Verified RealEstate™

RE REGULATORY RECORD

RERA Document

The document as the regulator published it, reproduced in full behind this page.

Published for reference. The authority's own register is the operative record.

Verified RealEstate™
3/350/2 Mettukuppam,
OMR Thoraipakkam,
Chennai 600 097, India

hello@verified.realestate
+91 9996 12 9996
verified.realestate

HARMONY RESIDENCES PVT. LTD.

DESIGN CALCULATION

FOR

RESIDENTIAL BUILDING

STILT + 5 FLOORS 15 DWELLING UNITS IN SINGLE BLOCK

AT NEW NO. 12, OLD NO. 179, RANGARAJAPURAM MAIN ROAD, KODAMBAKKAM, CHENNAI – 600 024 COMPRISED IN T. S. NO. 66, BLOCK 37, PULIYUR VILLAGE, EGMORE TALUK, WITHIN THE LIMIT OF GREATER CHENNAI CORPORATION, DIVISION 134, NEW DIVISION NO. N132, ZONE 10, TAMILNADU.

M. PUNITHAN B.Sc.,M.I.E.
Registered Structural Engineer Grade-II
CMDA Reg. No. SE/GR II/19/04/044
Renewed 10-04-2024. Valid upto 09-04-2029
52/141, Flat C2, PJM Apartments, East Vanniar Street,
West K.K. Nagar, Chennai-600 078.
Mobile: 9884400273, Email: mpunithan@yahoo.com

ARCHITECTS:
M/S Diastyle
NO.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.

RESIDENTIAL FLATS

COLUMN A1

No. of floors	=	1	+	5	=	6						
Foundation depth	=	1.8	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	=	0.681	m									
Parapet wall height	=	1	m									
Plinth beams assumed	=	0.34	m									
Total height of wall	=	15.17	m									
Total height of column	=	21.8	m									
Size of column	=	0.45	x	0.3	m							

Total load:

Due to slab	=	6	x	3.43	x	3.375	x	0.623			=	43.24 t
Wall	=	2	x	0.23	x	6.805	x	15.17			=	47.48 t
Roof beams	=	2.5	x	0.23	x	0.556	x	0.34	x	6	=	0.652 t
Plinth beam	=	2.5	x	0.23	x	0.34	x	0.34	x	1	=	0.067 t
Self wt	=	2.5	x	0.45	x	0.3	x	21.8			=	7.358 t
												98.79 t
						Total					=	**98.79 t**

Using size of column to be	=	**450**	**X**	**300**	**mm**						
With 10/20 + 0/12 Rods, Ast	=	10	x	201	+	4	x	113	=	2462	sqmm
Capacity of column	=	450	x	300	x	6	+	2462	x	190	
	=	**127.8 t**		>		**148 t**					
Minimum Reinforcement	=	0.008	x	45	x	30	=	10.8	sqcm	<	24.62 sqcm
% of Reinforcement	=	2462	/	45	x	30	=	1.824	<	4	

M. PUNITHAN B.Sc.,M.I.E.
Registered Structural Engineer Grade-II
CMDA Reg. No. SE/GR-II/19/04/044
Renewed 10-04-2024. Valid upto 09-04-2029
52/141, Flat C2, PJM Apartments, East Vanniar Street,
West K.K. Nagar, Chennai-600 078.
Mobile: 9884400273, Email: mpunithan@yahoo.com

COLUMN N4

No. of floors	=	1	+	5	=	6						
Foundation depth	=	1.8	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	=	0.413	m									
Parapet wall height	=	1	m									
Plinth beams assumed	=	0.413	m									
Total height of wall	=	16.77	m									
Total height of column	=	21.8	m									
Size of column	=	0.45	x	0.3	m							

Total load:

Due to slab	=	6	x	3.43	x	4.823	x	0.623			=	61.78	t
Wall	=	2	x	0.23	x	8.253	x	16.77			=	63.68	t
Roof beams	=	2.5	x	0.23	x	0.288	x	0.413	x	6	=	0.409	t
Plinth beam	=	2.5	x	0.23	x	0.413	x	0.413	x	1	=	0.098	t
Self wt	=	2.5	x	0.45	x	0.3	x	21.8			=	7.358	t
												133.3	t
						Total					=	**133.3**	**t**

Using size of column to be	=	**450**	**X**	**300**	**mm**						
With 8/20 + 4/12 Rods, Ast	=	8	x	314	+	3	x	113	=	2851	sqmm
Capacity of column	=	450	x	300	x	6	+	2851	x	190	
	=	**135.2 t**		>		**200 t**					
Minimum Reinforcement	=	0.008	x	45	x	30	=	10.8	sqcm	<	28.51 sqcm
% of Reinforcement	=	2851	/	45	x	30	=	2.112	<	4	

M. PUNITHAN B.Sc.,M.I.E.
Registered Structural Engineer Grade-II
CMDA Reg. No. SE/GR-II/19/04/044
Renewed 10-04-2024. Valid upto 09-04-2029
52/141, Flat C2, PJM Apartments, East Vanniar Street,
West K.K. Nagar, Chennai-600 078.
Mobile: 9884400273, Email: mpunithan@yahoo.com

COLUMN N4

No. of floors	=	1	+	5	=	6						
Foundation depth	=	1.8	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	=	0.314	m									
Parapet wall height	=	1	m									
Plinth beams assumed	=	0.243	m									
Total height of wall	=	17.36	m									
Total height of column	=	21.8	m									
Size of column	=	0.45	x	0.23	m							

Total load:

Due to slab	=	6	x	3.43	x	2.855	x	0.623			=	36.58 t
Wall	=	2	x	0.23	x	4.858	x	17.36			=	38.8 t
Roof beams	=	2.5	x	0.2	x	0.189	x	0.243	x	6	=	0.138 t
Plinth beam	=	2.5	x	0.2	x	0.243	x	0.243	x	1	=	0.029 t
Self wt	=	2.5	x	0.45	x	0.23	x	21.8			=	5.641 t
												81.18 t
						Total					=	**81.18 t**

Using size of column to be	=	**450**	**X**	**230**	**mm**						
With 10/32 Rods, Ast	=	8	x	314	+	3	x	113	=	2851	sqmm
				D							
Capacity of column	=	450	x	230	x	6	+	2851	x	190	
	=	**116.3 t**		>		**122 t**					
Minimum Reinforcement	=	0.008	x	45	x	23	=	8.28	sqcm	<	28.51 sqcm
% of Reinforcement	=	2851	/	45	x	23	=	2.755	<	4	

M. PUNITHAN B.Sc.,M.I.E.
Registered Structural Engineer Grade-II
CMDA Reg. No. SE/GR-II/19/04/044
Renewed 10-04-2024. Valid upto 09-04-2029
52/141, Flat C2, PJM Apartments, East Vanniar Street,
West K.K. Nagar, Chennai-600 078.
Mobile: 9884400273, Email: mpunithan@yahoo.com

Design of sections

Piles

Using M30 concrete and TMT bars 500 grade

σ ac in concrete	=	81.6	kg/sq-cm
σ bc in concrete	=	102	kg/sq-cm
σ ac in steel	=	1938	kg/sq-cm

Vertical load, V (t) 220 / 2 = 110

I. For 500 dia. pile with end bearing

a) Safe bearing capacity of pile (t) = 3.142 x 0.5 x 0.5 x 750 / 4 = 147.3

b) Bearing load / sq-m. 110 / 0.785

140 < 147.3 o.k

c) V / bc d d = 110 x 1500 / 250000 x 30 = 0.022

d) Ve / bc d d d = 0 x 1500 / 1.25E+08 x 30 = 0.000

Using 16 dia HSD rods d'/D = 83 / 450 = 0.184

Using chart 57 & 58 of SP:16-1980

e) As required (sq-cm.) 0 x 3.142 x 450 x 450 x 30 / 400 = 0.0

Min area of reinforcement = 0.004 x 3.142 x 45 x 45 / 4 = 6.362 sq-cm

Use 6/16 dia. HSD rods = 6 x 2.011 = 12.06 sq-cm > 6.36 sq-cm

M. PUNITHAN B.Sc.,M.I.E.
Registered Structural Engineer Grade-II
CMDA Reg. No. SE/GR-II/19/04/044
Renewed 10-04-2024. Valid upto 09-04-2029
52/141, Flat C2, PJM Apartments, East Vanniar Street,
West K.K. Nagar, Chennai-600 078.
Mobile: 9884400273, Email: mpunithan@yahoo.com

Pile cap

Column size			300	x	450			
Pedestal size			650	x	1775			
Area of pedestal	=	65	x	177.5	=	11537.5	sq-cm	
Actual stress	=	110	x	1500	/	11537.5		
	=	14.3	kg/sq-cm					
Permissible stress	=	0.45	x	300	/	11537.5	/	1350
	=	135	x	2.923	=	395	kg/sq-cm	

So use plain concrete pedestal of 30cm all around

Coinciding the critical section for shear with outerface of the pile in each direction

			0.5	/	2	+	0.225	+	d/2	=	0.63	+ 0.25
			0.475	+	d/2	=	0.875					
	d/2	=	0.875	-	0.475	=	0.4					
	d	=	0.8									
Provide	d	=	0.715									
	D	=	0.8									
BM		=	1	x	110	(	0.75	-	0.3	)		
		=	49.5	m-t								
Mu/bd2		=	49.5	x	1.5	x	100000	/(	225.0	x	71.5	x 71.5 x 300)
		=	0.022	x	30	=	0.65					
Area of steel required		=	0.09	x	225.0	x	71.5	/	100			
		=	14.8	sq-cm								
Min steel required		=	0.0012	x	90	x	225					
		=	24.3	sq-cm								
Use 20dia. HSD bars At 100		=	10	x	3.14	=	31.40					

