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DIGITALLY VERIFIED RECORD

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STRUCTURAL DESIGN REPORT

G THE PROPOSED CONSTRUCTION OF STILT FLOOR + 4 FLOORS (16.0M HEIGHT) RESIDENTIAL BUILDING WITH 14 DWELLING UNITS AT PLOT NO. 10 & 11, NEW DOOR NO.45 & 47, OLD DOOR NO.25 & 26, RUKMANI ROAD, KALACHATRA COLONY, BESANT NAGAR, CHENNAI 600090 COMPRISED IN OLD S.NO. 161/2 & 161/3 (PART), AND T.S.NO.21, BLOCK NO.51 OF THIRUVANMIYUR VILLAGE WITHIN THE LIMIT OF GREATER CHENNAI CORPORATION.

STRUCTURAL CONSULTANT:

B&W STRUCTURAL DESIGN CONSULTANTS

181/64, GANDHI ROAD, (NEAR CENTRAL BANK OF INDIA),

VELACHERY,

CHENNAI-600042.

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1. INTRODUCTION

The Structure is a Residential building. It is designed as RCC building supported on Footing at 2 **m** depth from Existing Ground Level.

2. STRUCTURAL SYSTEM

The structural system adopted is as below.

- The entire structure is designed as R.C. Framed Beam-Slab Structure with Beams Framing in to Columns.
- The Foundation System considered for the Structure is an footing at 2 **m** depth from Existing Ground Level and SBC of soil 250kN/m^2.

3. MATERIAL SPECIFICATIONS

3.1. CONCRETE AND REINFORCEMENT

1. Concrete Grades: **M25**

(Minimum cement content-340kg/m3, water cement ratio – 0.45).

2. TMT High:max **Fe 500**Grade for all R.C. members

Yield Strength Bars (For efficient usage of Rebar (for all rebar) Consumption in Concrete).

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4. ENVIRONMENTAL CONDITIONS, CORROSION AND FIRE PROTECTION FOR CONCRETE.

Environment – Severe

Exposure conditions – Concrete exposed to rain

Fire protection – Thickness of the structural elements proportioned to suit Fire rating (2hrsFire rating considered in the Design)

Nominal concrete cover to reinforcement – Exposure – severe –45 mm Nominal covers for 2 hr. fire resistance

Nominal Cover to reinforcement

(As per IS 456:2000 , TABLE 16A) For 2 hr. fire resistance

Beams	-	25 mm
Slabs	-	20 mm
Columns	-	40mm
Foundation	-	50mm
pile and pile cap	-	75mm
RC wall	-	50 mm
waist slab	-	25 mm

5. STRUCTURAL ANALYSIS & DESIGN

- The entire Structure is analyzed using Software STAAD PRO-V8i Structural Analysis Package.
- In the 3D Model, Loads are applied and Analyzed for various Load Combinations. The results of all Load Combinations are reviewed and Members are designed for Maximum Forces arrived.
- The 3D Model Comprises Column-Beam Frame with Slabs contributing loads to the Frame and the effect of Slab stiffness has been ignored in the analysis.

Ultimate load combination

* * * WITH LOAD FACTOR * * *

1. LOAD COMB 1 1.5*DL + 1.5*L.L
2. LOAD COMB 2 1.0*DL + 1.0*L.L

A. Dead loads:

Dead Load shall include weight of all Structural and Architectural components.

Self-weight of the materials shall be calculated on the basis of unit weights given in IS: 875 PART I-1987.

1. Unit weight of concrete - 25 kN /m^3

2. Unit weight of steel - 78.5 kN /m^3

3. Floor finish considered - 1.5kN /m^2

5. Unit weight of Solid block -20kN/m

B. Live loads:

Following Live Loads are considered while designing the Structural Elements Apart from the Dead Loads as per codes.

1. Living, Kitchen and bed room floor slab	:	3KN / Sq. m
2. Toilet	:	2 KN / Sq. m
3. Corridor, staircase and passage	:	3 KN/ Sq.m

C. Additional Floor Provision & Equipment Load

In the Design intent, Loads arising due to Provision for additional Floors to be built in Future has not been considered. If any equipment has been proposed to be mounted on terrace, then the load details based on vendor inputs will be considered.

7. LOADING INTENSITIES ON SLABS:

1. REDENTIAL BUILDING FLOOR SLAB:

Self-wt. of the slab = 0.15m x 25 KN/m3	= 3.75 KN/m^2
Floor finishes	= 1 KN/m^2
False ceiling	= 0.5 KN/m^2
Total load	= 5.25 KN/m^2

2. RESIDENTIAL BUILDING TOILET FLOOR SLAB:

Self-wt. of the slab = 0.15m x 25 KN/m3	= 3.75 KN/m^2
Soil filling = 0.23*18	= 4.14 KN/m^2
Total load	= 7.89 KN/m^2

3. Member load:

Grade beam	= (4.8m -0.38m) x 0.23m x 20 KN/ m^3	= 20 KN/m
Ground floor beam	= (3.5m -0.38m) x 0.23m x 20 KN/ m^3	= 14 KN/m
Parapet wall	= 0.9m x 0.23m x 20 KN/ m^3	= 4 KN/m

FOOTING DESIGN CALCULATIONS

Design Code	:	IS Code	
Footing No	:	F1	
Column No	:	C1	(300mm X 750mm)
Analysis No	:	42	
Concrete Grade	:	M25	
Steel Grade	:	Fe500	
Clear Cover	:	40 mm	
Df	:	2.1M	
Dw	:	4 M	
Density of Soil	=	18	KN/cuM
Soil Bearing Capacity	=	180	KN/sqM
Permissible SBC Increse for EQ	=	25	%
Permissible SBC Increse for Wind	=	25	%
Live Load Reduction	=	50	%
Permissible area of loss of contact	=	0	%
Cross Section designed by	:	Maximum pressure	
Consider overburden pressure			
Surcharge Load	=	2	KN/sqM
Footing Type	:	Pad	
Footing Size (LxBxD)	:	3050 X3050mm X 450mm	
Soil Wt. + Footing Wt. + Surcharge Load	=	170.72+4.80	KN
	=	175.52	KN

Check For Maximum Soil Pressure:

Critical Analysis Load Combination	=	3	
Critical Load Combination	=	[1] : (LOAD 1: DEAD LOAD) +(LOAD 2: LIVE LOAD)	
Pcomb	=	4068.30	KN
P	=	Pcomb + Soil Wt. + Footing Wt. + Surcharge Load	
P	=	550	KN
Mx	=	0	KNM
My	=	0	KNM
P/A	=	119.09	KN/sqM
Mx/Zx	=	0	KN/sqM
My/Zy	=	0	KN/sqM
Maximum Soil Pressure	=	119.09	KN/sqM
Allowable Soil Pressure	=	1x120	KN/sqM
	=	120	KN/sqM

Check For Minimum Soil Pressure:

Critical Analysis Load Combination	=	3	
Critical Load Combination	=	[1] : (LOAD 1: DEAD LOAD) +(LOAD 2: LIVE LOAD)	
Pcomb	=	468.3	KN
P	=	Pcomb + Soil Wt. + Footing Wt. + Surcharge Load	
P	=	550	KN
Mx	=	0	KNM
My	=	0	KNM
P/A	=	119.09	KN/sqM
Mx/Zx	=	0	KN/sqM
My/Zy	=	0	KN/sqM
Minimum Soil Pressure	=	119.09	KN/sqM
	>	0	

Offset Along L (Loff)	=	610	mm
Offset Along B (Boff)	=	600	mm

Check For Bouyancy:

Critical Analysis Load Combination	=	3	
Critical Load Combination	=	[1] : (LOAD 1: DEAD LOAD) +(LOAD 2: LIVE LOAD)	
Factor of safety	=	1.4	
Depth of Founding Layer	=	2.1	M
Ground Water Level	=	4	M
Water Pressure	=	22	KN/sqM
Upward force	=	Water Pressure X L X B	
	=	53	KN
Downward force	=	321.81	KN
Factor of safety available	=	Downward Force / Upward Force	
	=	6.09	
	>		1.4

Check For Sliding:

Critical Analysis Load Combination	=	3	
Critical Load Combination	=	[1] : (LOAD 1: DEAD LOAD) +(LOAD 2: LIVE LOAD)	
Coefficient Of Friction	=	0.4	
Factor of safety	=	1.2	
Shear Vx	=	0.24	KN
shear Vy	=	1.30	KN
Resultant sliding force	=	1.32	KN
Downward force	=	321.81	KN
Upward water pressure	=	52.80	KN
Net downward force	=	269.01	KN
Force resisting sliding	=	Friction Coeff X Net Downward Force	
	=	107.60	KN
Factor of safety available	=	Resisting Force / Sliding Force	
	=	81.68	
	>	1.2	

