HARMONY RESIDENCES PVT. LTD.

DESIGN CALCULATION

FOR

RESIDENTIAL BUILDING

STILT + 5 FLOORS 22 DWELLING UNITS IN SINGLE BLOCK

AT PLOT NO. 8, DOOR NO.2, MAHARANI CHINNAMMAL ROAD, TENAMPET, CHENNAI – 600 018 COMPRISED IN T. S. NO. 1554/152, BLOCK 30, MYLAPORE PART I VILLAGE, MYLAPORE TALUK, WITHIN THE LIMIT OF GREATER CHENNAI CORPORATION, DIVISION 118, ZONE 9, TAMILNADU.

M. PUNITHAN B.Sc.,M.I.E.
istered Structural Engineer Grade-II
MDA Reg. No. SE/GR-II/19/04/044
enewed 10-04-2024. Valid upto 09-04-2029
141, Flat C2, PJM Apartments, East Vanniar Street,
West K.K. Nagar, Chennai-600 078.
bile: 9884400273, Email: mpunithan@yahoo.com

ARCHITECTS:
M/S Diastyle
N0.65/55, 12th AVENUE
ASHOK NAGAR,
CHENNAI-600 083.
PHONE : 65853326

ENGINEERS:
M/S MURUGU CONSULTANT
NO.9A/10, UMAPATHI STREET EXT,
WEST MAMBALAM,
CHENNAI – 600 033.
PHONE : 9884400273.

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

PROFESSIONAL REGISTRATION CERTIFICATE

This is to certify that the **Thiru. M. PUNITHAN** has enrolled as **Registered Structural Engineer Grade-II (SE)** with Chennai Metropolitan Development Authority (CMDA) who has the qualification of **A.M.I.E.,(Civil Engg.)** and experience in the relevant field for **26 years**.

He has been given the Registration No.**SE/GR-II/2019/04/044 Renewed** on **10.04.2024.** 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 **09.04.2029**.

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10/4/24.

(A. MEGANATHAN)
Superintendent

MURUGU CONSULTANT

9A/10, Ist Floor, Umapathy Street Ext.
West Mambalam, Chennai – 600 033.

PH: 91 – 9884400273

To
The Chairman,
TNRERA,
EGMORE, Chennai – 600 008.

Dated : 02 - 06 - 2024

Dear Sir

Sub : Construction of Residential flats stilt + 5 floors, 22 dwelling unit in single block in Mylapore - Stability certificate

The Residential buildings in the address Plot No. 8, Door No. 2, Maharani chinnamal Road, Tenampet, Chennai- 600 018, comprised in T. S No.1554/152, Block 30, Mylapore part 1 Village, Mylapore Taluk, within the limit of Greater Chennai Corporation, Division No. 118, Zone 9, is designed as per IS : 456, 2000, IS 1893 (part 1) : 2002 for seismic zone 3 and loading has been taken from IS 875 part 1 & 2 for dead load, live load. & seismic load With SBC of 13.5t/sqm Found Structurally Sound and safe.

Thanking you

Yours truly,

For MURUGU CONSULTANT

M.PUNITHAN, B.Sc., M.I.E
M-1371961

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RESIDENTIAL FLATS

COLUMN A1

No. of floors	=	1	+	5	=	6						
Foundation depth	=	1.5 m										
Ground to floor level	=	1 m										
GFloor to floor height	=	3.00 m										
FFloor to floor height	=	3.00 m										
Thickness of slab assumed	=	0.125 m										
Slab loading t/ sqm	=	0.623 t										
Breadth of beams	=	0.23 m										
Depth of beams assumed	=	0.524 m										
Parapet wall height	=	1 m										
Plinth beams assumed	=	0.262 m										
Total height of wall	=	16.1 m										
Total height of column	=	21.5 m										
Size of column	=	0.45 x		0.3 m								
Total load:												
Due to slab	=	6	x	3.645	x	1.598	x	0.623			=	21.75 t
Wall	=	2	x	0.23	x	5.243	x	16.1			=	38.84 t
Roof beams	=	2.5	x	0.23	x	0.399	x	0.262	x	6	=	0.361 t
Plinth beam	=	2.5	x	0.23	x	0.262	x	0.262	x	1	=	0.04 t
Self wt	=	2.5	x	0.45	x	0.3	x	21.5			=	7.256 t
												68.24 t
						Total					=	**68.24 t**
Using size of column to be	=	**450**	**X**	**300 mm**								
With 8/16 + 3/12 Rods, Ast	=	8	x	201	+	3	x	113	=	1947 sqmm		
Capacity of column	=	450	x	300	x	6	+	1947	x	190		
	=	**118 t**		>		**102 t**						
Minimum Reinforcement	=	0.008	x	45	x	30	=	10.8 sqcm	<	19.47 sqcm		
% of Reinforcement	=	1947	/	45	x	30	=	1.442	<	4		

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COLUMN N4

No. of floors	=	1	+	5	=	6						
Foundation depth	=	1.5 m										
Ground to floor level	=	1 m										
GFloor to floor height	=	3.00 m										
FFloor to floor height	=	3.00 m										
Thickness of slab assumed	=	0.125 m										
Slab loading t/ sqm	=	0.623 t										
Breadth of beams	=	0.23 m										
Depth of beams assumed	=	0.422 m										
Parapet wall height	=	1 m										
Plinth beams assumed	=	0.422 m										
Total height of wall	=	16.72 m										
Total height of column	=	21.5 m										
Size of column	=	0.45 x		0.3 m								
Total load:												
Due to slab	=	6	x	6.85	x	1.595	x	0.623			=	40.81 t
Wall	=	2	x	0.23	x	8.445	x	16.72			=	64.94 t
Roof beams	=	2.5	x	0.2	x	0.297	x	0.422	x	6	=	0.377 t
Plinth beam	=	2.5	x	0.2	x	0.422	x	0.422	x	1	=	0.089 t
Self wt	=	2.5	x	0.45	x	0.3	x	21.5			=	7.256 t
												113.5 t
						Total					=	**113.5 t**
Using size of column to be	=	**450**	**X**	**300 mm**								
With 8/25 + 3/12 Rods, Ast	=	8	x	490.6	+	3	x	113	=	4264 sqmm		
Capacity of column	=	450	x	300	x	6	+	4264	x	190		
	=	162 t		>		170 t						
Minimum Reinforcement	=	0.008	x	45	x	30	=	10.8 sqcm	<	42.64 sqcm		
% of Reinforcement	=	4264	/	45	x	30	=	3.159	<	4		

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COLUMN N4

No. of floors	=	1	+	5	=	6						
Foundation depth	=	1.5 m										
Ground to floor level	=	1 m										
GFloor to floor height	=	3.00 m										
FFloor to floor height	=	3.00 m										
Thickness of slab assumed	=	0.125 m										
Slab loading t/ sqm	=	0.623 t										
Breadth of beams	=	0.23 m										
Depth of beams assumed	=	0.504 m										
Parapet wall height	=	1 m										
Plinth beams assumed	=	0.665 m										
Total height of wall	=	16.23 m										
Total height of column	=	21.5 m										
Size of column	=	0.45 x		0.3 m								

Total load:

Due to slab	=	6	x	6.85	x	3.225	x	0.623			=	82.51 t
Wall	=	2	x	0.115	x	13.3	x	16.23			=	49.64 t
Roof beams	=	2.5	x	0.2	x	0.379	x	0.665	x	6	=	0.756 t
Plinth beam	=	2.5	x	0.2	x	0.665	x	0.665	x	1	=	0.221 t
Self wt	=	2.5	x	0.45	x	0.3	x	21.5			=	7.256 t
												140.4 t
						Total					=	**140.4 t**

Using size of column to be	=	**450**	**X**	**300 mm**							
With 8/32 +3/12 Rods, Ast	=	8	x	803.8	+	3	x	113	=	6770 sqmm	
Capacity of column	=	450	x	300	x	6	+	6770	x	190	
	=	209.6 t		>		211 t					
Minimum Reinforcement	=	0.008	x	45	x	30	=	10.8 sqcm	<	67.7 sqcm	
% of Reinforcement	=	6770	/	45	x	30	=	5.015	<	4	