Shear

Critical section for shear	=	250	+	300	+	357.5	=	907.5 mm
The pile outer edge	=	625	+	250	=	875	<	907.5

So shear reinforcement is not provided

For top of pile cap and pedestal use nominal Reinforcement
Use 16 dia. At 200 crs

M. PUNITHAN B.Sc.,M.I.E.
Registered Structural Engineer Grade-II
CMDA Reg. No. SE/GR-II/19/04/044
Renewed 10-04-2024. Valid upto 09-04-2029
52/141, Flat C2, PJM Apartments, East Vanniar Street,
West K.K. Nagar, Chennai-600 078.
Mobile: 9884400273, Email: mpunithan@yahoo.com

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**

M. PUNITHAN B.Sc.,M.I.E.
Registered Structural Engineer Grade-II
CMDA Reg. No. SE/GR-II/19/04/044
Renewed 10-04-2024. Valid upto 09-04-2029
52/141, Flat C2, PJM Apartments, East Vanniar Street,
West K.K. Nagar, Chennai-600 078.
Mobile: 9884400273, Email: mpunithan@yahoo.com

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**

M. PUNITHAN B.Sc.,M.I.E.
Registered Structural Engineer Grade-II
CMDA Reg. No. SE/GR-II/19/04/044
Renewed 10-04-2024. Valid upto 09-04-2029
52/141, Flat C2, PJM Apartments, East Vanniar Street,
West K.K. Nagar, Chennai-600 078.
Mobile: 9884400273, Email: mpunithan@yahoo.com

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**

M. PUNITHAN B.Sc.,M.I.E.
Registered Structural Engineer Grade-II
CMDA Reg. No. SE/GR-II/19/04/044
Renewed 10-04-2024. Valid upto 09-04-2029
52/141, Flat C2, PJM Apartments, East Vanniar Street,
West K.K. Nagar, Chennai-600 078.
Mobile: 9884400273, Email: mpunithan@yahoo.com

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**

M. PUNITHAN B.Sc.,M.I.E.
Registered Structural Engineer Grade-II
CMDA Reg. No. SE/GR-II/19/04/044
Renewed 10-04-2024. Valid upto 09-04-2029
2/141, Flat C2, PJM Apartments, East Vanniar Street,
West K.K. Nagar, Chennai-600 078.
Mobile: 9884400273, Email: mpunithan@yahoo.com

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**

M. PUNITHAN B.Sc.,M.I.E.
Registered Structural Engineer Grade-II
CMDA Reg. No. SE/GR-II/19/04/044
Renewed 10-04-2024. Valid upto 09-04-2029
52/141, Flat C2, PJM Apartments, East Vanniar Street,
West K.K. Nagar, Chennai-600 078.
Mobile: 9884400273, Email: mpunithan@yahoo.com

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	x	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	x	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**

M. PUNITHAN B.Sc.,M.I.E.
Registered Structural Engineer Grade-II
CMDA Reg. No. SE/GR-II/19/04/044
Renewed 10-04-2024. Valid upto 09-04-2029
52/141, Flat C2, PJM Apartments, East Vanniar Street,
West K.K. Nagar, Chennai-600 078.
Mobile: 9884400273, Email: mpunithan@yahoo.com

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**

M. PUNITHAN B.Sc.,M.I.E.
Registered Structural Engineer Grade-II
CMDA Reg. No. SE/GR-II/19/04/044
Renewed 10-04-2024. Valid upto 09-04-2029
2/141, Flat C2, PJM Apartments, East Vanniar Street,
West K.K. Nagar, Chennai-600 078.
Mobile: 9884400273, Email: mpunithan@yahoo.com

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**

M. PUNITHAN B.Sc.,M.I.E.
Registered Structural Engineer Grade-II
CMDA Reg. No. SE/GR-II/19/04/044
Renewed 10-04-2024. Valid upto 09-04-2029
52/141, Flat C2, PJM Apartments, East Vanniar Street,
West K.K. Nagar, Chennai-600 078.
Mobile: 9884400273, Email: mpunithan@yahoo.com

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**

M. PUNITHAN B.Sc.,M.I.E.
Registered Structural Engineer Grade-II
CMDA Reg. No. SE/GR-II/19/04/044
Renewed 10-04-2024. Valid upto 09-04-2029
52/141, Flat C2, PJM Apartments, East Vanniar Street,
West K.K. Nagar, Chennai-600 078.
Mobile: 9884400273, Email: mpunithan@yahoo.com

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**.



10/4/24.

(A. MEGANATHAN)
Superintendent

M. PUNITHAN B.Sc.,M.I.E.
Registered Structural Engineer Grade-II
CMDA Reg. No. SE/GR-II/19/04/044
Renewed 10-04-2024. Valid upto 09-04-2029
52/141, Flat C2, PJM Apartments, East Vanniar Street,
West K.K. Nagar, Chennai-600 078.
Mobile: 9884400273, Email: mpunithan@yahoo.com

HARMONY RESIDENCES PVT. LTD.

DESIGN CALCULATION

FOR

RESIDENTIAL BUILDING

STILT + 5 FLOORS 15 DWELLING UNITS IN SINGLE BLOCK

AT NEW NO. 12, OLD NO. 179, RANGARAJAPURAM MAIN ROAD, KODAMBAKKAM, CHENNAI – 600 024 COMPRISED IN T. S. NO. 66, BLOCK 37, PULIYUR VILLAGE, EGMORE TALUK, WITHIN THE LIMIT OF GREATER CHENNAI CORPORATION, DIVISION 134, NEW DIVISION NO. N132, ZONE 10, TAMILNADU.

M. PUNITHAN B.Sc.,M.I.E.
Registered Structural Engineer Grade-II
CMDA Reg. No. SE/GR-II/19/04/044
Renewed 10-04-2024. Valid upto 09-04-2029
52/141, Flat C2, PJM Apartments, East Vanniar Street,
West K.K. Nagar, Chennai-600 078.
Mobile: 9884400273, Email: mpunithan@yahoo.com

ARCHITECTS:
M/S Diastyle
NO.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.

MURUGU CONSULTANT

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

PH: 91 – 9884400273

To
The Principal Cheif Engineer,
Greater Chennai Corporation,
Rippen Building, Chennai.

Dated : 29 - 08 - 2025

Dear Sir

Sub : Construction of Residential Building stilt + 5 floors in Kodambakkm – Stability certificate

The Residential buildings in the address at New door no.12, Old door no.179, Rangarajapuram Main road, Kodambakkam, Chennai – 600 024, Comprised in T. S. no- 66, Block No. 37, in Puliyur Village, Egmore Taluk, Within limits of Greater Chennai Corporation, Division 137, New Division No. N132, Zone 10, 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 and for Pile foundation and found structurally sound and safe.

Thanking you

Yours truly,

For MURUGU CONSULTANT

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

M. PUNITHAN B.Sc.,M.I.E.
Registered Structural Engineer Grade-II
CMDA Reg. No. SE/GR-II/19/04/044
Renewed 10-04-2024. Valid upto 09-04-2029
52/141, Flat C2, PJM Apartments, East Vanniar Street,
West K.K. Nagar, Chennai-600 078.
Mobile: 9884400273, Email: mpunithan@yahoo.com

RESIDENTIAL FLATS

COLUMN A1

No. of floors	=	1	+	5	=	6						
Foundation depth	=	1.8	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	=	0.681	m									
Parapet wall height	=	1	m									
Plinth beams assumed	=	0.34	m									
Total height of wall	=	15.17	m									
Total height of column	=	21.8	m									
Size of column	=	0.45	x	0.3	m							

Total load:

Due to slab	=	6	x	3.43	x	3.375	x	0.623			=	43.24	t
Wall	=	2	x	0.23	x	6.805	x	15.17			=	47.48	t
Roof beams	=	2.5	x	0.23	x	0.556	x	0.34	x	6	=	0.652	t
Plinth beam	=	2.5	x	0.23	x	0.34	x	0.34	x	1	=	0.067	t
Self wt	=	2.5	x	0.45	x	0.3	x	21.8			=	7.358	t
												98.79	t
						Total					=	**98.79**	t

Using size of column to be	=	**450**	**X**	**300**	**mm**						
With 10/20 + 0/12 Rods, Ast	=	10	x	201	+	4	x	113	=	2462	sqmm
Capacity of column	=	450	x	300	x	6	+	2462	x	190	
	=	**127.8**	**t**	>		**148**	**t**				
Minimum Reinforcement	=	0.008	x	45	x	30	=	10.8	sqcm	<	24.62 sqcm
% of Reinforcement	=	2462	/	45	x	30	=	1.824	<	4	

M. PUNITHAN B.Sc.,M.I.E.
Registered Structural Engineer Grade-II
CMDA Reg. No. SE/GR-II/19/04/044
Renewed 10-04-2024. Valid upto 09-04-2029
52/141, Flat C2, PJM Apartments, East Vanniar Street,
West K.K. Nagar, Chennai-600 078.
Mobile: 9884400273, Email: mpunithan@yahoo.com