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Design For Bending:

Bottom Steel Along L:

Critical Analysis Load Combination	= 4	
Critical Load Combination	= [4] : 1.5 (LOAD 1: DEAD LOAD) +1.5 (LOAD 2: LIVE LOAD)	
Pu	= 550	KN
Mux	= 0	KNM
Muy	= 0	KNM
P/A	= 188.94	KN/sqM
Mx/Zx	= 0	KN/sqM
My/Zy	= 0	KN/sqM
Deff	= 277	mm
Beff	= 1500	mm
SPu	= 188.94	KN/sqM
Mu	= SPu X B X Loff X Loff / 2	
	= 52.73	KNM
Pt	= 0.141	%
Ast Rqd (BM)	= 585	Sqmm
Ast Prv	= T10 @ 150	
	= 628	Sqmm

Distributed Across Total Width

Bottom Steel Along B:

Critical Analysis Load Combination	= 4	
Critical Load Combination	= [4] : 1.5 (LOAD 1: DEAD LOAD) +1.5 (LOAD 2: LIVE LOAD)	
Pu	= 550	KN
Mux	= 0	KNM
Muy	= 0	KNM
P/A	= 188.94	KN/sqM
Mx/Zx	= 0	KN/sqM
My/Zy	= 0	KN/sqM
Deff	= 261	mm
Leff	= 1600	mm
SPu	= 188.94	KN/sqM
Mu	= SPu X L X Boff X Boff / 2	
	= 54.41	KNM

Pt	= 0.149	%
Ast Rqd (BM)	= 624	Sqmm
Ast Prv	= T10 @ 150	
	= 628	Sqmm

Distributed Across Total Length

Design For Shear:

One Way Shear Along L:

Critical Section @ d from Column Face

	= 277	mm
Critical Analysis Load Combination	= 4	
Critical Load Combination	= [4] : 1.5 (LOAD 1: DEAD LOAD) +1.5 (LOAD 2: LIVE LOAD)	
Pu	= 453.46	KN
Mux	= 0	KNM
Muy	= 0	KNM
P/A	= 188.94	KN/sqM
Mx/Zx	= 0	KN/sqM
My/Zy	= 0	KN/sqM
Deff	= 277	mm
Beff	= 1500	mm
SPu	= 188.94	KN/sqM
Vu	= SPu X (Loff - d) X B	
	= 94.38	KN
Tv	= Vu / (Beff X Deff)	
	= 0.23	N/Sqmm
Tc	= 0.29	N/Sqmm
Tv	< Tc	

One Way Shear Along B:

Critical Section @ d from Column Face

	= 261	mm
Critical Analysis Load Combination	= 4	
Critical Load Combination	= [4] : 1.5 (LOAD 1: DEAD LOAD) +1.5 (LOAD 2: LIVE	

	LOAD)	
Pu	= 453.46	KN
Mux	= 0	KNM
Muy	= 0	KNM
P/A	= 188.94	KN/sqM
Mx/Zx	= 0	KN/sqM
My/Zy	= 0	KN/sqM
Deff	= 261	mm
Leff	= 1600	mm
SPu	= 188.94	KN/sqM
Vu	= SPu X (Boff - d) X L	
	= 102.48	KN
Tv	= Vu / (Leff X Deff)	
	= 0.25	N/Sqmm
Tc	= 0.29	N/Sqmm
Tv	< Tc	

Design For Punching Shear:

Critical Section @ d/2 from Column Face

= 134 mm

Critical Analysis Load Combination	= 4	
Critical Load Combination	= [4] : 1.5 (LOAD 1: DEAD LOAD) +1.5 (LOAD 2: LIVE LOAD)	
Pu	= 453.46	KN
Mux	= 0	KNM
Muy	= 0	KNM
P/A	= 188.94	KN/sqM
Mx/Zx	= 0	KN/sqM
My/Zy	= 0	KN/sqM
Deff	= 269	mm
Leff	= 649	mm
Beff	= 569	mm
SPu	= Max Pressure	
	= 188.94	KN/sqM
Vu	= SPu X ((L X B)-(Leff X Beff)	

	= 383.69	KN
Tv	= Vu / (2 X (Leff + Beff) X Deff))	
	= 0.586	N/Sqmm
Tc	= 1.25	N/Sqmm
Tv	< Tc	

Load Transfer Check For Load Transfer From Column To Footing

Critical Analysis Load Combination	= 4	
Critical Load Combination	= [4] : 1.5 (LOAD 1: DEAD LOAD) +1.5 (LOAD 2: LIVE LOAD)	
Pu	= 453.46	KN
A2	= 0.11	sqM
A1	= 2.69	sqM
Base Area	= 2.4	sqM
A1	> Base Area	
Thus, A1	= 2.4	
Modification Factor	= SquareRoot(A1/A2) < =2	
SquareRoot(A1/A2)	= 4.671	
Thus, Modification Factor	= 2	
Concrete Bearing Capacity	= 0.45 X Fck X Modication Factor X Column Area	
	= 2565	KN
Concrete Bearing Capacity	> Pu, Hence Safe.	

COLUMN DESIGN CALCULATIONS

General Data

Column No.	:	C1	
Level	:	0m To 1.8m	
Design Code	=	IS Code	
Grade Of Concrete	=	M25	N/Sqmm
Grade Of Steel	=	Fe500	N/Sqmm
Column B	=	300	MM
Column D	=	600	MM
Clear Cover	=	40	MM
Clear Floor Height @ B	=	3000	MM
Clear Floor Height @ D	=	3000	MM
No Of Floors	=	1	
No Of Columns In Group	=	1	
Column Type	:	UnBraced	
Minimum eccentricity check	:	One Axis at a Time	

Load Data

Analysis Reference No.	=	47	
Critical Analysis Load Combination	:	4	
Load Combination	=	[2] : 1.5 (LOAD 1: DL) +1.5 (LOAD 2: LL)	
Critical Location	=	Top Joint	
Pu	=	550	KN
Mux	=	-30.31	KNM
Muy	=	-10.07	KNM
Vux	=	-8.55	KN
Vuy	=	15.6	KN

Minimum Eccentricity Check

Since Axial Force is compressive, Min. Eccentricity check to be performed

Most critical case is with Min. Eccentricity check in Y-direction

Minimum Eccentricity Along B :

Minimum Eccentricity	=	Unsupported Length / 500 + B

		/ 30	
	=	14.32	MM
Mminy	=	Pu x Minimum Eccentricity	
	=	34.83	KNM

Slenderness Check

Max Slenderness Ratio(L/B)	=	6	
	<	60	(Hence Ok)

Column Is Unbraced Along D

Slenderness Check Along D:

Effective Length Factor	=	1.2	
Slenderness Ratio	=	Effective Length / D	
	=	2.7, Column not Slender Along D	

Column Is Unbraced Along B

Slenderness Check Along B:

Effective Length Factor	=	1.2	
Slenderness Ratio	=	Effective Length / B	
	=	7.2, Column not Slender Along B	

Calculation of Design Moment

Direction	Manalysis	Mmin	Mdesign	Mslndx	Mdesign-final
	A	B	C	E	F
Major Axis - Mux	30.31	---	30.31	0	30.31
Minor Axis - Muy	10.07	34.83	34.83	0	34.83

Wher e

A = Moments directly from analysis

B = Moments due to minimum eccentricity

C = Maximum of analysis moment and min. eccentricity = Max (A,B)

E = Moment due to slenderness effect

F = Final design Moment = Max(C- Top Bottom , D- Top Bottom) + E

Final Critical Design Forces

Critical Case - Axial Load & BiAxial Bending

Pu	=	550	KN

Mux	=	30.31	KNM
Muy	=	34.83	KNM

Biaxial Bending Check

Pt Calculated	=	2.07	
Steel Provided	=	8-T16	
Mux1	=	306.98	KNM
Muy1	=	154.32	KNM
Puz	=	0.45 x Fck x Ac + 0.75 x Fy x Asc	
	=	3378.02	KN
Pu/Puz	=	0.52	
Alpha	=	1.53	
Interaction Ratio	=	(Mux / Mux1)^Alpha + (Muy / Muy1)^Alpha)	
	=	0.13 < 1	

