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06.12.2023

CERTIFICATE

It is certified that the plan showing the proposed construction of residential building (stilt+03) at door No:15/8,17(5/9),Mandapam road 4th street,comprised in T.S.NO:55/76 & 55/79,Block No:03 of Kilpauk village,Egmore taluk,zone-08,Division -101,Greater Chennai Corporation.. is designed by us is safe and stable against all possible loads and Combination of loads as per IS Code, also check has been made and found safe and I hereby certify that,

1. The minimum grade of concrete is M25
2. The least dimension of column is 230 mm. in stilt floor
3. The design and analysis using code of practice IS 875, IS 456 and IS1893, is carried out.

The building will be Structually safe and sound when used for the purpose for which it is designed.


S.SOUNDRAPANDIAN
STRUCTURAL ENGINEER,

S. SOUNDRAPANDIAN, M.E.Structural
SE Grade-I CMDA (Reg. No: SE/GR 1/19/03/028)
36, Suppa Colony, Guindy, Ch-32. 9952046424

THE PROPOSED RESIDENTIAL BUILDING **AT KILPAUK, CHENNAI**

OBJECT BRIEF

This report sets out the basic parameter used for the structural design of the proposed construction of **Residential Building at Kilpauk, Chennai.**

STRUCTURAL SYSTEM

The structural system adopted is as below, based on preliminary analysis and design, which have been elucidated later in this report

- The building is basically a RCC framed structure comprising of **Stilt+3** floors.
- *The foundation system comprises of open foundation is adopted*
- All slab are designed as conventional RCC design

CODES AND STANDARDS

All structural design is carried out conforming to the provision in national building code of India and other relevant Indian code and standards.

1. I.S. 456-2000
2. I.S. 875-PART I to II
3. I.S. 1893 – 2002
4. I.S. 13920 – 2016

SOIL DETAIL

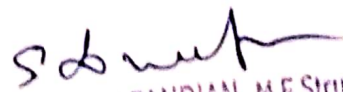
Based on soil test report open foundation is adopted

DESIGN METHODS

General design and detailing of concrete members are done conforming to the provision of IS456 and other relevant IS codes. Limit state method is followed for the design. The structure has been modeled, analyzed and designed in software "STAAD.Pro". Beams and columns are designed by "STAAD.Pro". The floor slab and footings are designed manually using IS Codal regulations.

BASIC CIVIL DESIGN LOADS

Live load for commercial – 2kN / sq.m


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Calculations

at Loads for 125th Slab

Thickness of Slab	125	mm
Unit Weight of Concrete	25.000	kN/m ³
Calculations		
Dead Load of Slab	3.125	kN/m ²
Floor Finishes	2.500	kN/m ²
	5.625	kN/m ²
Say	5.625	kN/m ²

Wall Loads

230mm thick wall for 3.20m height

Thickness of wall 'b'	0.230	m
Height of Walls 'h'	3.200	m
Depth of Beams 'd'	0.450	m
Unit Weight of Brick 'γ'	19.200	kN/m ³
Height=(h-d)	2.750	m
(h-d)*b*γ	12.144	
Say	11.000	kN/m

115mm thick wall for 3.20m height

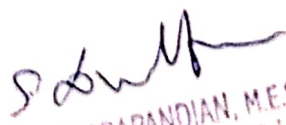
Thickness of wall 'b'	0.115	m
Height of Walls 'h'	3.200	m
Depth of Beams 'd'	0.150	m
Unit Weight of Brick 'γ'	19.200	kN/m ³
Height=(h-d)	3.050	m
(h-d)*b*γ	6.734	
Say	6.800	kN/m

Head room Wall load

Thickness of wall 'b'	0.230	m
Height of Walls 'h'	2.500	m
Depth of Beams 'd'	0.425	m
Unit Weight of Brick 'γ'	19.200	kN/m ³
Height=(h-d)	2.075	m
(h-d)*b*γ	9.163	
Say	9.200	kN/m

Parapet Wall load

Thickness of wall 'b'	0.230	m
Parapet wall 'h' 0.9m	0.900	m
Unit Weight of Brick 'γ'	19.200	kN/m ³
h*b*γ	3.974	
Say	4.000	kN/m


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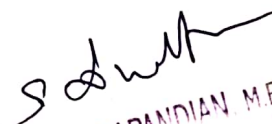
LOAD COMBINATION

Load combination	Ultimate limit load	Serviceability Limit state
DL + LL + WL	$1.2DL + 1.2LL + 1.2WL$	$1DL + 0.8LL + 0.8WL$
Or	or	or
DL + LL + EL	$1.2DL + 1.2LL + 1.2EL$	$1DL + 0.8LL + 0.8EL$

4.3 MINIMUM COVER

Slab	20mm
Beam	25mm
Column	40mm
Foundation	50mm

Structure will be sound and stable when used for the purpose of which it is designed.


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Panal size	=	lg. Span (L_y)	sh. Span (L_x)
	=	3.80	3.80
f_{ck}	=	25	N/mm ²
f_y	=	500	N/mm ²

EDGE COND. 7

ONE LONG EDGE CONT.

