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Chennai 600 097, India

hello@verified.realestate
+91 9996 12 9996
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DIGITALLY VERIFIED RECORD

JAYA SANKARA ENGINEERING CONSULTANTS
Structural Engineer, Chartered Engineer & Quality Auditor
Registered DTCP Structural Engineer-SE/Gr-I/DTCP/TRICHY/AUG2021/321
Registered CMDA Structural Engineer-Grade-I/SE/Gr-I/19/07/168
GST No: 33AORPB8823M1ZJ

JAYA SANKARA
Engineering Consultants

16.07.2026

STABILITY CERTIFICATE

(To be furnished while filing application for registration of building)

The detailed engineering and structure design of the proposed building comprising of Silt +5 floors at 17 Dwelling Unit Plot No.72 Old No,2 New Door No.6 16 th Street, Nanganallur Chennai -600061 has been done by me/us based on the report of geotechnical investigation (soil test) done by **Geo Soil Foundation** Report No. GSF/Sreejee -Yamuna/2018-2526 Dated 27-04-2026 and considering the functional requirement of the building.

2. It is certified that among other factors, the proposed building has been designed to resist earthquake. I/We have checked various parameters and found that the proposed building would be safe.

3. I/We further certify that:

(i) The minimum grade of concrete is M25

(ii) The design and analysis has been done using the code of practice for plain and reinforced concrete as per IS 456, design loads as per IS Codes No 875 and design of earthquake resistant structure as per IS Code No 1893-2016

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

Stamp and Signature

S. BALAKUMAR, M.E.,A.I.M.E.,C.Eng.
Registered CMDA Structural Engineer Grade - I
Registration No: SE/Gr.I/19/07/168
Jaya Sankara Engineering Consultants
1, First Floor, LakeView Road, Kottur,
Chennai - 85. 9884936309, 9884936311

Encl.: Structural Design Calculation

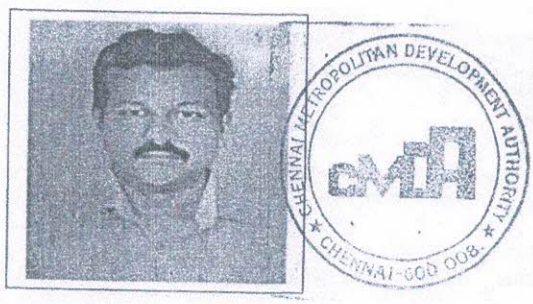
CHENNAI METROPOLITAN DEVELOPMENT AUTHORITY
'Thalamuthu Natarajan Building', No.1, Gandhi Irwin Road,
Egmore, Chennai-600 008.

PROFESSIONAL REGISTRATION CERTIFICATE

This is to certify that the **Thiru. S. BALAKUMAR** has enrolled as **Registered Structural Engineer Grade-I (SE)** with Chennai Metropolitan Development Authority (CMDA) who has the qualification of **M.E., (Structural Engg.)** and experience in the relevant field for **7 years**.

He has been given the Registration No.**SE/GR-I/2019/07/168 Renewed** on **02.07.2024.** He shall be required to comply with the duties and responsibilities prescribed by the Government of Tamil Nadu in Part-V, "Registration of Professionals", Tamil Nadu Combined Development and Building Rules, 2019 approved vide G.O.(Ms) No.18 MAWS (MA1) Dept. dated 04.02.2019.

This Registration is valid upto **01.07.2029.**



(A. MEGANATHAN)
Superintendent

JAYA SANKARA
Engineering Consultants

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Registered CMDA Structural Engineer-Grade-I/SE/Gr-I/19/07/168
GST No: 33AORPB8823M1ZJ

DESIGN LOAD CALCULATION

1. Client,	: M/S SREEJEE YAMUNA, PLOT NO.72, OLD DOOR NO.2, NEW DOOR NO.6, 16TH STREET, NANGANALLUR, CHENNAI-600061
2. Location of the building	: PROPOSED DEMOLITION AND RECONSTRUCTION OF RESIDENTIAL BUILDING(S+05) AT PLOT NO.72, OLD DOOR NO.2, NEW DOOR NO.6, 16TH STREET, NANGANALLUR, CHENNAI-600061
3. Soil Report	: Gravel.
1. Safe Bearing capacity of the soil as per soil report(M/s.Geo Soil Foundation Velachery-Ch-600032)	
a. Soil	: Gravel. – Pile foundation at 5.0m depth
b. Type of construction	: RCC column with Framed Structure
c. Foundation	: Pile foundation.
5. Loading standards as per I.S code	: IS 875 (part 2)1987
a. Live load for Residential buildings as per, IS 875 (part2) 1987 clause 3.1.1, table 1-IV b	: 200 kg per sqm.
b. Live load for open terrace with access as per IS 875 - 1987.	: 150 kg per sqm

S. BALAKUMAR, M.E., Structures,
Chartered Engineer (AM - 150318 - 1)
CMDA Structural Engineer Grade - I
Regd. No: SE/GR-I/19/07/168
Jaya Sankara Engineering Consultants
1, First Floor, LakeView Road, Kottur
Chennai - 85. 9884936309, 9884936311

#1, First Floor, Lake View Road,
Near Ellaiamman Temple,
Kottur, Chennai- 600085.

044-478 21300
+91 98849 36309
jsec2022@gmail.com
jaisankaran.engg@gmail.com

DESIGN OF PILE

Length of Pile	L =	500	cm
Characteristic strength of Concrete	f_{ck} =	25	N/mm^2
Diameter of Pile	D =	60	cm
Length of pile cap	=	2.7	m
Depth of pile cap	=	0.75	m

Modulas of Elasticity of Concrete (E) $5000 \times f_{ck}$ = 5000×30 N/mm^2

[As per IS 456 :2000 pg. no : 16]

= 250000 Kg/cm^2

Moment of Inertia of Pile (I) $\frac{\pi \times D^4}{64}$ $\frac{3.14 \times 60^4}{64}$ cm^4

= 635850.0 cm^4

K_1 (constant) = 0.146 Kg/cm^2

[As per IS : 2911(Part 1 / Sec 4)-appendix-B]

T (constant) = $\frac{5 \ (E \times I)}{K_1}$

[As per IS : 2911 (Part 1 / Sec 4) - appendix-B, B-1.2]

= 255.50 cm

Hence L / R = $\frac{L}{R}$

[As per IS : 2911 (Part 1 / Sec 4) - appendix-B]

= 1.957



For free head pile

$\frac{L_f}{R}$ = 1.85 [As per IS : 2911 (Part 1 / Sec 4) - appendix-B, B-1.1 fig 2]

Length of fixity

L_f = 472.67 cm [As per IS : 2911 (Part 1 / Sec 4) - appendix-B]

= 4.73 m

Embedded Length

Le > 4 x R [As per IS:2911(Part 1 / Sec 4) - appendix-B, B-1.2]

> 10.2 m

Length of pile, L_1

= L - Le

= -5.2

Calculation of Lateral capacity of pile

(From IS:2911, Part 1 / Sec. 4, B-1.3 - Appendix B)

$$\text{Lateral capacity , } Q = \frac{12\,E\,I\,Y}{(L_1 + L_f)^3}$$

Where ,

Y = Lateral deflection pf pile = 5 mm (As per IS2911, part4)

Modulas of Elasticity of Concrete (E) = 250000 Kg/cm2

Moment of Inertia of Pile (I) = 635850.0 cm4

L1 + Lf = 0 + 481.37

= 972.7 cm

= 9.73 m

Lateral capacity

$$Q = \frac{12 \times 223606.8 \times 306640.6 \times 0.5}{481.37 \times 481.37 \times 481.37}$$

= 1.0 Mt

= 10 kN

DESIGN OF MAXIMUM MOMENT IN THE PILE

Lateral Load on each pile from Staad Q = 6.00 Mt

Lateral load taken by the pile cap (for 2 piles) = 3 x 18 x 2.7 x 0.75

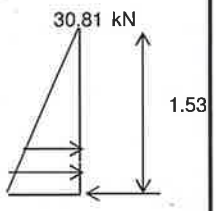
= 10.94 Mt

Net lateral load in each pile = 6 - (10.935 / 2)

= 2.36 Mt

Considering the effect of passive pressure on piles

Angle of repose of soil	φ	=	30	
Coeff of passive pressure	Kp	=	$\frac{1+\sin\varphi}{1-\sin\varphi}$	
	Kp	=	3.00	
Unit weight of submerged soil	γ	=	16	KN/m^3
Shape factor	s	=	0.70	



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Force due to passive pressure	=	$Kp*\gamma*s*h$		
Equating the passive pressure to the shear force acting on the pile		3x16x0.7x0.6		
		20.16	h	
20.16h xh/2	=	2.36 t		
	=	$\sqrt{(2.355 \times 10 \times 2) / 20.16}$		
h	=	1.53	m	
Depth of soil	=	1.53	m	
20.16	h	30.81		
	=	20.16h xh/2		
	F =	23.55	kN	

Maximum Moment = F*h-F*(1/3)*h

= 24.00 kNm

Mu = 3.60 t-m

Vertical Load on each pile P = 60.00 t

Maximum Vertical load on Pile Pu = 1.5 x P

Pu = 90.00 t

$\frac{Pu}{f_{ck} D^2}$ = 0.10

$\frac{Mu}{f_{ck} D^3}$ = 0,01 0

Diameter of bar = 16 mm

Clear cover = 60 mm

d' = 50 + (16 / 2)

= 68 mm

$\frac{d'}{D}$ = $\frac{58}{600}$

= 0.11

DESIGN OF PILE

$\frac{Pu}{f_{ck} D^2}$ = 0.10

$\frac{Mu}{f_{ck} D^3}$ = 0.01

$\frac{p}{f_{ck}}$ = 0.015 (As per SP -16, chart 60)

Percentage of Steel required (p) = 0.38%

Min. Percentage of Steel required = 0.40% [As per IS : 2911 (Part 1/Sec 2) - 1979 Pg - 14]

Percentage of Steel = 0.40%

Area of Steel required A_{st} = 1130.4 mm^2

Using 16 mm dia bar 5.62215 nos

Hence provide 16 **mm dia bar** 8 **nos** provided Ast 1608.495 mm^2



DESIGN OF 2-PILE CAP

C1

ANALYSIS & DESIGN OF 2-PILE CAP

INPUT DATA FOR FOUNDATION

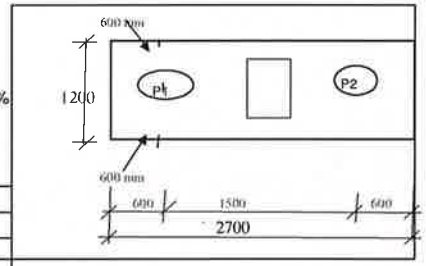
NGL to FGL		= 0.60	m
Projection of pedestal above FGL		= 0.15	m
Founding lvl (Top - pdstl - Pile cap)	D	= 0.75	m
Density of soil	γ_s	= 18	kN/m^3
Bearing capacity factor		= 1.00	
Clear cover	d'	= 75	mm

COLUMN SIZE = 300 mm X 600 mm

DEPTH OF PILE CAP = 0.75 m

TYPE OF PILE			-		
DAIMETER OF PILE			-	600 mm	
CAPACITY OF PILE					
Compression(pile capacity)			-	80.00 t	
Horiz. Thrust			-	20.00 t	15%
Uplift			-	7.50 t	
Seismic zone			-	0.1	II
Wind Pressure			-	50	m/s
Soil - Foundation Coeff.			-	1	
Importance Factor			-	1.5	

PILE CAP DIMENSIONS



ANALYSIS

Comp	lateral	Pull out
Safe	Safe	Safe
Safe	safe	safe
safe	safe	safe

All loads are in kN-m

Sl.No	PILE	load comb		fy	fx	fz	Mx	Mz
1	C1	DL+LL	100	1277.657	9.483	6.839		
		DL+LL	100	519.846	4.633	4.003		
		DL+LL	100	154.522	0.801	2.224		
				1277.657	9.483	6.839		
		maximum forces of wl/sl comb		1277.657	23.053	46.964	0	0
		minimum forces of wl/sl comb		154.522	0.801	2.224	0	0
		DL +LL		1277.657	9.483	6.839	0	0

FOR PEDESAL DESIGN ONLY

FOOTING	CASE	Fy	Mxx	Mzz
C1	100	1277.657	5.12925	7.11225
	101	519.846	0	0
	102	154.522	40.032	14.418

No of piles = **1.597** DL + LL - COMB

No of piles = **0.003** DL + LL + WL/SL - COMB

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All loads are in kN-m

	COLUMN	load comb	fy	fz	Mx	fx	mz
1	C1	DL+LL	1277.66	6.84	0.00	9.48	0.00
		DL+LL	519.85	4.00	0.00	4.63	0.00
		DL+LL	154.52	2.22	0.00	0.80	0.00

	DIA	NOS	Vu / d
1	20 DIA	5	1200.00

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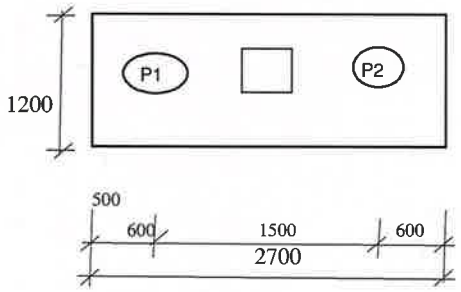
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0

Analysis of 2 Pile group

DL+LL - C1

Size of Column = 300 mm X 600 mm

	Sum	Column Load
Fy	1278	1277.66
Fz	6.839	6.84
Mx	0	0.00
Fx	9.483	9.48
Mz	0	0.00



pilecap Top level	dforct	1	
Pilecap bottom Lvl	dforcb	1.750	m
Depth for filling (soil)	df	2.00	m
Unit Weight of soil	γs	16.00	kN/m^3
Overburden Pressure	w_{over}	5.00	kN/m^2
Length of Pile Cap	l	2.70	m
Width of Pile Cap	b	1.20	m
Depth of Pile Cap	Dpc	0.75	m
No of Piles	n	2	Nos.
Area of pedestal	Ap_{each}	0.18	m^2
Total area of pedestal	Ap	0.18	m^2

5.00

capacity of pile

Vertical	Ppv	800	kN
Lateral	Pph	200	kN
Pullout	Ppp	75	kN
Increment Factor for Wind loads	Fincw	1.00	
Increment Factor for Seismic forces	Fincs	1.00	

Increment for current load case
finc = 1.00

Calculations :

	Sum	
Mxh	11.97	11.96825
Mzh	16.6	16.59525

Vertical Loads

Area of Pile Cap	Apc	l * b	3.24 m^2
	Apc_{nett} =	(Apc-Ap)	3.06 m^2
Soil Weight Wsoil	df *γs * Apc_{nett}		97.92 kN
Overburden Wover	wover * Apc_{nett}		15.30 kN
Self Weight of Pile Cap	Wswpc	Apc * Dpc * 25	60.75 kN
Self weight of pedestal	Wp = Ap*(dforcb-Dpc)*25		4.50 kN
Total	ΣW		178.47 kN
Vertical Load	Pv	ΣFy + ΣW	1456.13 kN