COLUMN N4

No. of floors	=	1	+	5	=	6						
Foundation depth	=	1.8	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	=	0.413	m									
Parapet wall height	=	1	m									
Plinth beams assumed	=	0.413	m									
Total height of wall	=	16.77	m									
Total height of column	=	21.8	m									
Size of column	=	0.45	x	0.3	m							

Total load:

Due to slab	=	6	x	3.43	x	4.823	x	0.623			=	61.78	t
Wall	=	2	x	0.23	x	8.253	x	16.77			=	63.68	t
Roof beams	=	2.5	x	0.23	x	0.288	x	0.413	x	6	=	0.409	t
Plinth beam	=	2.5	x	0.23	x	0.413	x	0.413	x	1	=	0.098	t
Self wt	=	2.5	x	0.45	x	0.3	x	21.8			=	7.358	t
												133.3	t
						Total					=	**133.3**	t

Using size of column to be	=	**450**	**X**	**300**	**mm**						
With 8/20 + 4/12 Rods, Ast	=	8	x	314	+	3	x	113	=	2851	sqmm
Capacity of column	=	450	x	300	x	6	+	2851	x	190	
	=	**135.2**	**t**	>		**200**	**t**				
Minimum Reinforcement	=	0.008	x	45	x	30	=	10.8	sqcm	<	28.51 sqcm
% of Reinforcement	=	2851	/	45	x	30	=	2.112	<	4	

M. PUNITHAN B.Sc.,M.I.E.
Registered Structural Engineer Grade-II
CMDA Reg. No. SE/GR-II/19/04/044
Renewed 10-04-2024. Valid upto 09-04-2029
52/141, Flat C2, PJM Apartments, East Vanniar Street,
West K.K. Nagar, Chennai-600 078.
Mobile: 9884400273, Email: mpunithan@yahoo.com

COLUMN N4

No. of floors	=	1	+	5	=	6						
Foundation depth	=	1.8	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	=	0.314	m									
Parapet wall height	=	1	m									
Plinth beams assumed	=	0.243	m									
Total height of wall	=	17.36	m									
Total height of column	=	21.8	m									
Size of column	=	0.45	x	0.23	m							

Total load:

Due to slab	=	6	x	3.43	x	2.855	x	0.623			=	36.58 t
Wall	=	2	x	0.23	x	4.858	x	17.36			=	38.8 t
Roof beams	=	2.5	x	0.2	x	0.189	x	0.243	x	6	=	0.138 t
Plinth beam	=	2.5	x	0.2	x	0.243	x	0.243	x	1	=	0.029 t
Self wt	=	2.5	x	0.45	x	0.23	x	21.8			=	5.641 t
												81.18 t
						Total					=	**81.18 t**

Using size of column to be	=	**450**	**X**	**230**	**mm**						
With 10/32 Rods, Ast	=	8	x	314	+	3	x	113	=	2851	sqmm
				D							
Capacity of column	=	450	x	230	x	6	+	2851	x	190	
	=	**116.3 t**		>		**122 t**					
Minimum Reinforcement	=	0.008	x	45	x	23	=	8.28	sqcm	<	28.51 sqcm
% of Reinforcement	=	2851	/	45	x	23	=	2.755	<	4	

M. PUNITHAN B.Sc.,M.I.E.
Registered Structural Engineer Grade-II
CMDA Reg. No. SE/GR-II/19/04/044
Renewed 10-04-2024. Valid upto 09-04-2029
52/141, Flat C2, PJM Apartments, East Vanniar Street,
West K.K. Nagar, Chennai-600 078.
Mobile: 9884400273, Email: mpunithan@yahoo.com

Design of sections

Piles

Using M30 concrete and TMT bars 500 grade

σ ac in concrete	=	81.6	kg/sq-cm
σ bc in concrete	=	102	kg/sq-cm
σ ac in steel	=	1938	kg/sq-cm

Vertical load, V (t) 220 / 2 = 110

I. For 500 dia. pile with end bearing

a) Safe bearing capacity of pile (t) = 3.142 x 0.5 x 0.5 x 750 / 4
= 147.3

b) Bearing load / sq-m. 110 / 0.785
140 < 147.3 o.k

c) V / bc d d = 110 x 1500 / 250000 x 30
= 0.022

d) Ve / bc d d d = 0 x 1500 / 1.25E+08 x 30
= 0.000

Using 16 dia HSD rods d'/D = 83 / 450 = 0.184
Using chart 57 & 58 of SP:16-1980

e) As required (sq-cm.) 0 x 3.142 x 450 x 450 x 30 / 400
0.0

Min area of reinforcement = 0.004 x 3.142 x 45 x 45 / 4
= 6.362 sq-cm

Use 6/16 dia. HSD rods = 6 x 2.011
= 12.06 sq-cm > 6.36 sq-cm

M. PUNITHAN B.Sc.,M.I.E.
Registered Structural Engineer Grade-II
CMDA Reg. No. SE/GR-II/19/04/044
Renewed 10-04-2024. Valid upto 09-04-2029
52/141, Flat C2, PJM Apartments, East Vanniar Street,
West K.K. Nagar, Chennai-600 078.
Mobile: 9884400273, Email: mpunithan@yahoo.com

Pile cap

Column size			300	x	450			
Pedestal size			650	x	1775			
Area of pedestal	=	65	x	177.5	=	11537.5	sq-cm	
Actual stress	=	110	x	1500	/	11537.5		
	=	14.3	kg/sq-cm					
Permissible stress	=	0.45	x	300	/	11537.5	/	1350
	=	135	x	2.923	=	395	kg/sq-cm	

So use plain concrete pedestal of 30cm all around

Coinciding the critical section for shear with outerface of the pile in each direction

			0.5	/	2	+	0.225	+	d/2	=	0.63	+ 0.25
			0.475	+	d/2	=	0.875					
	d/2	=	0.875	-	0.475	=	0.4					
	d	=	0.8									
Provide	d	=	0.715									
	D	=	0.8									

BM	=	1	x	110	(	0.75	-	0.3	)			
	=	49.5	m-t									
Mu/bd2	=	49.5	x	1.5	x	100000	/(	225.0	x	71.5	x	71.5 x 300)
	=	0.022	x	30	=	0.65						
Area of steel required	=	0.09	x	225.0	x	71.5	/	100				
	=	14.8	sq-cm									
Min steel required	=	0.0012	x	90	x	225						
	=	24.3	sq-cm									
Use 20dia. HSD bars At 100	=	10	x	3.14	=	31.40						

Shear

Critical section for shear	=	250	+	300	+	357.5	=	907.5 mm
The pile outer edge	=	625	+	250	=	875	<	907.5

So shear reinforcement is not provided

For top of pile cap and pedestal use nominal Reinforcement
Use 16 dia. At 200 crs

M. PUNITHAN B.Sc.,M.I.E.
Registered Structural Engineer Grade-II
CMDA Reg. No. SE/GR-II/19/04/044
Renewed 10-04-2024. Valid upto 09-04-2029
52/141, Flat C2, PJM Apartments, East Vanniar Street,
West K.K. Nagar, Chennai-600 078.
Mobile: 9884400273, Email: mpunithan@yahoo.com

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**

M. PUNITHAN B.Sc.,M.I.E.
Registered Structural Engineer Grade-II
CMDA Reg. No. SE/GR-II/19/04/044
Renewed 10-04-2024. Valid upto 09-04-2029
52/141, Flat C2, PJM Apartments, East Vanniar Street,
West K.K. Nagar, Chennai-600 078.
Mobile: 9884400273, Email: mpunithan@yahoo.com

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**

M. PUNITHAN B.Sc.,M.I.E.
Registered Structural Engineer Grade-II
CMDA Reg. No. SE/GR-II/19/04/044
Renewed 10-04-2024. Valid upto 09-04-2029
52/141, Flat C2, PJM Apartments, East Vanniar Street,
West K.K. Nagar, Chennai-600 078.
Mobile: 9884400273, Email: mpunithan@yahoo.com

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**

M. PUNITHAN B.Sc.,M.I.E.
Registered Structural Engineer Grade-II
CMDA Reg. No. SE/GR-II/19/04/044
Renewed 10-04-2024. Valid upto 09-04-2029
52/141, Flat C2, PJM Apartments, East Vanniar Street,
West K.K. Nagar, Chennai-600 078.
Mobile: 9884400273, Email: mpunithan@yahoo.com

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**

M. PUNITHAN B.Sc.,M.I.E.
Registered Structural Engineer Grade-II
CMDA Reg. No. SE/GR-II/19/04/044
Renewed 10-04-2024. Valid upto 09-04-2029
2/141, Flat C2, PJM Apartments, East Vanniar Street,
West K.K. Nagar, Chennai-600 078.
Mobile: 9884400273, Email: mpunithan@yahoo.com

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**



M. PUNITHAN B.Sc.,M.I.E.
Registered Structural Engineer Grade-II
CMDA Reg. No. SE/GR-II/19/04/044
Renewed 10-04-2024. Valid upto 09-04-2029
52/141, Flat C2, PJM Apartments, East Vanniar Street,
West K.K. Nagar, Chennai-600 078.
Mobile: 9884400273, Email: mpunithan@yahoo.com

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	+	230	+	3	x	150			
		12									
	=	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	x	1.5	x	100000			=	0.151	
		250	x	20	x	41.70	x	41.70			
Ast required	=	0.2260	x	250	x	20.00	x	41.70	=	9.42	sqcm
				5000							
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	x	1.5	x	100000			=	0.039	
		250	x	93.55875	x	41.70	x	41.70			
Ast required	=	0.0560	x	250	x	93.56	x	41.70	=	13.02	sqcm
				4200							
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**

