$$\frac{concrete\ M25}{depth\ req\ d.} = \sqrt{\frac{B.M}{Q \times b}}$$

Provide depth D Area of steel At $= \sqrt{\frac{73594}{14.7 \times 100}} = 7.09$ cm

= 12 cm

Area of steel At $= \frac{73594}{2300 \times 0.87 \times 10} = 3.69\ cm^2$

Provide for steel rod – 10 for @ 12.5 c/c

Provide Distributors = 8 for @ 20 cm c/c

b) Two way slab:

Longer span 1x = 3.6 m

Shorter span ly = 3.4 m

lx = 3.6 m = 1.06

ly = 3.4 m

Load on slab w = 675 kg/m2

From National Building Code if India 1983, Group 5, Table.

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Shorter span - ve B.M = 0.04 x w x1,,2

+ ve B.M = 0.03 x w x 1,,2

Longer span = - ve B.M = 0.033 x w x 1,,2

+ ve B.M = 0.025 x w x1,2

Max. Bending Moment = 0.04 x w x 1,2

= 0.04 x 675 x (3.20)2 x 100

= 27648 kg/cm²

Concrete M25 = $\sqrt{\frac{27648}{14.7 \times 23}}$ = 9.03 cm

Depth reqd. d

Provided depth D = 12 cm

Area of steel at = $\frac{27648}{2300 \times 0.87 \times 10}$ = 1.38 cm²

Prodived for steel rod = 10 tor @ 12.5cm c/c

Bothways

II. DESIGN OF BEAM:

ul Design of Main beam (MB) :

Singly reinforced beam:

Concrete M25

Span = 8.2 m

Load from slab = 675 kg/m2x 3.2 = 2160 kg/m

Self wt. Of beam = 0.23 x 0.75 x 2500 kg/m2 = 431 kg/m

Self wt. B.W. = 0.23 x 2.60 x 600 kg/m2 = 359 kg/m

= **2950 kg/m**

Load on beam w = 3000 kg/m

Bending Moment = $\frac{3000x (8.5)^2 \times 100}{10}$

= 588063 kg/cm

Concrete 2017200

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Depth regd. d = $\sqrt{}$ 14.7 x 23 = 77.24 cm

Provide depth D = 75 cm

Area of steel at = $\frac{2017200}{2300 \times 0.87 \times 35}$ = 14.4 cm²

Provide for steel rod

Bottom rod - 4 Nos-25 tor

Top rod - 3 Nos-20 tor

Crank - 2 Nos-25 tor

2 legged stirrups - 10 tor @ 15 cm c/c

bl Design of secondary beam (SB) :

Singly reinforced beam:

Concrete M25:

Span = 6.6 m

Slab load = 675 kg/m²

Load from slab = 675 Kg/m² x 2.89 m = 1951 kg/m

Self wt. Of beam = 0.23 x 0.45 x 2500 kg/m² = 173 kg/m

Self wt. A.E.C Block = 0.23 x 2.60 x 600 Kg/m² = 1148 kg/m

= 2777.55 kg/m

Say w = 2800 Kg/m

Bending Moment = $\frac{2800 \times (3.20)2 \times 100}{10}$

B.M = 1219680 kg/cm

Depth required (d) = $\sqrt{\frac{337920}{14.7 \times 23}}$ = 60. cm

Provide depth (D) = 60 cm

Area of steel At = $\sqrt{\frac{337820}{2300 \times 0.87 \times 25}}$ = 4.94 cm²

Provide for steel rod

Bottom rod = 4 Nos-16 tor

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Top rod	=	2 Nos -16 tor
Crank	=	1 Nos - 16 tor
2 legged stirrups	=	8 for @ 15 cm c/c

III.DESIGN OF COLUMN :

Concrete M25

Consider a critical column which is taking more load.