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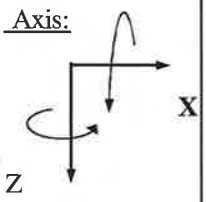
CG of load system

M_{xv}	Σ(Fy z)	0.00	v - represents vertical
M_{xh}	$\Sigma Fz * d_{forct}$	6.84	moment
Mxm	ΣMx	0.00	h - represents hori-
M_{xt}	$M_{xv} + M_{xh} + M_{xm}$	6.84 kNm	-zantal moment
			m - represents column
Mz_v	Σ(Fy x)	0.00	moment
Mz_h	$\Sigma F_x * d_{forct}$	9.48	
Mz_m	ΣMz	0.00	
Mz_t	$Mz_v + Mz_h + Mz_m$	9.48 kNm	
ex	Mz_t / P_v	0.01 m	
ez	M_{xt} / P_v	0.00 m	
Final Moment about X axis	M_{xf}	6.839 kNm	
Final Moment about Z axis	Mz_f	9.483 kNm	

MX

Mz

Axis:



Pile Forces

Sl No	Pile Desig	x (m)	z (m)	Pv / n (kN)	Fp (kN)
1	P1	-0.75	0	721.7415	721.742
2	P2	0.75	0	734.3855	734.386

ΣFp 1456.127

Σx^2	1.125	Max	734.4	kN
Σz^2	0	Min	721.7	kN

Check for Compressive Force

Max force in Pile		734.39 kN	**Safe**
Permissible Compressive Force	Finc * Ppv	800 kN	

Check for Lateral Force

ΣHx	9.483	kN		
ΣHz	6.839	kN		
Resultant	H	sqrt($\Sigma Hx^2 + \Sigma Hz^2$)	11.69 kN	
Lateral Force per Pile		H / n	5.85 kN	**Safe**
Permissible Lateral force		Finc * Pph	200 kN	

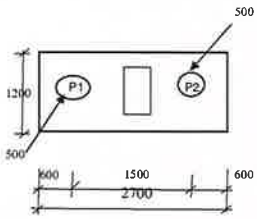


Check for Pull Out **Since all Piles are in Compression,There is No Uplift force in the piles**

Minimum compressive force		721.74 kN	**Safe**
Permissible Tensile Force	Finc * Ppp	93.75 kN	

Analysis of 2 Pile group

C1



Pedestal Size
Width B = 300 mm
Depth D = 600 mm
Height hped = 0 m

Strength of Concrete fck = 25 N/mm²
Strength of Steel fy = 500 N/mm²

Assuming the Dia of Main Bar		20	mm	16 mm
Clear Cover to the Tie Reinf.		75	mm	
Effective Cover	75+20/2	85	mm	
Eff. Depth of Pile Cap	deff	665	mm	

Loads on pile cap :
Overburden pressure

Due to Grade Slab	=	0.00 kN/m²	
Due to Soling	=	0.00 kN/m²	
Due to Live Load	=	0.00 kN/m²	
Soil Weight	=	32 kN/m²	Depth of soil filling 2.00 m
Self Weigth of pile cap	=	18.75 kN/m²	unit wt. of Soil 16.00 kN/m³
			Thickness of PC 0.75 m
Total pressure	=	50.75 kN/m²	pile diameter 600 mm

Max. pile reaction occur in pile = 800 + 800

Distance of Pile from the face of pedeatal = 600 mm

Distance from the face of col to edge of PC = 1200 mm

B.M at the face of pedestal = (800.00)x0.6 - 50.75 x 2.7 x 1.2²/2

= 381.342 + 0.00

Mu = 381.342 kN-m

Additional Moment due to torsion :

Horizontal load in Critical Direction = 5 **kN**

Torsion Tu = 4.5 **kN**

Equivalent BM due to torsion $Me = \frac{Tu\,(1+D/b)}{1.7}$

Me = 4.30 **KN-m**

Total BM = Mu + Me

= 381.3 + 4.30

= 385.64 **KN-m**

Shear force at d/2 from face of pedestal

Critical shear section = 332.5 mm from face of column (As per cl34.2.4.1 IS456:2000)
Factor = 0.95

Shear force at critical section = (800.00)x 0.946 -50.75x2.7 x 0.87

= 637.7975 kN

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Additional Shear due to torsion :

Horizontal load in Critical Direction	=	5	**kN**	
Torsion	Tu =	4.5	**kN**	
Equivalent Shear due to torsion	Ve =	1.6 Tu /b		
	Ve =	6.00	**KN-m**	
Total Shear Force	=	Vu	+.	Ve
	=	637.79748	+	6.0
	=	643.80	KN	

Load Factor	1.5	1.5	
Factored Moment	482.05	482.05	482.05 kN.m / m - width
Factored Shear	536.50	536.50	536.50 kN / m -width

Reinforcement:

Mu = 482.05
= 482.05 kN.m

Mu/bd^2 = 482.05 / (1000 x 665^2)
= 1.09 N/mm^2

P_t = 0.20 % Pc = 0.109 d'/d = 0.13

Bottom Reinforcement

Ast = 1330.00 mm^2

Required Spacing = 236.21 mm 314.159

4.2335

Provide 20 DIA 5 Nos

Hence Provide 20 DIA 5 Nos

If singly reinforced beam provide minimum reinforcement otherwise provide Pc of doubly reinforced beam

Top Reinforcement

Providing Minimum % of Steel = 0.12 % or 0.109

Ast = $\frac{0.12 \times 1000 \times 750}{100}$

= 0.12

= 900 mm^2

Required Spacing = 223.40 mm 201.062

4.4762

Provide 16 DIA 5 Nos

Hence Provide 16 DIA 5 Nos

Check for Shear :

For Column load :

Maximum Shear Force = 536.50 kN Load Factor 1.5

V_u = 1.5 x 536.50
= 603.6 kN

Pt% = 0.20

Value of = Vu / d τc = 0.62

bo = 1200 mm

= 0.76

Hence Provide shear reinforcement

DIA =	12		LEG=	4	
Providing	4	LEG	12	DIA @	150 C/C



DESIGN OF COLUMN FOR BIAXIAL BENDING

		C1			staad member no-	178
CRITICAL LOAD CASE: LOAD COMB	**200**				**Fy-max**	
DATA						
Length of column			D	=	600	mm
Breadth of column			b	=	300	mm
Unsupported length (longer direction)			L_x	=	2000	mm
Unsupported length (shorter direction)			L_y	=	2000	mm
Eff. length (longer direction)			L_{ex}	=	1.2 Lx	mm
Ref Tab-28 of IS456				=	2400	
Eff. length (shorter direction)			L_{ey}	=	1.2 Ly	mm
Ref Tab-28 of IS456				=	2400	
Check for Braced/Unbraced				=	Unbraced	
From Staad O/P Factored axial load			P_u	=	1893.594	kN
Factored moment (longer direction)			M_{ix}	=	-1.174	kNm
Factored moment (shorter direction)			M_{iy}	=	9.194	kNm
Charac. comp strength of concrete			f_{ck}	=	25	N/mm^2
Yield stress of steel			f_y	=	500	N/mm^2
Effective cover			d'	=	60.5	mm
Check for slenderness						
Longer Direction						
Slenderness ratio			L_{ex}/D	=	4.00	short
Additional moment due to slenderness			M_{ax}	=	0.000	kN-m
Shorter Direction						
Slenderness ratio			L_{ey}/b	=	8.00	short
Additional moment due to slenderness			M_{ay}	=	0.000	kN-m
Calculation of P_{uz}						
Assumed percentage of reinforcement			p_t	=	1.0	%
Area of concrete			Ag	=	180000	mm^2
Ultimate axial load (without moments)			P_{uz}	=	2680	kN
Calculation of P_b:						
Longer Direction						
From TABLE 60 of SP16:1980		**FOR**	d'/D	=	0.101	
Coefficient k_1			k_{1x}	=	**0.2**	
Coefficient k_2			k_{2x}	=	**0.385**	
Axial load corresponding to balanced failure			P_{bx}	=	969	kN
Reduction factor for additional moments			k_x	=	0.000	
Moment due to slenderness			M_{ax}	=	**0.00**	kN-m
Shorter Direction						
From TABLE 60 of SP16:1980		**FOR**	d'/b	=	0.202	
Coefficient k_1	Coefficient k_1(from TABLE 60 of SP:1980)		k_{1y}	=	**0.184**	
Coefficient k_2	Coefficient k_2(from TABLE 60 of SP:1980)		k_{2y}	=	**0.056**	
Axial load corresponding to balanced failure			P_{by}	=	838	kN
Reduction factor for additional moments			k_y	=	0.000	
Moment due to slenderness			M_{ax}	=	**0.00**	kN-m

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Check for moments due to min. eccentricity

Longer Direction

Minimum eccentricity	e_x	=	24.00	mm
Moment due to min. eccentricity	M_x	=	45.45	kN-m
Moment in longer direction	M_{ux}	=	45.45	kNm

Shorter direction

Minimum eccentricity	e_y	=	14.00	mm
Moment due to min. eccentricity	M_y	=	26.51	kN-m
Moment in shorter direction	M_{uy}	=	26.510316	kNm

Final design moments

Moment in longer direction (Mux)	M_{ux}	=	**45.45**	kNm
Moment in shorter direction (Muy)	M_{uy}	=	**26.51**	kNm

Check for Interaction

p/f_{ck}	p/f_{ck}	=	0.040	
$P_u/f_{ck}bD$ value	$P_u/f_{ck}bD$	=	0.421	
$M_{ux1}/f_{ck}bD^2$ value **From chart 48 of SP16:1980**	$M_{ux1}/f_{ck}bD^2$	=	**0.09**	
Uniaxial moment capacity (longer direction)	M_{ux1}	=	**243.00**	kNm
$M_{uy1}/f_{ck}bD^2$ value **From chart 50 of SP16:1980**	$M_{uy1}/f_{ck}bD^2$	=	**0.09**	
Uniaxial moment capacity (shorter direction)	M_{uy1}	=	**121.50**	kNm
P_u/P_{uz} ratio	P_u/P_{uz}	=	**0.707**	
Value of exponent	α_n	=	1.8	

$$\left[\frac{M_{ux}}{M_{ux1}}\right]^{\alpha n} + \left[\frac{M_{uy}}{M_{uy1}}\right]^{\alpha n} \leq 1.00$$

Interaction ratio	=	**0.11**	
Percentage reinforcement satisfactory or not	=	SAFE	
Area of steel required	=	1800	mm^2

Provide 8 # of Y 20 as main reinforcement

Area of steel provided	=	2513.3	mm^2
		SAFE	

Lateral ties

Tie diameter

As per IS 456:2000 clause 26.5.3.2	ϕ_T	>	a)20/4	5mm
			b)	6mm

Tie spacing

	S_t		a)	300mm
		<	b)16x20	320mm
			c)	300mm

Hence provide 8 mm dia ba@ 150 mm c/c SAFE

JAYASANKARA ENGINEERING CONSULTANTS CHENNAI 600 085

DESIGN OF COLUMN FOR BIAXIAL BENDING

	C1			staad member no	181
CRITICAL LOAD CASE: LOAD COMB	205			My- MAX	
DATA					
Length of column		D	=	600	mm
Breadth of column		b	=	300	mm
Unsupported length (longer direction)		L_x	=	3000	mm
Unsupported length (shorter direction)		L_y	=	3000	mm
Eff. length (longer direction)		L_{ex}	=	1.2 Lx	mm
Ref Tab-28 of IS456			=	3600	
Eff. length (shorter direction)		L_{ey}	=	1.2 Ly	mm
Ref Tab-28 of IS456			=	3600	
Check for Braced/Unbraced			=	Unbraced	
From Staad O/P	Factored axial load	P_u	=	-1197.047	kN
Factored moment (longer direction)		M_{ix}	=	8.075	kNm
Factored moment (shorter direction)		M_{iy}	=	111.35	kNm
Charac. comp strength of concrete		f_{ck}	=	25	N/mm^2
Yield stress of steel		f_y	=	500	N/mm^2
Effective cover		d'	=	60.5	mm
Check for slenderness					
Longer Direction					
Slenderness ratio		L_{ex}/D	=	6.00	short
Additional moment due to slenderness		M_{ax}	=	0.000	kN-m
Shorter Direction					
Slenderness ratio		L_{ey}/b	=	12.00	slender
Additional moment due to slenderness		M_{ay}	=	-25.856	kN-m
Calculation of P_{uz}					
Assumed percentage of reinforcement		p_t	=	1.0	%
Area of concrete		Ag	=	180000	mm^2
Ultimate axial load (without moments)		P_{uz}	=	2680	kN
Calculation of P_b:					
Longer Direction					
From TABLE 60 of SP16:1980	**FOR**	d'/D	=	0.101	
Coefficient k_1	Coefficient k_1(from TABLE 60 of SP:1980)	k_{1x}	=	0	
Coefficient k_2	Coefficient k_2(from TABLE 60 of SP:1980)	k_{2x}	=	0	
Axial load corresponding to balanced failure		P_{bx}	=	0	kN
		Pu/P_{uz}	=	0.0000	
		Pb/P_{uz}	=	0.0000	
Reduction factor for additional moments(FROM CHART 65 OF SP16)		k_x	=	0.000	
Moment due to slenderness		M_{ax}	=	0.00	kN-m
Shorter Direction					
From TABLE 60 of SP16:1980	**FOR**	d'/b	=	0.202	
Coefficient k_1	Coefficient k_1(from TABLE 60 of SP:1980)	k_{1y}	=	0.184	
Coefficient k_2	Coefficient k_2(from TABLE 60 of SP:1980)	k_{2y}	=	0.056	
Axial load corresponding to balanced failure		P_{by}	=	838	kN
		Pu/P_{uz}	=	0.4467	
		Pb/P_{uz}	=	0.3127	
Reduction factor for additional moments(FROM CHART 65 OF SP16)		k_y	=	2.105	
Moment due to slenderness		M_{ax}	=	-54.43	kN-m

JAYA SANKARA ENGINEERING CONSULTANTS
CHENNAI 600 085

Check for moments due to min. eccentricity

Longer Direction

Minimum eccentricity	e_x	=	26.00	mm
Moment due to min. eccentricity	M_x	=	-31.12	kN-m
Moment in longer direction	M_{ux}	=	8.08	kNm

Shorter direction

Minimum eccentricity	e_y	=	16.00	mm
Moment due to min. eccentricity	M_y	=	-19.15	kN-m
Moment in shorter direction	M_{uy}	=	111.35	kNm

Final design moments

Moment in longer direction (Mux)	M_{ux}	=	**8.08**	kNm
Moment in shorter direction (Muy)	M_{uy}	=	**56.92**	kNm

