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B&W STRUCTURAL DESIGN CONSULTANT

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181/64, GANDHI ROAD
VELACHERY

STABILITY CERTIFICATE

Date: 06/11/2024

**PLAN SHOWING THE PROPOSED CONSTRUCTIONS OF THE
RESIDENTIAL BUILDING AT PLAT NO:20 &21 SECOND MAINROAD,
ALWARTHIRUNAGAR ANNEXE,CHENNAI-600087 SURVEY NO:115/2F &
115/2G(AS PER PATTa) UP OF VALASARAVAKKAM VILLAGE,
CORPORATION OF CHENNAI**

It is certified that the Proposed building G+3 Floor is designed as per the Indian Code of Practice for concrete construction IS – 456-2000 Where the grade of concrete used for all structural elements is M25. Loading standards followed for design are IS – 875 part- I (DEAD LOAD), IS – 875 part- II (LIVE LOAD), Thus Analysis check has been made and we found it structurally stable and safe for construction.


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**STRUCTURAL ENGINEER
CONSULTANT**

STRUCTURAL DESIGN REPORT

**PLAN SHOWING THE PROPOSED CONSTRUCTIONS OF THE RESIDENTIAL
BUILDING AT PLAT NO:20 &21 SECOND MAINROAD, ALWARTHIRUNAGAR
ANNEXE, CHENNAI-600087 SURVEY NO:115/2F & 115/2G (AS PER PATT)UP OF
VALASARAVAKKAM VILLAGE,CORPORATION OF CHENNAI**

STRUCTURAL CONSULTANT:

B&W STRUCTURAL DESIGN CONSULTANTS

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

VELACHERY,

CHENNAI-600042.

PLAN SHOWING THE PROPOSED CONSTRUCTIONS OF THE RESIDENTIAL BUILDING AT PLAT NO:20 &21 SECOND MAINROAD, ALWARTHIRUNAGAR ANNEXE, CHENNAI-600087 SURVEY NO:115/2F & 115/2G (AS PER PATT)UP OF VALASARAVAKKAM VILLAGE,CORPORATION OF CHENNAI

1. INTRODUCTION

The Structure is a Residential building. It is designed as RCC building supported on Footing at 6.6 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 6.6 m depth from Existing Ground Level and SBC of soil 110kN/m².

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 500Grade for all R.C. members

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

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 (2hrs Fire rating considered in the Design)

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

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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 $1.5 \cdot DL + 1.5 \cdot L.L$
2. LOAD COMB 2 $1.0 \cdot DL + 1.0 \cdot L.L$

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 - 1.5 kN /m^2
5. Unit weight of Solid block - 20 kN/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:

$$\text{Self-wt. of the slab} = 0.15\text{m} \times 25 \text{ KN/m}^3 = 3.75 \text{ KN/m}^2$$

$$\text{Floor finishes} = 1 \text{ KN/m}^2$$

$$\text{False ceiling} = 0.5 \text{ KN/m}^2$$

$$\text{Total load} = 5.25 \text{ KN/m}^2$$

2. RESIDENTIAL BUILDING TOILET FLOOR SLAB:

$$\text{Self-wt. of the slab} = 0.15\text{m} \times 25 \text{ KN/m}^3 = 3.75 \text{ KN/m}^2$$

$$\text{Soil filling} = 0.23 \times 18 = 4.14 \text{ KN/m}^2$$

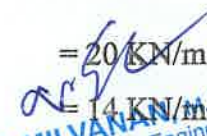
$$\text{Total load} = 7.89 \text{ KN/m}^2$$

3. Member load:

$$\text{Grade beam} = (4.8\text{m} - 0.38\text{m}) \times 0.23\text{m} \times 20 \text{ KN/ m}^3 = 20 \text{ KN/m}$$

$$\text{Ground floor beam} = (3.5\text{m} - 0.38\text{m}) \times 0.23\text{m} \times 20 \text{ KN/ m}^3 = 14 \text{ KN/m}$$

$$\text{Parapet wall} = 0.9\text{m} \times 0.23\text{m} \times 20 \text{ KN/ m}^3$$