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COLUMN M4

No. of floors	=	1	+	5	=	6					
Foundation depth	=	1.5 m									
Ground to floor level	=	1 m									
GFloor to floor height	=	3.00 m									
FFloor to floor height	=	3.00 m									
Thickness of slab assumed	=	0.125 m									
Slab loading t/ sqm	=	0.623 t									
Breadth of beams	=	0.23 m									
Depth of beams assumed	=	0.344 m									
Parapet wall height	=	1 m									
Plinth beams assumed	=	0.344 m									
Total height of wall	=	17.19 m									
Total height of column	=	21.5 m									
Size of column	=	0.45 x		0.3 m							

Total load:

Due to slab	=	6	x	3.645	x	3.225	x	0.623			=	43.91 t
Wall	=	2	x	0.23	x	6.87	x	17.19			=	54.32 t
Roof beams	=	2.5	x	0.23	x	0.219	x	6.87	x	6	=	5.179 t
Plinth beam	=	2.5	x	0.23	x	0.344	x	6.87	x	1	=	1.357 t
Self wt	=	2.5	x	0.45	x	0.3	x	21.5			=	7.256 t
												112 t
						Total					=	**112 t**

Using size of column to be	=	**450**	**X**	**300 mm**							
With 8/20 + 3/12 Rods, Ast	=	8	x	314	+	3	x	113	=	2851 sqmm	
Capacity of column	=	450	x	300	x	6	+	2851	x	190	
	=	135.2 t		>		140 t					
Minimum Reinforcement	=	0.008	x	45	x	30	=	10.8 sqcm	<	28.51 sqcm	
% of Reinforcement	=	2851	/	45	x	30	=	2.112	<	4	

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COLUMN J10

No. of floors	=	1	+	5	=	6						
Foundation depth	=	1.5 m										
Ground to floor level	=	1 m										
GFloor to floor height	=	3.00 m										
FFloor to floor height	=	3.00 m										
Thickness of slab assumed	=	0.125 m										
Slab loading t/ sqm	=	0.623 t										
Breadth of beams	=	0.23 m										
Depth of beams assumed	=	0.425 m										
Parapet wall height	=	1 m										
Plinth beams assumed	=	0.579 m										
Total height of wall	=	16.7 m										
Total height of column	=	21.5 m										
Size of column	=	0.45 x		0.23 m								
Total load:												
Due to slab	=	6	x	5.425	x	3.08	x	0.623			=	62.41 t
Wall	=	2	x	0.115	x	11.59	x	16.7			=	44.49 t
Roof beams	=	2.5	x	0.23	x	0.3	x	0.579	x	6	=	0.6 t
Plinth beam	=	2.5	x	0.23	x	0.579	x	0.579	x	1	=	0.193 t
Self wt	=	2.5	x	0.45	x	0.23	x	21.5			=	5.563 t
												113.3 t
						Total					=	**113.3 t**
Using size of column to be	=	**450**	**X**	**230 mm**								
With 8/32 Rods, Ast	=	8	x	803.8	+	0	x	113	=	6431 sqmm		
Capacity of column	=	450	x	230	x	6	+	6431	x	190		
	=	**184.3 t**		>		**170 t**						
Minimum Reinforcement	=	0.008	x	45	x	23	=	8.28 sqcm	<	64.31 sqcm		
% of Reinforcement	=	6431	/	45	x	23	=	6.213	<	4		

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HARMONY

Design of foundation using M25 grade concrete.

SPAN	=	3275 mm	Column Size	=	300 X	450							
FOUNDATION SIZE	=	18.25	X	12.50 Ft									
Column size	=	300	x	450 mm									
Soil pressure	=	13.00	t /sq.m		188.709								
Assuming size of fodn. to be		5.56	x	3.81 =	21.19 sqm								
Depth of footing at face	=	900 mm											
Depth of footing at end	=	200 mm			1680.0								
Effective depth	=	845 mm											
Cantilever B.M	=	15.00	x	1.68000	x	1.680	X	0.50					
	=	21.17	t - m										
Mu / (bdd fck)	=	21.17	x	1.5	100000	/(	250.00	x	84.50	x	84.5	x	100)
	=	0.018											
Area of steel required		=	0.02668	x	84.50	x	250.00	x	100.00	/	4200		
		=	13.42 sq-cm.										
Use 16 tor rods at	**150 crs**		**Ast**	**=**	**201.0**	**/**	**15.00**	**=**	**13.40 sq-cm.**	**>**	**13.42 sq-cm.**		

Shear force on footing

Shear to be checked at distance effective depth from column face

Shear force	=	13	x	0.835 =	10.86 t				
Shear stress	=	10.86	x	1.50 x	10000 /(	1000.00	x	515)	
	=	0.316 N/sq-mm.							
100 As / bd	=	13.40 /		51.49					
	=	0.26017		0.010174		0.36			
Permissible shear stress	=	**0.433 N/sq-mm.**		**<**	**0.430 N/sq-mm.**				

RESULT :

Foundation size	=	5563	x	3810 m		18.25	X	12.50 Ft
Overall depth	=	**200 +**		**700 =**	**900 mm**			
Reinforcement	=	**Use 16 tor rods at**			**150 crs**			

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DESIGN OF FOUNDATION BEAM

Span considered	=	3.353 m								
Assuming beam size to be		450 x	1200 mm							
Load /m :										
Self wt. of beam	=	2.5 x	0.45	x	0	=	0.00 t			
Slab	=	13.00 x	3.353			=	43.59 t			
							43.59 t			
Effective Depth of beam	=	1200 -	50	-	10	=	1140 mm			
Negative B.M.	=	43.59 x	3.353	x	3.353	x	0.100 =	49.00 t-m		
Mu/ fck bdd	=	49.00 x	1	x	100000		=	0.004		
		250 x	381	x	114.00	x	114.00			
Area of steel required	=	0.00574 x	250	x	381.00	x	114.00			
			5500							
	=	**11.33 sqcm**								
Use 4/20 dia hsd rods,	**at bottom**		**Ast**	**=**	**12.56 sqcm**		**>**	**11.33 sqcm**		
Minimum reinforcement	=	0.85 x	45	x	114.00	=	10.51 sqcm			
			415							
Positive B.M.	=	43.59 x	3.353	x	3.353	x	0.100 =	49.00 t-m		
Mu/ fck bdd	=	49.00 x	1.5	x	100000		=	0.006		
		250 x	381	x	114.00	x	114.00			
Area of steel required	=	0.00861 x	250	x	381.00	x	114.00			
			5000							
	=	**18.70 sqcm**								
Use 7/25 dia hsd rods,	**at bottom**		**Ast**	**=**	**34.3438 sqcm**		**>**	**18.70 sqcm**		
Cantilever B.M.	=	43.59 x	1.524	x	0.500	x	1.524 =	50.62 t-m		
Mu/ fck bdd	=	50.62 x	1.5	x	100000		=	0.006		
		250 x	381	x	114.00	x	114.00			
Area of steel required	=	0.00889 x	250	x	381.00	x	114.00			
			4200							
	=	22.99 sqcm								
Use 7/25 dia hsd rods,			**Ast**	**=**	**34.3438 sqcm**		**>**	**22.99 sqcm**		
Shear force	=	43.59 x	3.353	/	2.00	=	73.07 t			
Shear stress	=	73.07 x	1.50	x	10000	/	450 x	1140 =	2.14 N/sqmm	
100As/ bd	=	100 x	34.34	/	45.00	x	114.00 =	0.67		
Permissible shear stress	=	0.534 N/sqmm		<	2.14 N/sqmm				0.50	0.48
Unbalanced shear stress	=	2.14 -	0.53423	=	1.60 N/sqmm				0.75	0.56
Unbalanced shear force	=	1.60 x	450	x	1140 /	10000 =	82.20 t		0.25	0.08
Using 10 dia HYSD 4 legged stirrups at			**100**	**crs**					0.32	
Shear Capacity	=	0.87 x	500	x	314.00 x	1140 /	100 x 10000			
	=	155.7 t	>	82 t						

RESULT :

Beam section = 450 X 1200 mm
Use 4/20 dia hsd rods, at top
Use 7/25 dia hsd rods, at bottom
Using 10 dia HYSD 4 legged stirrups at 100 crs onwards