L_y/L_x	=	1.00	
(Assume D =	=	125	mm
Dead load of the slab	=	$D \times 25$ =	3.13 Kn/m ²
Floor finishes	=	3.00	Kn/m ²
Live load	=	2.00	Kn/m ²
Total load (w)	=	8.13	Kn/m ²

$$\begin{aligned}\alpha_x(-ve) &= 0.0570 \\ \alpha_x(+ve) &= 0.0430 \\ \alpha_y(-ve) &= 0.0000 \\ \alpha_y(+ve) &= 0.0430\end{aligned}$$

The Factored Moments are

	Moment in KNm	Ast in m ²	8 tor mm c/c	10 tor mm c/c	12 tor mm c/c
$M_x(-ve) = \alpha_x(-ve) * w * l_x^2 * 1.5$	= 10.03	254	198	310	792
$M_x(+ve) = \alpha_x(+ve) * w * l_x^2 * 1.5$	= 7.57	189	266	416	1065
$M_y(-ve) = \alpha_y(-ve) * w * l_y^2 * 1.5$	= 0.00	0	#DIV/0!	#DIV/0!	#DIV/0!
$M_y(+ve) = \alpha_y(+ve) * w * l_y^2 * 1.5$	= 7.57	208	242	378	968
min Ast		150	335	524	754
max spacing			288	288	288
$d_{req} = \sqrt{M_u * 10^6 / (0.138 * f_{ck} * b)}$					54 mm
$D_{prov} =$	125	mm			
$dx_{prov} =$	96	mm			
$dy_{prov} =$	88	mm			
Provide 125 mm Thk	8 tor @	125	mm c/c in Shorter direction &		
	8 tor @	175	mm c/c in longer direction		

Check for Deflection :

Percentage of Tension reinforcement @ mid span = 0.42

$$f_s = 0.58 * f_y * \frac{\text{Area of c/s of steel required}}{\text{Area of c/s of steel provided}} = 136 \text{ N/mm}^2$$

Basic span/eff depth ratio for continuous slabs = 26.00

Modification factor = 2.00

Coefficient for max ratio of span/eff depth = 52

Effective Depth required = 73 < 96 mm

SAFE

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ROOF BEAM

Beam Data

width	230 mm
depth	600 mm
clear cover to main reinf.	30 mm

d'	50 mm	$= cc + sdia + mdia/2$
eff depth	550 mm	$= d - d'$

Material Grades

Concrete	25 MPa
Steel	500 MPa

Moment	220 KN-m
--------	----------

Mu/bd ²	3.16	
xumax	251	$= (700/(1100 * (0.87 * ($
Mulim	231	$= 0.36 * fck * b * xumax * ($
Mulim/bd ²	3.33	

Beam is designed as Singly Reinforced Beam

Area of Steel	Tension (Ast)	Compr (Asc)
Percentage	0.884 %	---
Area of Steel	1118 sqmm	---

Refer Table 2 SP 16 pg
48

Tension Reinforcement

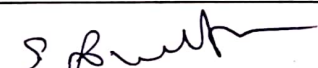
Type	Bar dia	Nos	Area of Steel
Layer 1	16 mm	3	603 sqmm
Layer 2	16 mm	3	603 sqmm
Layer 3	-	4	
Total Steel Provided			1206 sqmm
Provided Steel OK			

0.954 %

Compression Reinforcement

Type	Bar dia	Nos	Area of Steel
Layer 1	16 mm	2	402 sqmm
Layer 2	16 mm	2	402 sqmm
Layer 3			
Total Steel Provided			804 sqmm

0.636 %


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Shear Force (Vu) **200 KN**

ζ_v 1.570

$$= V_u / (b \cdot d)$$

ζ_c 0.628

Refer Table 61 SP 16 pg 179

$$\text{or } = (0.85 \cdot v(0.8 \cdot f_{ck}) \cdot v(1+5\beta) - 1)) / (6\beta)$$

ζ_{cmax} 3.1

Refer Table J SP 16 pg 175

Type	Bar Dia	Nos	Area of Steel
Layer 1	16 mm	3	603 sqmm
Layer 2	16 mm	3	603 sqmm
Layer 3	-	4	
Total Steel Provided			1206 sqmm