Design Of Shear

Design for shear along D

Critical Analysis Load Combination	:	4	
Critical Load Combination	=	[2] : 1.5 (LOAD 1: DL) +1.5 (LOAD 2: LL)	KN
Design shear force, Vuy	=	15.5958	KN
Pu	=	1741.62	
Design shear stress, Tvy	=	Vuy / (B x Deff)	N/Sqmm
	=	0.0945	N/Sqmm
Design shear strength, Tc	=	0.6493	N/Sqmm
Shear Strength Enhancement Factor	=	1 + 3 x Pu / (B x D x Fck)	
	=	2.1611	
Shear Strength Enhancement Factor (max)	=	1.5	
Shear Strength Enhancement Factor	=	1.5	
Enhanced shear strength, Tc-e	=	0.9739	N/Sqmm
Design shear check	=	Tvy < Tc x Enhancement factor	

Link for Shear Design along D are not required

Design for shear along B

Critical Analysis Load Combination	:	4	
Critical Load Combination	=	[2] : 1.5 (LOAD 1: DL) +1.5 (LOAD 2: LL)	KN
Design shear force, Vux	=	-8.5535	kN
Pu	=	550	
Design shear stress, Tvx	=	Vux / (D x Beff)	kN
	=	0.057	N/Sqmm
Design shear strength, Tc	=	0.6493	N/Sqmm
Shear Strength Enhancement Factor	=	1 + 3 x Pu / (B x D x Fck)	
	=	2.1611	
Shear Strength Enhancement Factor (max)	=	1.5	
Shear Strength Enhancement Factor	=	1.5	
Enhanced shear strength, Tc-e	=	0.9739	N/Sqmm
Design shear check	=	Tvx < Tc x Enhancement factor	

Link for Shear Design along B are not required

Design Of Links

Links in the zone where special confining links are not required

Normal Links

Diameter of link	=	8	mm
	>	Max. longitudinal bar dia / 4	
	=	5	mm

Criterion for spacing of normal links

Min. Longitudinal Bar dia X 16	=	256	mm
Min. dimension of column	=	230	mm
Max. 300 mm	=	300	mm
Maximum B/2	=	150	mm
Provided spacing	=	150	mm

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Table For Links

	Required			Provided	
	Normal Design	**Shear Design**	**Ductile Design**	**Normal Zone**	**Ductile Zone**
Link Dia.	8	---	---	8	---
Spacing	150	---	---	150	---

BEAM DESIGN CALCULATION

Group : **G1**
Beam No : **B1**
Analysis Reference (Member) 4.2m : 125
Beam Length : 5275 mm
Breadth (B) : 200 mm
Depth (D) : 750 mm
Effective Depth (d) : 395 mm
Design Code : IS Code
Beam Type : Regular Beam
Grade Of Concrete : M25
Grade Of Steel : Fe500
Clear Cover (Cmin) : 25 mm
Es : 2x10^5 N/Sqmm

Flexure Design

	Beam Bottom			Beam Top		
	Left	**Mid**	**Right**	**Left**	**Mid**	**Right**
Critical L/C - Analysis	4	4	4	4	4	4
Critical L/C - RCDC	2	2	2	2	2	2
Mu (KNm)	4.56	23.9	1.77	48.43	0	54.01
Tu (KNm)	3.39	3.39	3.39	3.39	3.39	3.39
M_{Tu} (KNm)	4.99	4.99	4.99	4.99	4.99	4.99
Mud (KNm)	9.55	28.88	6.76	53.41	4.99	59

MuLim (KNm)	156	156	156	156	156	156
R	0.204	0.617	0.144	1.141	0.107	1.26
Ptmin (%)	0.2	0.2	0.2	0.2	0.2	0.2
Ptclc (%)	0.2	0.2	0.2	0.278	0.2	0.309
Pcclc (%)	0.002	0	0.016	0	0.025	0
PtPrv (%)	0.679	0.679	0.679	0.87	0.679	0.87
AstCalc (Sqmm)	237	237	237	329.24	237	366.11
AstPrv (Sqmm)	804.24	804.24	804.24	1030.44	804.24	1030.44
Reinforcement	3-T12 2-T12	3- T12 2-T12	3- T12 2-T12	3- T12 2-T12	3- T12 2-T12	3- T12 2-T12

Shear Design			
	Left	**Mid**	**Right**
Critical L/C - Analysis	4	4	4
Critical L/C - RCDC	2	2	2
Vu (KN)	69.77	32.17	72.73
Tu (KNm)	3.39	3.39	3.39
V_{Tu} (KN)	18.08	18.08	18.08
Vut (KN)	87.85	50.25	90.81
Tv (N/Sqmm)	0.74	0.42	0.77
Tc (N/Sqmm)	0.61	0.55	0.61
Vc (KN)	72.1	65.5	72.1
Vus=Vut-Vc (KN)	15.75	0	18.71
Asv Torsion (Sqmm)	327.085	213.898	335.988
Asv Reqd (Sqmm)	332.364	332.364	332.364
Legs	2	2	2

Stirrup Dia	8	8	8
SvCalc (mm)	165	175	165
SvPrv (mm)	165	175	165
Asv Torsion Prv (Sqmm)	609.33	574.51	609.33
Asv Total Prv (Sqmm)	609.33	574.51	609.33

Maximum Spacing Criteria

Basic

Spc1 =0.75d = 296 mm

Spc2 = 300 mm

For Torsion

(X1 = 260, Y1 = 410)

Spc3 = X1 = 260 mm

Spc4=(X1+Y1)/4 = 167.5 mm

SFR Design

Beam Width =300 mm

Beam Depth =450 mm

Web Depth =450 <= 750 mm

Side Face Reinforcement
Not Required.

SLAB DESIGN CALCULATIONS

Level	=	4.2m	
Design Code	=	IS Code	
Grade Of Concrete	=	M25	N/Sqmm
Grade Of Steel	=	Fe500	N/Sqmm
Clear Cover	=	20.000	mm
Long Span, Ly	=	5.19	M
Short Span, Lx	=	4.19	M
Imposed Load	=	1.000	KN/Sqm
Live Load	=	2.000	KN/Sqm
Slab Thickness	=	150.000	mm
Effective Depth Along LX, Deffx	=	125.000	mm
Effective Depth Along LY, Deffy	=	125.000	mm
Self Weight	=	5.000	KN/Sqm
Total Load, TL	=	14.000	KN/Sqm
Span	=	2-Way	
Panel Type	=	Two Adjacent Edge continuous	

Design Moments:

Short Span Positive Moment At Midspan -

Moment Coefficient	=	0.043	
BM	=	20.382	KNM
Mu = 1.5 X BM	=	30.573	KNM
Area Of Steel Required (Mu)	=	422.079	Sqmm/M
Steel Provided	=	**T8 @ 150 c/c**	
	=	931.000	Sqmm/M

Short Span Negative Moment At Continuous Support -

Moment Coefficient	=	0.058	
BM	=	27.176	KNM
Mu = 1.5 X BM	=	40.764	KNM
Area Of Steel Required (Mu)	=	573.231	Sqmm/M
Steel Provided	=	**T8@ 150 c/c**	
	=	931.000	Sqmm/M

Long Span Positive Moment At Midspan -

Moment Coefficient	=	0.028	
BM	=	12.951	KNM
Mu = 1.5 X BM	=	19.427	KNM
Area Of Steel Required (Mu)	=	280.233	Sqmm/M
Steel Provided	=	**T8@ 150 c/c**	
	=	1131.000	Sqmm/M

Long Span Negative Moment At Continuous Support -

Moment Coefficient	=	0.037	
BM	=	17.269	KNM
Mu = 1.5 X BM	=	25.903	KNM
Area Of Steel Required (Mu)	=	378.325	Sqmm/M
Steel Provided	=	**T8@ 150 c/c**	
	=	1131.000	Sqmm/M

Distribution Steel @ 0.12% -

Area Of Steel Required	=	210.000	Sqmm
Steel Provided	=	**T8@ 150 c/c**	
	=	931.000	Sqmm/M

Shear Check :

Along Short Span

Shear Coefficient(Lx), SF1	=	0.447	
V = SF1 x TL x Lx	=	36.316	KN
Vu = 1.5 X V	=	54.474	KN
Shear Stress, Tv	=	0.311	N/Sqmm
Nominal Shear Stress, Tc	=	0.410	N/Sqmm
Modification Factor 'K'	=	1.200	
K x Tc	=	0.492	
	>	0.311	Slab Is Safe In Shear