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DESIGN OF PLINTH BEAM

Span considered	=	5.525 m									
Assuming beam size to be		230 x	450	mm							
Load /m :											
Self wt. of beam	=	2.5 x	0.23	x	0.45	=	0.26 t				
Wall	=	2.0 x	0.23	x	2.400	=	1.10 t				
							1.36 t				
Effective Depth of beam	=	450 -	25	-	8	=	417 mm				
Design negative B.M	=	1.36 x	5.525	x	5.525	x	0.100 =	4.16 t-m			
Mu/ fck bdd	=	4.16 x	1.5	x	100000		=	0.062			
		250 x	23	x	41.70	x	41.70				
Ast required	=	0.0905 x	250	x	23.00	x	41.70 =	4.34 sqcm			
			5000								
Use 2/12 + 2/16 dia hsd rods,			**Ast**	=	**8.54 sqcm**		>	**4.34 sqcm**			
Design Positive B.M	=	1.36 x	5.525	x	5.525	x	0.08333 =	3.47 t-m			
Mu/ fck bdd	=	3.47 x	1.5	x	100000		=	0.052			
		250 x	23	x	41.70	x	41.70				
Ast required	=	0.0754 x	250	x	23.00	x	41.70 =	4.30 sqcm			
			4200								
Use 2/12 + 2/16 dia hsd rods,			**Ast**	=	**6.28 sqcm**		>	**4.30 sqcm**			
Shear force	=	1.36 x	1.000	/	1.00	=	1.36 t				
Shear stress	=	1.36 x	1.00	x	10000	/	230 x	417 =	0.14 N/sqmm		
100As/ bd	=	100 x	8.54	/	23.00	x	41.70 =	0.89			
Permissible shear stress	=	0.44 N/sqmm		<	0.14 N/sqmm						
Unbalanced shear stress	=	0.14 -	0.442	=	-0.30 N/sqmm						
Unbalanced shear force	=	-0.30 x	230	x	417	/	10000 =	-2.88 t			
Using 8 dia TMT 2 legged stirrups at			100	crs							
Shear Capacity	=	0.87 x	415	x	100.48	x	417 /	100 x	10000		
	=	15.1 t	>	-3 t							

RESULT :

Beam section = 230 X 450 mm
Use 2/12 + 2/16 dia hsd rods, at top
Use 2/12 + 2/16 dia hsd rods, at bottom
Using 8 dia TMT 2 legged stirrups at **100 crs**

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DESIGN OF PLINTH BEAM

Span considered	=	8.041	m								
Assuming beam size to be		230	x	450	mm						
Load /m :											
Self wt. of beam	=	2.5	x	0.23	x	0.45	=	0.26	t		
Wall	=	2.0	x	0.23	x	1.500	=	0.69	t		
								0.95	t		
Effective Depth of beam	=	450	-	25	-	8	=	417	mm		
Design negative B.M	=	0.95	x	8.041	x	8.041	x	0.100	=	6.14	t-m
	=	6.14	x	1.5	x	100000			=	0.092	
		250	x	23	x	41.70	x	41.70			
Ast required	=	0.1335	x	250	x	23.00	x	41.70	=	6.40	sqcm
				5000							
Use 2/12+4/16 dia hsd rods,				**Ast**	=	**10.30**	**sqcm**		>	**6.40**	**sqcm**
Design Positive B.M	=	0.95	x	8.041	x	8.041	x	0.08333	=	5.11	t-m
Mu/ fck bdd	=	5.11	x	1.5	x	100000			=	0.077	
		250	x	23	x	41.70	x	41.70			
Ast required	=	0.1112	x	250	x	23.00	x	41.70	=	6.35	sqcm
				4200							
Use 2/12+4/16 dia hsd rods,				**Ast**	=	**10.30**	**sqcm**		>	**6.35**	**sqcm**
Shear force	=	0.95	x	8.041	/	2.00	=	3.81	t		
Shear stress	=	3.81	x	1.50	x	10000	/	230	x	417 =	0.60 N/sqmm
100As/ bd	=	100	x	10.30	/	23.00	x	41.70	=	1.07	
Permissible shear stress	=	0.44	N/sqmm		<	0.60	N/sqmm				
Unbalanced shear stress	=	0.60	-	0.442	=	0.15	N/sqmm				
Unbalanced shear force	=	0.15	x	230	x	417	/	10000	=	1.48	t
Using 8 dia TMT 2 legged stirrups at				100	crs						
Shear Capacity	=	0.87	x	415	x	100.48	x	417	/	100 x	10000
	=	15.1	t	>	1	t					

RESULT :

Beam section = **230 X 450 mm**
Use 2/12+4/16 dia hsd rods, at top
Use 2/12+4/16 dia hsd rods, at bottom
Using 8 dia TMT 2 legged stirrups at **100 crs**

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DESIGN OF PLINTH BEAM

Span considered	=	4.382 m								
Assuming beam size to be		230 x	450	mm						
Load /m :										
Self wt. of beam	=	2.5 x	0.23	x	0.45	=	0.26 t			
Wall	=	2.0 x	0.23	x	3.900	=	1.79 t			
							2.05 t			
Effective Depth of beam	=	450 -	25	-	8	=	417 mm			
Design negative B.M	=	2.05 x	4.382	x	4.382	x	0.083 =	3.28 t-m		
Mu/ fck bdd	=	3.28 x	1.5	x	100000		=	0.049		
		250 x	23	x	41.70	x	41.70			
Ast required	=	0.0714 x	250	x	23.00	x	41.70 =	4.08 sqcm		
			4200							
Use 2/12+1/16 dia hsd rods,			**Ast**	**=**	**4.27 sqcm**		**>**	**4.08 sqcm**		
Design Positive B.M	=	2.05 x	4.382	x	4.382	x	0.08333 =	3.28 t-m		
Mu/ fck bdd	=	3.28 x	1.5	x	100000		=	0.049		
		250 x	23	x	41.70	x	41.70			
Ast required	=	0.0714 x	250	x	23.00	x	41.70 =	4.08 sqcm		
			4200							
Use 2/12+1/16 dia hsd rods,			**Ast**	**=**	**4.27 sqcm**		**>**	**4.08 sqcm**		
Shear force	=	2.05 x	4.382	/	2.00	=	4.50 t			
Shear stress	=	4.50 x	1.50	x	10000	/	230 x	417 =	0.70 N/sqmm	
100As/ bd	=	100 x	4.27	/	23.00	x	41.70 =	0.45		
Permissible shear stress	=	0.44 N/sqmm		<	0.70 N/sqmm					
Unbalanced shear stress	=	0.70 -	0.442	=	0.26 N/sqmm					
Unbalanced shear force	=	0.26 x	230	x	417	/	10000 =	2.51 t		
Using 8 dia TMT 2 legged stirrups at			150	crs						
Shear Capacity	=	0.87 x	415	x	100.48	x	417 /	150 x	10000	
	=	10.1 t	>	3	t					

RESULT :

Beam section = 230 X 450 mm
Use 2/12+1/16 dia hsd rods, at top
Use 2/12+1/16 dia hsd rods, at bottom
Using 8 dia TMT 2 legged stirrups at **150 crs**

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DESIGN OF ROOF BEAM

Span considered	=	5.525 m								
Assuming beam size to be		230 x	450	mm	2.76225					
Load /m :					7.63003					
Self wt. of beam	=	2.5 x	0.23	x	0.325	=	0.19 t			
Wall	=	2.0 x	0.23	x	2.591	=	1.19 t			
Slab	=	0.71 x	2.40	/	1.000	=	1.71 t			
							3.09 t			
Effective Depth of beam	=	450 -	25	-	8	=	417 mm			
Breadth of flange	=	3867 / 12 +	230	+	3	x	150			
	=	1002 mm								
Design negative B.M	=	3.09 x	5.525	x	5.525	x	0.100 =	9.43 t-m		
Mu/ fck bdd	=	9.43 x	1.5	x	100000		=	0.141		
		250 x	23	x	41.70	x	41.70			
Ast required	=	0.2121 x	250	x	23.00	x	41.70 =	10.17 sqcm		
			5000							
Use 6/16 dia hsd rods,			**Ast**	=	**12.06 sqcm**		>	**10.17 sqcm**		
Design Positive B.M	=	3.09 x	5.525	x	5.525	x	0.1 =	9.43 t-m		
Mu/ fck bdd	=	9.43 x	1.5	x	100000		=	0.041		
		200 x	100.2263	x	41.70	x	41.70			
Ast required	=	0.0588 x	200	x	100.23	x	41.70 =	9.83 sqcm		
			5000							
Use 6/16 dia hsd rods,			**Ast**	=	**12.06 sqcm**		>	**9.83 sqcm**		
Shear force	=	3.09 x	5.525	/	2.00	=	8.53 t			
Shear stress	=	8.53 x	1.50	x	10000	/	230 x	417 =	1.33 N/sqmm	
100As/ bd	=	100 x	12.06	/	23.00	x	41.70 =	1.26		
Permissible shear stress	=	0.53 N/sqmm		<	1.33 N/sqmm					
Unbalanced shear stress	=	1.33 -	0.525	=	0.81 N/sqmm					
Unbalanced shear force	=	0.81 x	230	x	417	/	10000 =	7.76 t		
Using 8 dia TMT 2 legged stirrups at			150	crs						
Shear Capacity	=	0.87 x	500	x	100.48	x	417 /	150 x	10000	
	=	12.2 t	>	8	t					