0.947 %

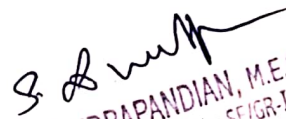
Sectional Dimensions OK

Shear Reinforcements required

Type of stirrup **2 legged**

Stirrup diameter **8 mm**

Spacing **168 c/c**


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COLUMN DESIGN

Design Loads

Load	Pu	1200 KN
Moment	Mu	45 KN-m

Column Data

width	b	230 mm
depth	d	450 mm
length	l	3.00 meters

Grade

Concrete	fck	25 MPa
Steel	fy	500 MPa

$Pu/(fckbd)$	0.46
$Mu/(fckbd^2)$	0.04
d'/d	0.05

Minimum eccentricity

e _x	1.37 mm	OK
e _y	2.10 mm	OK

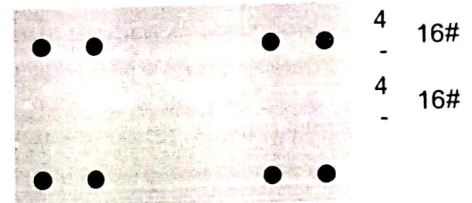
Refer Chart 35 of SP 16, Page no: 120

pt/fck	0.06
--------	------

pt	1.50%
Ast	1553 sqmm

Number of bars

dia	nos	ast
16 mm	4	804 sqmm
16 mm	4	804 sqmm
-	-	-
Total	8	1608 sqmm



Steel provided OK


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Footing Size OK

Scanned with CamScanner

One Way Shear along x direction

V_{u1}	262 KN
ζ_v	0.217 MPa

ζ_c	0.265 MPa
V_{c1}	320 KN

One Way Shear Check OK

4 One Way Shear along y direction

V_{u1}	262 KN
ζ_v	0.217 MPa

ζ_c	0.265 MPa
V_{c1}	320 KN

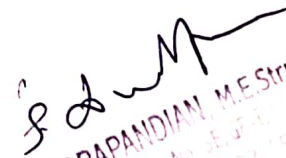
One Way Shear Check OK

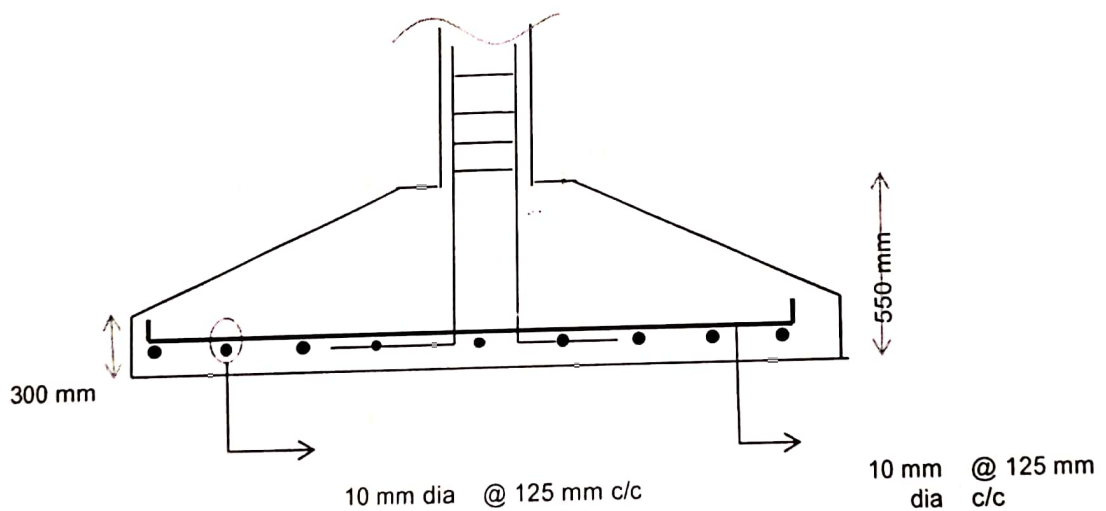
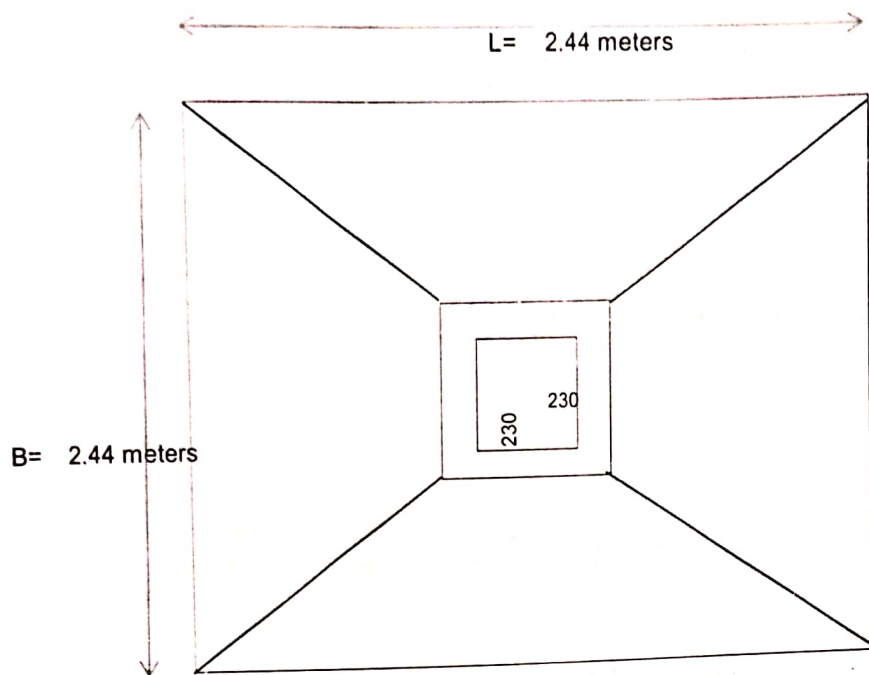
5 Two Way Shear

V_{u2}	954 KN
ζ_v	0.665 MPa

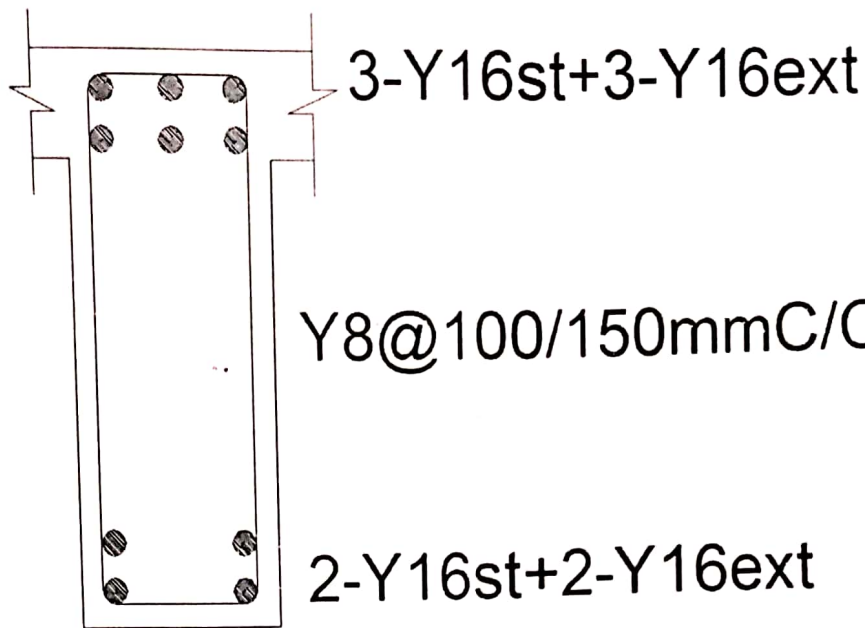
$k_s \cdot \zeta_c$	1.118 MPa
V_{c1}	1605 KN