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Along Long Span

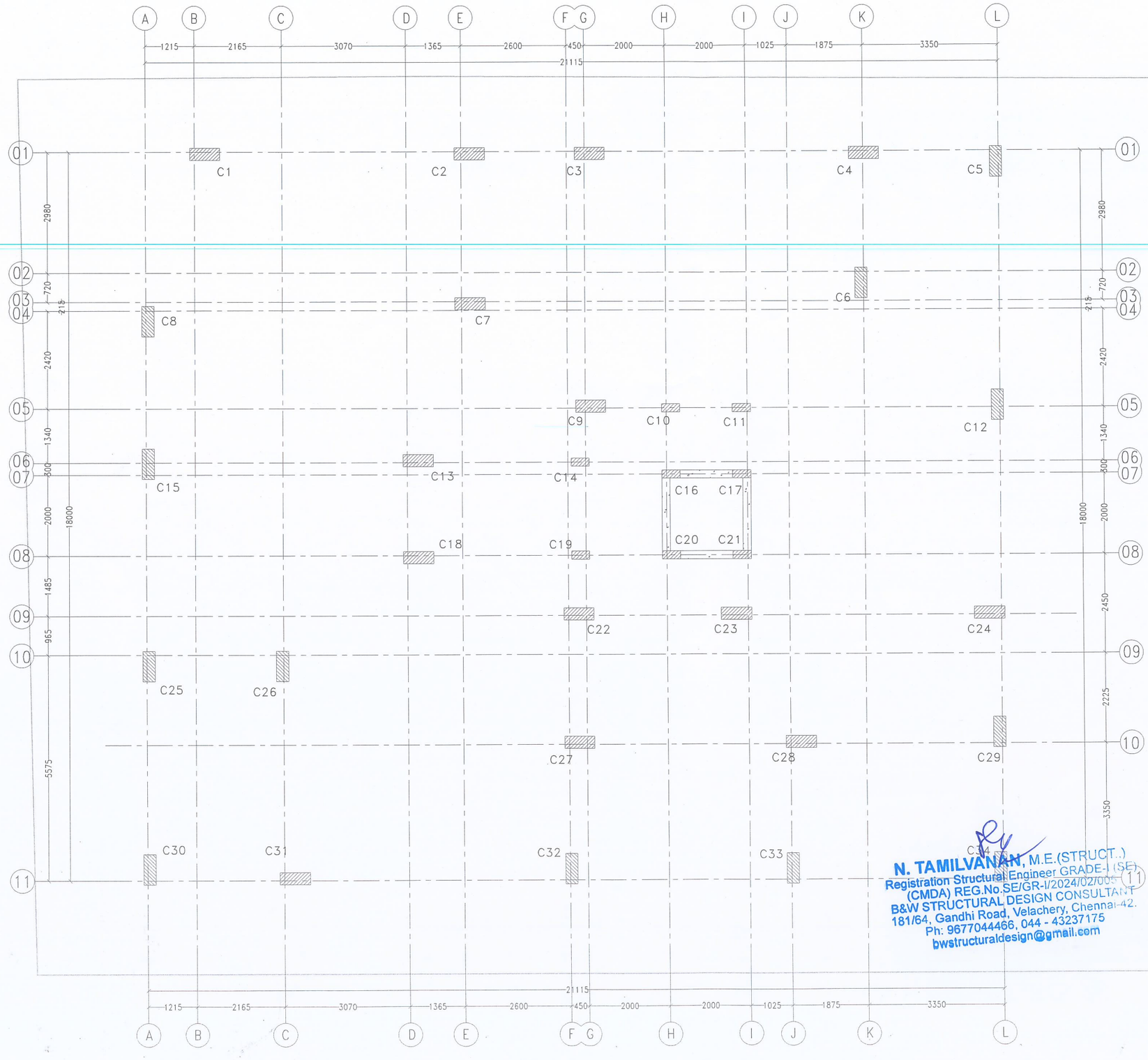
Shear Coefficient(Ly),	=	0.360	

SF2			
V = SF2 x TL x Lx	=	29.232	KN
Vu = 1.5 X V	=	43.848	KN
Shear Stress, Tv	=	0.266	N/Sqmm
Nominal Shear Stress, Tc	=	0.342	N/Sqmm
Modification Factor 'K'	=	1.200	
K x Tc	=	0.411	
	>	0.266	Slab Is Safe In Shear

Deflection Check:

Basic Span To Depth Ratio	=	26	
Span Correction Factor	=	1.000	
Tensile Steel Factor	=	2.198	
Compression Steel Factor	=	1.000	
Flange Correction Factor	=	1.000	
Max Span To Depth Ratio	=	26.00 x 1.00 x 2.20 x 1.00 x 1.00	
	=	57.142	
Lx/d	=	33.143	
	<	57.142	Slab Is Safe In Deflection

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DRAWING RELEASED FOR:-

APPROVAL ONLY

PROJECT:-

PLAN SHOWING THE PROPOSED CONSTRUCTION OF STILT FLOOR + 4 FLOORS (16.0M HEIGHT) RESIDENTIAL BUILDING WITH 14 DWELLING UNITS AT PLOT NO. 10 & 11, NEW DOOR NO.45 & 47, OLD DOOR NO.25 & 26, RUKMANI ROAD, KALACHATRA COLONY, BESANT NAGAR, CHENNAI 600090 COMPRISED IN OLD S.NO. 161/2 & 161/3 (PART), AND T.S.NO.21, BLOCK NO.51 OF THIRUVANMIYUR VILLAGE WITHIN THE LIMIT OF GREATER CHENNAI CORPORATION.