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FOOTING DESIGN CALCULATIONS

Design Code : IS Code
Footing No : F1
Column No : C1 (230mm X 380mm)
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 Increase for EQ = 25 %
Permissible SBC Increase 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) : 1800 X1800mm 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	= 199.09	KN/sqM
Mx/Zx	= 0	KN/sqM
My/Zy	= 0	KN/sqM
Maximum Soil Pressure	= 199.09	KN/sqM
Allowable Soil Pressure	= 1x200	KN/sqM
	= 200	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	= 199.09	KN/sqM
Mx/Zx	= 0	KN/sqM
My/Zy	= 0	KN/sqM
Minimum Soil Pressure	= 199.09	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	

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

$$= 134 \quad \text{mm}$$

Critical Analysis Load Combination

$$= 4$$

Critical Load Combination

$$= [4] : 1.5 (\text{LOAD 1: DEAD LOAD}) + 1.5 (\text{LOAD 2: LIVE LOAD})$$

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))	

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$$\begin{aligned}
 &= 383.69 \quad \text{KN} \\
 T_v &= V_u / (2 \times (L_{eff} + B_{eff}) \times D_{eff}) \\
 &= 0.586 \quad \text{N/Sqmm} \\
 T_c &= 1.25 \quad \text{N/Sqmm} \\
 T_v &< T_c
 \end{aligned}$$

Load Transfer Check For Load Transfer From Column To Footing

$$\begin{aligned}
 \text{Critical Analysis Load Combination} &= 4 \\
 \text{Critical Load Combination} &= [4] : 1.5 (\text{LOAD 1: DEAD LOAD}) + 1.5 (\text{LOAD 2: LIVE LOAD}) \\
 P_u &= 453.46 \quad \text{KN} \\
 A_2 &= 0.11 \quad \text{sqM} \\
 A_1 &= 2.69 \quad \text{sqM} \\
 \text{Base Area} &= 2.4 \quad \text{sqM} \\
 A_1 &> \text{Base Area} \\
 \text{Thus, } A_1 &= 2.4 \\
 \text{Modification Factor} &= \text{SquareRoot}(A_1/A_2) < 2 \\
 \text{SquareRoot}(A_1/A_2) &= 4.671 \\
 \text{Thus, Modification Factor} &= 2 \\
 \text{Concrete Bearing Capacity} &= 0.45 \times F_{ck} \times \text{Modification Factor} \times \text{Column Area} \\
 &= 2565 \quad \text{KN} \\
 \text{Concrete Bearing Capacity} &> P_u, \text{ Hence Safe.}
 \end{aligned}$$

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	=	230	MM
Column D	=	450	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 :

$$\text{Minimum Eccentricity} = \frac{\text{Unsupported Length} / 500 + B}{30}$$

$$\begin{aligned}
 M_{\min} &= 14.32 \text{ MM} \\
 &= P_u \times \text{Minimum Eccentricity} \\
 &= 34.83 \text{ KNM}
 \end{aligned}$$

Slenderness Check

$$\begin{aligned}
 \text{Max Slenderness Ratio}(L/B) &= 6 \\
 &< 60 \quad (\text{Hence Ok})
 \end{aligned}$$

Column Is Unbraced Along D

Slenderness Check Along D:

$$\begin{aligned}
 \text{Effective Length Factor} &= 1.2 \\
 \text{Slenderness Ratio} &= \text{Effective Length} / D \\
 &= 2.7, \text{ Column not Slender Along D}
 \end{aligned}$$

Column Is Unbraced Along B

Slenderness Check Along B:

$$\begin{aligned}
 \text{Effective Length Factor} &= 1.2 \\
 \text{Slenderness Ratio} &= \text{Effective Length} / B \\
 &= 7.2, \text{ Column not Slender Along B}
 \end{aligned}$$