M. PUNITHAN B.Sc.,M.I.E.
Registered Structural Engineer Grade-II
CMDA Reg. No. SE/GR-II/19/04/044
Renewed 10-04-2024. Valid upto 09-04-2029
2/141, Flat C2, PJM Apartments, East Vanniar Street,
West K.K. Nagar, Chennai-600 078.
Mobile: 9884400273, Email: mpunithan@yahoo.com

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**

M. PUNITHAN B.Sc.,M.I.E.
Registered Structural Engineer Grade-II
CMDA Reg. No. SE/GR-II/19/04/044
Renewed 10-04-2024. Valid upto 09-04-2029
52/141, Flat C2, PJM Apartments, East Vanniar Street,
West K.K. Nagar, Chennai-600 078.
Mobile: 9884400273, Email: mpunithan@yahoo.com

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**

M. PUNITHAN B.Sc.,M.I.E.
Registered Structural Engineer Grade-II
CMDA Reg. No. SE/GR-II/19/04/044
Renewed 10-04-2024. Valid upto 09-04-2029
52/141, Flat C2, PJM Apartments, East Vanniar Street,
West K.K. Nagar, Chennai-600 078.
Mobile: 9884400273, Email: mpunithan@yahoo.com

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**

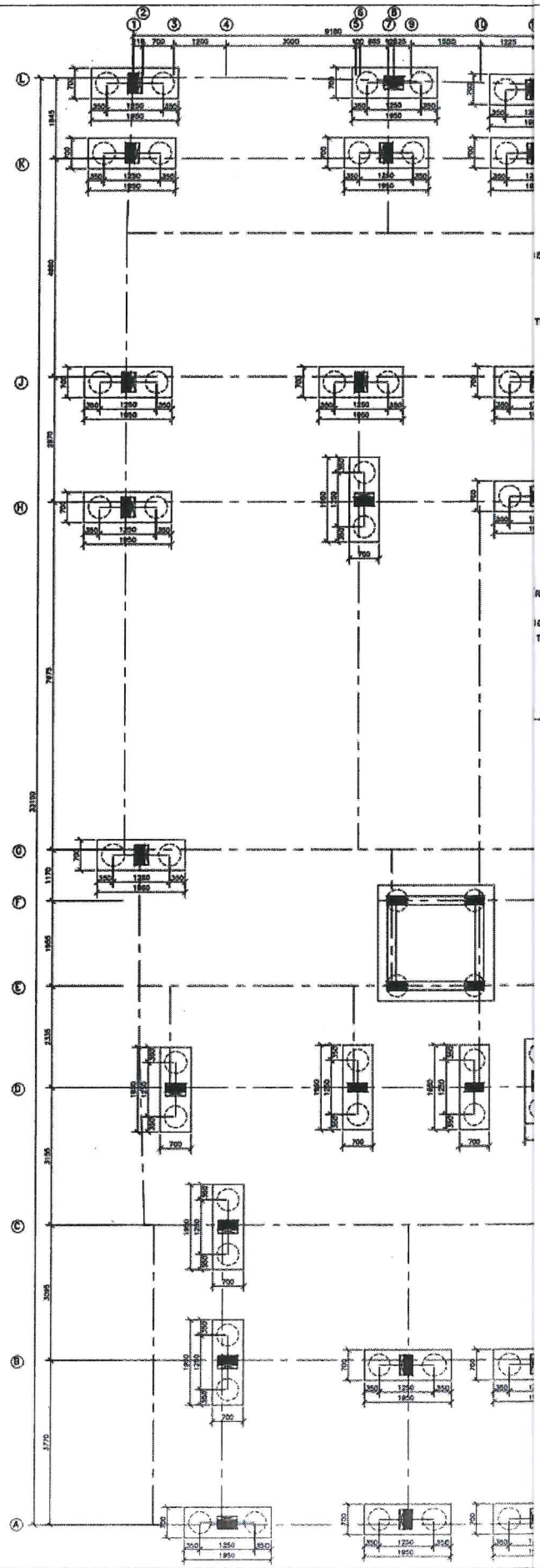
Long span

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**

M. PUNITHAN B.Sc.,M.I.E.
Registered Structural Engineer Grade-II
CMDA Reg. No. SE/GR-II/19/04/044
Renewed 10-04-2024. Valid upto 09-04-2029
2/141, Flat C2, PJM Apartments, East Vanniar Street,
West K.K. Nagar, Chennai-600 078.
Mobile: 9884400273, Email: mpunithan@yahoo.com



M. PUNITHAN B.Sc.,M.I.E.
Registered Structural Engineer Grade-II
CMDA Reg. No. SE/GR-II/19/04/044
Renewed 10-04-2024. Valid upto 09-04-2029
52/141, Flat C2, PJM Apartments, East Vanniar Street,
West K.K. Nagar, Chennai-600 078.
Mobile: 9884400273, Email: mpunithan@yahoo.com

NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE STATED.
2. ALL RCC WORKS TO BE WITH M30 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 SHALL 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	28/02/25	AS DRAWN			

CONSULTANTS	MURUGU CONSULTANT 9A/10, UMAPATHY STREET EXT. W.MAMBALAM, CHENNAI – 33. Ph No.9884400273.
CLIENT	M/S HORMONY HOMES 12TH AVENUE, ASHOK NAGAR CHENNAI – 600 083.
ARCHITECT	diastyle PROP CHENNAI – 600 083. PHONE : 65855326, 65359407.

PROPOSED CONSTRUCTION OF RESIDENTIAL BUILDING IN KODAMBAKKAM.

LAYOUT AND RCC DETIALS PILE FOUNDATION

SCALE : 1 : 50, 1 : 25

DRG.No: MC-112/2025 SHEET 1

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.

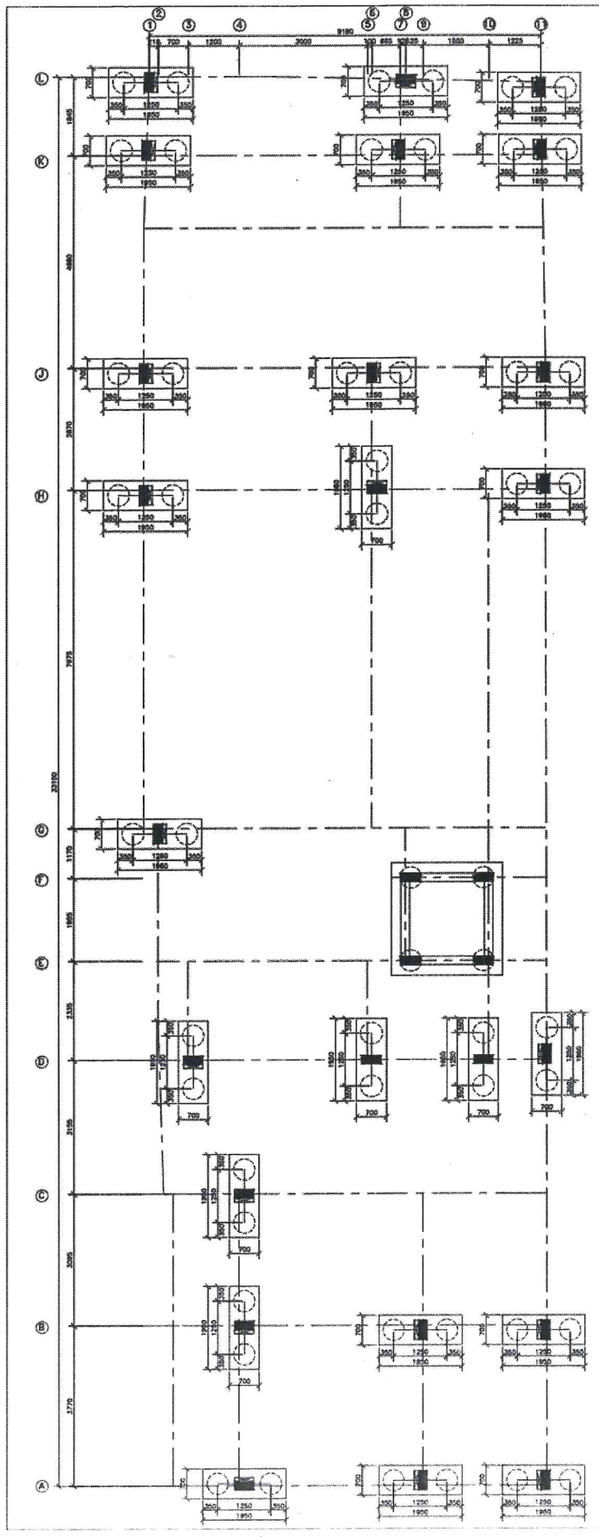
This Registration is valid upto **09.04.2029**.