Two Way Shear Check OK

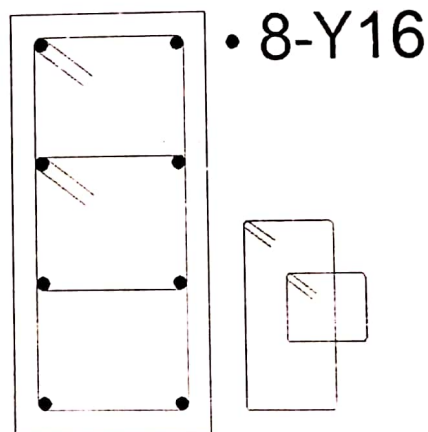

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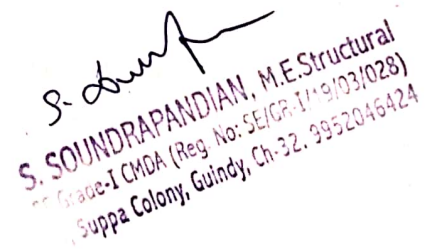
Beam (230X600)

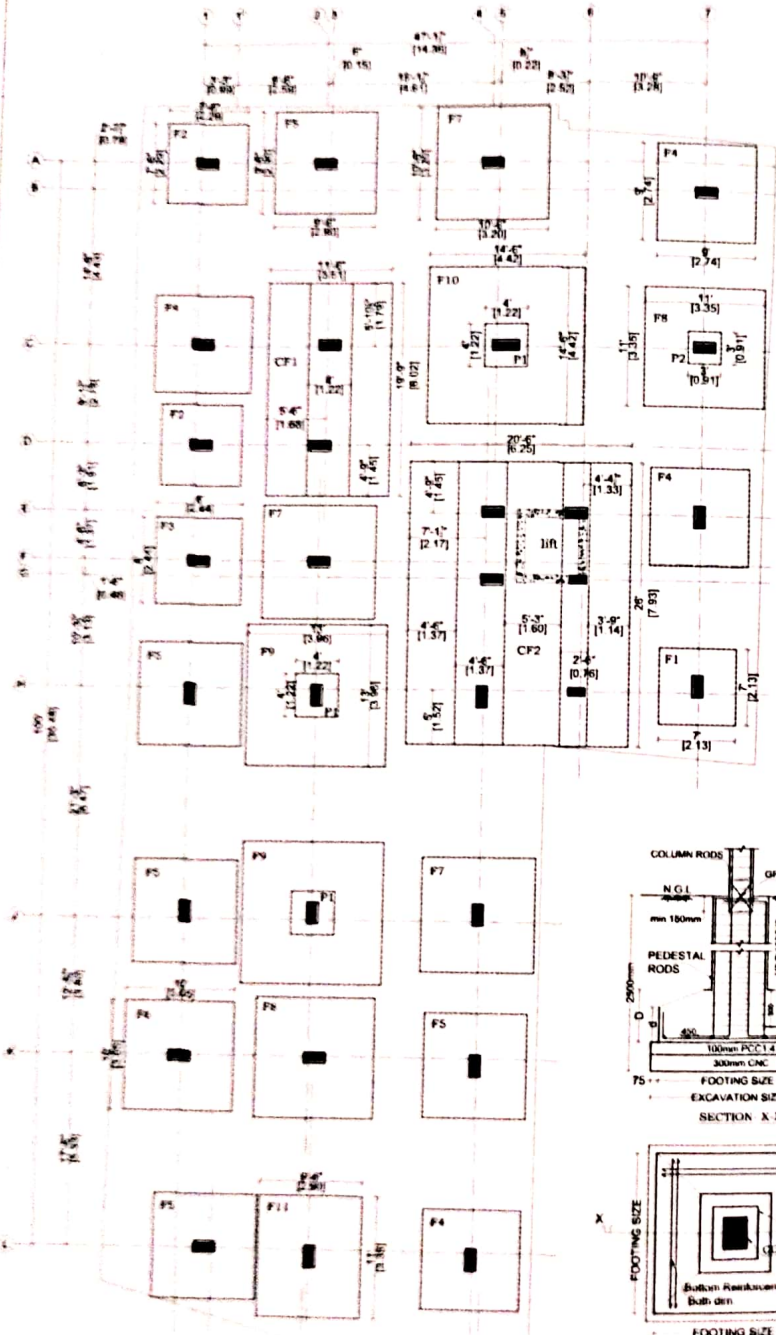


Column

230x450

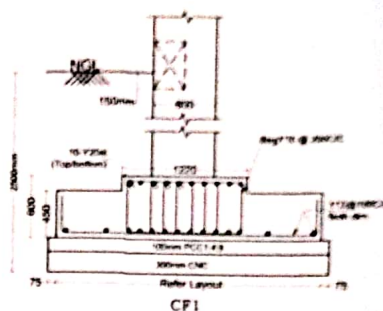
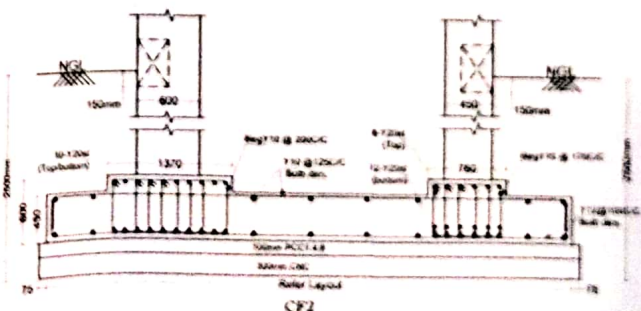
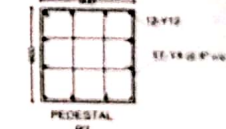
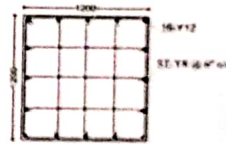
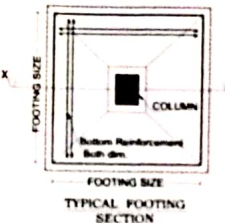
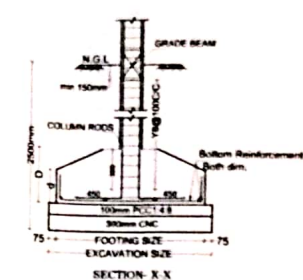
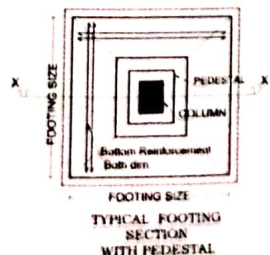
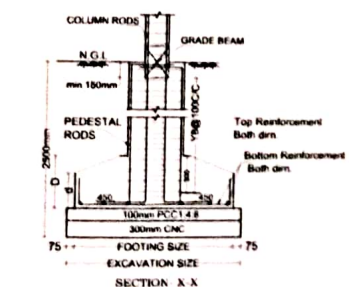
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SE Grade-I CMDA (Reg. No. SE/GR-I/19/03/028)
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FOOTING LAYOUT