Calculation of Design Moment

Direction	M _{analysis}	M _{min}	M _{design}	M _{sldx}	M _{design-final}
	A	B	C	E	F
Major Axis - M _{ux}	30.31	---	30.31	0	30.31
Minor Axis - M _{uy}	10.07	34.83	34.83	0	34.83

Where

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

$$\begin{aligned}
 P_u &= 550 \text{ KN} \\
 M_{ux} &= 30.31 \text{ KNM}
 \end{aligned}$$

Muy	=	34.83	KNM
-----	---	-------	-----

Biaxial Bending Check

Pt Calculated	=	2.07	
Steel Provided	=	4-T16 +2-T12	
Mux1	=	306.98	KNM
Muy1	=	154.32	KNM
Puz	=	$0.45 \times F_{ck} \times A_c + 0.75 \times F_y \times A_{sc}$	
	=	3378.02	KN
Pu/Puz	=	0.52	
Alpha	=	1.53	
Interaction Ratio	=	$(M_{ux} / M_{ux1})^{\alpha} + (M_{uy} / M_{uy1})^{\alpha}$	
	=	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	=	$V_{uy} / (B \times D_{eff})$	N/Sqmm
	=	0.0945	N/Sqmm
Design shear strength, Tc	=	0.6493	N/Sqmm
Shear Strength Enhancement Factor	=	$1 + 3 \times P_u / (B \times D \times F_{ck})$	
	=	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	=	$T_{vy} < T_c \times \text{Enhancement factor}$	
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, Tv _x	=	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	=	Tv _x < 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	
Provided spacing	= 150	mm

Table For Links

	Required			Provided	
	Normal	Shear	Ductile	Normal	Ductile Zone

	Design	Design	Design	Zone	
Link Dia.	8	---	---	8	---
Spacing	150	---	---	150	---

BEAM DESIGN CALCULATION

Group : G1
 Beam No : B1
 Analysis Reference (Member) : 4.2m : 125
 Beam Length : 3800 mm
 Breadth (B) : 230 mm
 Depth (D) : 300 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 : 2×10^5 N/Sqmm

<u>Flexure Design</u>						
	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
Pccclc (%)	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
V _{ut} (KN)	87.85	50.25	90.81
T _v (N/Sqmm)	0.74	0.42	0.77
T _c (N/Sqmm)	0.61	0.55	0.61
V _c (KN)	72.1	65.5	72.1
V _{us} =V _{ut} -V _c (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

$$\text{Spc1} = 0.75d = 296 \text{ mm}$$

$$\text{Spc2} = 300 \text{ mm}$$

For Torsion

$$(X1 = 260, Y1 = 410)$$

$$\text{Spc3} = X1 = 260 \text{ mm}$$

$$\text{Spc4} = (X1 + Y1) / 4 = 167.5 \text{ mm}$$

SFR Design

$$\text{Beam Width} = 300 \text{ mm}$$

$$\text{Beam Depth} = 450 \text{ mm}$$

$$\text{Web Depth} = 450 \leq 750 \text{ mm}$$

Side Face Reinforcement
Not Required.


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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	=	4.195	M
Short Span, Lx	=	3.765	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	=	T10@ 150 c/c	
	=	931.000	Sqmm/M

Long Span Positive Moment At Midspan -

$$\begin{aligned}\text{Moment Coefficient} &= 0.028 \\ \text{BM} &= 12.951 \text{ KNM} \\ \text{Mu} = 1.5 \times \text{BM} &= 19.427 \text{ KNM} \\ \text{Area Of Steel Required (Mu)} &= 280.233 \text{ Sqmm/M} \\ \text{Steel Provided} &= \mathbf{T10@ 150 \text{ c/c}} \\ &= 1131.000 \text{ Sqmm/M}\end{aligned}$$