Check for Interaction

p/f_{ck}	p/f_{ck}	=	0.040	
$P_u/f_{ck}bD$ value	$P_u/f_{ck}bD$	=	-0.266	
$M_{ux1}/f_{ck}bD^2$ value **From chart 48 of SP16:1980**	$M_{ux1}/f_{ck}bD^2$	=	**0.21**	
Uniaxial moment capacity (longer direction)	M_{ux1}	=	**567.00**	kNm
$M_{uy1}/f_{ck}bD^2$ value **From chart 50 of SP16:1980**	$M_{uy1}/f_{ck}bD^2$	=	**0.21**	
Uniaxial moment capacity (shorter direction)	M_{uy1}	=	**283.50**	kNm
P_u/P_{uz} ratio	P_u/P_{uz}	=	**-0.447**	
Value of exponent	α_n	=	1.0	

$$\left[\frac{M_{ux}}{M_{ux1}}\right]^{\alpha n} + \left[\frac{M_{uy}}{M_{uy1}}\right]^{\alpha n} \leq 1.00$$

Interaction ratio	=	**0.22**	
Percentage reinforcement satisfactory or not	=	SAFE	
Area of steel required	=	1800	mm^2

Provide 8 # of Y 20 as main reinforcement

Area of steel provided	=	2513.3	mm^2
		SAFE	

Lateral ties

Tie diameter

As per IS 456:2000 clause 26.5.3.2	ϕ_T	>	a)20/4	5mm
			b)	6mm

Tie spacing

	S_t		a)	300mm
		<	b)16x20	320mm
			c)	300mm

Hence provide 8 mm dia @ 150 mm c/c SAFE

JAYA SANKARA ENGINEERING CONSULTANTS CHENNAI 600 085

DESIGN OF COLUMN FOR BIAXIAL BENDING

	C1			staad member no	328
CRITICAL LOAD CASE: LOAD COMB	200			Mx- MAX	
DATA					
Length of column		D	=	600	mm
Breadth of column		b	=	300	mm
Unsupported length (longer direction)		L_x	=	3000	mm
Unsupported length (shorter direction)		L_y	=	3000	mm
Eff. length (longer direction)		L_{ex}	=	1.2 Lx	mm
Ref Tab-28 of IS456			=	3600	
Eff. length (shorter direction)		L_{ey}	=	1.2 Ly	mm
Ref Tab-28 of IS456			=	3600	
Check for Braced/Unbraced			=	Unbraced	
From Staad O/P Factored axial load		P_u	=	150.002	kN
Factored moment (longer direction)		M_{ix}	=	153.168	kNm
Factored moment (shorter direction)		M_{iy}	=	3.188	kNm
Charac. comp strength of concrete		f_{ck}	=	25	N/mm^2
Yield stress of steel		f_y	=	500	N/mm^2
Effective cover		d'	=	60.5	mm

Check for slenderness					
Longer Direction					
Slenderness ratio		L_{ex}/D	=	6.00	short
Additional moment due to slenderness		M_{ax}	=	0.000	kN-m
Shorter Direction					
Slenderness ratio		L_{ey}/b	=	12.00	slender
Additional moment due to slenderness		M_{ay}	=	3.240	kN-m
Calculation of P_{uz}					
Assumed percentage of reinforcement		p_t	=	1.0	%
Area of concrete		Ag	=	180000	mm^2
Ultimate axial load (without moments)		P_{uz}	=	2680	kN
Calculation of P_b:					
Longer Direction					
From TABLE 60 of SP16:1980	**FOR**	d'/D	=	0.101	
Coefficient k_1		k_{1x}	=	0.2	
Coefficient k_2		k_{2x}	=	0.385	
Axial load corresponding to balanced failure		P_{bx}	=	969	kN
Reduction factor for additional moments		k_x	=	0.000	
Moment due to slenderness		M_{ax}	=	0.00	kN-m
Shorter Direction					
From TABLE 60 of SP16:1980	**FOR**	d'/b	=	0.202	
Coefficient k_1 Coefficient k_1(from TABLE 60 of SP:1980)		k_{1y}	=	0.184	
Coefficient k_2 Coefficient k_2(from TABLE 60 of SP:1980)		k_{2y}	=	0.056	
Axial load corresponding to balanced failure		P_{by}	=	838	kN
Reduction factor for additional moments		k_y	=	0.668	
Moment due to slenderness		M_{ax}	=	2.16	kN-m



Check for moments due to min. eccentricity

Longer Direction

Minimum eccentricity	e_x	=	26.00	mm
Moment due to min. eccentricity	M_x	=	3.90	kN-m
Moment in longer direction	M_{ux}	=	153.17	kNm

Shorter direction

Minimum eccentricity	e_y	=	16.00	mm
Moment due to min. eccentricity	M_y	=	2.40	kN-m
Moment in shorter direction	M_{uy}	=	3.188	kNm

Final design moments

Moment in longer direction (Mux)	M_{ux}	=	**153.17**	kNm
Moment in shorter direction (Muy)	M_{uy}	=	**5.35**	kNm

Check for Interaction

p/f_{ck}	p/f_{ck}	=	0.040	
$P_u/f_{ck}bD$ value	$P_u/f_{ck}bD$	=	0.033	
$M_{ux1}/f_{ck}bD^2$ value **From chart 48 of SP16:1980**	$M_{ux1}/f_{ck}bD^2$	=	**0.1**	
Uniaxial moment capacity (longer direction)	M_{ux1}	=	**270.00**	kNm
$M_{uy1}/f_{ck}bD^2$ value **From chart 50 of SP16:1980**	$M_{uy1}/f_{ck}bD^2$	=	**0.1**	
Uniaxial moment capacity (shorter direction)	M_{uy1}	=	**135.00**	kNm
P_u/P_{uz} ratio	P_u/P_{uz}	=	**0.056**	
Value of exponent	α_n	=	1.0	

$$\left[\frac{M_{ux}}{M_{ux1}}\right]^{\alpha_n} + \left[\frac{M_{uy}}{M_{uy1}}\right]^{\alpha_n} \leq 1.00$$

Interaction ratio	=	**0.61**	
Percentage reinforcement satisfactory or not	=	**SAFE**	
Area of steel required	=	1800	mm^2

Provide 8 # of Y 20 as main reinforcement

Area of steel provided	=	2513.3	mm^2
		SAFE	

Lateral ties

Tie diameter

As per IS 456:2000 clause 26.5.3.2	ϕ_T	>	a)20/4	5mm
			b)	6mm
Tie spacing	S_t		a)	300mm
		<	b)16x20	320mm
			c)	300mm

Hence provide 8 mm dia ba @ 150 mm c/c **SAFE**

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CHENNAI
600 085

DESIGN OF TWO WAY SLAB

S1

Data:

Concrete	M25	fck	=	25	N/mm²
Steel	Fe 500	fy	=	500	N/mm²
Shorter Span		Lx	=	4.00	m
Longer Span		Ly	=	4.00	m
Assuming Depth of Slab		D	=	450	mm
Assuming Dia of reinf.			=	12	mm
Clear Cover			=	20	mm
Eff. Depth of Slab		d	=	150	mm
Eff.Shorter Span		l_x	=	4.15	m
Eff. Longer Span		l_y	=	4.15	m

Load Calculations:

Self weight of slab			=	11.25	kN/m²
Finishing load			=	1.50	kN/m²
Live load			=	40.00	kN/m²
Total load			=	52.75	kN/m²
Load Factor			=	1.50	
Factored Load			=	79.13	kN/m²
Span Ratio		ℓ_y/ℓ_x	=	4.15 / 4.15	
			=	1.00	

Bending Moment Calculation:

Support Condition 9 Four Edges Discontinuous

From IS 456-2000 Table 26

α_{Nx}	=	0.000	
α_{Px}	=	0.056	
α_{Ny}	=	0.000	
α_{Py}	=	0.056	

Shorter Span:

Negative Moment (Support)	M_{Nx}	=	$\alpha_{Nx} \times w_u \times l_x^2$
		=	$0.000 \times 79.13 \times 4.15^2$
		=	0.000 kN.m
Positive Moment (Mid span)	M_{Px}	=	$\alpha_{Px} \times w_u \times l_x^2$
		=	$0.056 \times 79.13 \times 4.15^2$
		=	76.313 kN.m

Longer Span :

Negative Moment (Support)	M_{Ny}	=	$\alpha_{Ny} \times w_u \times l_x^2$
		=	$0.000 \times 79.13 \times 4.15^2$
		=	0.000 kN.m
Positive Moment (Mid span)	M_{Py}	=	$\alpha_{Py} \times w_u \times l_x^2$
		=	$0.056 \times 79.13 \times 4.15^2$
		=	76.313 kN.m

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Reinforcement:

Required in Shorter Span	Reinf Required		Reinf Provided
Support	12Ø @ 450mm c/c	-	12 dia @ 100 mm c/c
Mid span	12Ø @ 75mm c/c	-	12 dia @ 100 mm c/c
Required in Longer Span			
Support	12Ø @ 450mm c/c	-	12 dia @ 100 mm c/c
Mid span	12Ø @ 75mm c/c	-	12 dia @ 100 mm c/c

Check for Shear:

Max Shear coeff. for continuous edge in short direction		γcx =	0.00
S.F for continuous edge in short direction	Vcx	=	γcx * ℓx * W
Maximum Shear Force	Vu	=	0.00 x 4.150 x 79.13
		=	0.000 kN
S.F for discontinuous edge in short direction		Vdcx =	γdcx * ℓx * W
		=	0.33 x 4.150 x 79.13 = 108.362kN
S.F for continuous edge in long direction		Vcy =	γcy * ℓx * W
		=	0.00 x 4.150 x 79.13 = 0.000kN
S.F for discontinuous edge in long direction		Vdcy =	γdcy * ℓx * W
		=	0.33 x 4.150 x 79.13 = 108.362kN
S.F for continuous edge in short direction	Vu	=	108.362 kN
Design Shear stress τv	Vu/bd	=	108362 / (1000 x 150)
		=	0.722 N/mm²
Reinforcement provided in the slab is		-	12Ø @ 100 mm c/c
% of reinforcement provided	pt	=	0.75
IS:456 Table 19			
Allowable shear stress	τc	=	0.58 N/mm²
As per IS:456 cl. 40.2.1.1 k value for slab		-	1.00
Design shear stress for concrete	k x τc	=	1.00 x 0.576
		=	0.576 N/mm²
Actual Shear Stress > Design Shear Stress		0.722 > 0.576	
			NOT SAFE

CHECK FOR DEFLECTION

Allowable span / depth Ratio	l/d	=	20	
% of Tension reinforcement	pt	=	0.754	
Corresponding Compression reinf.	Bar dia	=	12	mm
	spacing	=	100	mm
% of Compression reinforcement	pc	=	0.754	
Modification factor for Tension reinf.	F1	=	1.63	(From Fig 4 in IS 456 - 2000)
Modification factor for Comp. reinf.	F2	=	1.00	(From Fig 5 in IS 456 - 2000)
Modified span/depth ratio		=	l/d x F1 x F2	
		=	20 x 1.63 x 1.00	
		=	**32.51**	
Actual span/depth ratio		=	4150 / 150	
		=	**27.67**	
Actual span/depth ratio < Modified span/depth ratio		27.67 < 32.51		**SAFE**

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DESIGN OF TWO WAY SLAB

S2

Data:

Concrete	M25	fck	=	25	N/mm²
Steel	Fe 500	fy	=	500	N/mm²
Shorter Span		Lx	=	3.80	m
Longer Span		Ly	=	4.60	m
Assuming Depth of Slab		D	=	150	mm
Assuming Dia of reinf.			=	10	mm
Clear Cover			=	20	mm
Eff. Depth of Slab		d	=	150	mm
Eff.Shorter Span		l_x	=	3.95	m
Eff. Longer Span		l_y	=	4.75	m

Load Calculations:

Self weight of slab			=	3.75	kN/m²
Finishing load			=	1.50	kN/m²
Live load			=	2.50	kN/m²
Total load			=	7.75	kN/m²
Load Factor			=	1.50	
Factored Load			=	11.63	kN/m²
Span Ratio		ℓ_y/ℓ_x	=	4.75 / 3.95	
			=	1.20	

Bending Moment Calculation:

Support Condition	4	Two Adjacent edges Discontinuous			
From IS 456-2000 Table 26		α_{Nx}	=	0.060	
		α_{Px}	=	0.045	
		α_{Ny}	=	0.047	
		α_{Py}	=	0.035	

<u>Shorter Span:</u>

Negative Moment (Support)	M_{Nx}	=	$\alpha_{Nx} \times w_u \times l_x^2$	
		=	0.060 x 11.63 x 3.95²	
		=	10.906	kN.m
Positive Moment (Mid span)	M_{Px}	=	$\alpha_{Px} \times w_u \times l_x^2$	
		=	0.045 x 11.63 x 3.95²	
		=	8.180	kN.m

<u>Longer Span :</u>

Negative Moment (Support)	M_{Ny}	=	$\alpha_{Ny} \times w_u \times l_x^2$	
		=	0.047 x 11.63 x 3.95²	
		=	8.525	kN.m
Positive Moment (Mid span)	M_{Py}	=	$\alpha_{Py} \times w_u \times l_x^2$	
		=	0.035 x 11.63 x 3.95²	
		=	6.348	kN.m

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CHENNAI
600 085

Reinforcement:

Required in Shorter Span	Reinf Required		Reinf Provided
Support	10Ø @ 435mm c/c	-	10 dia @ 150 mm c/c
Mid span	10Ø @ 435mm c/c	-	10 dia @ 150 mm c/c
Required in Longer Span			
Support	10Ø @ 435mm c/c	-	10 dia @ 150 mm c/c
Mid span	10Ø @ 435mm c/c	-	10 dia @ 150 mm c/c

Check for Shear:

Max Shear coeff. for continuous edge in short direction γcx = 0.47

S.F for continuous edge in short direction	Vcx	=	$\gamma cx * \ell x * W$
Maximum Shear Force	Vu	=	0.47 x 3.950 x 11.63
		=	21.617 kN
S.F for discontinuous edge in short direction		Vdcx =	$\gamma dcx * \ell x * W$
		=	0.31 x 3.950 x 11.63 = 14.258kN
S.F for continuous edge in long direction		Vcy =	$\gamma cy * \ell x * W$
		=	0.40 x 3.950 x 11.63 = 18.368kN
S.F for discontinuous edge in long direction		Vdcy =	$\gamma dcy * \ell x * W$
		=	0.26 x 3.950 x 11.63 = 11.939kN
S.F for continuous edge in short direction	Vu	=	21.617 kN
Design Shear stress τv	Vu/bd	=	21617 / (1000 x 150)
		=	0.144 N/mm²
Reinforcement provided in the slab is		-	10Ø @ 150 mm c/c
% of reinforcement provided	pt	=	0.35
IS:456 Table 19			
Allowable shear stress	τc	=	0.42 N/mm²
As per IS:456 cl. 40.2.1.1 k value for slab		-	1.30
Design shear stress for concrete	k x τc	=	1.30 x 0.421
		=	0.547 N/mm²

Actual Shear Stress < Design Shear Stress 0.144 < 0.547 **SAFE**

CHECK FOR DEFLECTION

Allowable span / depth Ratio	l/d	=	20	
% of Tension reinforcement	pt	=	0.349	
Corresponding Compression reinf.	Bar dia	=	10	mm
	spacing	=	150	mm
% of Compression reinforcement	pc	=	0.349	
Modification factor for Tension reinf.	F1	=	2.00	(From Fig 4 in IS 456 - 2000)
Modification factor for Comp. reinf.	F2	=	1.00	(From Fig 5 in IS 456 - 2000)
Modified span/depth ratio		=	l/d x F1 x F2	
		=	20 x 2.00 x 1.00	
		=	**40.00**	
Actual span/depth ratio		=	3950 / 150	
		=	**26.33**	

Actual span/depth ratio < Modified span/depth ratio 26.33 < 40.00 **SAFE**



CHENNAI METROPOLITAN DEVELOPMENT AUTHORITY
"Thalamuthu Natarajan Building", No.1, Gandhi Irwin Road,
Egmore, Chennai-600 008.