FOOTING TYPE	FOOTING SIZE	FOOTING DIM.	FOOTING DIM.	FOOTING DIM.
F1	7'0" x 7'0"	17'	17'	17'
F2	7'0" x 7'0"	17'	17'	17'
F3	7'0" x 7'0"	17'	17'	17'
F4	7'0" x 7'0"	17'	17'	17'
F5	7'0" x 7'0"	17'	17'	17'
F6	7'0" x 7'0"	17'	17'	17'
F7	7'0" x 7'0"	17'	17'	17'
F8	7'0" x 7'0"	17'	17'	17'
F9	7'0" x 7'0"	17'	17'	17'
F10	7'0" x 7'0"	17'	17'	17'
F11	7'0" x 7'0"	17'	17'	17'

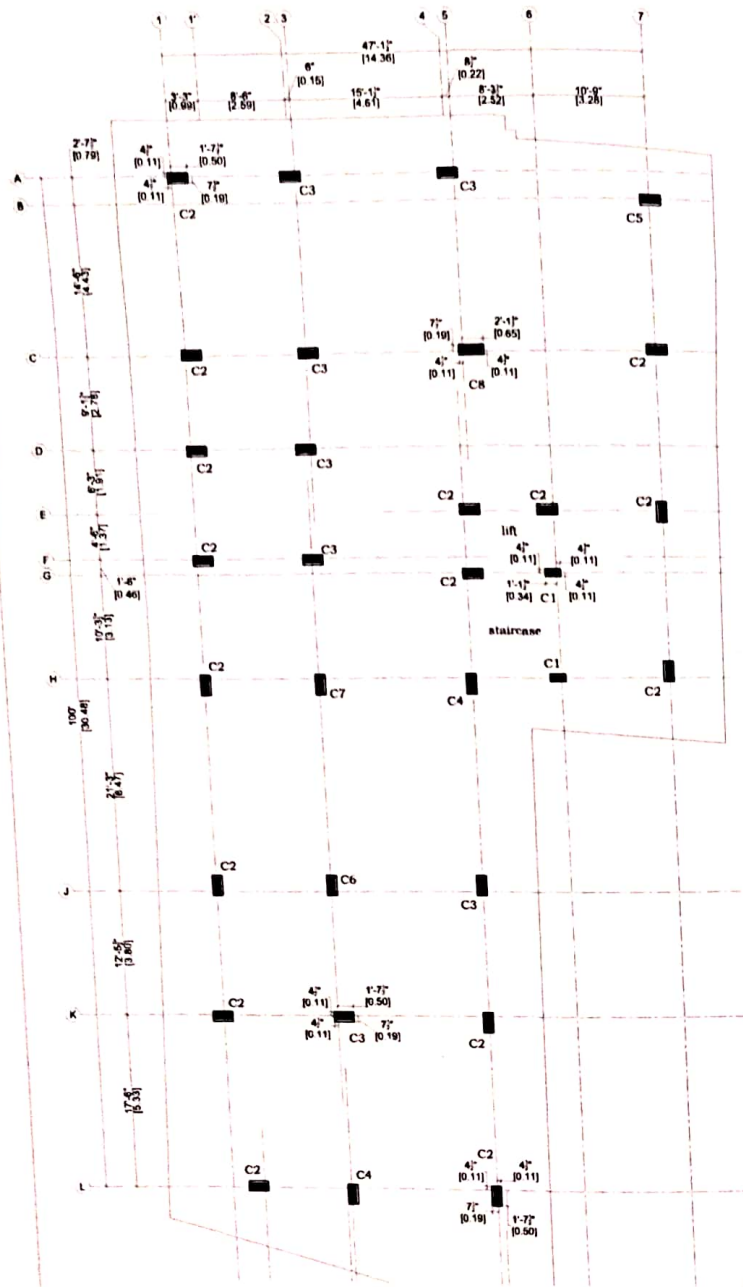


- NOTES:
1. ALL CONSTRUCTION SHALL BE IN ACCORDANCE WITH THE LATEST EDITIONS OF THE FOLLOWING:
 2. THE FOUNDATION SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE LATEST EDITIONS OF THE FOLLOWING:
 3. THE FOUNDATION SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE LATEST EDITIONS OF THE FOLLOWING:
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 19. THE FOUNDATION SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE LATEST EDITIONS OF THE FOLLOWING:
 20. THE FOUNDATION SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE LATEST EDITIONS OF THE FOLLOWING:

REV. DATE DESCRIPTION

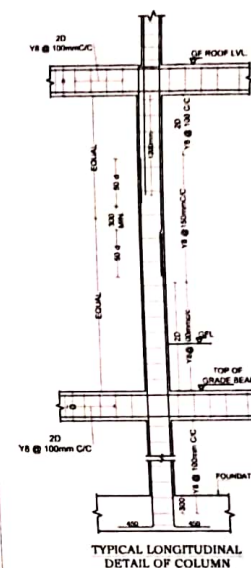
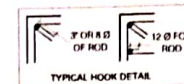
PROJECT NAME -