TECHNICAL NOTES:-

1.0 ALL DIMENSIONS ARE IN MM
LEVELS ARE IN MM

2.0 GRADE:-
CONCRETE - M25 (1:1:2),
STEEL - FE 500.

3.0 COVER:-
FOOTING-2",COLUMN-1.5",BEAM-1",
SLAB-$\frac{3}{4}$",RC WALL-1.5", WAIST SLAB-$\frac{3}{4}$".

4.0 DESIGNED:-
FOUNDATION & COLUMN ARE DESIGNED FOR S+4 FLOORS ONLY.

5.0 SOIL TEST:-
AS PER SOIL TEST REPORT THE SBC OF SOIL IS TAKEN AS 250 kN/M2. AT DEPTH OF 2000MM FROM NGL.

PROJECT NO:	ST-2024/02/01/79/01	ST-01

TITLE:-

COLUMN MARKING LAYOUT

REVISION:-

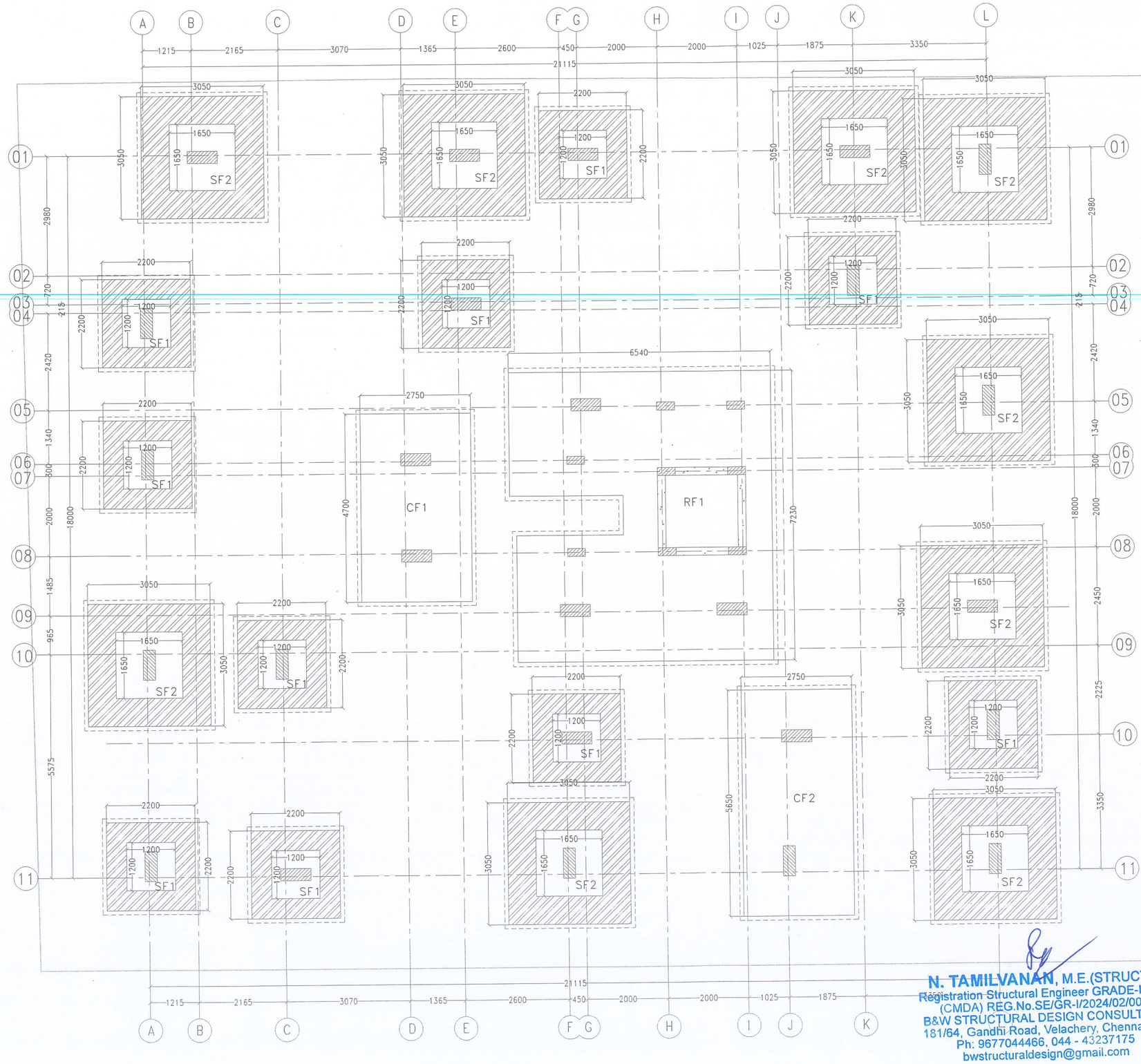
R0

DIRECTION:-

N W E S

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TECHNICAL NOTES:-

1.0 ALL DIMENSIONS ARE IN MM
LEVELS ARE IN MM

2.0 GRADE:-
CONCRETE - M25 (1:1:2).
STEEL - FE 500.

3.0 COVER:-
FOOTING-2",COLUMN-1.5",BEAM-1",
SLAB-$\frac{3}{4}$",RC WALL-1.5", WAIST SLAB-$\frac{3}{4}$".

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5.0 SOIL TEST:-
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PROJECT NO:	ST-2024/02/01/79/01	ST-02

TITLE:-

FOOTING MARKING LAYOUT

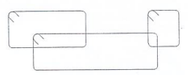
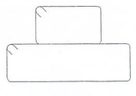
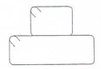
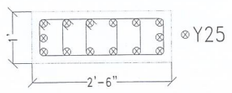
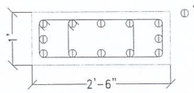
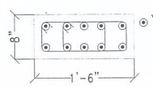
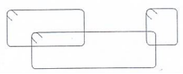
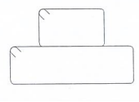
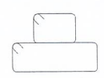
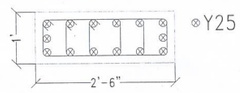
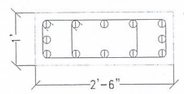
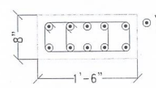
REVISION:- R0

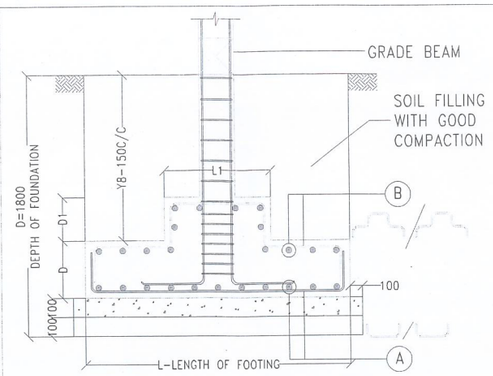
DIRECTION:- N W E S

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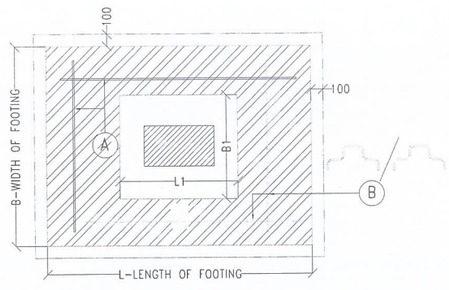
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COLUMN SCHEDULE:-

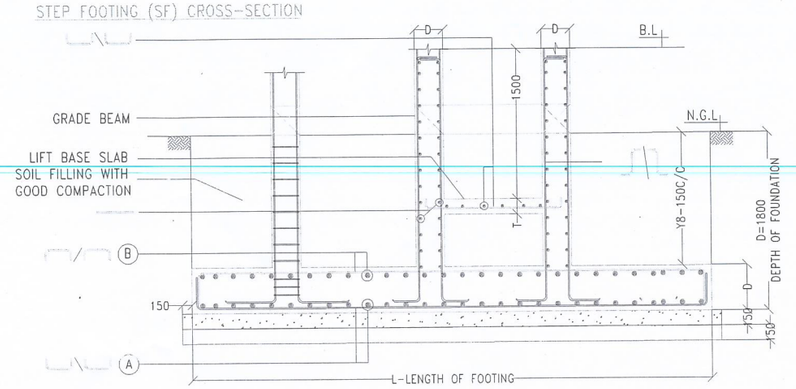
GROUND FLOOR ROOF TO TERRACE FLOOR			
	Y8-6"C/C	Y8-6"C/C	Y8-6"C/C
			
	14-Y25	12-Y20	10-Y16
UP TO GROUND FLOOR ROOF			
	Y8-6"C/C	Y8-6"C/C	Y8-6"C/C
			
	14-Y25	12-Y20	10-Y16
COLUMN MARKED	C1, C2, C3, C4, C5, C6, C9, C12, C15, C18, C22, C23, C24, C25, C28, C29, C32, C33, C34	C7, C8, C13, C14, C26, C27, C30, C31	C10, C11, C14, C16, C17, C19, C20, C21



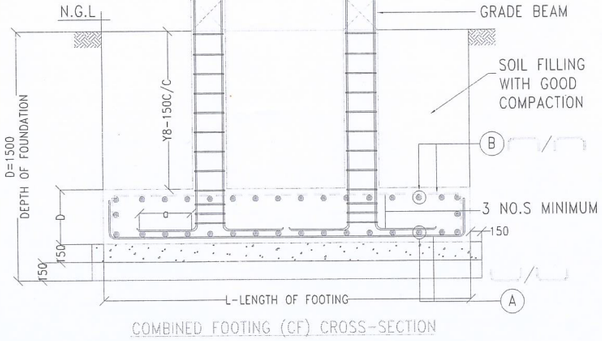
STEP FOOTING (SF) CROSS-SECTION



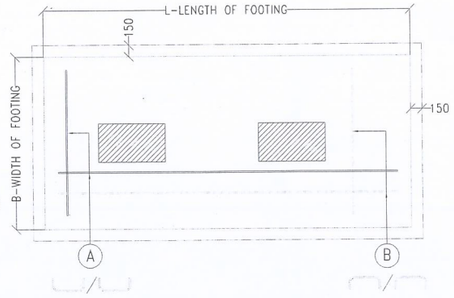
STEP FOOTING (SF)-PLAN



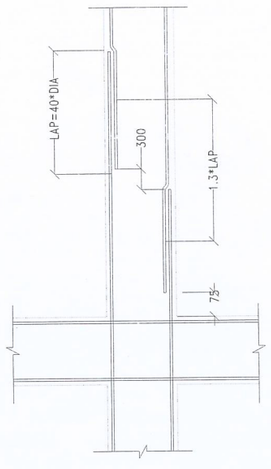
RAFT FOOTING (RF1) CROSS-SECTION



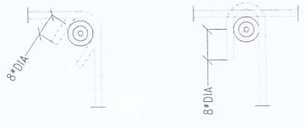
COMBINED FOOTING (CF) CROSS-SECTION



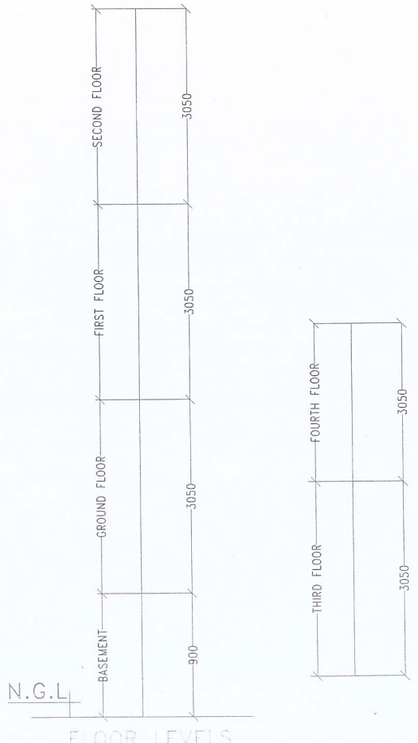
COMBINED FOOTING (CF)-PLAN



LAPPING DISTANCE



LATERAL TIE DETAILS



FLOOR LEVELS

STEP FOOTING (SF)-SCHEDULE:-

FOOTING	SIZE OF FOOTING		THICKNESS		NO.S	BOTTOM REINFORCEMENT (A)	TOP REINFORCEMENT (B)
	L x B	L1 x B1	D1	D2			
SF1	2200x2200	1200x1200	450	450	10	Y16-100C/C	Y16-100C/C
SF2	3050x3050	1650x1650	450	450	08	Y16-100C/C	Y16-100C/C