PROFESSIONAL REGISTRATION CERTIFICATE

This is to certify that the **Thiru. S. BALAKUMAR** has enrolled as **Registered Structural Engineer Grade-I (SE)** with Chennai Metropolitan Development Authority (CMDA) who has the qualification of **M.E., (Structural Engg.)** and experience in the relevant field for **7 years**.

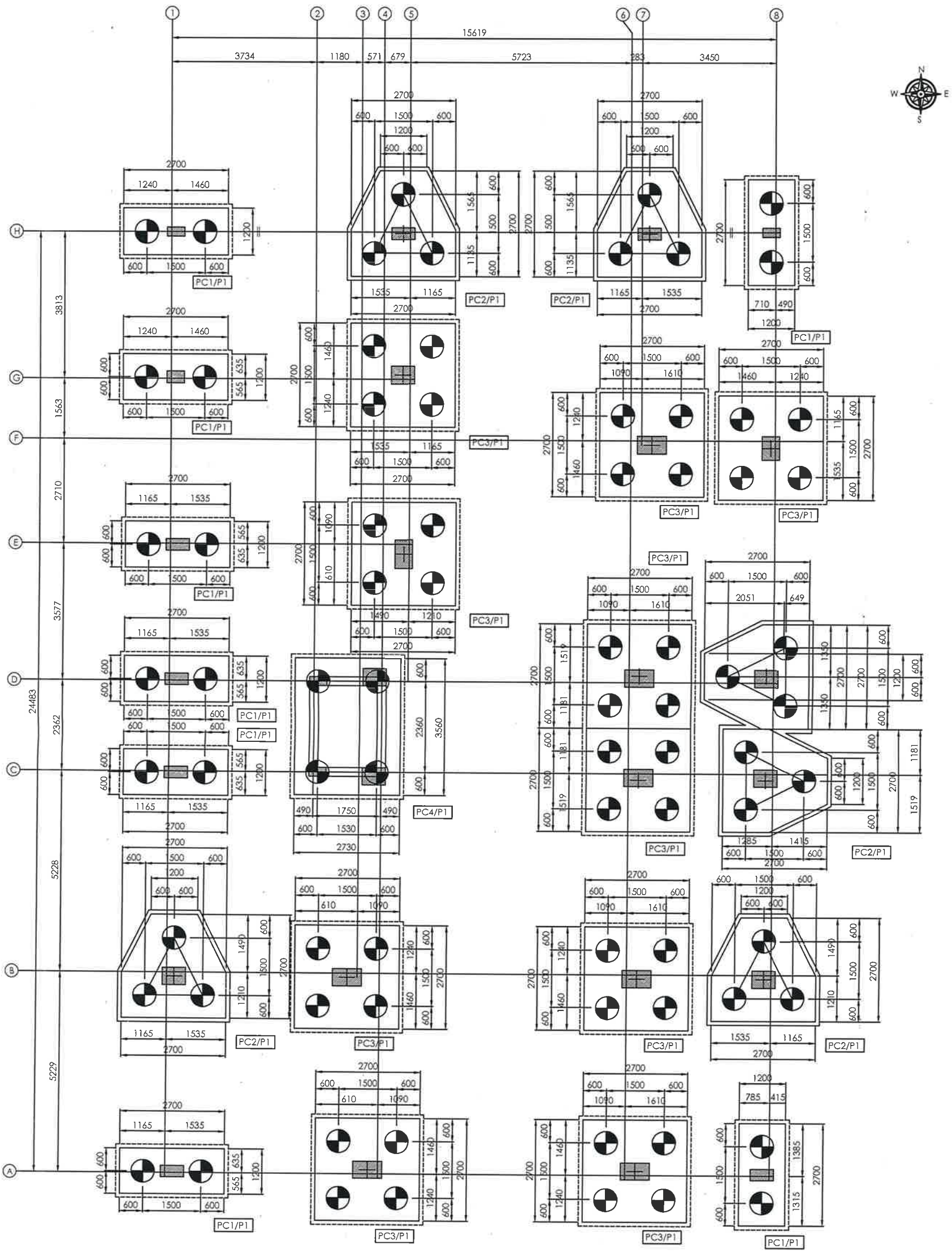
He has been given the Registration No.**SE/GR-I/2019/07/168 Renewed** on **02.07.2024.** He shall be required to comply with the duties and responsibilities prescribed by the Government of Tamil Nadu in Part-V, "Registration of Professionals", Tamil Nadu Combined Development and Building Rules, 2019 approved vide G.O.(Ms) No.18 MAWS (MA1) Dept. dated 04.02.2019.

This Registration is valid upto **01.07.2029.**



(A. MEGANATHAN)
Superintendent

S. BALAKUMAR, M.E., Structures,
Chartered Engineer (AM - 150318 - 1)
CMDA Structural Engineer Grade - I
Regd. No: SE/GR-I/19/07/168
Jaya Sankara Engineering Consultants
1, First Floor, LakeView Road, Kottur
Chennai - 85. 9884936309, 9884936311



PILE FOUNDATION LAYOUT

(SCALE 1:75)

NOTES:-

1. ALL DIMENSIONS ARE IN `MILLIMETER'
2. USE CONCRETE MIX : M25 GRADE
3. LAP LENGTH 56Ø
4. CLEAR COVER TO THE REINFORCEMENT FOR FOOTING : 50MM , COLUMN :40MM ,
5. HIGH YIELD STRENGTH DEFORMED BARS CONFIRMING IS 1786-1985 TO BE USED, Fe 500
6. Y DENOTES FOR HYSD BARS

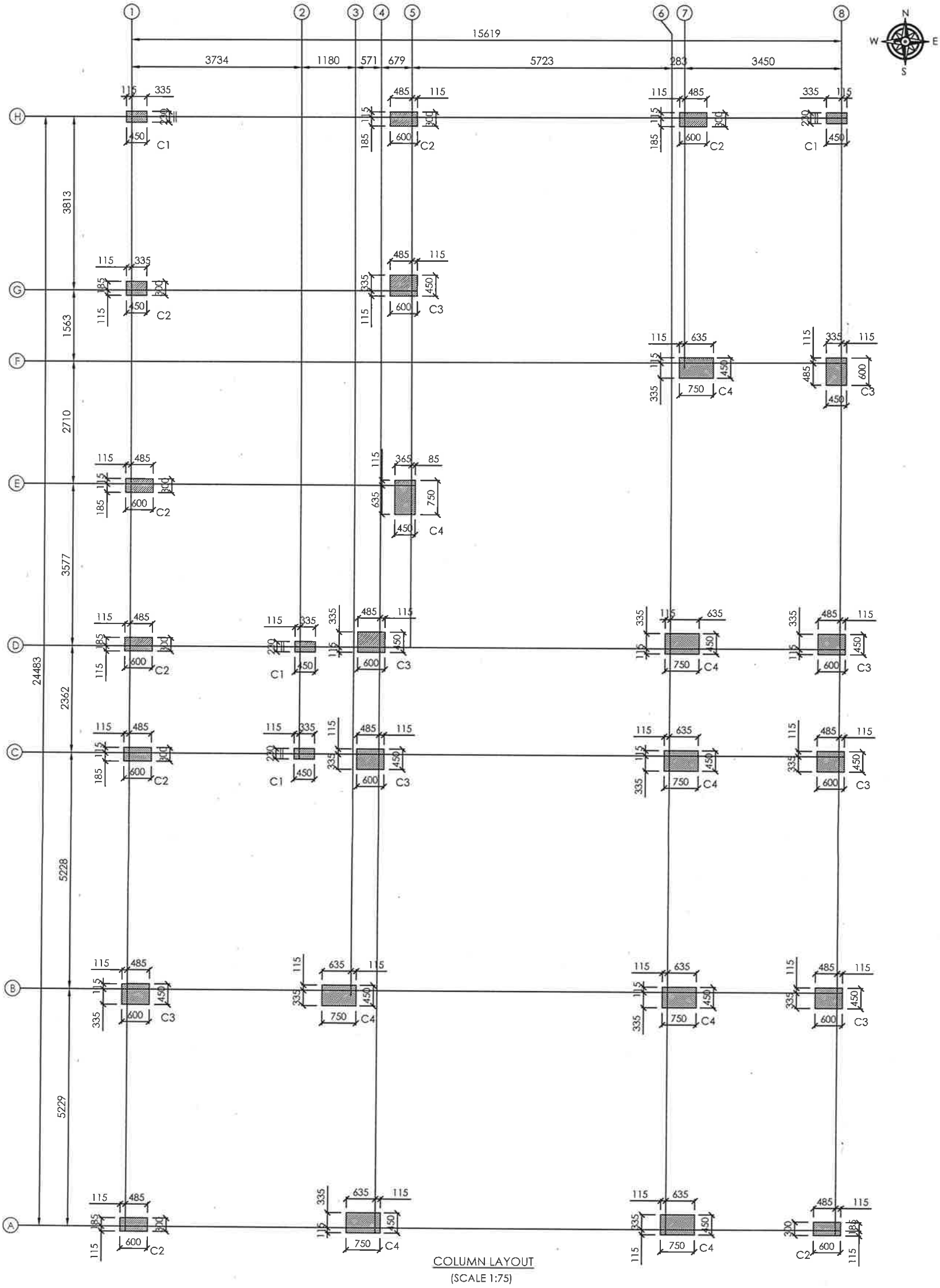
S. BALAKUMAR, M.E., Structures,
Chartered Engineer (AM - 150318 - 1)
CMDA Structural Engineer Grade - I
Regd. No: SE/GR-I/19/07/168
Jaya Sankara Engineering Consultants
1, First Floor, LakeView Road, Kottur
Chennai - 85. 9884936309, 9884936311

REV	DATE	DRAWN	DESCRIPTION

PROJECT:-
PROPOSED DEMOLITION AND RECONSTRUCTION OF RESIDENTIAL BUILDING(S+05)
AT PLOT NO.72, OLD DOOR NO.2, NEW DOOR NO.6,
16TH STREET, NANGANALLUR, CHENNAI-600061

CLIENT:-
SREEJEE CONSTRUCTION P LTD
PLOT NO.72, OLD DOOR NO.2, NEW DOOR NO.6
16TH STREET, NANGANALLUR, CHENNAI-600061

SIZE : A2



COLUMN LAYOUT
(SCALE 1:75)

NOTES:-

1. ALL DIMENSIONS ARE IN `MILLIMETER'
2. USE CONCRETE MIX : M25 GRADE
3. LAP LENGTH 56Ø
4. CLEAR COVER TO THE REINFORCEMENT FOR FOOTING : 50MM , COLUMN :40MM ,
5. HIGH YIELD STRENGTH DEFORMED BARS CONFIRMING IS 1786-1985 TO BE USED, Fe 500
6. Y DENOTES FOR HYSD BARS

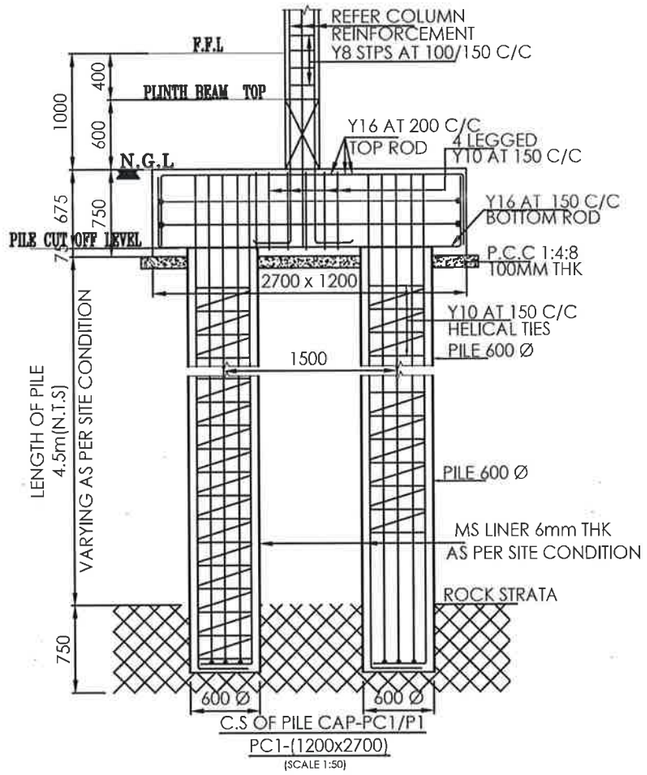
S. BALAKUMAR, M.E., Structures,
Chartered Engineer (AM - 150318 - 1)
CMDA Structural Engineer Grade - I
Regd. No: SE/GR-I/19/07/168
Jaya Sankara Engineering Consultants
1, First Floor, LakeView Road, Kottur
Chennai - 85. 9884936309, 9884936311

REV	DATE	DRAWN	DESCRIPTION

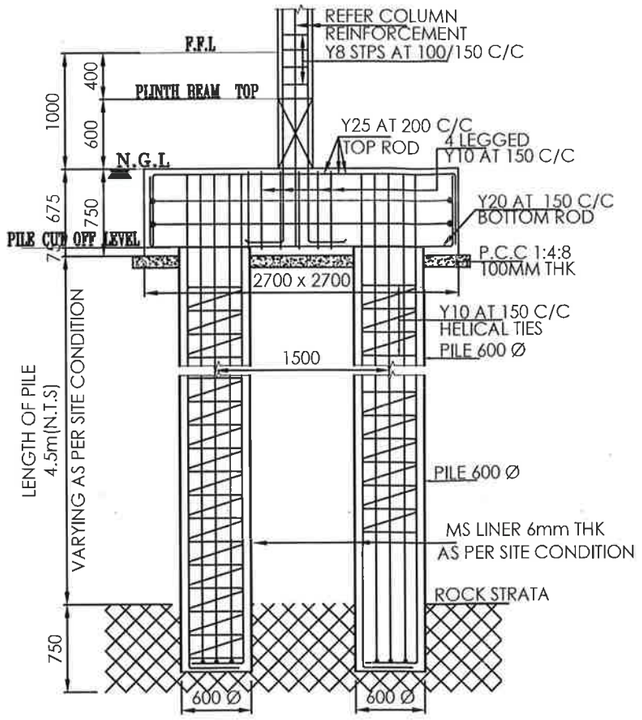
PROJECT:-
PROPOSED DEMOLITION AND RECONSTRUCTION OF RESIDENTIAL BUILDING(S+05)
AT PLOT NO.72, OLD DOOR NO.2, NEW DOOR NO.6,
16TH STREET, NANGANALLUR, CHENNAI-600061