PROPOSED CONSTRUCTION OF RESIDENTIAL BUILDING (STL 1-10) AT DOOR NO. 15/16, 17/18, 19/20, 21/22, 23/24, 25/26, 27/28, 29/30, 31/32, 33/34, 35/36, 37/38, 39/40, 41/42, 43/44, 45/46, 47/48, 49/50, 51/52, 53/54, 55/56, 57/58, 59/60, 61/62, 63/64, 65/66, 67/68, 69/70, 71/72, 73/74, 75/76, 77/78, 79/80, 81/82, 83/84, 85/86, 87/88, 89/90, 91/92, 93/94, 95/96, 97/98, 99/100, 101/102, 103/104, 105/106, 107/108, 109/110, 111/112, 113/114, 115/116, 117/118, 119/120, 121/122, 123/124, 125/126, 127/128, 129/130, 131/132, 133/134, 135/136, 137/138, 139/140, 141/142, 143/144, 145/146, 147/148, 149/150, 151/152, 153/154, 155/156, 157/158, 159/160, 161/162, 163/164, 165/166, 167/168, 169/170, 171/172, 173/174, 175/176, 177/178, 179/180, 181/182, 183/184, 185/186, 187/188, 189/190, 191/192, 193/194, 195/196, 197/198, 199/200, 201/202, 203/204, 205/206, 207/208, 209/210, 211/212, 213/214, 215/216, 217/218, 219/220, 221/222, 223/224, 225/226, 227/228, 229/230, 231/232, 233/234, 235/236, 237/238, 239/240, 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COLUMN LAYOUT

SL NO	COLUMN NO	COLUMN SIZE	UPTO MIDDLE OF FIRST FLOOR	UPTO MIDDLE OF SECOND FLOOR	ABOVE MIDDLE OF SECOND FLOOR
01	C1	(230x450)		SAME	SAME
02	C2	(300x600) (230x600) UPTO FIRST FLOOR ABOVE FIRST FLOOR			SAME
03	C3	(300x600) (230x600) UPTO FIRST FLOOR ABOVE FIRST FLOOR			SAME
04	C4	(300x600) (230x600) UPTO FIRST FLOOR ABOVE FIRST FLOOR			SAME
05	C5	(300x600) (230x600) UPTO FIRST FLOOR ABOVE FIRST FLOOR			SAME
06	C6	(300x600) (230x600) UPTO FIRST FLOOR ABOVE FIRST FLOOR			SAME
07	C7	(300x600) (230x600) UPTO FIRST FLOOR ABOVE FIRST FLOOR			SAME
08	C8	(300x750) (230x750) UPTO FIRST FLOOR ABOVE FIRST FLOOR			SAME



NOTES:-

1. ALL DIMENSIONS ARE IN METER & MILLIMETER UNLESS INDICATED.
2. THIS DRAWING SHALL BE READ ALONG WITH THE ARCHITECTURAL DRAWINGS.
3. THE CONCRETE MIX SHALL BE M20 DESIGN MIX FOR ALL RCC WORKS.
4. ALL CONC. WORK SHALL BE MACHINE MIXED & VIBRATED.
5. ALL CONC. WORK SHALL BE CURED FOR MIN. 14 DAYS.
6. IF ANY AMBIGUITY FOUND IN DRAWINGS OR DETAILS PLEASE CONTACT US BEFORE CONCRETING.
7. PROPER WORKMANSHIP & STRENGTH OF MATERIALS IS NOT STRUCTURAL ENGINEER'S RESPONSIBILITY.
8. APPLY CONC. BONDING AGENT AT EACH CONSTRUCTION JOINT.
9. ANY DISCREPANCY IF FOUND SHALL BE BROUGHT TO THE NOTICE OF STRUCTURAL ENGINEER WELL BEFORE EXECUTION.
10. BOTTOM OF ALL FOUNDATIONS MUST BE AT SAME LEVEL.
11. CLEAR COVER TO THE OUTERMOST REINFORCEMENT IS TO BE: (50mm FOR COLUMN) (50mm FOR FOOTING) (80mm FOR BEAM) (20mm FOR SLAB).
12. GRADE OF STEEL SHALL BE F450 EXCEPT WHEREVER INDICATED.
13. SFC IS CONSIDERED AS 1200mm x 2500mm.
14. THIS STRUCTURE IS DESIGNED FOR S-1 ONLY.
15. THIS STRUCTURE IS DESIGNED FOR GRAVITY LOAD ONLY.

REV DATE DESCRIPTION

PROJECT NAME:-

PROPOSED CONSTRUCTION OF RESIDENTIAL BUILDING (STILT+03) AT DOOR NO-15/8,17(5/9), MANDAPAM ROAD 4TH STREET, COMPRISED IN T S NO 55/76 & 55/79, BLOCK NO 03 OF KILPAUK VILLAGE, EGMORE TALUK, ZONE-08, DIVISION -101, GREATER CHENNAI CORPORATION.