Long Span Negative Moment At Continuous Support -

$$\begin{aligned}\text{Moment Coefficient} &= 0.037 \\ \text{BM} &= 17.269 \text{ KNM} \\ \text{Mu} = 1.5 \times \text{BM} &= 25.903 \text{ KNM} \\ \text{Area Of Steel Required (Mu)} &= 378.325 \text{ Sqmm/M} \\ \text{Steel Provided} &= \mathbf{T10@ 150 \text{ c/c}} \\ &= 1131.000 \text{ Sqmm/M}\end{aligned}$$

Distribution Steel @ 0.12% -

$$\begin{aligned}\text{Area Of Steel Required} &= 210.000 \text{ Sqmm} \\ \text{Steel Provided} &= \mathbf{T10@ 150 \text{ c/c}} \\ &= 931.000 \text{ Sqmm/M}\end{aligned}$$

Shear Check :

Along Short Span

$$\begin{aligned}\text{Shear Coefficient(Lx), SF1} &= 0.447 \\ V = \text{SF1} \times \text{TL} \times \text{Lx} &= 36.316 \text{ KN} \\ V_u = 1.5 \times V &= 54.474 \text{ KN} \\ \text{Shear Stress, Tv} &= 0.311 \text{ N/Sqmm} \\ \text{Nominal Shear Stress, Tc} &= 0.410 \text{ N/Sqmm} \\ \text{Modification Factor 'K'} &= 1.200 \\ K \times T_c &= 0.492 \\ &> 0.311 \quad \text{Slab Is Safe In Shear}\end{aligned}$$

Along Long Span

$$\begin{aligned}\text{Shear Coefficient(Ly),} &= 0.360\end{aligned}$$

SF2

$$V = \frac{SF2 \times TL \times Lx}{Lx} = 29.232 \text{ KN}$$

$$Vu = 1.5 \times V = 43.848 \text{ KN}$$

$$\text{Shear Stress, } Tv = 0.266 \text{ N/Sqmm}$$

$$\text{Nominal Shear Stress, } Tc = 0.342 \text{ N/Sqmm}$$

$$\text{Modification Factor 'K'} = 1.200$$

$$K \times Tc = 0.411$$

$$> 0.266 \quad \text{Slab Is Safe In Shear}$$

Deflection Check:

$$\text{Basic Span To Depth Ratio} = 26$$

$$\text{Span Correction Factor} = 1.000$$

$$\text{Tensile Steel Factor} = 2.198$$

$$\text{Compression Steel Factor} = 1.000$$

$$\text{Flange Correction Factor} = 1.000$$

$$\text{Max Span To Depth Ratio} = \frac{26.00 \times 1.00 \times 2.20 \times 1.00 \times 1.00}{1.00}$$