CLIENT:-
SREEJEE CONSTRUCTION P LTD
PLOT NO.72, OLD DOOR NO.2, NEW DOOR NO.6
16TH STREET, NANGANALLUR, CHENNAI-600061

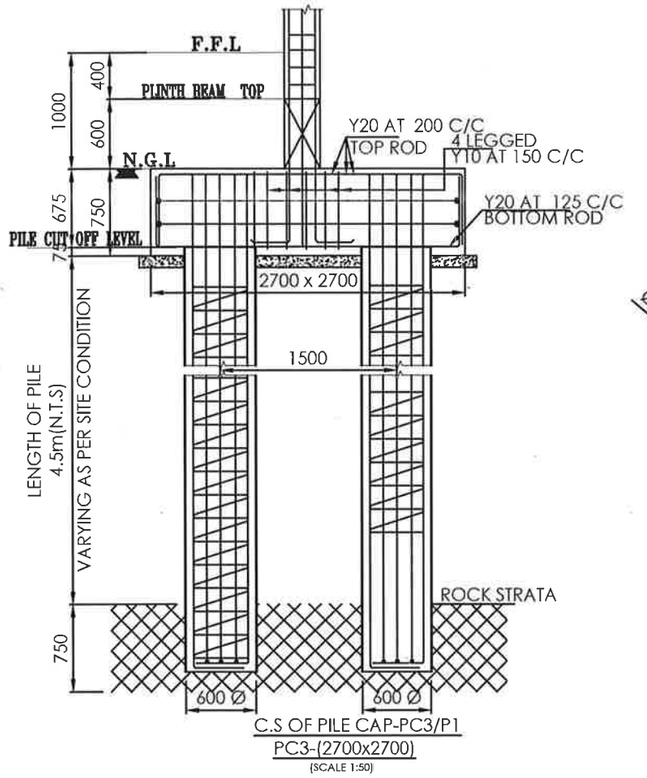
SIZE : A2



C.S OF PILE CAP-PC1/P1
PC1-(1200x2700)
(SCALE 1:50)



C.S OF PILE CAP-PC2/P1
PC2-(2700x2700)
(SCALE 1:50)

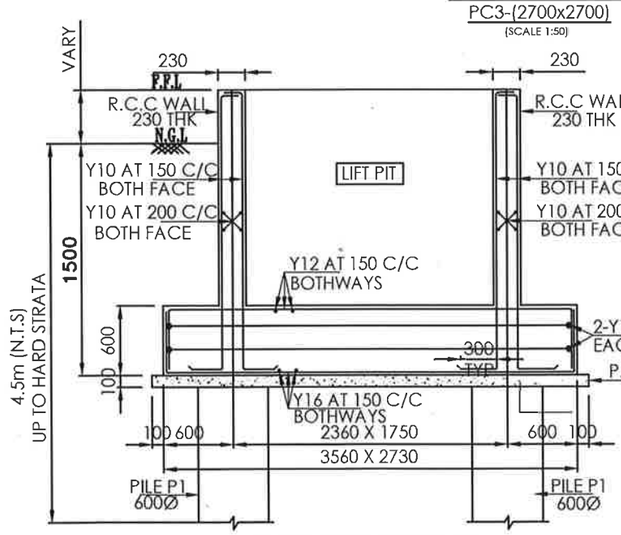


C.S OF PILE CAP-PC3/P1
PC3-(2700x2700)
(SCALE 1:50)



SECTION A-A
(4.5m LONG)
(SCALE 1:50)

S. NO	COLUMN	GROUND & FIRST FLOOR	SECOND & THIRD FLOOR	FOURTH & FIFTH FLOOR
1.	C1 230 x 450	230 × 450 8-Y16 LINKS Y8 AT 150 C/C	230 × 450 8-Y16 LINKS Y8 AT 150 C/C	230 × 450 8-Y16 LINKS Y8 AT 150 C/C
2.	C2 300 x 600	300 × 600 8-Y20 LINKS Y10 TIES AT 150 C/C	300 × 600 8-Y20 LINKS Y10 TIES AT 150 C/C	230 × 600 8-Y20 LINKS Y10 TIES AT 150 C/C
3.	C3 450 x 600	450 × 600 16-Y20 LINKS Y10 TIES AT 150 C/C	450 × 600 16-Y20 LINKS Y10 TIES AT 150 C/C	300 × 600 12-Y20 LINKS Y10 TIES AT 150 C/C
4.	C4 450 x 750	450 × 750 16-Y25 LINKS Y10 TIES AT 150 C/C	450 × 750 16-Y25 LINKS Y10 TIES AT 150 C/C	300 × 750 12-Y20 LINKS Y10 TIES AT 150 C/C



C.S OF LIFT PIT DETAILS PC4
PC4-(3560x2730x600)

NOTES:-

1. ALL DIMENSIONS ARE IN `MILLIMETER'
2. USE CONCRETE MIX : M25 GRADE
3. LAP LENGTH 56Ø
4. CLEAR COVER TO THE REINFORCEMENT FOR FOOTING : 50MM , COLUMN :40MM ,
5. HIGH YIELD STRENGTH DEFORMED BARS CONFIRMING IS 1786-1985 TO BE USED, Fe 500
6. Y DENOTES FOR HYSD BARS

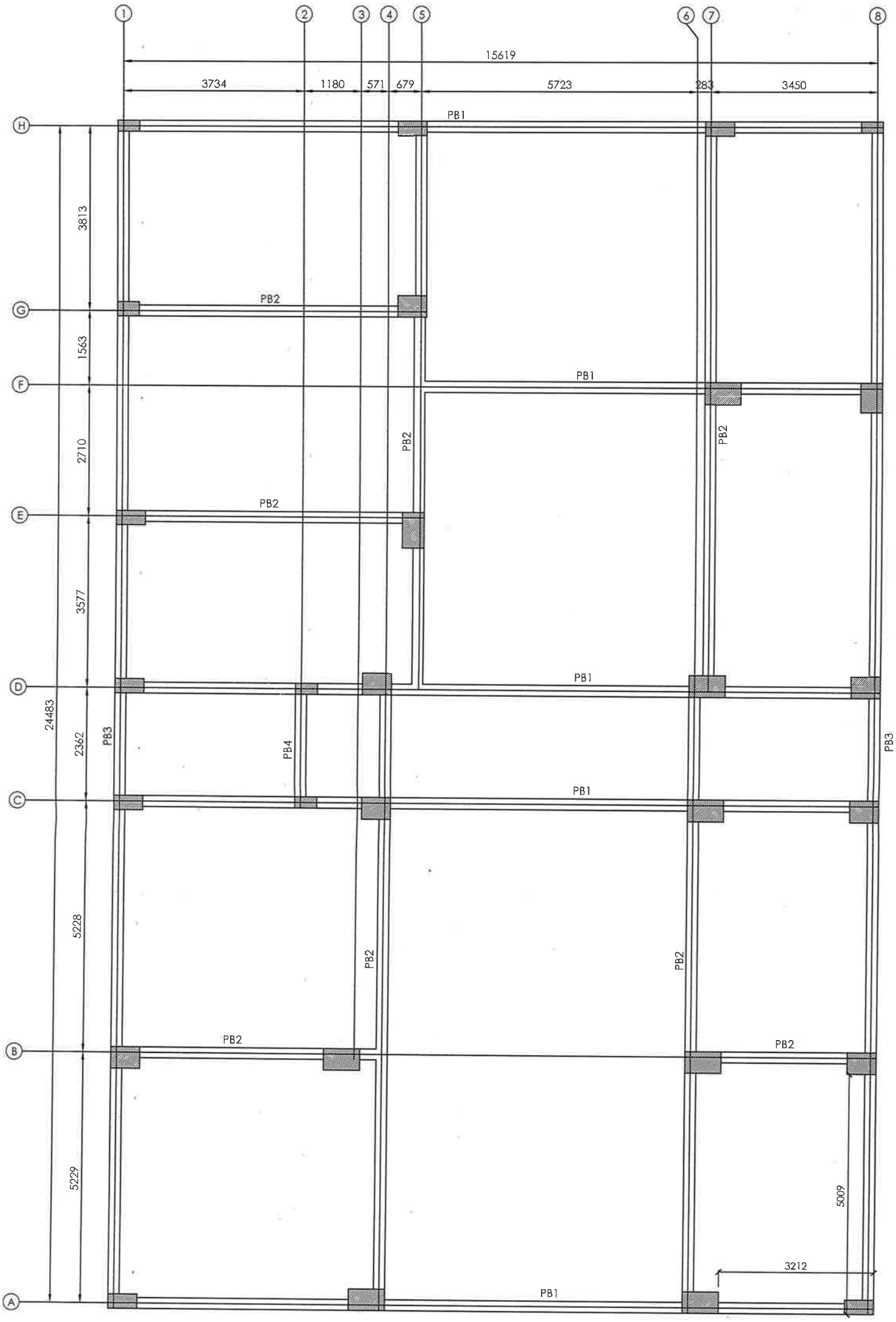
S. BALAKUMAR, M.E., Structures,
Chartered Engineer (AM - 150318 - 1)
CMDA Structural Engineer Grade - I
Regd. No: SE/GR-I/19/07/168
Jaya Sankara Engineering Consultants
1, First Floor, LakeView Road, Kottur
Chennai - 85. 9884936309, 9884936311

REV	DATE	DRAWN	DESCRIPTION

PROJECT:-
PROPOSED DEMOLITION AND RECONSTRUCTION OF RESIDENTIAL BUILDING(S+05)
AT PLOT NO.72, OLD DOOR NO.2, NEW DOOR NO.6,
16TH STREET, NANGANALLUR, CHENNAI-600061

CLIENT:-
SREEJEE CONSTRUCTION P LTD
PLOT NO.72, OLD DOOR NO.2, NEW DOOR NO.6
16TH STREET, NANGANALLUR, CHENNAI-600061

SIZE : A2



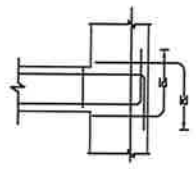
PLINTH BEAM LAYOUT
(SCALE 1:75)

NOTES:-

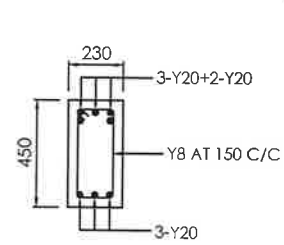
1. ALL DIMENSIONS ARE IN `MILLIMETER'
2. USE CONCRETE MIX : M25 GRADE
3. LAP LENGTH 56Ø
4. CLEAR COVER TO THE REINFORCEMENT FOR PLINTH BEAM : 40MM
5. HIGH YIELD STRENGTH DEFORMED BARS CONFIRMING IS 1786-1985 TO BE USED, Fe 500
6. Y DENOTES FOR HYSD BARS

Ld FOR TENSION & COMP BAR

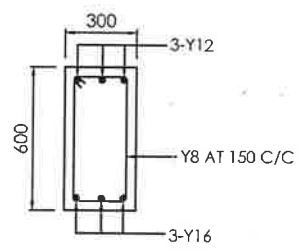
12mm dia	:	544 mm
16mm dia	:	725 mm
20mm dia	:	906 mm
25mm dia	:	1133 mm



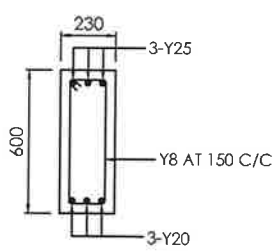
TYPICAL TENSION & COMP BAR



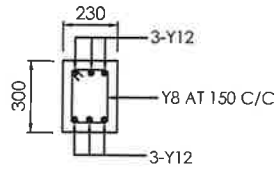
C.S OF PLINTH BEAM - PB1
(230x450)
(SCALE 1:25)



C.S OF PLINTH BEAM - PB2
(300x600)
(SCALE 1:25)



C.S OF PLINTH BEAM - PB3
(230x600)
(SCALE 1:25)



C.S OF PLINTH BEAM - PB4
(230x300)
(SCALE 1:25)

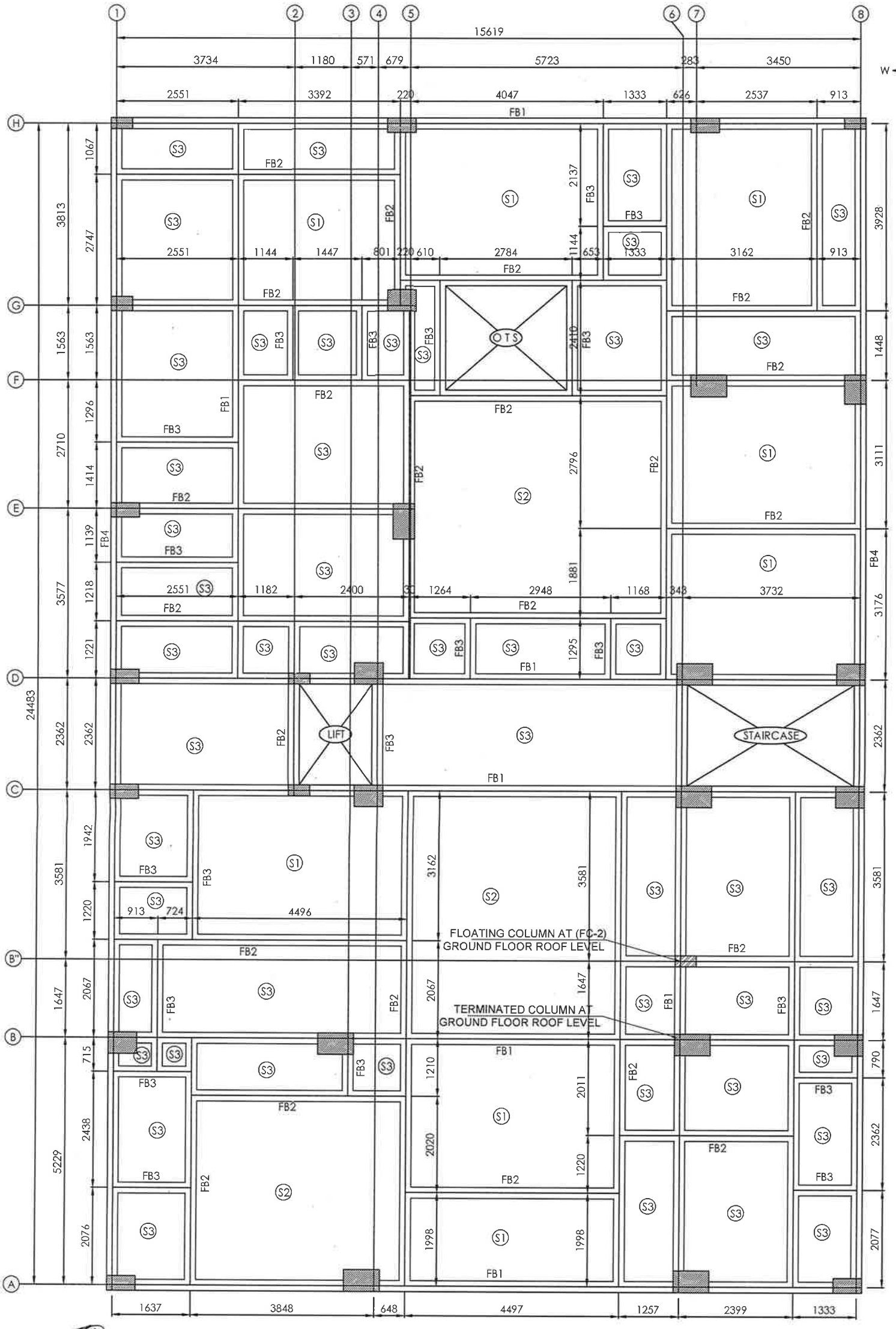
S. BALAKUMAR, M.E., Structures,
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Jaya Sankara Engineering Consultants
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REV	DATE	DRAWN	DESCRIPTION