DRAWING TITLE :-

COLUMN DETAILS

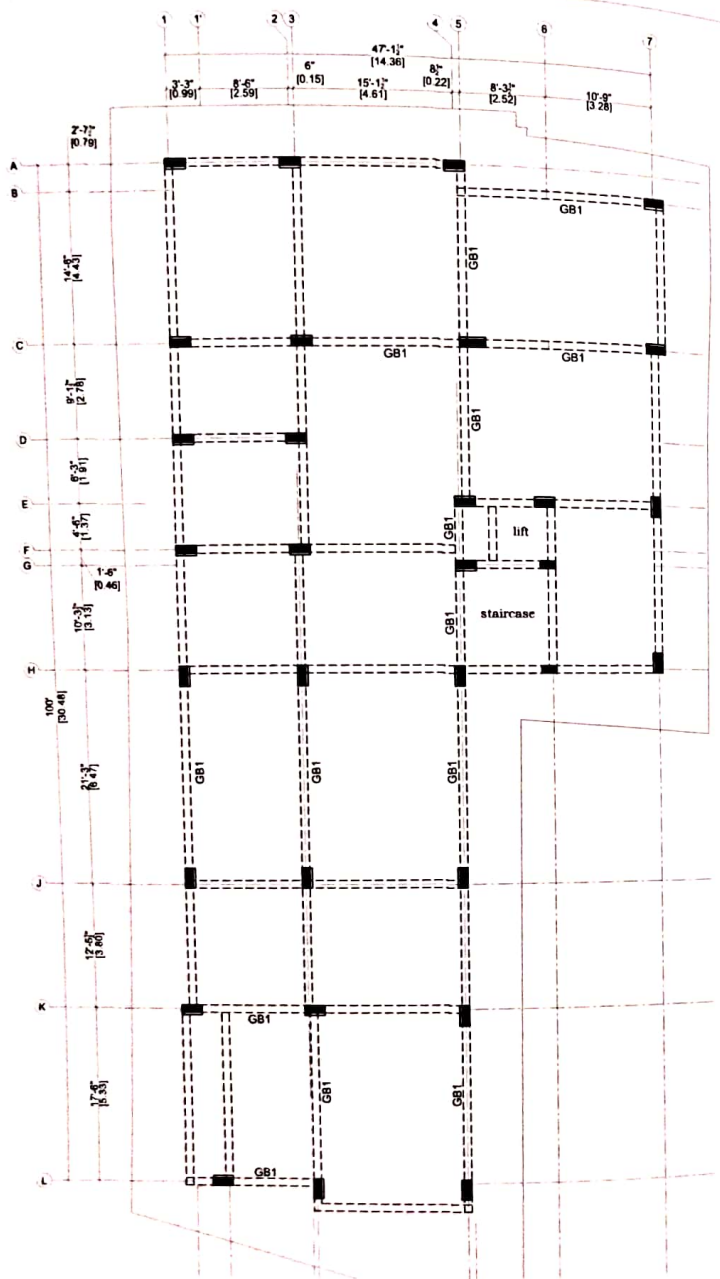
DRAWING NO. -

DATE	DESIGN	DRAWN	CHECKED
06.07.23	SS	RK	SS
SCALE - 1:100	SIZE - A2	SHEET -	REV. NO -

ARCHITECT :-

STRUCTURAL CONSULTANT :-

S. SOUNTHAR ASSOCIATES
No. 117, Chakrapani Road,
SE Madhavankam, Gundy, No. 30/30/28
36 Chennai-600 032. PH: 9852046424 9852046424
EMAIL: sountharassociates@gmail.com



GRADE BEAM LAYOUT

NOTES -

1. ALL DIMENSIONS ARE IN METERS & MILLIMETER UNLESS INDICATED.
2. THIS DRAWING SHALL BE READ ALONG WITH THE ARCHITECTURAL DRAWINGS.
3. THE CONCRETE WORK SHALL BE NOTED AGAIN FOR ALL RECC WORKS.
4. ALL CONCRETE WORK SHALL BE MACHINE MIXED & VIBRATED.
5. ALL CONCRETE WORK SHALL BE CURED FOR MIN. 14 DAYS.
6. IF ANY AMBIGUITY EXISTING IN DRAWINGS FOR DETAILS PLEASE CONTACT US BEFORE COMMENCING.
7. PROPER BRACING & STRENGTH OF MATERIALS IS NOT STRUCTURAL ENGINEER'S RESPONSIBILITY.
8. APPLY CORRECTION AT EACH CONSTRUCTION JOINT.
9. ANY DISCREPANCY IF FOUND SHALL BE BROUGHT TO THE NOTICE OF STRUCTURAL ENGINEER WELL BEFORE EXECUTION.
10. BOTTOM OF ALL FOUNDATIONS MUST BE AT SAME LEVEL.
11. CLEAR COVER TO THE OUTERMOST REINFORCEMENT IS TO BE 40MM FOR COLUMN & 25MM FOR BEAM & 20MM FOR SLAB.
12. GRADE OF STEEL SHALL BE M300 EXCEPT WHEREVER INDICATED.
13. SMC IS CONSIDERED AS 100MPa IN DESIGN.
14. THIS STRUCTURE IS DESIGNED FOR S-1 ONLY.
15. THIS STRUCTURE IS DESIGNED FOR GRAVITY LOAD ONLY.

REV DATE DESCRIPTION

PROJECT NAME -

PROPOSED CONSTRUCTION OF RESIDENTIAL BUILDING (STLT-03) AT DOOR NO.15/8,17/5/9, MANDAPAM ROAD & 7TH STREET, COMPRISED IN T.S.NO.55/78 & 55/79, BLOCK NO.03 OF KILPAUK VILLAGE & CAMORE TALUK, ZONE-08 DIVISION - 101 GREATER CHENNAI CORPORATION.