RESULT :

Beam section = **230 X 450 mm**
Use 6/16 dia hsd rods, at top
Use 6/16 dia hsd rods, at bottom
Using 8 dia TMT 2 legged stirrups at **150 crs**

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DESIGN OF ROOF BEAM

Span considered	=	7.584 m								
Assuming beam size to be		230 x	450	mm	3.792069					
Load /m :					14.3798					
Self wt. of beam	=	2.5 x	0.23	x	0.325	=	0.19 t			
Wall	=	2.0 x	0.23	x	2.591	=	1.19 t			
Slab	=	0.91 x	2.40	/	1.000	=	2.19 t			
							3.57 t			
Effective Depth of beam	=	450 -	25	-	8	=	417 mm			
Breadth of flange	=	5309 / 12 +	230	+	3	x	150			
	=	1122 mm								
Design negative B.M	=	3.57 x	7.584	x	7.584	x	0.100 =	20.53 t-m		
Mu/ fck bdd	=	10.00 x	1	x	100000		=	0.100		
		250 x	23	x	41.70	x	41.70			
Ast required	=	0.1450 x	250 / 5000	x	23.00	x	41.70 =	6.95 sqcm		
Use 2/16+4/32 dia hsd rods,			**Ast**	=	**25.91 sqcm**		>	**6.95 sqcm**		
Design Positive B.M	=	3.57 x	7.584	x	7.584	x	0.1 =	20.53 t-m		
Mu/ fck bdd	=	20.53 x	1.5	x	100000		=	0.063		
		250 x	112.2408	x	41.70	x	41.70			
Ast required	=	0.0915 x	250 / 5000	x	112.24	x	41.70 =	21.41 sqcm		
Use 2/16+4/25 dia hsd rods,			**Ast**	=	**23.64 sqcm**		>	**21.41 sqcm**		
Shear force	=	3.57 x	7.584	/	2.00	=	13.53 t			
Shear stress	=	13.53 x	1.50	x	10000	/	230 x	417 =	2.12 N/sqmm	
100As/ bd	=	100 x	25.91	/	23.00	x	41.70 =	2.70		
Permissible shear stress	=	0.75 N/sqmm		<	2.12 N/sqmm					
Unbalanced shear stress	=	2.12 -	0.75	=	1.37 N/sqmm					
Unbalanced shear force	=	1.37 x	230	x	417	/	10000 =	13.11 t		
Using 8 dia TMT 2 legged stirrups at			125	crs						
Shear Capacity	=	0.87 x	500	x	100.48	x	417 /	125 x	10000	
	=	14.6 t	>	13	t					

RESULT :

Beam section	=	**230 X 450 mm**
Use 2/16+4/32 dia hsd rods,		**at top**
Use 2/16+4/25 dia hsd rods,		**at bottom**
Using 8 dia TMT 2 legged stirrups at		**125 crs**

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DESIGN OF ROOF BEAM

Span considered	=	4.382 m									
Assuming beam size to be		230 x	450	mm	2.19075						
Load /m :					4.79939						
Self wt. of beam	=	2.5 x	0.23	x	0.325	=	0.19 t				
Wall	=	2.0 x	0.23	x	3.150	=	1.45 t				
Slab	=	0.91 x	4.19	/	1.000	=	3.82 t				
							5.46 t				
Effective Depth of beam	=	450 -	25	-	8	=	417 mm				
Breadth of flange	=	3067 / 12 +	230	+	3	x	150				
	=	936 mm									
Design negative B.M	=	5.46 x	4.382	x	4.382	x	0.083	=	8.73 t-m		
Mu/ fck bdd	=	8.73 /	1.5	x	100000			=	0.151		
		250 x	20	x	41.70	x	41.70				
Ast required	=	0.2260 x	250 / 5000	x	20.00	x	41.70	=	9.42 sqcm		
Use 2/25 + 6/32 dia hsd rods,			**Ast**	=	**58.04 sqcm**			>	**9.42 sqcm**		
Design Positive B.M	=	5.46 x	4.382	x	4.382	x	0.1	=	10.48 t-m		
Mu/ fck bdd	=	10.48 /	1.5	x	100000			=	0.039		
		250 x	93.55875	x	41.70	x	41.70				
Ast required	=	0.0560 x	250 / 4200	x	93.56	x	41.70	=	13.02 sqcm		
Use 2/25 + 6/32 dia hsd rods,			**Ast**	=	**58.04 sqcm**			>	**13.02 sqcm**		
Shear force	=	5.46 x	4.382	/	2.00	=	11.96 t				
Shear stress	=	11.96 x	1.50	x	10000	/	230	x	417 =	1.87 N/sqmm	
100As/ bd	=	100 x	58.04	/	23.00	x	41.70	=	6.05		
Permissible shear stress	=	0.53 N/sqmm		<	1.87 N/sqmm						
Unbalanced shear stress	=	1.87 -	0.525	=	1.35 N/sqmm						
Unbalanced shear force	=	1.35 x	230	x	417	/	10000 =		12.90 t		
Using 8 dia TMT 2 legged stirrups at			150	crs							
Shear Capacity	=	0.87 x	415	x	100.48	x	417 /		150 x	10000	
	=	10.1 t	>	13	t						

RESULT :

Beam section = **230 X 450 mm**

Use 2/25 + 6/32 dia hsd rods, at top

Use 2/25 + 6/32 dia hsd rods, at bottom

Using 8 dia TMT 2 legged stirrups at **150 crs**

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ROOF SLAB DESIGN

LOAD/ m2

Clear short span	=	3950	mm		3.95						
	=	5220	mm		5.22						
Ly / Lx	=	1.3215		<	1.50	DESIGN AS TWO WAY SLAB					
Slab Thickness Assumed	=	125	mm								
Self weight of slab	=	2.4	x	0.125	=	0.3	t				
LIVE LOAD	=				=	0.50	t				
Floor finish	=	0.1	x	2.00	=	0.20	t				
				Total	=	1.000	or	**1.00**	t		
Effective Depth of slab	=	125	-	25	-	4	=	96	mm		
Effective short span	=	3950	+	96	=	4046	mm				
Effective long span	=	5220	+	96	=	5316	mm				

Three edges discontinuous, one short edge continuous

B.M. due to UDL

Negative short span B.M	=	0.054	x	4.046	x	4.046	x	1.00	=	0.884	m.t		
positive short span B.M	=	0.076	x	4.046	x	4.046	x	1.00	=	1.244	m.t		
Negative long span B.M	=	0.057	x	4.046	x	4.046	x	1.00	=	0.933	m.t		
positive long span B.M	=	0.043	x	4.046	x	4.046	x	1.00	=	0.704	m.t		

Short span

Mu / bdd	=	0.88	x	1.00	x	100000			=	0.98			
		9.807	x	100	x	9.60	x	9.6	=				
Ast Required	=	0.2400	x	1.00	x	100.00	x	9.60	=	2.3	sqcm		
					100								
Use 8 dia hsd rods at	**150**	**crs**	**Ast**		**=**	**50.24**	**/**	**15.00**	**=**	**3.3**	**Sqcm**	**>**	**2.3 Sqcm**
Mu / bdd	=	1.24	x	1.00	x	100000			=	1.38			
		9.807	x	100	x	9.60	x	9.6	=				
Ast Required	=	0.2400	x	1.00	x	100.00	x	9.60	=	2.3	sqcm		
					100								
Use 8 dia hsd rods at	**150**	**crs**	**Ast**		**=**	**50.24**	**/**	**15.00**	**=**	**3.3**	**Sqcm**	**>**	**2.3 Sqcm**