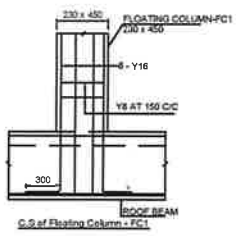
PROJECT:-
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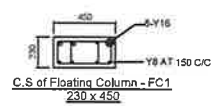
SIZE : A2



GROUND FLOOR ROOF BEAM & SLAB LAYOUT
(SCALE 1:75)



C.S of Floating Column - FC1

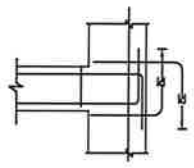


C.S of Floating Column - FC1
230 x 450

NOTES:-

1. ALL DIMENSIONS ARE IN `MILLIMETER'
2. USE CONCRETE MIX : M25 GRADE
3. LAP LENGTH 56Ø
4. CLEAR COVER TO THE REINFORCEMENT FOR FLOOR BEAM : 25 & FLOOR SLAB :20
5. HIGH YIELD STRENGTH DEFORMED BARS CONFIRMING IS 1786-1985 TO BE USED, Fe 500
6. Y DENOTES FOR HYSD BARS

LD FOR TENSION & COMP BAR		
12mm dia	:	544 mm
16mm dia	:	725 mm
20mm dia	:	906 mm
25mm dia	:	1133 mm

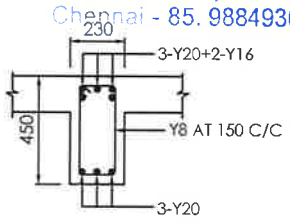


TYPICAL TENSION & COMP BAR

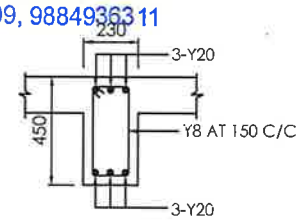
SLAB REINFORCEMENT DETAILS :-

S1	150 THK	Y8 AT 150 C/C (SHORTER) Y8 AT 200 C/C (LONGER)
S2	150 THK	Y10 AT 150 C/C (SHORTER) Y10 AT 150 C/C (LONGER)
S3	150 THK	Y8 AT 150 C/C (BOTHWAYS) TOP & BOTTOM

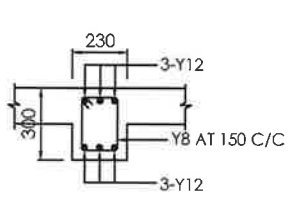
S. BALAKUMAR, M.E., Structures,
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Jaya Sankara Engineering Consultants
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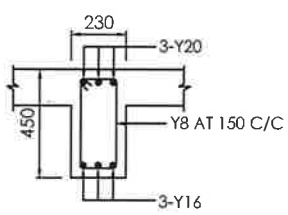
C.S OF FLOOR BEAM - FB1
(230x450)
(SCALE 1:25)



C.S OF FLOOR BEAM - FB2
(230x450)
(SCALE 1:25)



C.S OF FLOOR BEAM - FB3
(230x300)
(SCALE 1:25)



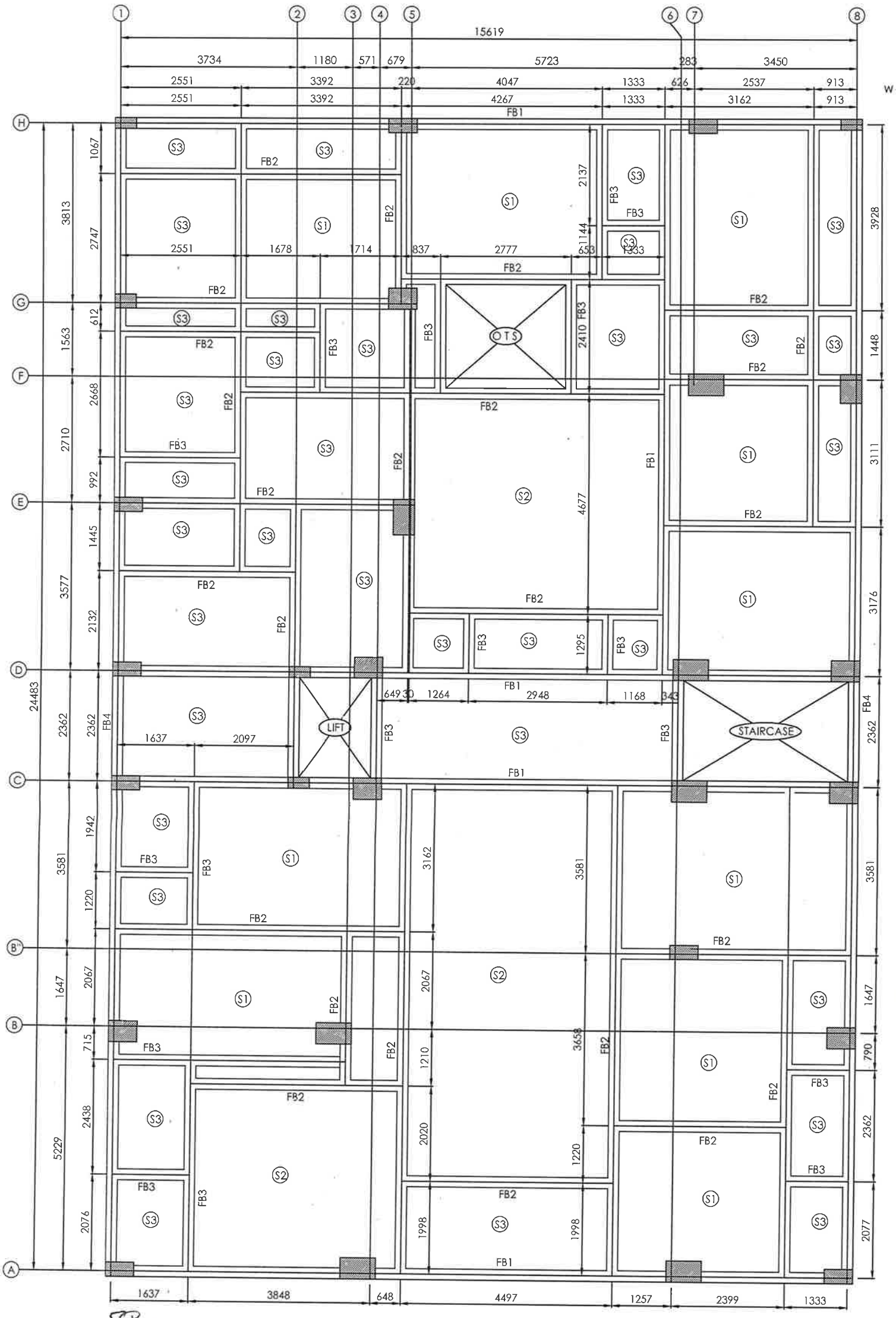
C.S OF FLOOR BEAM - FB4
(230x450)
(SCALE 1:25)

REV	DATE	DRAWN	DESCRIPTION

PROJECT:-
PROPOSED DEMOLITION AND RECONSTRUCTION OF RESIDENTIAL BUILDING(S+05)
AT PLOT NO.72, OLD DOOR NO.2, NEW DOOR NO.6,
16TH STREET, NANGANALLUR, CHENNAI-600061

CLIENT:-
SREEJEE CONSTRUCTION P LTD
PLOT NO.72, OLD DOOR NO.2, NEW DOOR NO.6
16TH STREET, NANGANALLUR, CHENNAI-600061

SIZE : A2



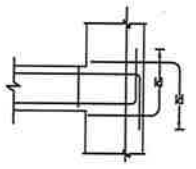
FIRST FLOOR ROOF BEAM & SLAB LAYOUT
(SCALE 1:75)

NOTES:-

1. ALL DIMENSIONS ARE IN `MILLIMETER'
2. USE CONCRETE MIX : M25 GRADE
3. LAP LENGTH 56Ø
4. CLEAR COVER TO THE REINFORCEMENT FOR FLOOR BEAM : 25 & FLOOR SLAB :20
5. HIGH YIELD STRENGTH DEFORMED BARS CONFIRMING IS 1786-1985 TO BE USED, Fe 500
6. Y DENOTES FOR HYSD BARS

LD FOR TENSION & COMP BAR

12mm dia	:	544 mm
16mm dia	:	725 mm
20mm dia	:	906 mm
25mm dia	:	1133 mm

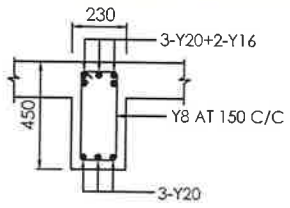


TYPICAL TENSION & COMP BAR

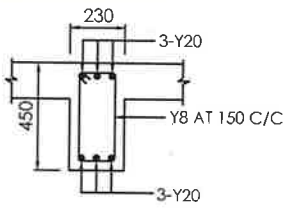
SLAB REINFORCEMENT DETAILS :-

S1	150 THK	Y8 AT 150 C/C (SHORTER) Y8 AT 200 C/C (LONGER)
S2	150 THK	Y10 AT 150 C/C (SHORTER) Y10 AT 150 C/C (LONGER)
S3	150 THK	Y8 AT 150 C/C (BOTHWAYS) TOP & BOTTOM

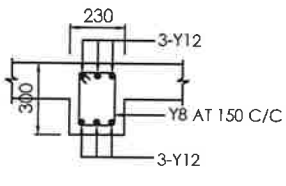
S. BALAKUMAR, M.E., Structures,
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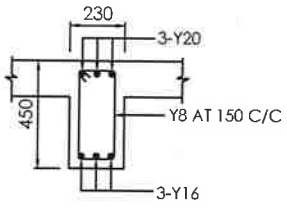
C.S OF FLOOR BEAM - FB1
(230x450)
(SCALE 1:25)



C.S OF FLOOR BEAM - FB2
(230x450)
(SCALE 1:25)



C.S OF FLOOR BEAM - FB3
(230x300)
(SCALE 1:25)



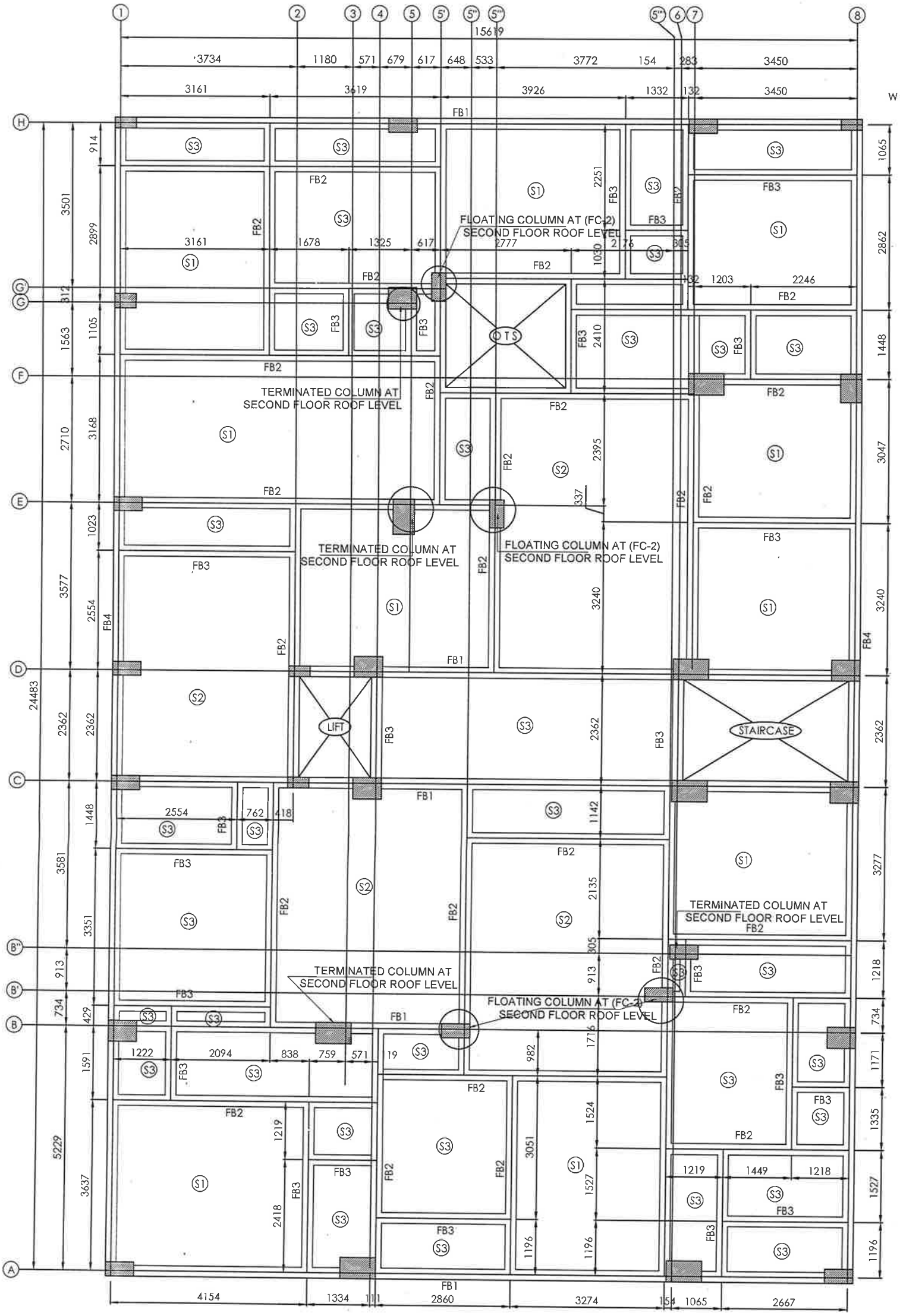
C.S OF FLOOR BEAM - FB4
(230x450)
(SCALE 1:25)

REV	DATE	DRAWN	DESCRIPTION

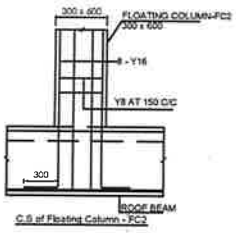
PROJECT:-
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AT PLOT NO.72, OLD DOOR NO.2, NEW DOOR NO.6,
16TH STREET, NANGANALLUR, CHENNAI-600061

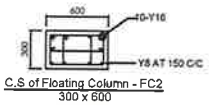
CLIENT:-
SREEJEE CONSTRUCTION P LTD
PLOT NO.72, OLD DOOR NO.2, NEW DOOR NO.6
16TH STREET, NANGANALLUR, CHENNAI-600061

SIZE : A2



SECOND FLOOR ROOF BEAM & SLAB LAYOUT
(SCALE 1:75)