Load from slab	= 675 kg/m² x 4.87 x 3.16	= 10.38 ton
Load from beam	= 0.23. x 0.55 x 5.10 x 2500 kg/m²	= 1.61 ton
	= 0.23x 0.30 x 3.39 x 2500 Kg/m²	= 0.58 ton
Load form beam	= 0.23 x 6.37 x 2.60 x 600 Kg/	= 2.3 ton
		= 14.87 ton
Load on column	= 14.87 ton/floor	
Increase the load by 25%	= 1.5 ton	
Total load on column	= 16.15 ton + 1.5 ton	= 16.5 ton
No. of floors	= (First, Second, Third,fourth & Fifth)	= 4 Floors
Total load on column	= 16.5 ton x 5 Floors	= 82.5 ton
Say	= 83 Ton	
Provide column size	= 23 cm x 45 cm	
Provide area of steel	= 26.85 cm² = 6 Nos -20 tor and 4 Nos -16 tor	
	2.00 % of area of column.	

Allowable load on column

P = (23x 45 x 60) + (26.85 x 1500)

= 62.10ton + 40.27 ton

= 102.37 ton > 83 Ton

Hence Safe

O.K

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IV. DESIGN OF COLUMN FOOTING:

Concrete M25

The column footing is individual RCC strip footing.

The safe bearing capacity of soil is 17 ton/m²

Total load on column P = 190 ton

Area of footing reqd. A = $\frac{190 \text{ ton}}{17}$

= 11.18 ton/m²

Size of footing reqd. = 3.4 m x 3.4 m

Stress on soil = $\frac{P}{A}$

= $\frac{190 \text{ ton}}{3.4 \text{ m} \times 3.4 \text{ m}^2}$

16.44 ton/ m² < 17 ton/m²

Hence safe

O.K

Bending moment = $\frac{17 \text{ ton/m}^2 \times (1.7)^2}{2}$

= 24.57 ton/ m²

Dept reqd d = $\frac{24.51 \times 10^5}{\sqrt{14.7 \times 100}}$

= $\frac{640845}{38.3}$

= 70 cm

Area of steel At = $\frac{24.31 \times 10^5}{2300 \times 0.87 \times 65}$ = 18.7 cm²

Provide tor steel rod 16 tor @ 150 mm c/c both ways top and bottom.

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V. CHECK FOR EARTHQUAKE FORCES:-

Check the column, critical and its foundation to Earthquake force as per 1S 1893-critica for earthquake resistant design of structure

Use seismic coefficient method as per Clause 3.4. 2-3 (a)

αb = B I Ap

αh = Horizontal seismic coefficient

β = a coefficient depend upon soil foundation coefficient as per Table -3

= 1.20

I = a coefficient depend upon soil importance of structure as pet Table -4

= 1.0

αb = Basic horizontal seismic coefficient as per seismic zone of the place-Madras/Chennai seismic zone Til.

– 0.04

αh = 1.2x1.0x 0.04

= 0.048

Total load on column = 190 ton

Size of individual footing = 3.4 m x 3.4 m

Safe bearing capacity of soil = 17 ton/m²

$H\Sigma$ = Horizontal force component of earthquake

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= h x w

W = load on column

= 190 ton

HΣ = 0.048 x 190 ton

= 0.05 x 190 ton

= 9.5 ton

Column size = 30 cm x 60 cm

b = 30 cm

D = 60 cm

Effective depth (d) = 55 cm

Concrete M25

Shear due to Earthquare = 9.5 ton

$$\text{Shear} = \frac{H\Sigma}{b_j d}$$

$$= \frac{6250}{30 \times 0.87 \times 55}$$

$$= \frac{9500}{1435.5}$$

$=6.6 \text{ kg/cm}^2 < 8 \text{ kg/cm}^2$

Hence column safe against Earthquake.

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Footing

Hv = Vertical component of Earthquake force as per clause 3.4.5. of 1893

Hv = Co-efficient of vertical component of seismic force

$= \frac{\alpha h}{2} = \frac{0.048}{2} = 0.024$

Vertical load on column (P) = 190 ton

Vertical component force due to Seismic (P1) = H x p

= 0.024 x 190 ton

= 4.56 ton

Total load on footing (P) = P + Pl

= 190 ton + 4.56 ton

= 194.56 ton

Size of footing = 3.4 m x 3.4 m

Stress on soil = $\frac{P}{A}$

$= \frac{194.56 \text{ ton}}{3.4 \text{ m} \times 3.4 \text{ m}}$

= 16.7 ton/m² < 17 ton/m²

as per seismic force above.

Hence column footing safe.

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For additional safety to building all columns are tied in the x and y axis positively.



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