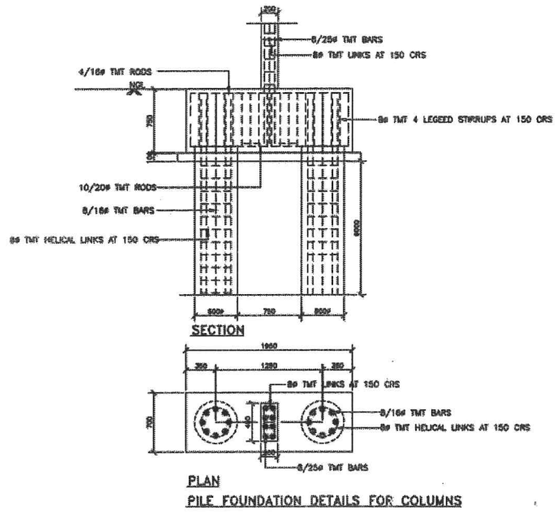


10/4/24.

(A. MEGANATHAN)
Superintendent

M. PUNITHAN B.Sc.,M.I.E.
Registered Structural Engineer Grade-II
CMDA Reg. No. SE/GR-II/19/04/044
Renewed 10-04-2024. Valid upto 09-04-2029
2/141, Flat C2, PJM Apartments, East Vanniar Street,
West K.K. Nagar, Chennai-600 078.
Mobile: 9884400273, Email: mpunithan@yahoo.com

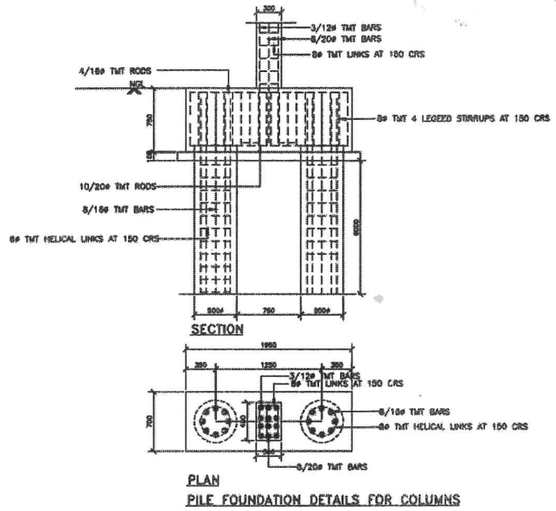




SECTION

PLAN

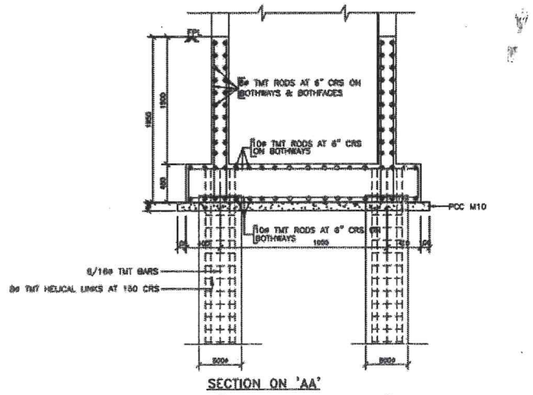
PILE FOUNDATION DETAILS FOR COLUMNS



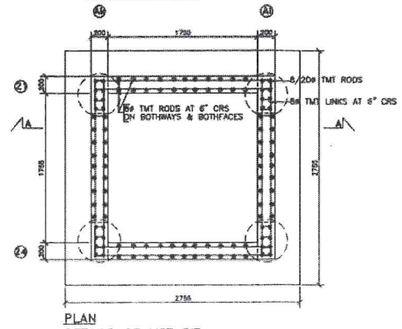
SECTION

PLAN

PILE FOUNDATION DETAILS FOR COLUMNS



SECTION ON 'AA'



PLAN

DETAILS OF LIFT PIT

M. PUNITHAN B.Sc.,M.I.E.
Registered Structural Engineer Grade-II
CMDA Reg. No. SE/GR-II/19/04/044
Renewed 10-04-2024. Valid upto 09-04-2029
52/141, Flat C2, PJM Apartments, East Vanniar Street,
West K.K. Nagar, Chennai-600 078.
Mobile: 9884400273, Email: mpunithan@yahoo.com

NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE STATED.
2. ALL RCC WORKS TO BE WITH M30 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 SHALL 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	28/02/25	AS DRAWN			

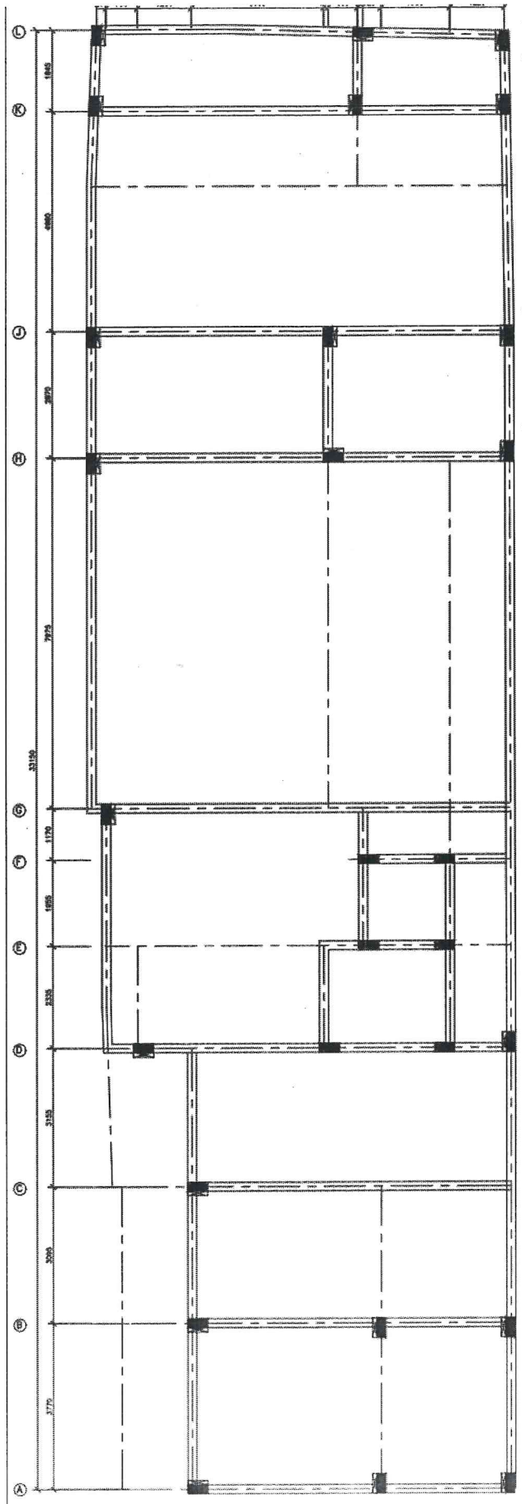
CONSULTANTS	MURUGU CONSULTANT 9A/10, UMAPATHY STREET EXT. W.MAMBALAM, CHENNAI – 33. Ph No.9884400273.
CLIENT	M/S HORMONY HOMES 12TH AVENUE, ASHOK NAGAR CHENNAI – 600 083.
ARCHITECT	diastyle PROP CHENNAI – 600 083. PHONE : 65855326, 65359407.

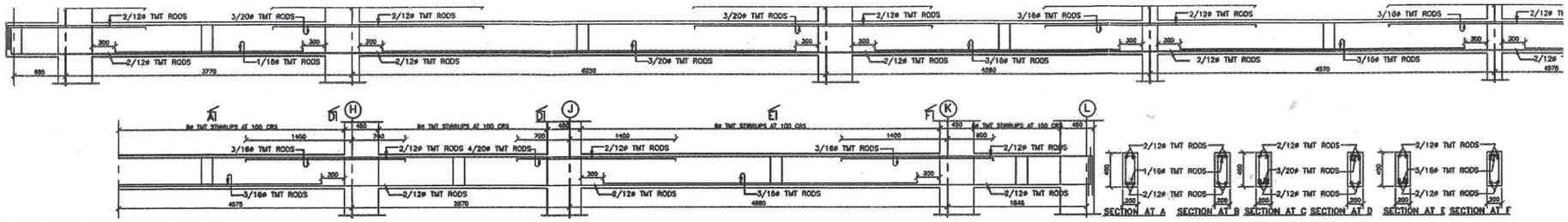
PROPOSED CONSTRUCTION OF RESIDENTIAL BUILDING IN KODAMBAKKAM.