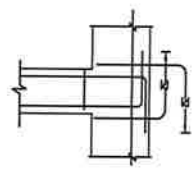


NOTES:-

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4. CLEAR COVER TO THE REINFORCEMENT FOR FLOOR BEAM : 25 & FLOOR SLAB :20
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6. Y DENOTES FOR HYSD BARS

LD FOR TENSION & COMP BAR

12mm dia	:	544 mm
16mm dia	:	725 mm
20mm dia	:	906 mm
25mm dia	:	1133 mm

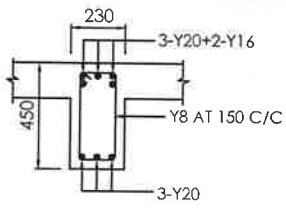


TYPICAL TENSION & COMP BAR

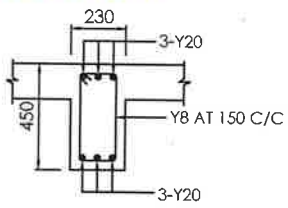
SLAB REINFORCEMENT DETAILS :-

S1	150 THK	Y8 AT 150 C/C (SHORTER) Y8 AT 200 C/C (LONGER)
S2	150 THK	Y10 AT 150 C/C (SHORTER) Y10 AT 150 C/C (LONGER)
S3	150 THK	Y8 AT 150 C/C (BOTHWAYS) TOP & BOTTOM

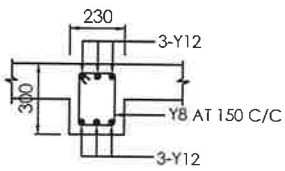
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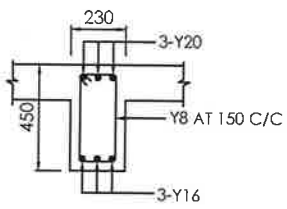
C.S OF FLOOR BEAM - FB1
(230x450)
(SCALE 1:25)



C.S OF FLOOR BEAM - FB2
(230x450)
(SCALE 1:25)



C.S OF FLOOR BEAM - FB3
(230x300)
(SCALE 1:25)



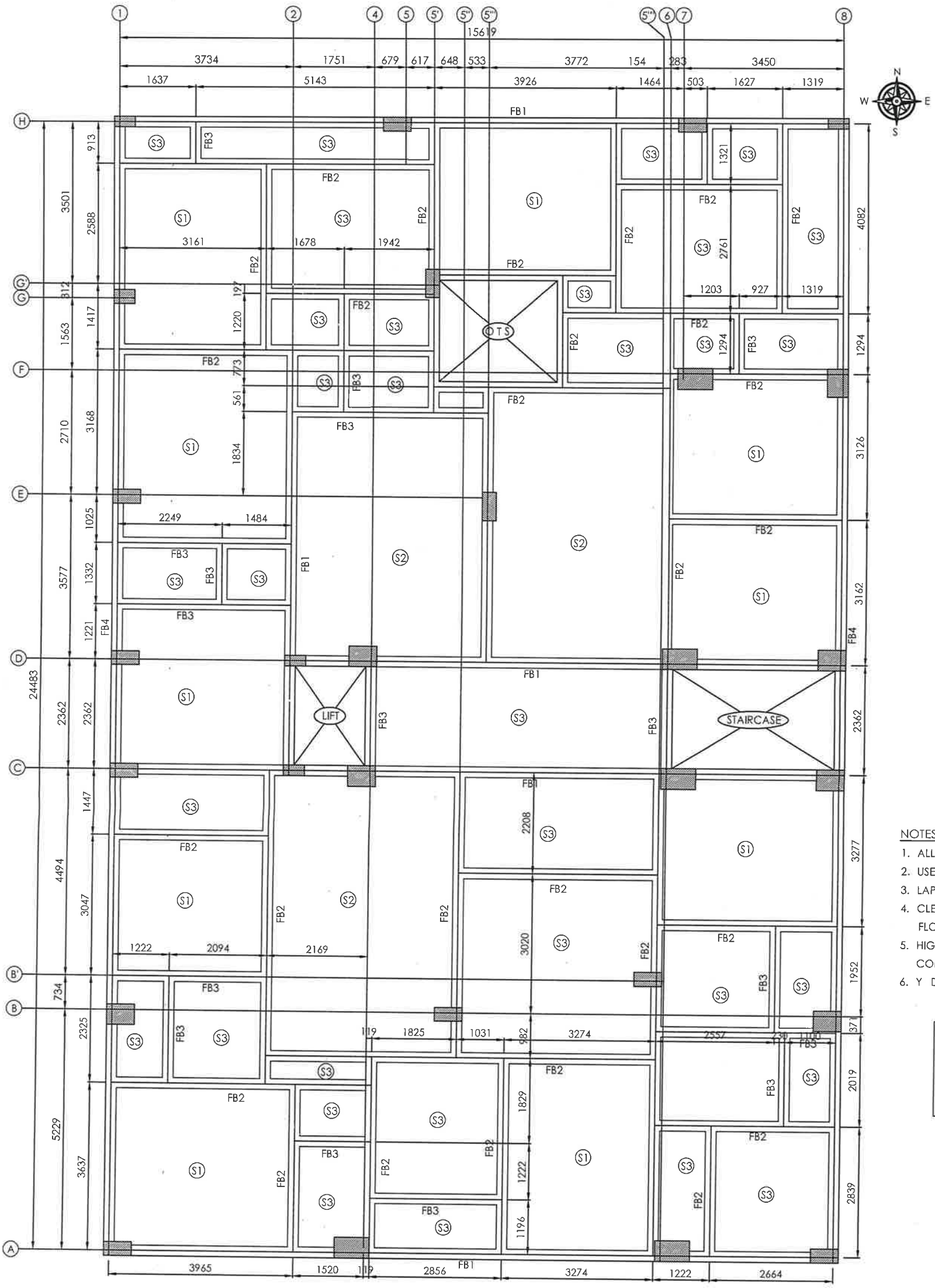
C.S OF FLOOR BEAM - FB4
(230x450)
(SCALE 1:25)

REV	DATE	DRAWN	DESCRIPTION

PROJECT:-
PROPOSED DEMOLITION AND RECONSTRUCTION OF RESIDENTIAL BUILDING(S+05)
AT PLOT NO.72, OLD DOOR NO.2, NEW DOOR NO.6,
16TH STREET, NANGANALLUR, CHENNAI-600061

CLIENT:-
SREEJEE CONSTRUCTION P LTD
PLOT NO.72, OLD DOOR NO.2, NEW DOOR NO.6
16TH STREET, NANGANALLUR, CHENNAI-600061

SIZE : A2

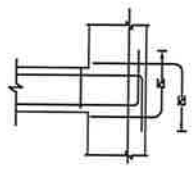


NOTES:-

1. ALL DIMENSIONS ARE IN `MILLIMETER'
2. USE CONCRETE MIX : M25 GRADE
3. LAP LENGTH 56Ø
4. CLEAR COVER TO THE REINFORCEMENT FOR FLOOR BEAM : 25 & FLOOR SLAB :20
5. HIGH YIELD STRENGTH DEFORMED BARS CONFIRMING IS 1786-1985 TO BE USED, Fe 500
6. Y DENOTES FOR HYSD BARS

LD FOR TENSION & COMP BAR

12mm dia	:	544 mm
16mm dia	:	725 mm
20mm dia	:	906 mm
25mm dia	:	1133 mm



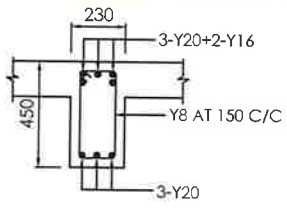
TYPICAL TENSION & COMP BAR

THIRD FLOOR ROOF BEAM & SLAB LAYOUT
(SCALE 1:75)

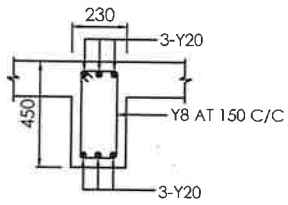
SLAB REINFORCEMENT DETAILS :-

S1	150 THK	Y8 AT 150 C/C (SHORTER) Y8 AT 200 C/C (LONGER)
S2	150 THK	Y10 AT 150 C/C (SHORTER) Y10 AT 150 C/C (LONGER)
S3	150 THK	Y8 AT 150 C/C (BOTHWAYS) TOP & BOTTOM

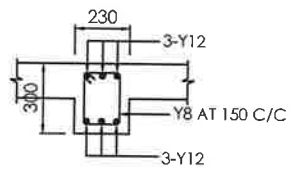
S. BALAKUMAR, M.E., Structures,
Chartered Engineer (AM - 150318 - 1)
CMDA Structural Engineer Grade - I
Regd. No: SE/GR-I/19/07/168
Jaya Sankara Engineering Consultants
1, First Floor, LakeView Road, Kottur
Chennai - 85. 9884936309, 9884936311



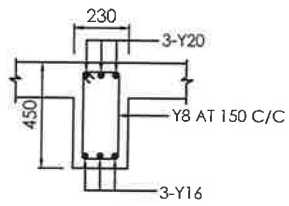
C.S OF FLOOR BEAM - FB1
(230x450)
(SCALE 1:25)



C.S OF FLOOR BEAM - FB2
(230x450)
(SCALE 1:25)



C.S OF FLOOR BEAM - FB3
(230x300)
(SCALE 1:25)



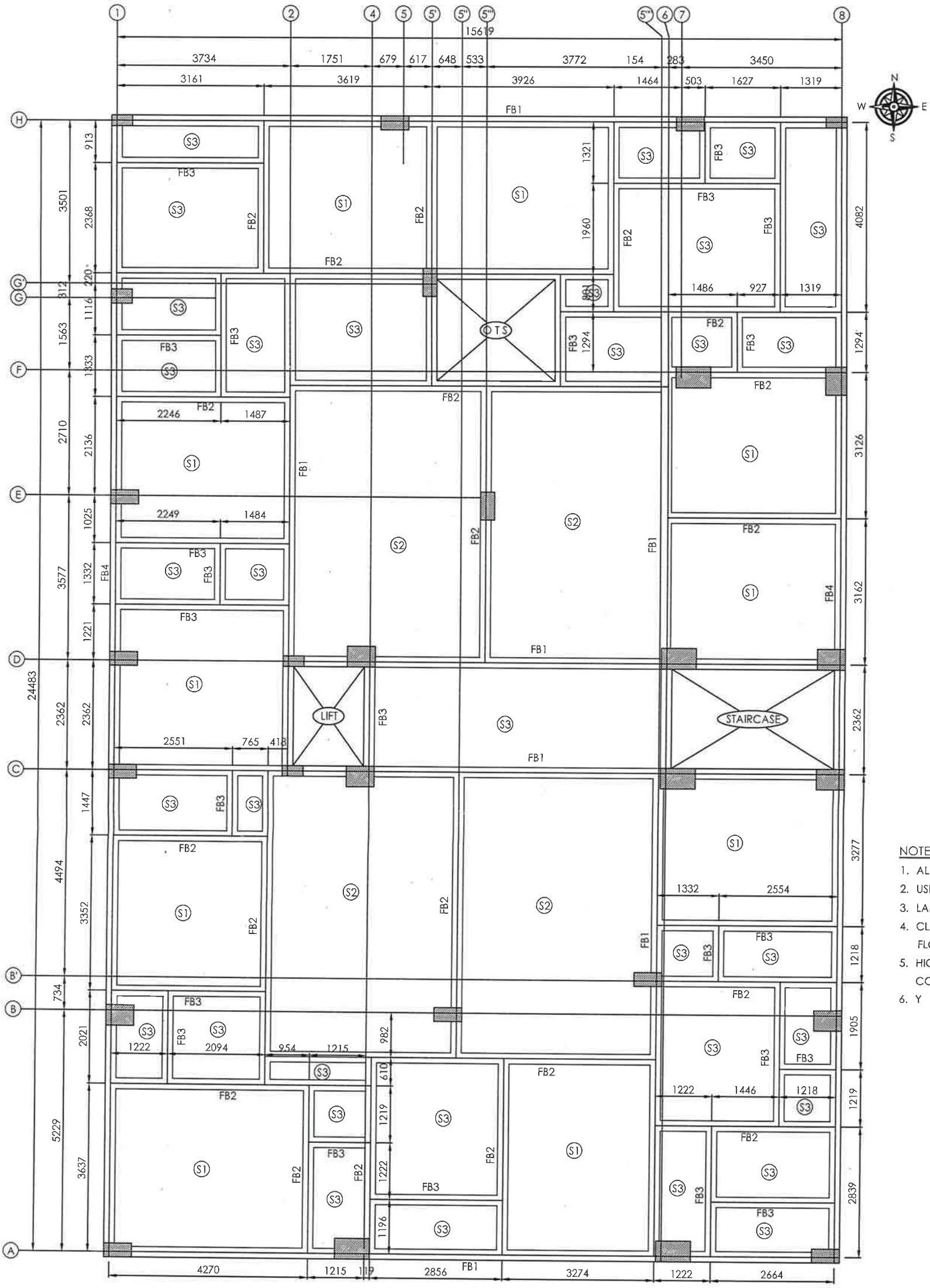
C.S OF FLOOR BEAM - FB4
(230x450)
(SCALE 1:25)

REV	DATE	DRAWN	DESCRIPTION

PROJECT:-
PROPOSED DEMOLITION AND RECONSTRUCTION OF RESIDENTIAL BUILDING(S+05)
AT PLOT NO.72, OLD DOOR NO.2, NEW DOOR NO.6,
16TH STREET, NANGANALLUR, CHENNAI-600061

CLIENT:-
SREEJEE CONSTRUCTION P LTD
PLOT NO.72, OLD DOOR NO.2, NEW DOOR NO.6
16TH STREET, NANGANALLUR, CHENNAI-600061

SIZE : A2

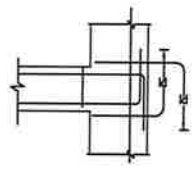


NOTES:-

1. ALL DIMENSIONS ARE IN `MILLIMETER'
2. USE CONCRETE MIX : M25 GRADE
3. LAP LENGTH 56Ø
4. CLEAR COVER TO THE REINFORCEMENT FOR FLOOR BEAM : 25 & FLOOR SLAB :20
5. HIGH YIELD STRENGTH DEFORMED BARS CONFIRMING IS 1786-1985 TO BE USED, Fe 500
6. Y DENOTES FOR HYSD BARS

LD FOR TENSION & COMP BAR

12mm dia	:	544 mm
16mm dia	:	725 mm
20mm dia	:	906 mm
25mm dia	:	1133 mm



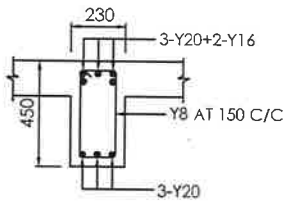
TYPICAL TENSION & COMP BAR

FOURTH FLOOR ROOF BEAM & SLAB LAYOUT
(SCALE 1:75)