$$= 57.142$$

$$Lx/d = 33.143$$

$$< 57.142 \quad \text{Slab Is Safe In Deflection}$$


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TECHNICAL NOTES

CLIENT

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MADURAI

PROJECT

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ED	RRS 02-01-16	
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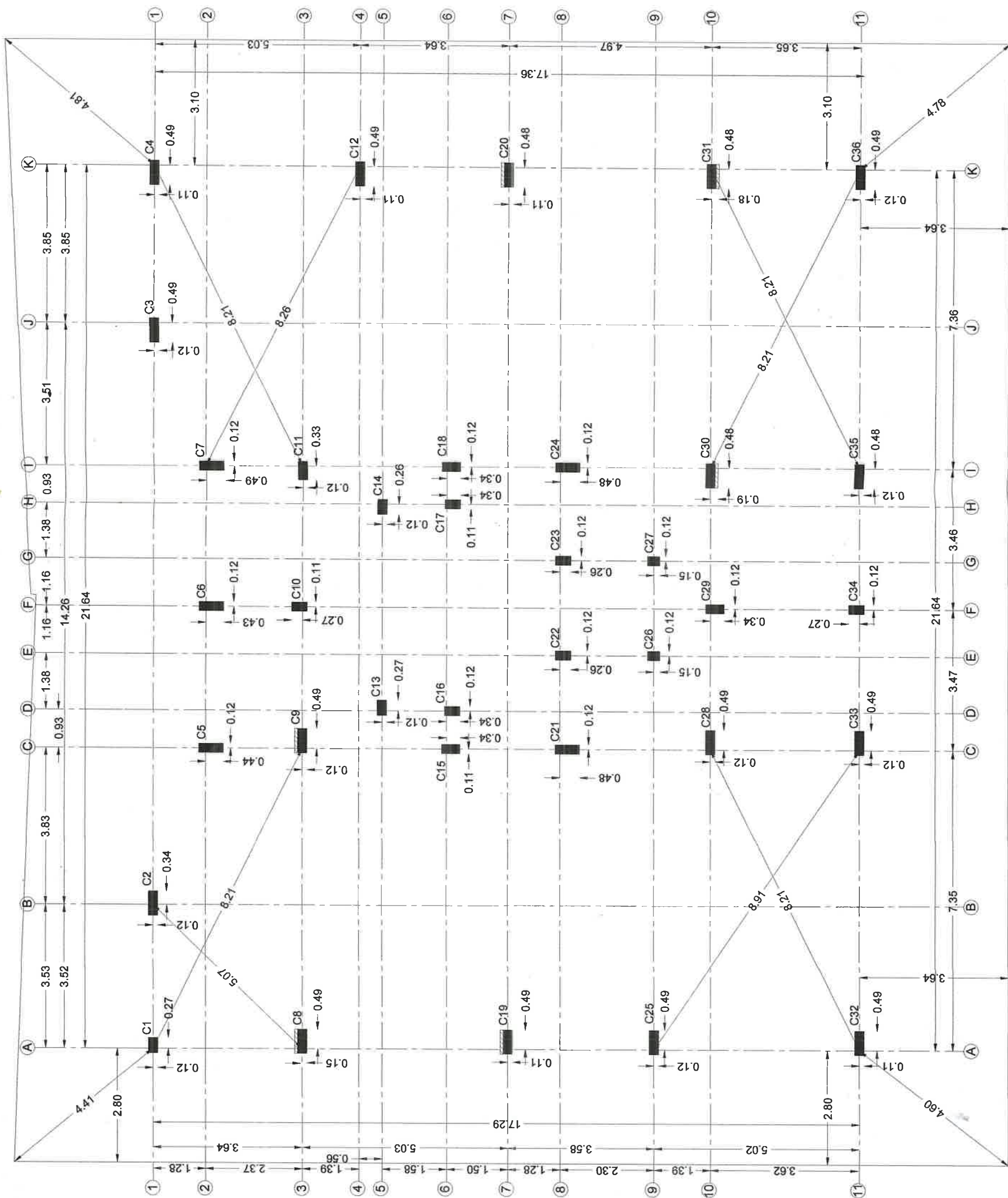
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DRAWING NAME

COLUMN MARKING LAYOUT

DRAWING NUMBER

PJ-2016/002-046-001-/B&W/ST-001



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DESIGNED NTY 02-01-16

DETAILED RRS 02-01-16

SCALE 1:100

SHEET A3



R0

DRAWING NAME

COLUMN

REINFORCEMENT DETAILS

DRAWING NUMBER

PJ-2016/002-046-001-B&W/ST-001(a)