LAYOUT AND RCC DETIALS
PILE FOUNDATION

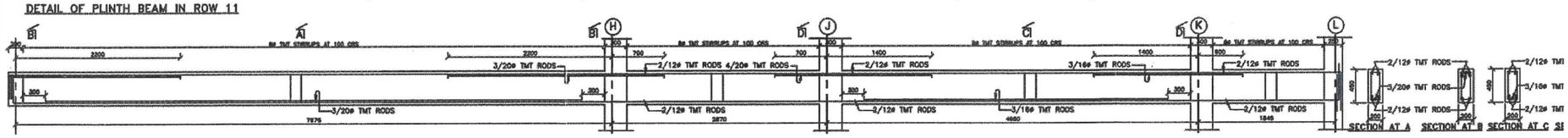
SCALE : 1 : 50, 1 : 25

DRG.No: MC-112/2025 SHEET 1

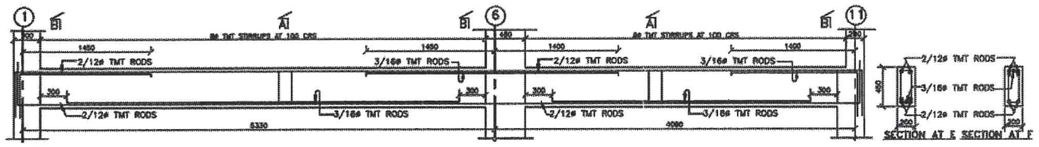




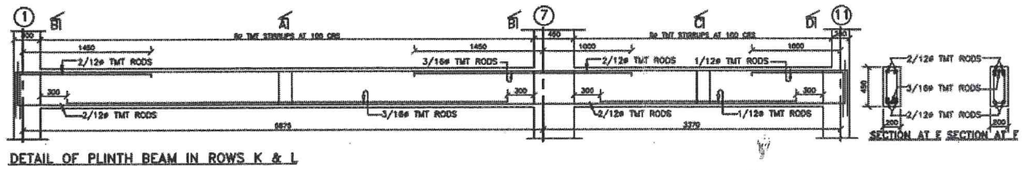
DETAIL OF PLINTH BEAM IN ROW 11



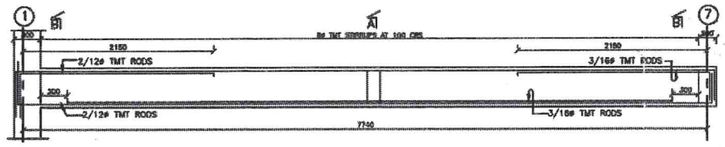
DETAIL OF PLINTH BEAM IN ROW 1



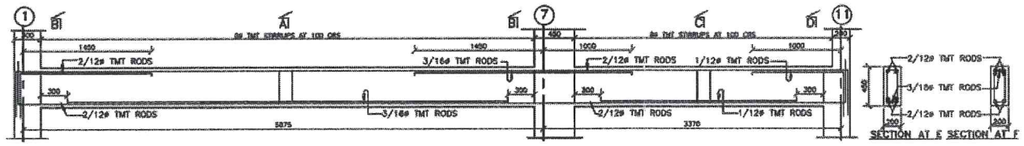
DETAIL OF PLINTH BEAM IN ROWS H & J



DETAIL OF PLINTH BEAM IN ROWS K & L



DETAIL OF PLINTH BEAM IN ROW C



DETAIL OF PLINTH BEAM IN ROWS A & B

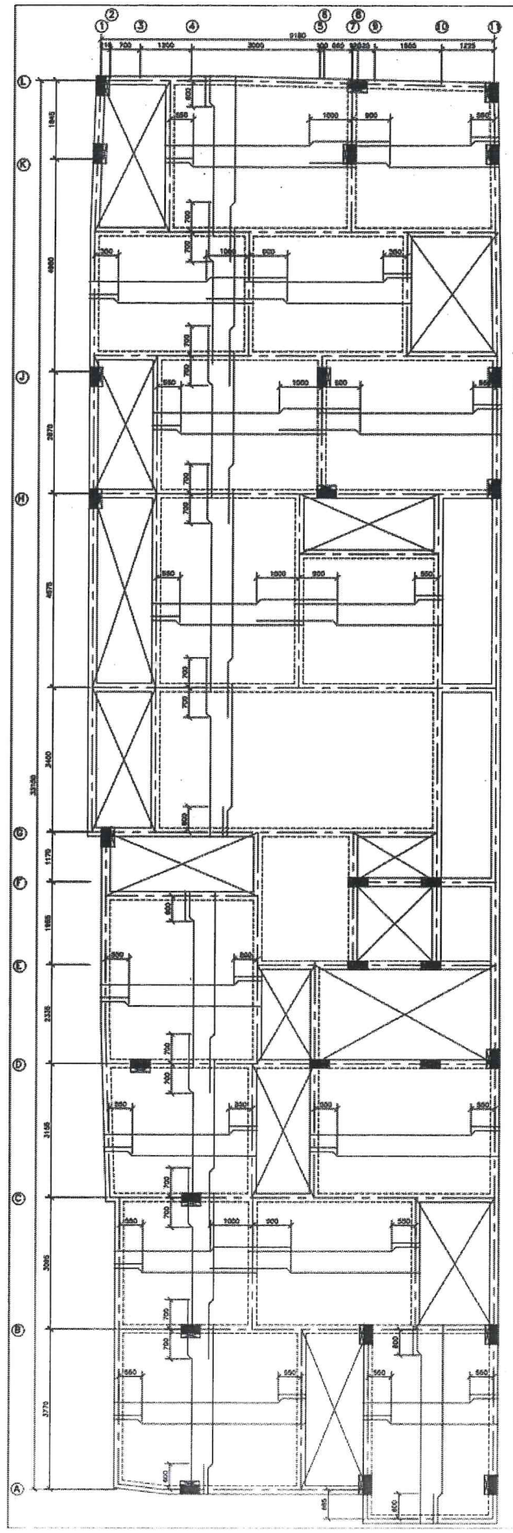
M. PUNITHAN B.Sc.,M.I.E.
gistered Structural Engineer Grade-II
CMDA Reg. No. SE/GR-II/19/04/044
Renewed 10-04-2024. Valid upto 09-04-2029
2/141, Flat C2, PJM Apartments, East Vanniar Street,
West K.K. Nagar, Chennai-600 078.
Mobile: 9884400273, Email: mpunithan@yahoo.com

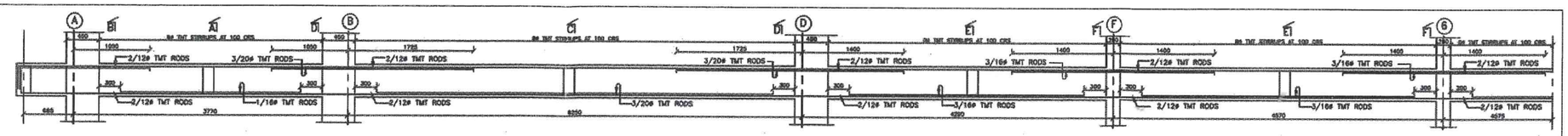
NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE STATED.
2. ALL RCC WORKS TO BE WITH M30 CONCRETE AND TO BE EXECUTED AS IS : 456 - 2000, USING 20mm GRADED GRANITE METAL. WATER CEMENT EXCEEDING 0.45. HIGH YIELD STRENGTH DEFORMED BARS (TOR SMALL CC 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 BEAM TO BE 40 UNLESS OTHERWISE STATED.

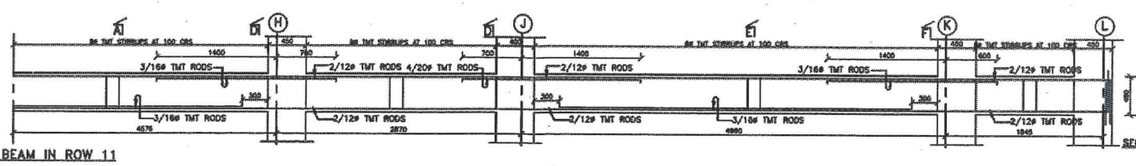
ALT	DATE	DESCRIPTION	DRAWN	CHECKED
0	28/02/25	AS DRAWN		

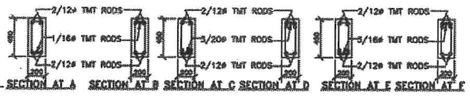
CONSULTANTS	MURUGU CONSULTA 8A/10, UMAPATHY STREET EXT. W.MAMBALAM, CHENNAI - 33. Ph N
CLIENT	M/S HORMONY HOMES 12TH AVENUE, ASHOK NAGAR CHENNAI - 600 083.
ARCHITECT	diastyle PROP CHENNAI - 600 083. PHONE : 65855526, 65359407.
	PROPOSED CONSTRUCTION OF BUILDING IN KODAMBAKK
	LAYOUT AND RCC PLINTH BEAM
	SCALE : 1 : 50, 1 : 25
	DRG.No: MC-112/2025