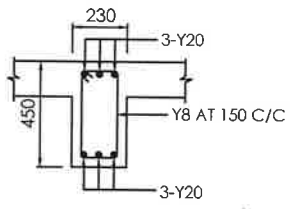
SLAB REINFORCEMENT DETAILS :-

S1	150 THK	Y8 AT 150 C/C (SHORTER) Y8 AT 200 C/C (LONGER)
S2	150 THK	Y10 AT 150 C/C (SHORTER) Y10 AT 150 C/C (LONGER)
S3	150 THK	Y8 AT 150 C/C (BOTHWAYS) TOP & BOTTOM

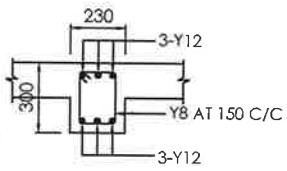
S. BALAKUMAR, M.E., Structures,
Chartered Engineer (AM - 150318 - 1)
CMDA Structural Engineer Grade - I
Regd. No: SE/GR-I/19/07/168
Jaya Sankara Engineering Consultants
1, First Floor, LakeView Road, Kottur
Chennai - 85. 9884936309, 9884936311



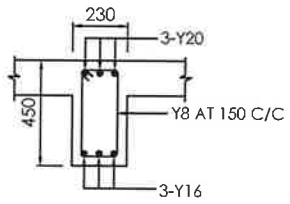
C.S OF FLOOR BEAM - FB1
(230x450)
(SCALE 1:25)



C.S OF FLOOR BEAM - FB2
(230x450)
(SCALE 1:25)



C.S OF FLOOR BEAM - FB3
(230x300)
(SCALE 1:25)



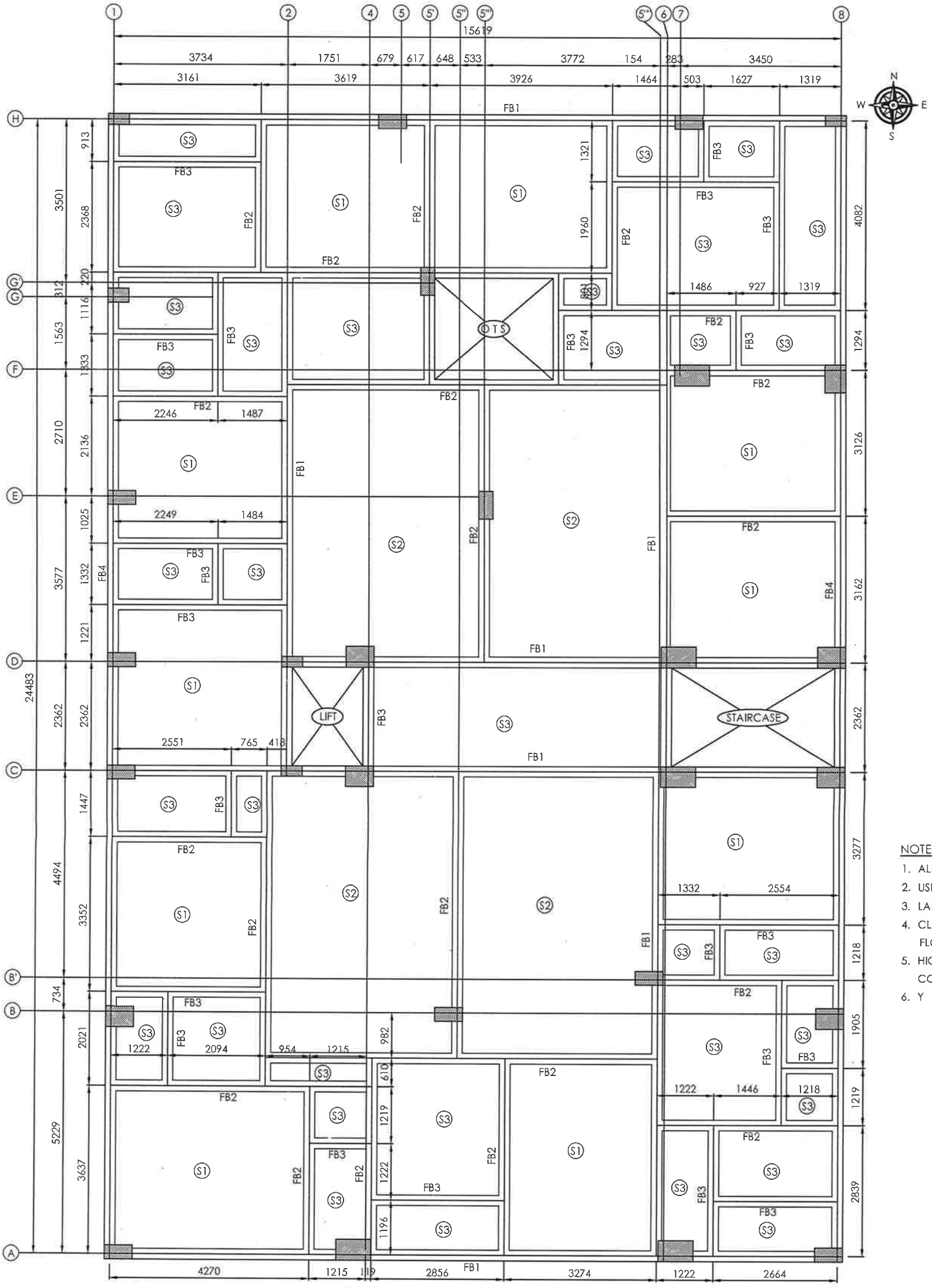
C.S OF FLOOR BEAM - FB4
(230x450)
(SCALE 1:25)

REV	DATE	DRAWN	DESCRIPTION

PROJECT:-
PROPOSED DEMOLITION AND RECONSTRUCTION OF RESIDENTIAL BUILDING(S+05)
AT PLOT NO.72, OLD DOOR NO.2, NEW DOOR NO.6,
16TH STREET, NANGANALLUR, CHENNAI-600061

CLIENT:-
SREEJEE CONSTRUCTION P LTD
PLOT NO.72, OLD DOOR NO.2, NEW DOOR NO.6
16TH STREET, NANGANALLUR, CHENNAI-600061

SIZE : A2

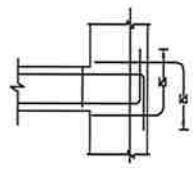


NOTES:-

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3. LAP LENGTH 56Ø
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6. Y DENOTES FOR HYSD BARS

LD FOR TENSION & COMP BAR

12mm dia	:	544 mm
16mm dia	:	725 mm
20mm dia	:	906 mm
25mm dia	:	1133 mm



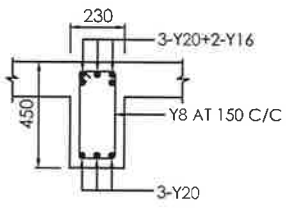
TYPICAL TENSION & COMP BAR

FOURTH FLOOR ROOF BEAM & SLAB LAYOUT
(SCALE 1:75)

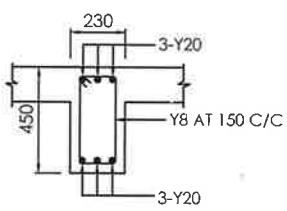
SLAB REINFORCEMENT DETAILS :-

S1	150 THK	Y8 AT 150 C/C (SHORTER) Y8 AT 200 C/C (LONGER)
S2	150 THK	Y10 AT 150 C/C (SHORTER) Y10 AT 150 C/C (LONGER)
S3	150 THK	Y8 AT 150 C/C (BOTHWAYS) TOP & BOTTOM

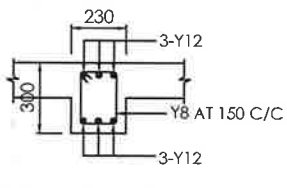
S. BALAKUMAR, M.E., Structures,
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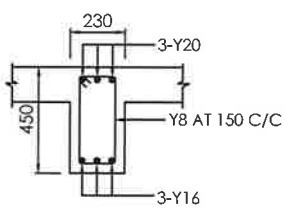
C.S OF FLOOR BEAM - FB1
(230x450)
(SCALE 1:25)



C.S OF FLOOR BEAM - FB2
(230x450)
(SCALE 1:25)



C.S OF FLOOR BEAM - FB3
(230x300)
(SCALE 1:25)



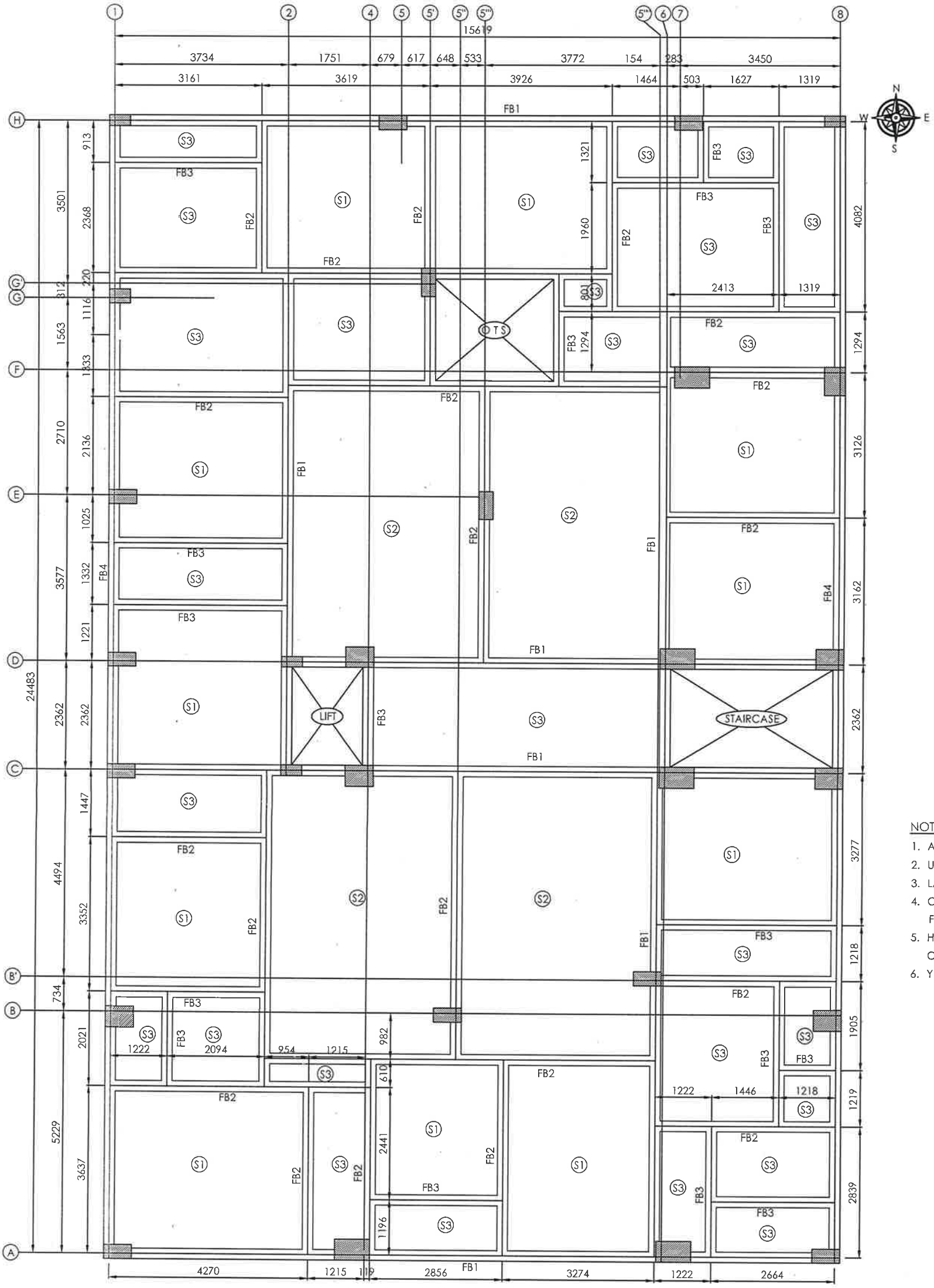
C.S OF FLOOR BEAM - FB4
(230x450)
(SCALE 1:25)

REV	DATE	DRAWN	DESCRIPTION

PROJECT:-
PROPOSED DEMOLITION AND RECONSTRUCTION OF RESIDENTIAL BUILDING(S+05)
AT PLOT NO.72, OLD DOOR NO.2, NEW DOOR NO.6,
16TH STREET, NANGANALLUR, CHENNAI-600061

CLIENT:-
SREEJEE CONSTRUCTION P LTD
PLOT NO.72, OLD DOOR NO.2, NEW DOOR NO.6
16TH STREET, NANGANALLUR, CHENNAI-600061

SIZE : A2

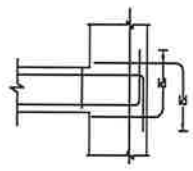


NOTES:-

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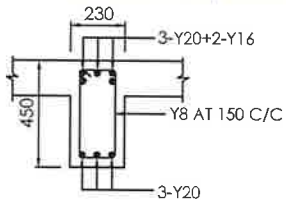
TYPICAL TENSION & COMP BAR

FIFTH FLOOR ROOF BEAM & SLAB LAYOUT
(SCALE 1:75)

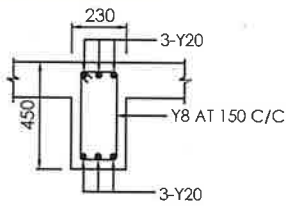
SLAB REINFORCEMENT DETAILS :-

S1	150 THK	Y8 AT 150 C/C (SHORTER) Y8 AT 200 C/C (LONGER)
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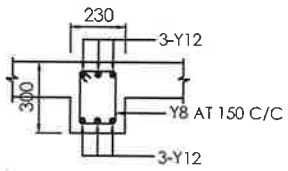
S. BALAKUMAR, M.E., Structures,
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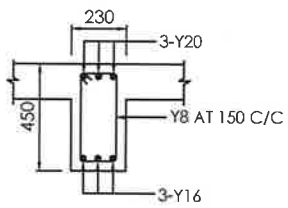
C.S OF FLOOR BEAM - FB1
(230x450)
(SCALE 1:25)



C.S OF FLOOR BEAM - FB2
(230x450)
(SCALE 1:25)



C.S OF FLOOR BEAM - FB3
(230x300)
(SCALE 1:25)



C.S OF FLOOR BEAM - FB4
(230x450)
(SCALE 1:25)

REV	DATE	DRAWN	DESCRIPTION

PROJECT:-
PROPOSED DEMOLITION AND RECONSTRUCTION OF RESIDENTIAL BUILDING(S+05)
AT PLOT NO.72, OLD DOOR NO.2, NEW DOOR NO.6,
16TH STREET, NANGANALLUR, CHENNAI-600061

CLIENT:-
SREEJEE CONSTRUCTION P LTD
PLOT NO.72, OLD DOOR NO.2, NEW DOOR NO.6
16TH STREET, NANGANALLUR, CHENNAI-600061

SIZE : A2

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

Verified RealEstate™

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

Verified RealEstate
3/350/2 Mettukuppam,
OMR Thoraipakkam,
Chennai 600 097, India
hello@verified.realestate
+91 9996 12 9996

Prepared from the registers named on the page each finding sits on. Where a register could not be read, this document says so in its place rather than leaving the gap to be read as a clean result.