TOTAL - 18

RAFT FOOTING (RF)-SCHEDULE:-

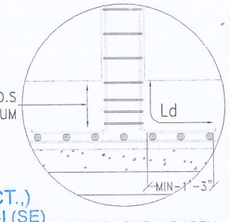
FOOTING	SIZE OF FOOTING	THICKNESS	NO.S	BOTTOM REINFORCEMENT (A)	TOP REINFORCEMENT (B)
	L x B	D			
RF1	"REFER ST-02"	450	01	Y16-100C/C	Y16-100C/C

TOTAL - 01

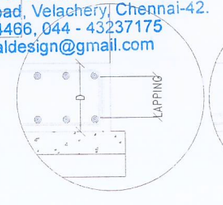
COMBINED FOOTING (CF)-SCHEDULE:-

FOOTING	SIZE OF FOOTING L x B	THICKNESS D	NO.S	BOTTOM REINFORCEMENT (A)	TOP REINFORCEMENT (B)
CF1	4700x2750	450	01	Y16-100C/C	Y16-100C/C
CF2	5650x2750	450	01	Y16-100C/C	Y16-100C/C

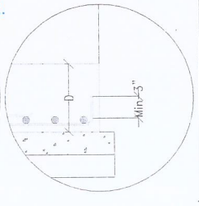
TOTAL - 02



DEVELOPEMENT LENGTH



AT END ANCHORAGE



AT END ANCHORAGE

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PROJECT:-

PLAN SHOWING THE PROPOSED CONSTRUCTION OF STILT FLOOR + 4 FLOORS (16.0M HEIGHT) RESIDENTIAL BUILDING WITH 14 DWELLING UNITS AT PLOT NO. 10 & 11, NEW DOOR NO.45 & 47, OLD DOOR NO.25 & 26, RUKMANI ROAD, KALACHATRA COLONY, BESANT NAGAR, CHENNAI 600090 COMPRISED IN OLD S.NO. 161/2 & 161/3 (PART), AND T.S.NO.21, BLOCK NO.51 OF THIRUVANMIYUR VILLAGE WITHIN THE LIMIT OF GREATER CHENNAI CORPORATION.

NOTE:
a - MINIMUM= 1'-3"

TECHNICAL NOTES:-

1.0 ALL DIMENSIONS ARE IN MM
LEVELS ARE IN MM

2.0 GRADE:-
CONCRETE - M25 (1:1:2).
STEEL - FE 500.

3.0 COVER:-
FOOTING-2",COLUMN-1.5",BEAM-1",
SLAB-$\frac{3}{4}$",RC WALL-1.5", WAIST SLAB-$\frac{3}{4}$".

4.0 DESIGNED:-
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5.0 SOIL TEST:-
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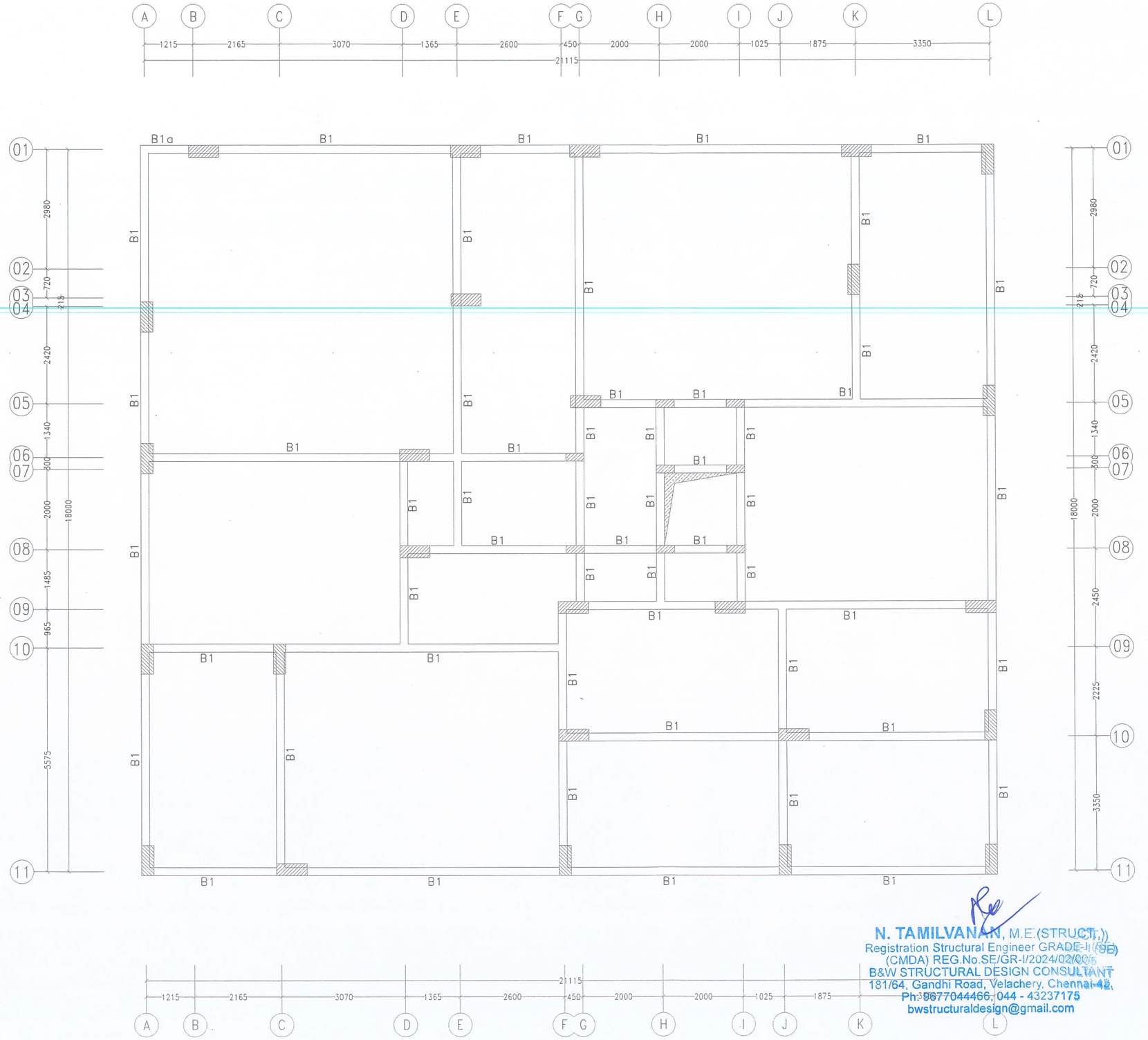
PROJECT NO:	ST-2024/02/01/79/01	ST-01A

TITLE:-
COLUMN & FOOTING REINFORCEMENT DETAILS

REVISION:-
R0

DIRECTION:-
N W E S

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TECHNICAL NOTES:-

1.0 ALL DIMENSIONS ARE IN MM
LEVELS ARE IN MM

2.0 GRADE:-
CONCRETE - M25 (1:1:2).
STEEL - FE 500.

3.0 COVER:-
FOOTING-2",COLUMN-1.5",BEAM-1",
SLAB-$\frac{3}{4}$",RC WALL-1.5", WAIST SLAB-$\frac{3}{4}$".

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PROJECT NO:	ST-2024/02/01/79/01	ST-03