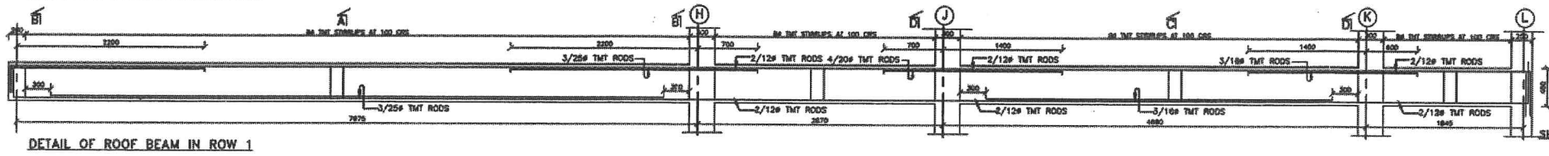




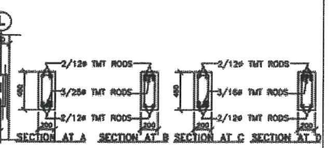
DETAIL OF ROOF BEAM IN ROW 11

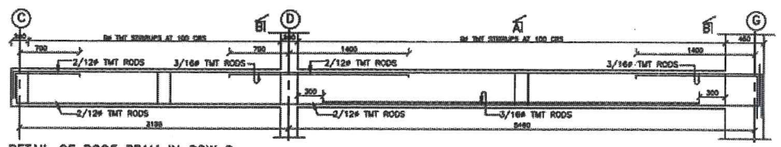




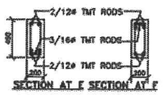


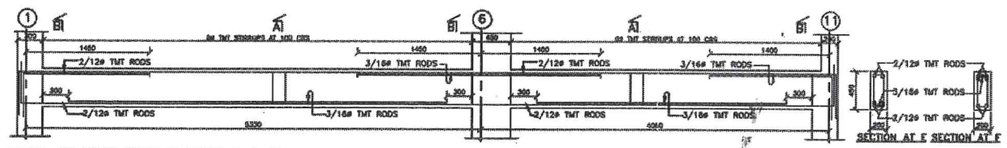
DETAIL OF ROOF BEAM IN ROW 1



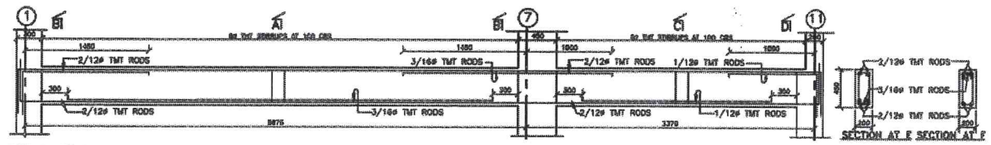


DETAIL OF ROOF BEAM IN ROW 2





DETAIL OF ROOF BEAM IN ROWS H & J



DETAIL OF ROOF BEAM IN ROW L

M. PUNITHAN B.Sc.,M.I.E.
Registered Structural Engineer Grade-II
CMDA Reg. No. SE/GR-II/19/04/044
Renewed 10-04-2024. Valid upto 09-04-2029
32/141, Flat C2, PJM Apartments, East Vanniar Street,
West K.K. Nagar, Chennai-600 078.
Mobile: 9884400273, Email: mpunithan@yahoo.com

NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE STATED.
2. ALL RCC WORKS TO BE WITH M30 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 SHALL 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	28/02/25	AS DRAWN			

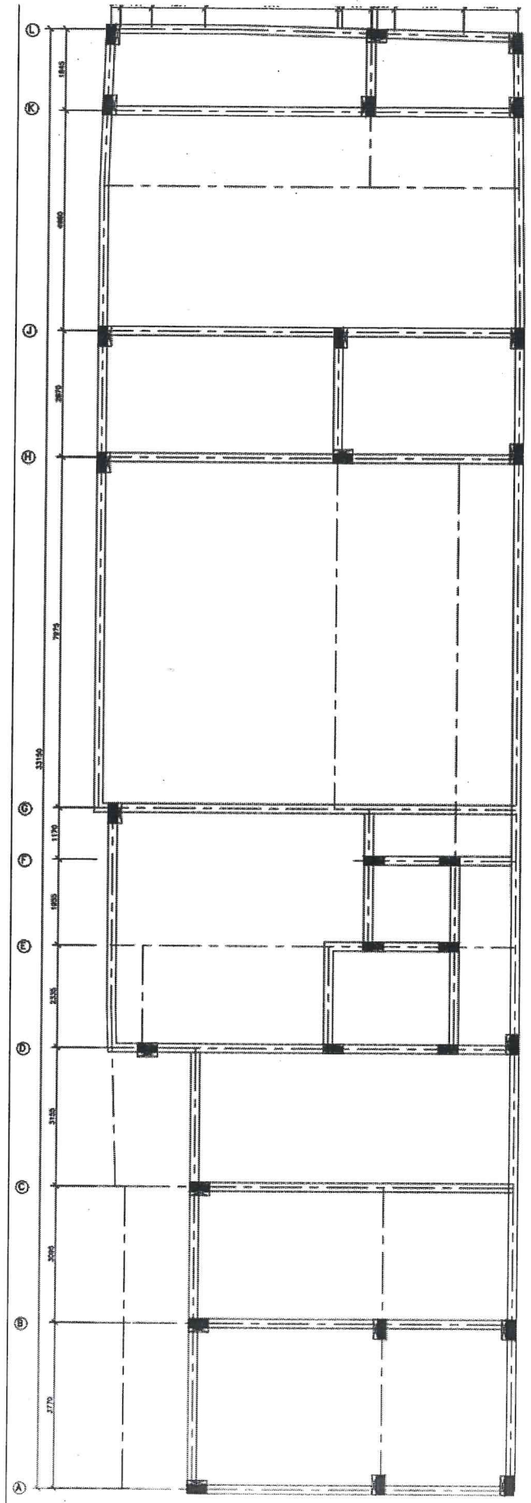
CONSULTANTS	MURUGU CONSULTANT 9A/10, UMAPATHY STREET EXT. W.MAMBALAM, CHENNAI – 33. Ph No.9884400273.
CLIENT	M/S HORMONY HOMES 12TH AVENUE, ASHOK NAGAR CHENNAI – 600 083.
ARCHITECT	diastyle PROP CHENNAI – 600 083. PHONE : 65853326, 65389407.

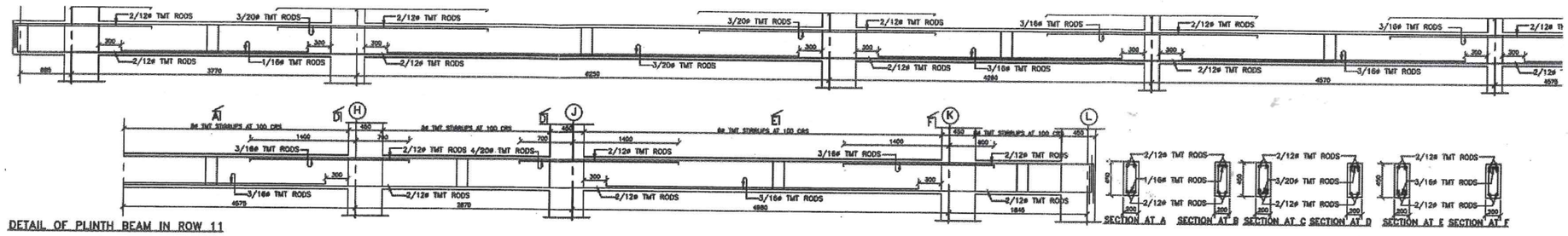
PROPOSED CONSTRUCTION OF RESIDENTIAL BUILDING IN KODAMBAKKAM.

LAYOUT AND RCC DETIALS
ROOF BEAM & SLAB

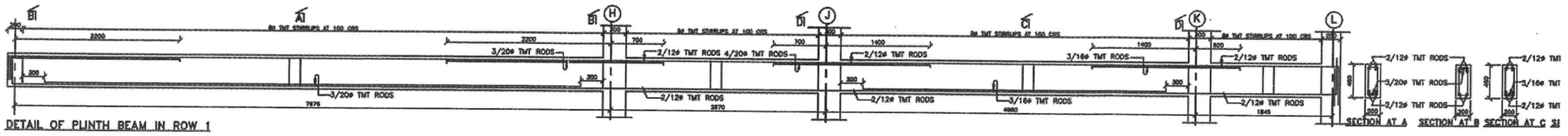
SCALE : 1 : 50, 1 : 25

DRG.No: MC-112/2025 SHEET 3

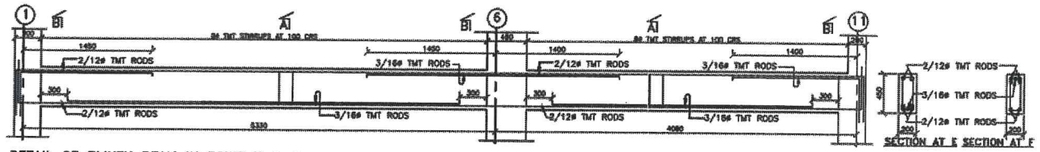




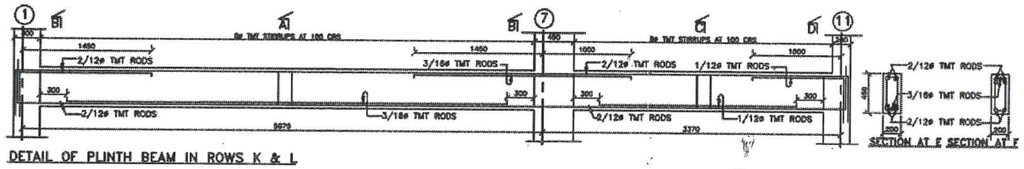
DETAIL OF PLINTH BEAM IN ROW 11



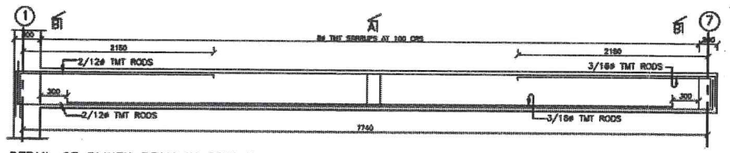
DETAIL OF PLINTH BEAM IN ROW 1



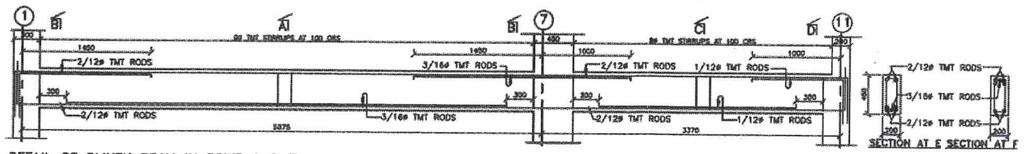
DETAIL OF PLINTH BEAM IN ROWS H & J



DETAIL OF PLINTH BEAM IN ROWS K & L



DETAIL OF PLINTH BEAM IN ROW C



DETAIL OF PLINTH BEAM IN ROWS A & B

M. PUNITHAN B.Sc.,M.I.E.
Registered Structural Engineer Grade-II
CMDA Reg. No. SE/GR-II/19/04/044
Renewed 10-04-2024. Valid upto 09-04-2029
2/141, Flat C2, PJM Apartments, East Vanniar Street,
West K.K. Nagar, Chennai-600 078.
Mobile: 9884400273, Email: mpunithan@yahoo.com

NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE STATED.
2. ALL RCC WORKS TO BE WITH M30 CONCRETE AND TO BE EXECUTED AS IS : 456 – 2000, USING 20mm GRADED GRANITE METAL. WATER CEMENT EXCEEDING 0.45. HIGH YIELD STRENGTH DEFORMED BARS (TOR SHALL CO 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 BEAM TO BE 40 UNLESS OTHERWISE STATED.