Long span

Mu / bdd	=	0.93	x	1.50	x	100000			=	1.84			
		9.807	x	100.00	x	8.80	x	8.8	=				
Ast Required	=	0.3250	x	1.00	x	100.00	x	8.80	=	2.9	sqcm		
					100								
Use 8 dia hsd rods at	**150**	**crs**	**Ast**		**=**	**50.24**	**/**	**15.00**	**=**	**3.3**	**Sqcm**	**>**	**2.9 Sqcm**
Mu / bdd	=	0.70	x	1.50	x	100000			=	1.39			
		9.807	x	100.00	x	8.80	x	8.8	=				
Ast Required	=	0.2430	x	1.00	x	100.00	x	8.80	=	2.1	sqcm		
					100								
Use 8 dia hsd rods at	**150**	**crs**	**Ast**		**=**	**50.24**	**/**	**15.00**	**=**	**3.3**	**Sqcm**	**>**	**2.1 Sqcm**

RESULT :

Use Thickness of Slab	=	**125**	**mm**	
Main rods	=	**Use 8 dia hsd rods at**	**150**	**crs**
Distributors	=	**Use 8 dia hsd rods at**	**150**	**crs**

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LOAD/ m2

Clear short span	=	3950	mm		3.95						
	=	10475	mm		10.48						
Ly / Lx	=	2.6519		<	1.00	**DESIGN AS One WAY SLAB**					
Slab Thickness Assumed	=	125	mm								
Self weight of slab	=	2.4		x	0.115	=	0.276	t			
LIVE LOAD	=					=	0.75	t			
Floor finish	=	0.1		x	2.00	=	0.20	t			
					Total	=	1.226	or	**1.25**	t	
Effective Depth of slab	=	115		-	20	-	5	=	90	mm	
Effective short span	=	3950		+	90	=	4040	mm			
Effective long span	=	10475		+	90	=	10565	mm			

Two long edges discontinuous

B.M. due to UDL

Negative short span B.M	=	0.100	x	4.040	x	4.04	x	1.25	=	2.04	m.t		
positive short span B.M	=	0.056	x	4.040	x	4.04	x	1.25	=	1.143	m.t		
Negative long span B.M	=	0.000	x	4.040	x	4.04	x	1.25	=	0	m.t		
positive long span B.M	=	0.056	x	4.040	x	4.04	x	1.25	=	1.143	m.t		

Short span

Mu / bdd	=	2.04	x	1.00	x	100000			=	2.57			
		9.807	x	100	x	9.00	x	9.0	=				
Ast Required	=	0.3600	x	1.00	x	100.00	x	9.00	=	3.2	sqcm		
					100								
Use 8 dia hsd rods at	**150**	**crs**	**Ast**		**=**	**50.24**	**/**	**15.00**	**=**	**3.3**	**Sqcm**	**>**	**3.2 Sqcm**
Mu / bdd	=	1.14	x	1.00	x	100000			=	1.44			
		9.807	x	100	x	9.00	x	9.0	=				
Ast Required	=	0.2590	x	1.00	x	100.00	x	9.00	=	2.3	sqcm		
					100								
Use 8 dia hsd rods at	**150**	**crs**	**Ast**		**=**	**50.24**	**/**	**15.00**	**=**	**3.3**	**Sqcm**	**>**	**2.3 Sqcm**

Long span

Mu / bdd	=	0.00	x	1.50	x	100000			=	0.00			
		9.807	x	100.00	x	8.20	x	8.2	=				
Ast Required	=	0.2520	x	1.00	x	100.00	x	8.20	=	2.1	sqcm		
					100								
Use 8 dia hsd rods at	**150**	**crs**	**Ast**		**=**	**50.24**	**/**	**15.00**	**=**	**3.3**	**Sqcm**	**>**	**2.1 Sqcm**
Mu / bdd	=	1.14	x	1.50	x	100000			=	2.60			
		9.807	x	100.00	x	8.20	x	8.2	=				
Ast Required	=	0.1950	x	1.00	x	100.00	x	8.20	=	1.6	sqcm		
					100								
Use 8 dia hsd rods at	**150**	**crs**	**Ast**		**=**	**50.24**	**/**	**15.00**	**=**	**3.3**	**Sqcm**	**>**	**1.6 Sqcm**

RESULT :

Use Thickness of Slab	=	*125 mm*		
Main rods	=	**Use 8 dia hsd rods at**	**150**	**crs**
Distributors	=	**Use 8 dia hsd rods at**	**150**	**crs**

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LOAD/ m2

Clear short span	=	3.77	mm		0.00							
	=	6900	mm		6.90							
Ly / Lx	=	1830.2		<	1.20	**DESIGN AS TWO WAY SLAB**						
Slab Thickness Assumed	=	125	mm									
Self weight of slab	=	2.4		x	0.175	=	0.42	t				
LIVE LOAD	=					=	0.20	t				
Floor finish	=	0.05		x	2.00	=	0.10	t				
					Total	=	0.720	or	**0.72**	t		
Effective Depth of slab	=	175		-	20	-	5	=	150	mm		
Effective short span	=	4		+	150	=	154	mm				
Effective long span	=	6900		+	150	=	7050	mm				

one long edges continuous

B.M. due to UDL

Negative short span B.M	=	0.071	x		0.154	x	0.15377	x	0.72	=	0.001	m.t
positive short span B.M	=	0.053	x		0.154	x	0.15377	x	0.72	=	9E-04	m.t
Negative long span B.M	=	0.000	x		0.154	x	0.15377	x	0.72	=	0	m.t
positive long span B.M	=	0.043	x		0.154	x	0.15377	x	0.72	=	7E-04	m.t

Short span

Mu / bdd	=	0.00	x		1.50	x	100000			=	0.00				
		9.807	x		100	x	15.00	x	15.0	=					
Ast Required	=	0.3590	x		1.00	x	100.00	x	15.00	=	5.4	sqcm			
						100									
Use 10 dia hsd rods at	**150**	**crs**	**Ast**			=	**78.50**	**/**	**15.00**	=	**5.2**	**Sqcm**	**>**	**5.4**	**Sqcm**
Mu / bdd	=	0.00	x		1.50	x	100000			=	0.00				
		9.807	x		100	x	15.00	x	15.0	=					
Ast Required	=	0.2590	x		1.00	x	100.00	x	15.00	=	3.9	sqcm			
						100									
Use 8 dia hsd rods at	**150**	**crs**	**Ast**			=	**50.24**	**/**	**15.00**	=	**3.3**	**Sqcm**	**>**	**3.9**	**Sqcm**

Long span

Mu / bdd	=	0.00	x		1.50	x	100000			=	0.00				
		9.807	x		100.00	x	14.20	x	14.2	=					
Ast Required	=	0.2520	x		1.00	x	100.00	x	14.20	=	3.6	sqcm			
						100									
Use 8 dia hsd rods at	**150**	**crs**	**Ast**			=	**50.24**	**/**	**15.00**	=	**3.3**	**Sqcm**	**>**	**3.6**	**Sqcm**
Mu / bdd	=	0.00	x		1.50	x	100000			=	0.00				
		9.807	x		100.00	x	14.20	x	14.2	=					
Ast Required	=	0.1950	x		1.00	x	100.00	x	14.20	=	2.8	sqcm			
						100									
Use 8 dia hsd rods at	**150**	**crs**	**Ast**			=	**50.24**	**/**	**15.00**	=	**3.3**	**Sqcm**	**>**	**2.8**	**Sqcm**

RESULT :

Use Thickness of Slab	=	125 mm		
Main rods	=	**Use 10 dia hsd rods at**	**150**	**crs**
Distributors	=	**Use 8 dia hsd rods at**	**150**	**crs**