TITLE:-

GRADE BEAM MARKING LAYOUT

REVISION:-

R0

DIRECTION:-

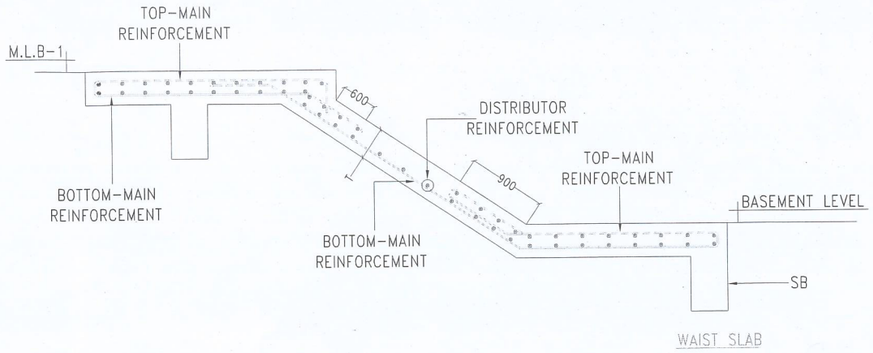
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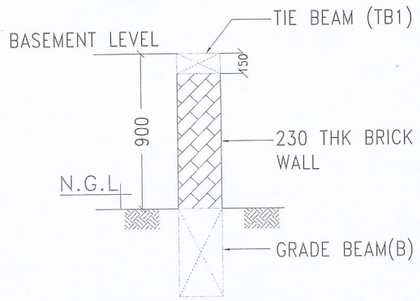
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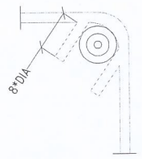
GRADE BEAM REINFORCEMENT SCHEDULE:-

BEAM SIZE B&D	BEAM @ LEFT CANTILEVER	BEAM @ LEFT	BEAM @ MIDDLE	BEAM @ RIGHT	BEAM @ RIGHT CANTILEVER
200X750	3-Y12(T) 2-Y12(T) Y8-5"C/C 2-Y12(T) 2-Y12(T) 3-Y12(T)	3-Y12(T) 2-Y12(T) Y8-5"C/C 2-Y12(T) 2-Y12(T) 3-Y12(T)	3-Y12(T) 2-Y12(T) Y8-7"C/C 2-Y12(T) 2-Y12(T) 3-Y12(T)	3-Y12(T) 2-Y12(T) Y8-5"C/C 2-Y12(T) 2-Y12(T) 3-Y12(T)	- - - -
B1	B1a				

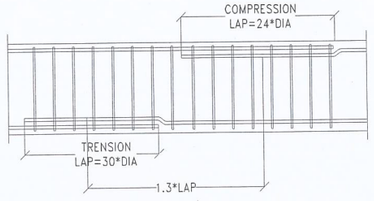




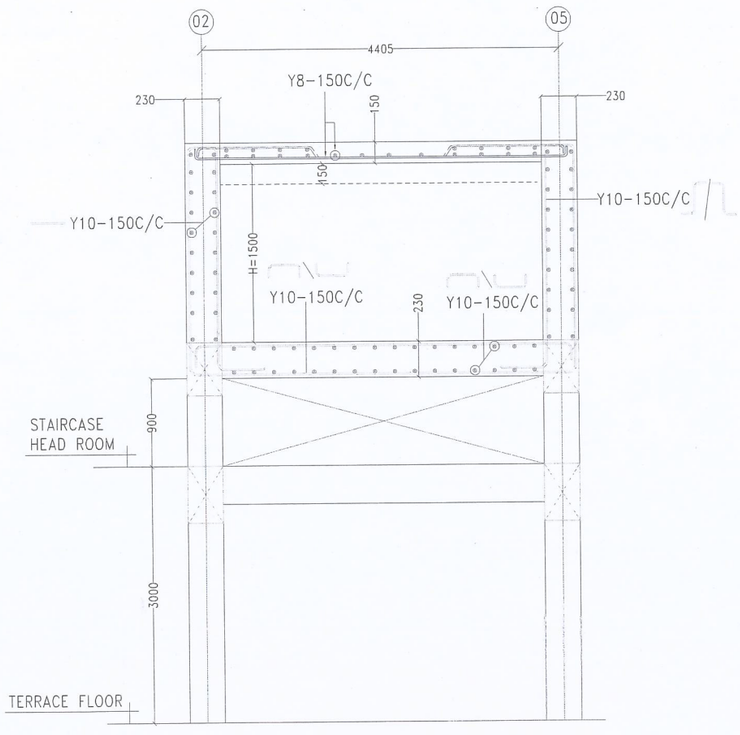
BASEMENT LEVEL TIE BEAM



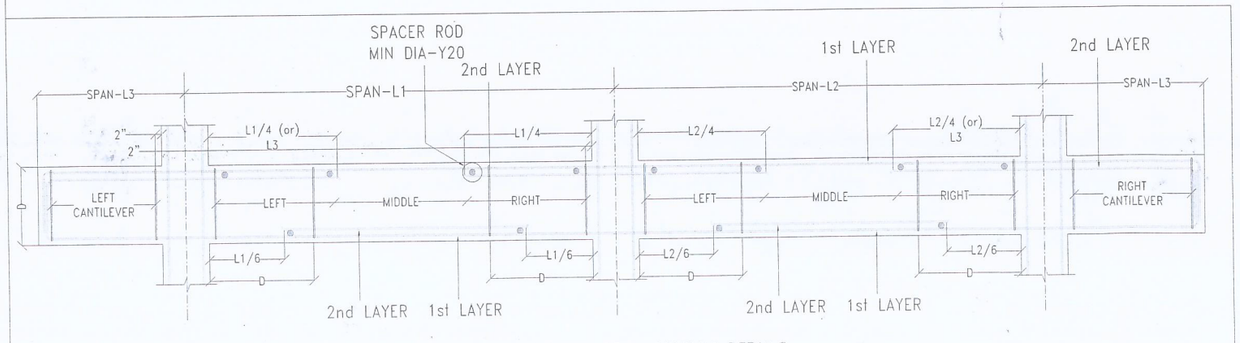
ANCHORING ENDS OF STIRRUPS



BEAM REINFORCEMENT LAPPING



STAIRCASE, HEAD ROOM & WATER TANK CROSS SECTION



TYPICAL LONGITUDINAL BEAM SECTION DETAILS

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DRAWING RELEASED FOR:-
APPROVAL ONLY

PROJECT:-

PLAN SHOWING THE PROPOSED CONSTRUCTION OF STILT FLOOR + 4 FLOORS (16.0M HEIGHT) RESIDENTIAL BUILDING WITH 14 DWELLING UNITS AT PLOT NO. 10 & 11, NEW DOOR NO.45 & 47, OLD DOOR NO.25 & 26, RUKMANI ROAD, KALACHATRA COLONY, BESANT NAGAR, CHENNAI 600090 COMPRISED IN OLD S.NO. 161/2 & 161/3 (PART), AND T.S.NO.21, BLOCK NO.51 OF THIRUVANMIYUR VILLAGE WITHIN THE LIMIT OF GREATER CHENNAI CORPORATION.