ALT	DATE	DESCRIPTION	DRAWN	CHECKED
0	28/02/25	AS DRAWN		

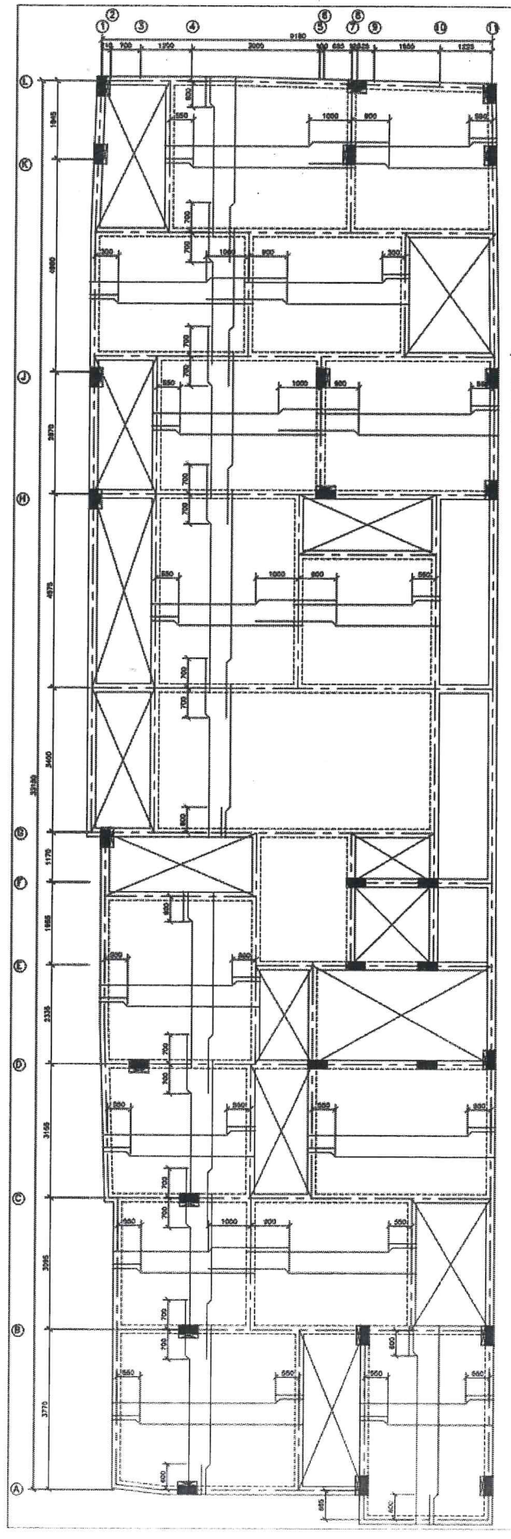
CONSULTANTS	MURUGU CONSULTA 8A/10, UMAPATHY STREET EXT. W.MAMBALAM, CHENNAI – 33. Ph N
CLIENT	M/S HORMONY HOMES 12TH AVENUE, ASHOK NAGAR CHENNAI – 600 083.
ARCHITECT	diastyle PROP CHENNAI – 600 083. PHONE : 65853325, 65359407.

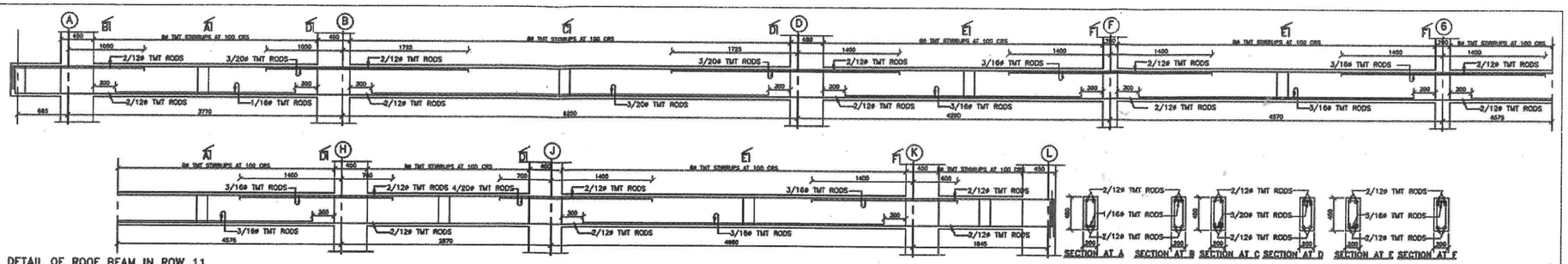
PROPOSED CONSTRUCTION OF BUILDING IN KODAMBAKK

LAYOUT AND RCC PLINTH BEAM

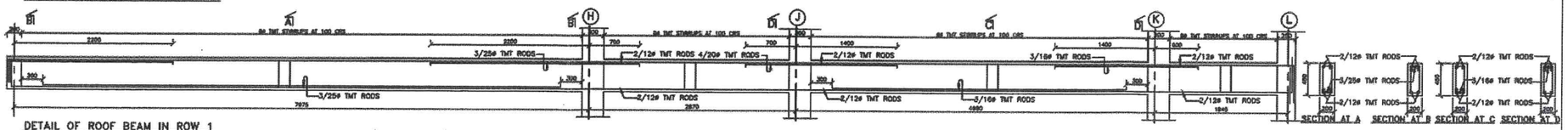
SCALE : 1 : 50, 1 : 25

DRG.No: MC-112/2025

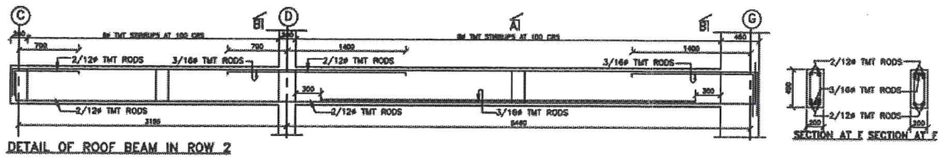




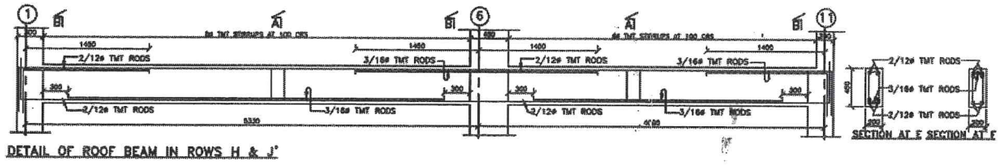
DETAIL OF ROOF BEAM IN ROW 11



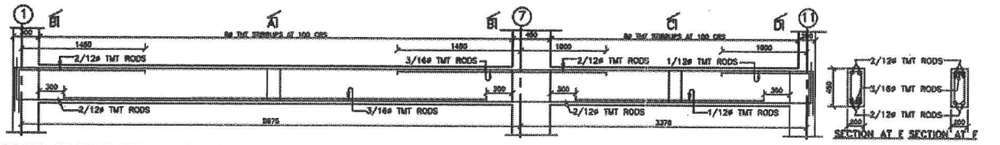
DETAIL OF ROOF BEAM IN ROW 1



DETAIL OF ROOF BEAM IN ROW 2



DETAIL OF ROOF BEAM IN ROWS H & J'



DETAIL OF ROOF BEAM IN ROW L

M. PUNITHAN B.Sc.,M.I.E.
Registered Structural Engineer Grade-II
CMDA Reg. No. SE/GR-II/19/04/044
Renewed 10-04-2024. Valid upto 09-04-2029
52/141, Flat C2, PJM Apartments, East Vanniar Street,
West K.K. Nagar, Chennai-600 078.
Mobile: 9884400273, Email: mpunithan@yahoo.com

NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE STATED.
2. ALL RCC WORKS TO BE WITH M30 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 SHALL 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	28/02/25	AS DRAWN			

CONSULTANTS	MURUGU CONSULTANT 9A/10, UMAPATHY STREET EXT. W.MAMBALAM, CHENNAI – 33. Ph No.9884400273.
CLIENT	M/S HORMONY HOMES 12TH AVENUE, ASHOK NAGAR CHENNAI – 600 083.
ARCHITECT	diastyle PROP CHENNAI – 600 083. PHONE : 65853328, 65359407.
	PROPOSED CONSTRUCTION OF RESIDENTIAL BUILDING IN KODAMBAKKAM.
	LAYOUT AND RCC DETIALS ROOF BEAM & SLAB
	SCALE : 1 : 50, 1 : 25
	DRG.No: MC-112/2025 SHEET 5

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.