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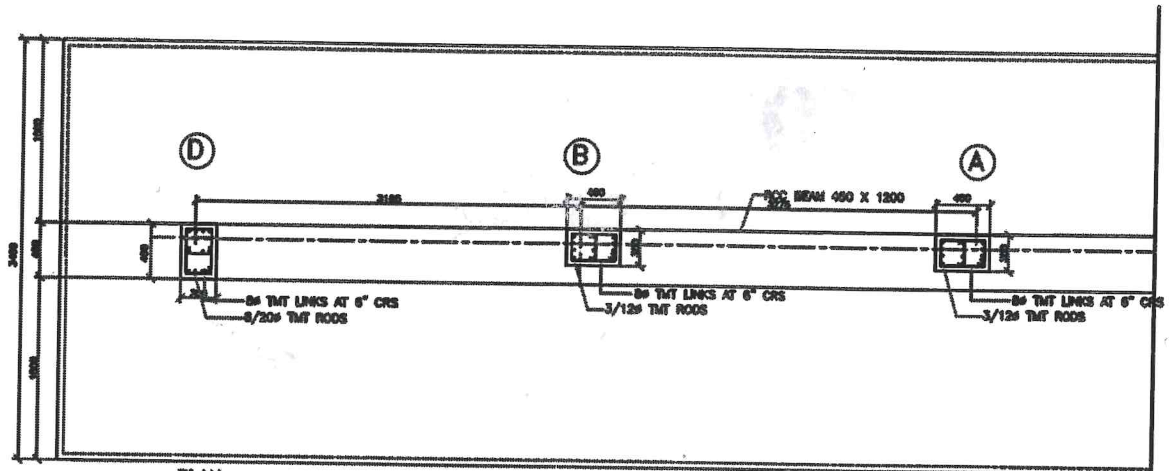
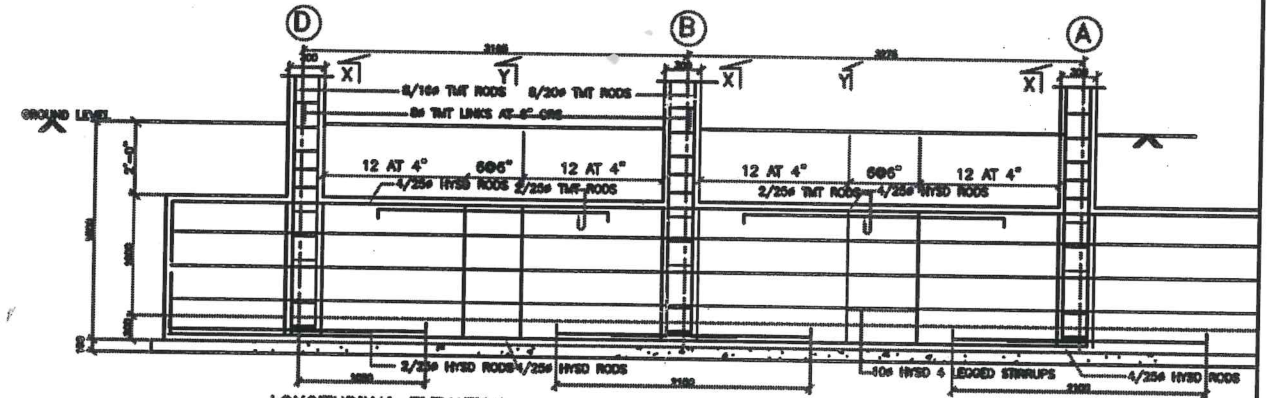
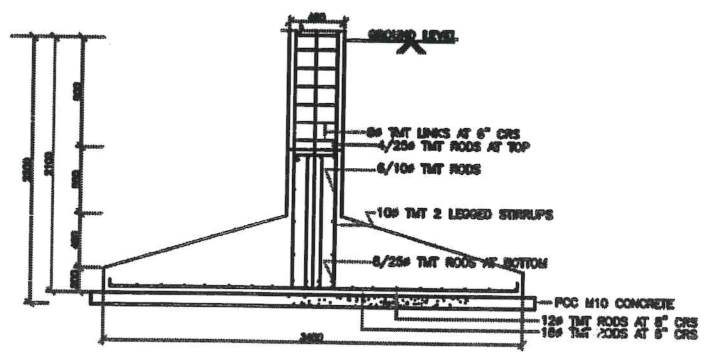
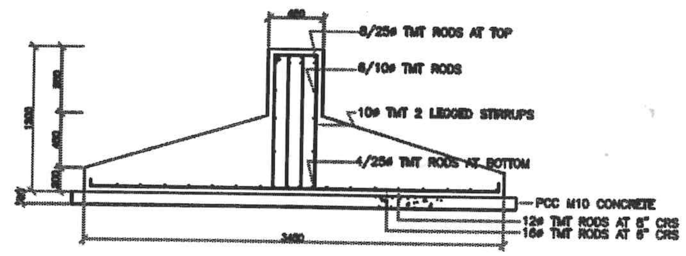




LONGITUDINAL ELEVATION



SECTION AT X



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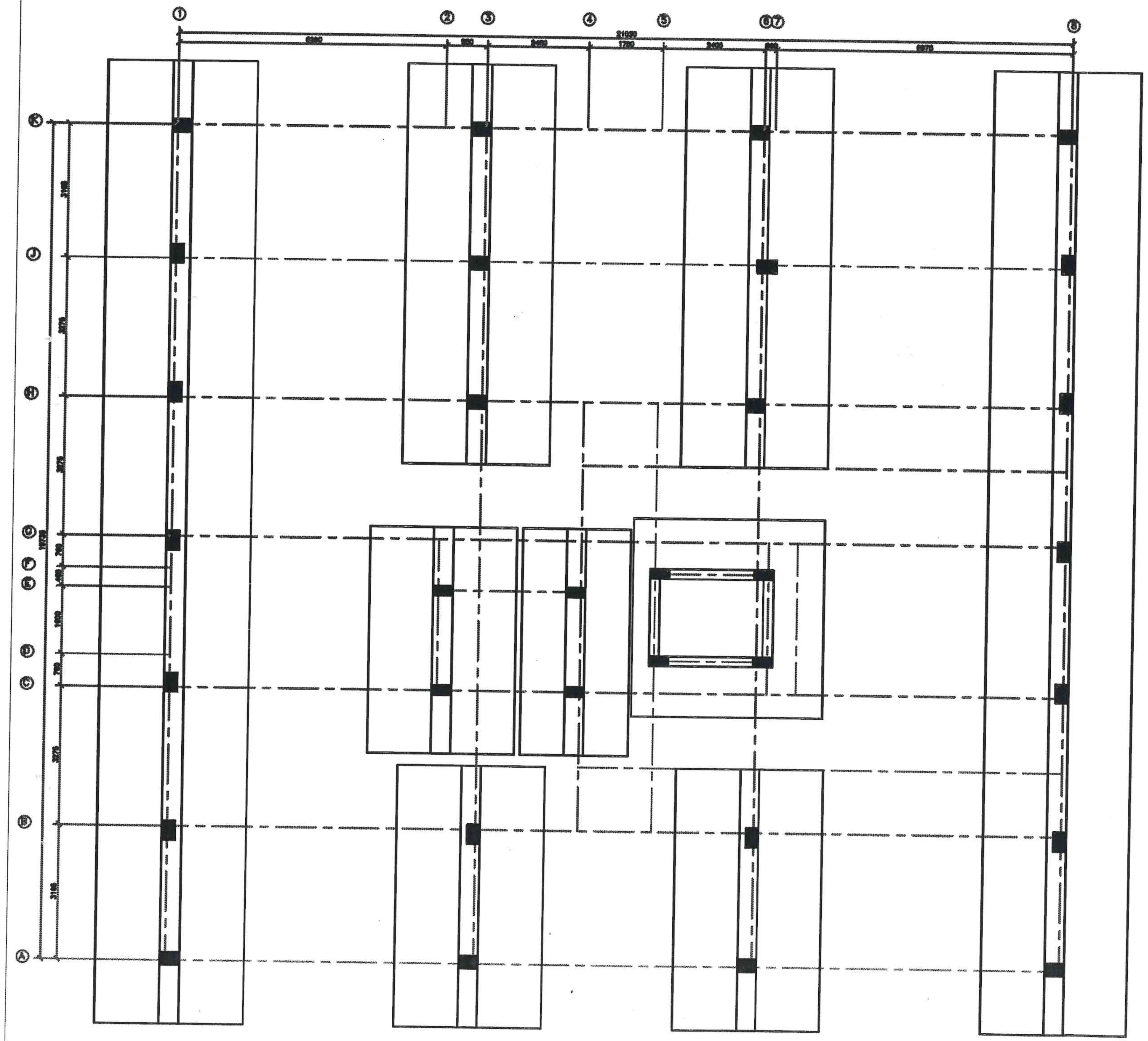

STRIP RAFT FOUNDATION LAYOUT

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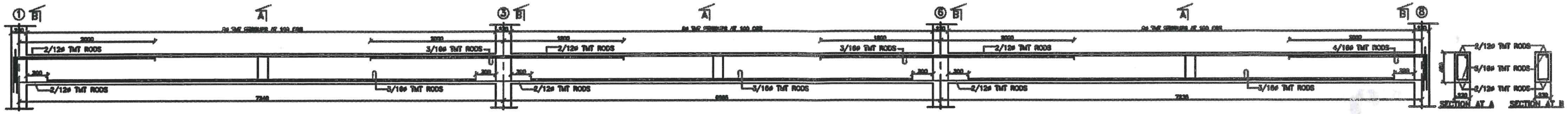
NOTES:

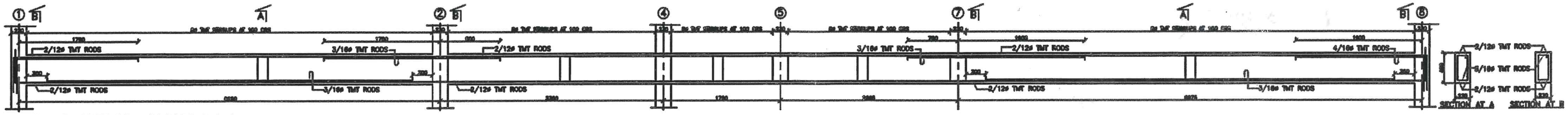
1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE STATED.
2. ALL RCC WORKS TO BE WITH M20 CONCRETE AND TO BE EXECUTED AS PER IS : 456 – 2000, USING 20mm GRADED GRANITE METAL. WATER CEMENT RATIO NOT EXCEEDING 0.45. HIGH YIELD STRENGTH DEFORMED BARS (TOR STEEL CONFORM TO IS 1786 – 2008 (Fe 500).
3. LAP LENGTH FOR ALL BARS TO BE 45 TIMES THE DIAMETER.
4. CONCRETE COVER FOR ALL MAIN RODS IN FOUNDATION AND PLINTH BEAMS TO BE 40 UNLESS OTHERWISE STATED.

ALT	DATE	DESCRIPTION	DRAWN	CHECKED	APPROVED
0	[illegible]	AS DRAWN			

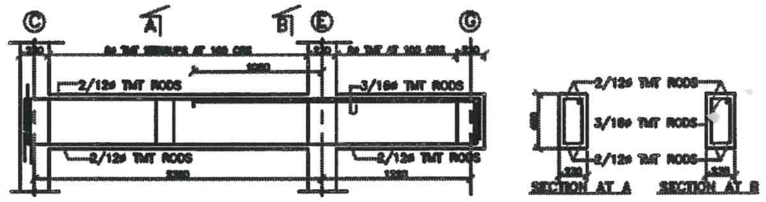
CONSULTANTS	MURUGU CONSULTANT [illegible]	
CLIENT	M/S HORMONY HOMES [illegible]	PROPOSED CONSTRUCTION OF RESIDENTIAL BUILDING [illegible] — LAYOUT AND RCC DETAILS OF FOUNDATION
ARCHITECT	[illegible]	SCALE : 1 : 50, 1 : 25
		DRG.No: MC-101/2025 SHEET 1



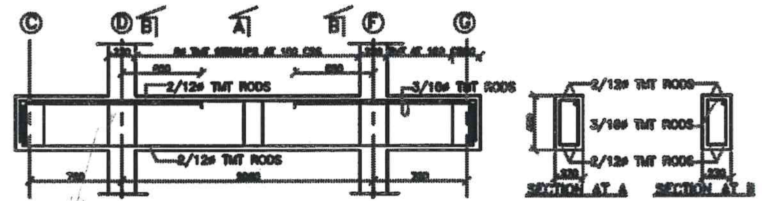
DETAILS OF PLINTH BEAM IN ROWS A, B, H, J & K



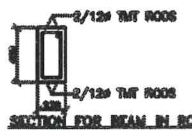
DETAILS OF PLINTH BEAM IN ROWS C & G



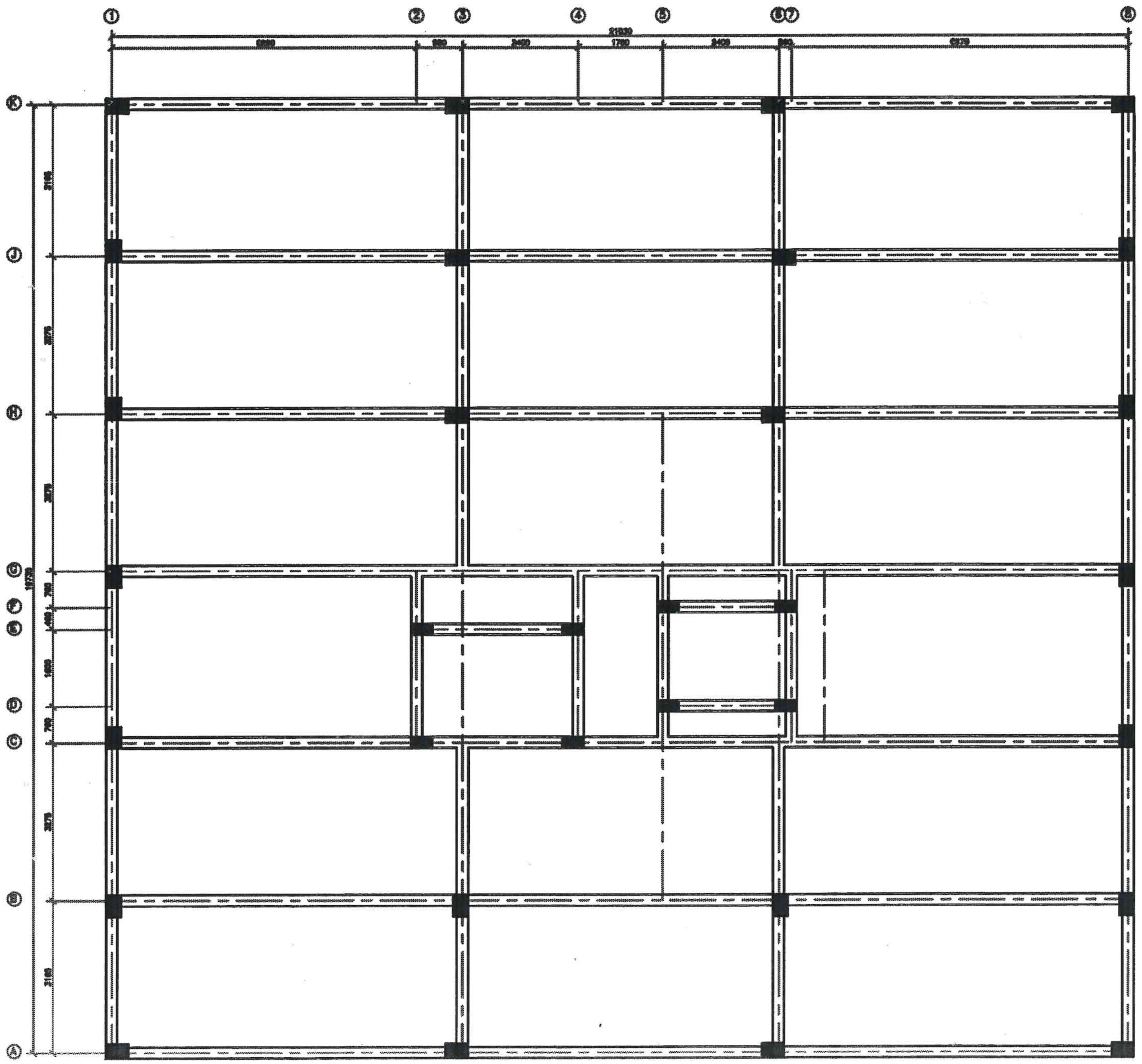
DETAILS OF PLINTH BEAM IN ROWS 2 & 4



DETAILS OF PLINTH BEAM IN ROWS 4 & 7



SECTION FOR BEAM IN ROWS 1, 3, 6 & 8



PLINTH BEAM LAYOUT

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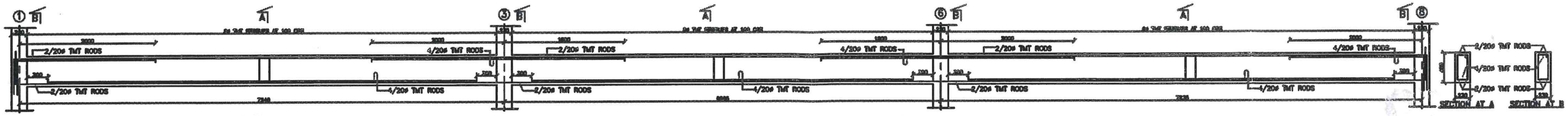
NOTES:

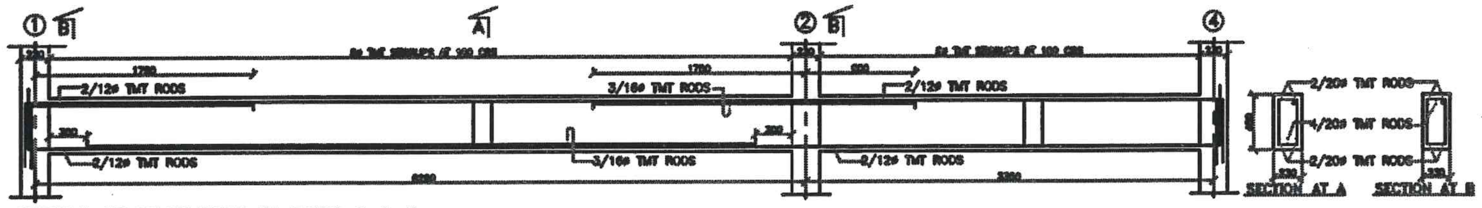
1. [illegible]
2. [illegible]
3. [illegible]
4. [illegible]

REV	DATE	DESCRIPTION	DRAWN	CHECKED	APPROVED
0	[illegible]	AS DRAWN			

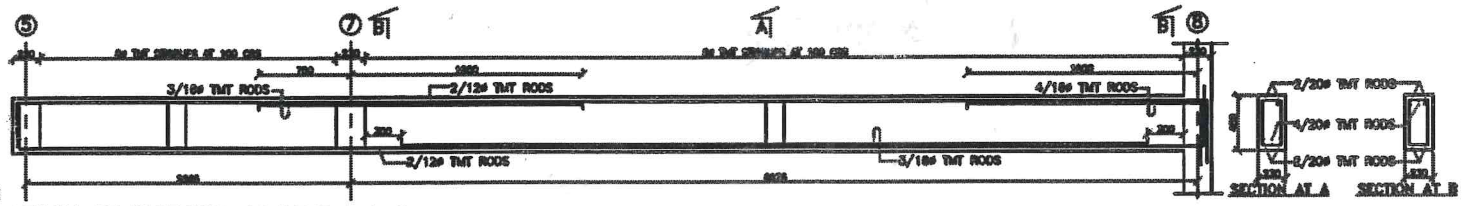
CONSULTANT	MURUGU CONSULTANT [illegible]	
CLIENT	M/S HORMONY HOMES [illegible]	PROPOSED CONSTRUCTION OF [illegible] — LAYOUT AND RCC DETAILS OF PLINTH BEAM
ARCHITECT	[illegible]	SCALE : 1 : 50, 1 : 25 — DWG.No: MC-101/2025 SHEET 2



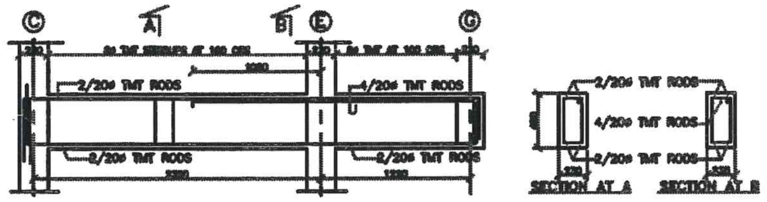
DETAILS OF ROOF BEAM IN ROWS A, B, J & K



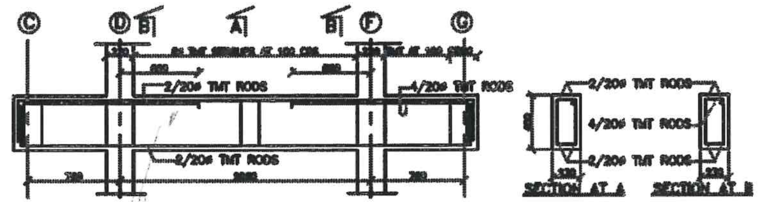
DETAILS OF ROOF BEAM IN ROWS C & G



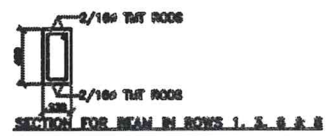
DETAILS OF ROOF BEAM IN ROWS C & G



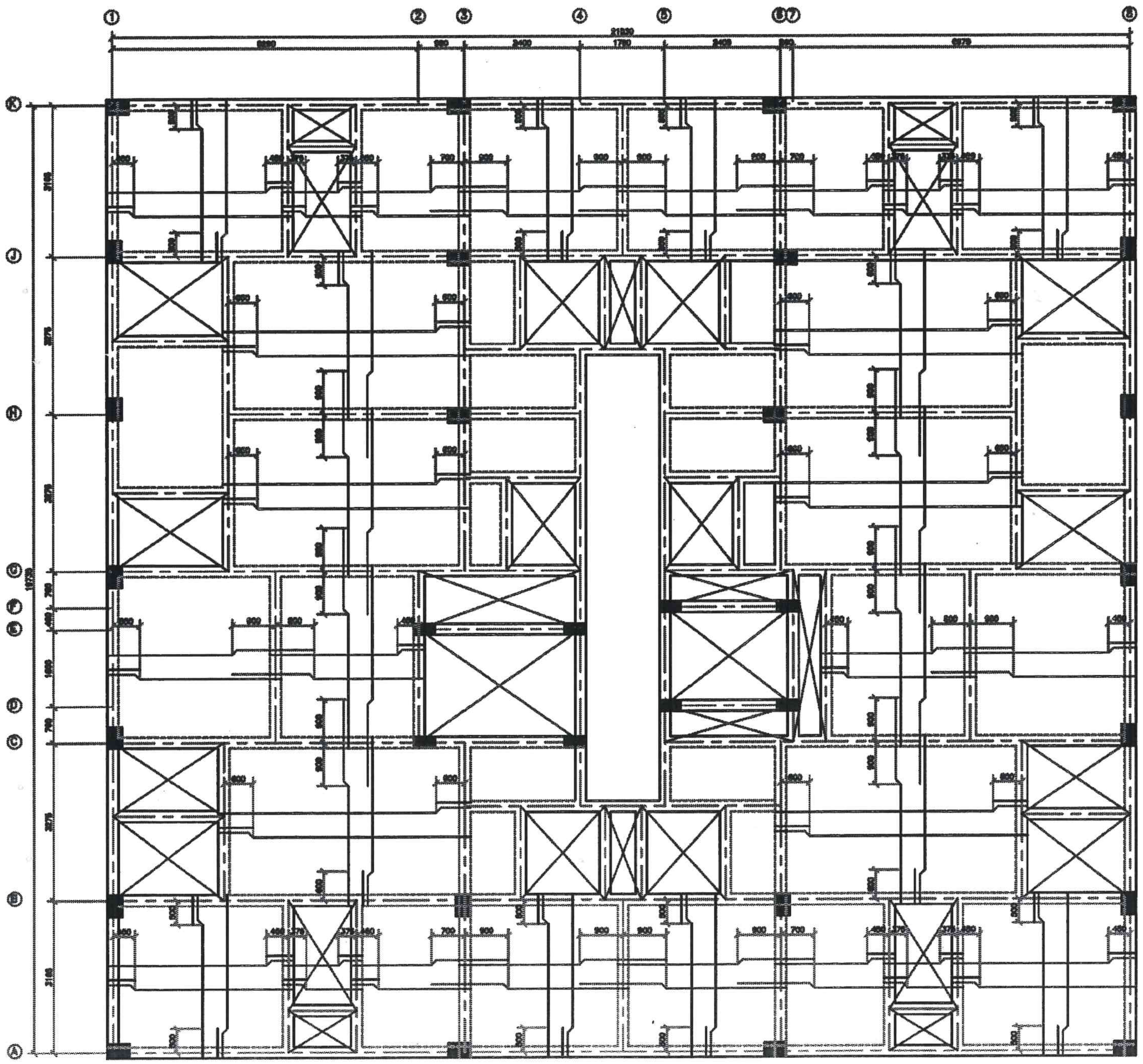
DETAILS OF ROOF BEAM IN ROWS 2 & 4



DETAILS OF ROOF BEAM IN ROWS 4 & 7



SECTION FOR BEAM IN ROWS 1, 3, 6 & 8



ROOF SLAB DETAILS 4.5" THICK

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NOTES:

1. [illegible]
2. [illegible]
3. [illegible]
4. [illegible]

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ALT	DATE	DESCRIPTION	DRAWN	CHECKED	APPROVED

MURUGU CONSULTANT

CLIENT: M/S HORMONY HOMES

LAYOUT AND RCC DETIALS ROOF BEAM & SLAB

DRG.No: MC-101/2025 SHEET 3