DRAWING TITLE -

GRADE BEAM DETAILS

DRAWING NO. -

DATE	DESIGN	DRAWN	CHECKED
06.07.23	SS	RM	SS

SCALE - 1:100 SIZE - A2 SHEET - REV NO. -

ARCHITECT -

STRUCTURAL CONSULTANT - *S. Sounthar*

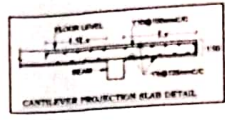
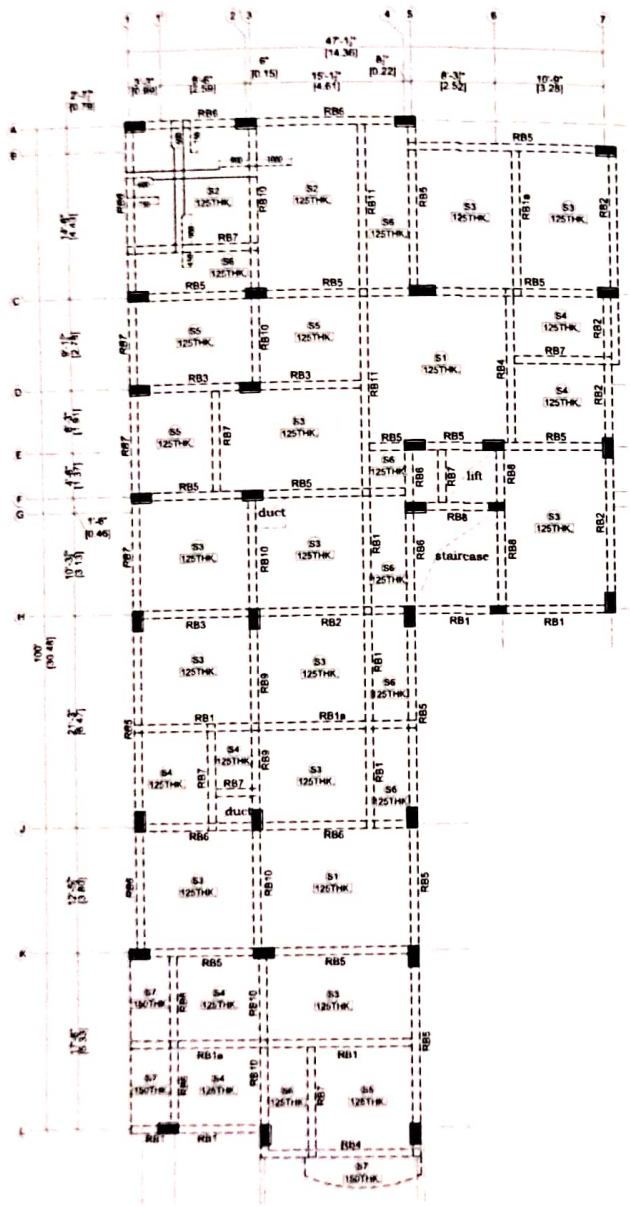
SOUNTHAR ASSOCIATES

No.187, Changanallur Road, Madhavaram, Chennai - 600044

S. Sounthar 9882244424, 9882244424

Email: sountharassociates@gmail.com

10, Supra Colony, Vadapatti, Chennai - 600044



SLAB SCHEDULE					
NO	NAME	THICKNESS	REINFORCEMENT		REMARKS
			SHORTER SPAN	LONGER SPAN	
01	S1	125	Y@100mm/c	Y@100mm/c	TWO WAY
02	S2	125	Y@125mm/c	Y@170mm/c	TWO WAY
03	S3	125	Y@100mm/c	Y@150mm/c	TWO WAY
04	S4	125	Y@200mm/c	Y@200mm/c	TWO WAY
05	S5	125	Y@150mm/c	Y@150mm/c	TWO WAY
06	S6	125	Y@150mm/c	Y@150mm/c	ONE WAY
07	S7	150	Y@100mm/c	Y@125mm/c	CANTILEVER



TYPICAL ROOF BEAM & SLAB LAYOUT

NOTES:-

1. ALL DIMENSIONS ARE IN METERS & MILLIMETERS UNLESS INDICATED.
2. THE DRAWING SHALL BE READ ALONG WITH THE ARCHITECTURAL DRAWINGS.
3. THE CONCRETE GRADE SHALL BE M20 (1:1.5:4) WITH 10% FINE AGGREGATE.
4. ALL STEEL WORK SHALL BE DONE IN ACCORDANCE WITH THE IS CODES.
5. ALL STEEL WORK SHALL BE DONE IN ACCORDANCE WITH THE IS CODES.
6. IF ANY AMBIGUITY EXISTS IN THE DRAWING, THE CONTRACTOR SHALL CONTACT THE ARCHITECT FOR CLARIFICATION.
7. THE STRUCTURE SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE IS CODES.
8. THE STRUCTURE SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE IS CODES.
9. THE STRUCTURE SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE IS CODES.
10. THE STRUCTURE SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE IS CODES.
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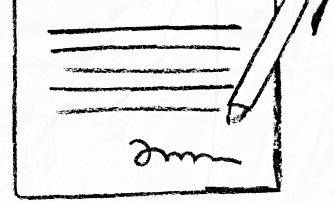
REV. DATE DESCRIPTION
PROJECT NAME:-
PROPOSED CONSTRUCTION OF RESIDENTIAL BUILDING (STL 7-8) AT DOOR NO: 15/8, 17/5/9, MANDAPAM ROAD 4TH STREET COMPREHENSIVE IN T.S. NO: 15/79 & 55/79 BLOCK NO: 10 OF KILPAUK VILLAGE SCHEME TALUK, ZONE-08, DIVISION-101 GREATER CHENNAI CORPORATION.

DRAWING TITLE:-
TYPICAL ROOF BEAM & SLAB DETAILS
DRAWING NO.:-
DATE: 06.07.23 DESIGN: CS CHECKED: CS
SCALE: 1:100 SIZE: A2 SHEET: REV: N/A
ARCHITECT:-

STRUCTURAL CONSULTANT - *S. S. Srinivasan*
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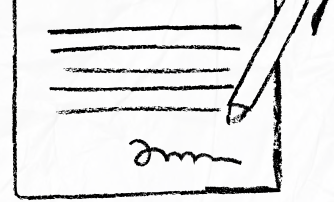
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