TECHNICAL NOTES:-

1.0 ALL DIMENSIONS ARE IN MM
LEVELS ARE IN MM

2.0 GRADE:-
CONCRETE - M25 (1:1:2).
STEEL - FE 500.

3.0 COVER:-
FOOTING-2",COLUMN-1.5",BEAM-1",
SLAB-$\frac{3}{4}$",RC WALL-1.5", WAIST SLAB-$\frac{3}{4}$".

4.0 DESIGNED:-
FOUNDATION & COLUMN ARE DESIGNED FOR S+4 FLOORS ONLY.

5.0 SOIL TEST:-
AS PER SOIL TEST REPORT THE SBC OF SOIL IS TAKEN AS 250 kN/M2. AT DEPTH OF 2000MM FROM NGL.

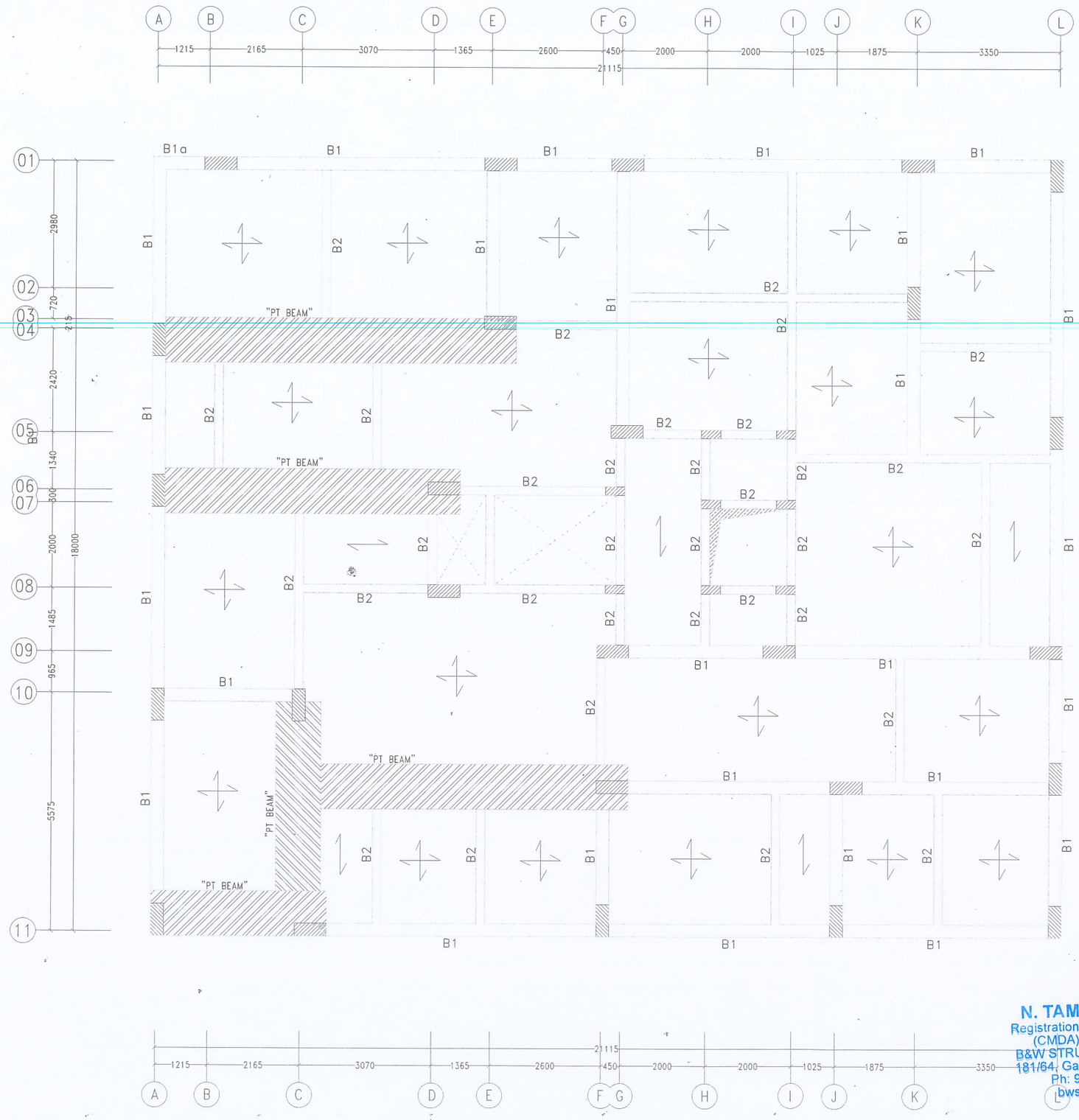
PROJECT NO:	ST-2024/02/01/79/01	ST-03A

TITLE:- GRADE BEAM & REINFORCEMENT DETAILS

REVISION:- R0

DIRECTION:- N W E S

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TWO WAY-150 - SHORTER DIRECTION - Y10-150C/C
TWO WAY-150 - LONGER DIRECTION - Y10-150C/C
ONE WAY-150 - SHORTER DIRECTION - Y10-150C/C
ONE WAY-150 - DISTRIBUTOR - Y10-150C/C
CANTILVER-150 - TOP REINFORCEMENT - Y10-150C/C

DRAWING RELEASED FOR:-
APPROVAL ONLY

PROJECT:-

PLAN SHOWING THE PROPOSED CONSTRUCTION OF STILT FLOOR + 4 FLOORS (16.0M HEIGHT) RESIDENTIAL BUILDING WITH 14 DWELLING UNITS AT PLOT NO. 10 & 11, NEW DOOR NO.45 & 47, OLD DOOR NO.25 & 26, RUKMANI ROAD, KALACHATRA COLONY, BESANT NAGAR, CHENNAI 600090 COMPRISED IN OLD S.NO. 161/2 & 161/3 (PART), AND T.S.NO.21, BLOCK NO.51 OF THIRUVANMIYUR VILLAGE WITHIN THE LIMIT OF GREATER CHENNAI CORPORATION.

TECHNICAL NOTES:-

1.0 ALL DIMENSIONS ARE IN MM
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2.0 GRADE:-
CONCRETE - M25 (1:1:2).
STEEL - FE 500.

3.0 COVER:-
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5.0 SOIL TEST:-
AS PER SOIL TEST REPORT THE SBC OF SOIL IS TAKEN AS 250 kN/M2. AT DEPTH OF 2000MM FROM NGL.

PROJECT NO:	ST-2024/02/01/79/01	ST-04
TITLE:-	TYPICAL GROUND, FIRST, SECOND, THIRD FLOOR ROOF BEAM LAYOUT & SLAB REINFORCEMENT DETAILS	

REVISION:-
R0

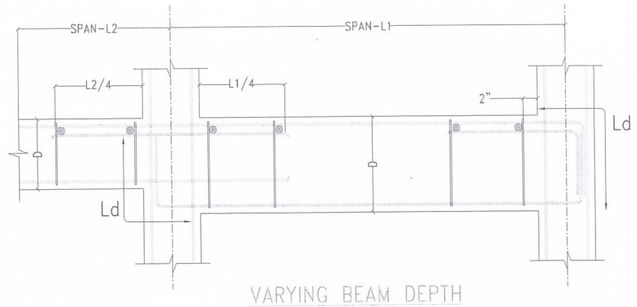
DIRECTION:-
N W E S

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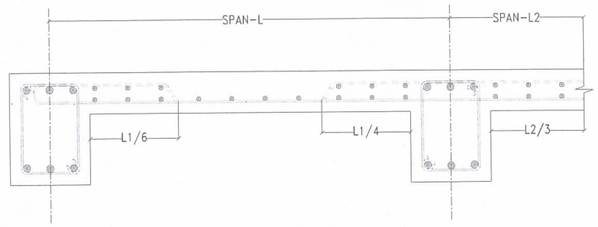
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TYPICAL GROUND, FIRST, SECOND, THIRD FLOOR ROOF & TERRACE FLOOR BEAM REINFORCEMENT SCHEDULE:-

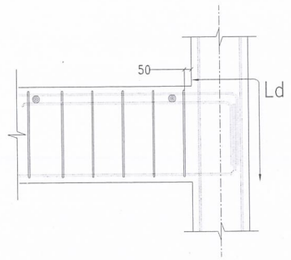
BEAM SIZE B&D	BEAM @ LEFT CANTILEVER	BEAM @ LEFT	BEAM @ MIDDLE	BEAM @ RIGHT	BEAM @ RIGHT CANTILEVER
300X600		3-Y20(T)	3-Y20(T)	3-Y20(T)	
B1	B1a	2-Y20(T) Y8-5"C/C 2-Y20(T) 3-Y20(T)	2-Y20(T) Y8-7"C/C 2-Y20(T) 3-Y20(T)	2-Y20(T) Y8-5"C/C 2-Y20(T) 3-Y20(T)	- - - -
200X450		3-Y16(T)	3-Y16(T)	3-Y16(T)	
B2	- - - -	2-Y16(T) Y8-5"C/C 2-Y16(T) 3-Y16(T)	2-Y16(T) Y8-7"C/C 2-Y16(T) 3-Y16(T)	2-Y16(T) Y8-5"C/C 2-Y16(T) 3-Y16(T)	- - - -
PT BEAM	"REFER PT BEAM"				



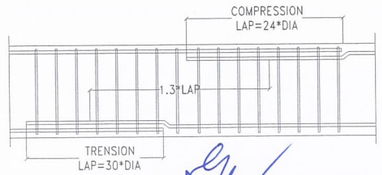
VARYING BEAM DEPTH



TYPICAL ROOF SLAB REINFORCEMENT DETAILS



ANCHOR REINFORCEMENT DETAILS FOR END BEAM



BEAM REINFORCEMENT ARRNG

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PROJECT:-

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LEVELS ARE IN MM

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STEEL - FE 500.

3.0 COVER:-
FOOTING-2",COLUMN-1.5",BEAM-1",
SLAB-$\frac{3}{4}$",RC WALL-1.5", WAIST SLAB-$\frac{3}{4}$".

4.0 DESIGNED:-
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5.0 SOIL TEST:-
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PROJECT NO:	ST-2024/02/01/79/01	ST-04A

TITLE:- TYPICAL GROUND, FIRST, SECOND, THIRD FLOOR ROOF BEAM & TERRACE FLOOR BEAM REINFORCEMENT DETAILS

REVISION:- R0

DIRECTION:- N, W, E, S

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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
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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.