COLUMN SCHEDULE

HEAD ROOM ROOF BEAM, WATER TANK, LIFT MACHINE ROOM ROOF TO TERRACE FLOOR BEAM									
TERRACE FLOOR BEAM TO TERRACE FLOOR BEAM									
TERRACE FLOOR BEAM TO SECOND FLOOR ROOF BEAM									
SECOND FLOOR ROOF BEAM TO SECOND FLOOR ROOF BEAM									
SECOND FLOOR ROOF BEAM TO FIRST FLOOR ROOF BEAM									
FIRST FLOOR ROOF BEAM TO FIRST FLOOR ROOF BEAM									
FIRST FLOOR ROOF BEAM TO GROUND FLOOR ROOF BEAM									
GROUND FLOOR ROOF BEAM TO GROUND FLOOR ROOF BEAM									
GROUND FLOOR ROOF BEAM TO GRADE BEAM									
GRADE BEAM TO GRADE BEAM									
GRADE BEAM TO FOOTING									
COLUMN MARKED	C1	C2	C3	C4, C38	C5, C35	C6	C7	C8	C9

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- | | |
|--|--|
| TO
TERRACE FLOOR BEAM

TERRACE FLOOR BEAM | |
|--|--|

0.23 - 0.23 - 0.23 - 0.23 - 0.23 - 0.23

The diagram shows a rectangular slab with the following reinforcement details:

- Top Reinforcement:**
 - Left edge: $\phi Y12$ (spacing 0.38)
 - Bottom edge: $\phi Y12$ (spacing 0.45)
 - Right edge: $\phi Y12$ (spacing 0.45)
 - Internal vertical spacing: 0.45, 0.45, 0.38, 0.45, 0.45
- Bottom Reinforcement:**
 - Left edge: $\phi Y12$ (spacing 0.38)
 - Bottom edge: $\phi Y12$ (spacing 0.45)
 - Right edge: $\phi Y12$ (spacing 0.45)
 - Internal vertical spacing: 0.45, 0.45, 0.38, 0.45, 0.45
- Bar Specifications:**
 - $\phi Y12$: 12mm diameter, yield strength 235 MPa
 - $\phi Y16$: 16mm diameter, yield strength 235 MPa
 - $\phi Y20$: 20mm diameter, yield strength 235 MPa
 - $\phi Y25$: 25mm diameter, yield strength 235 MPa
- Dimensions:**
 - Overall width: 0.80
 - Overall height: 0.80

FIRST FLOOR ROOF BEAM

01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
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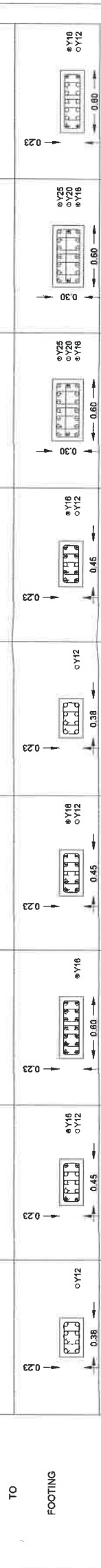
GROUND FLOOR ROOF BEAM								
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[illegible]

GRADE BEAM																																																
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[illegible]

0.23



6-Y12	4-Y16 + 6-Y12	8-Y12	14-Y16	8-Y16 + 2-Y12	9-Y12	8-Y16 + 2-Y12	4-Y25 + 2-Y16 + 10-Y20	4-Y16 + 10-Y12
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[illegible]

RELASED FOR	☐ PRIMARY	☐ INFORMATION	☒ CONSTRUCTION
	☐ TENED	☐ APPROVAL	

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CLIENT

MR.MANIKKAM
MADURAI

PROJECT

RESIDENTIAL BUILDING AT
ALWARTHIRUNAGAR, CHENNAI

CONSULTANT



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DESIGNED	NTV 02-01-16
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DETAILED	RRS 02-01-16
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SCALE	1:100
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SCALE	1:100	1:50
ROUTING		



DRAWING NAME

COLUMN

REINFORCEMENT DETAILS

DRAWING NUMBER

PJ-2016/002-046-001-/B&W/ST-001(c)

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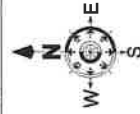


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DESIGNED	MT	02-01-16
DETAILED	RRS	02-01-16
SCALE	1:100	R0
SHEET	A3	

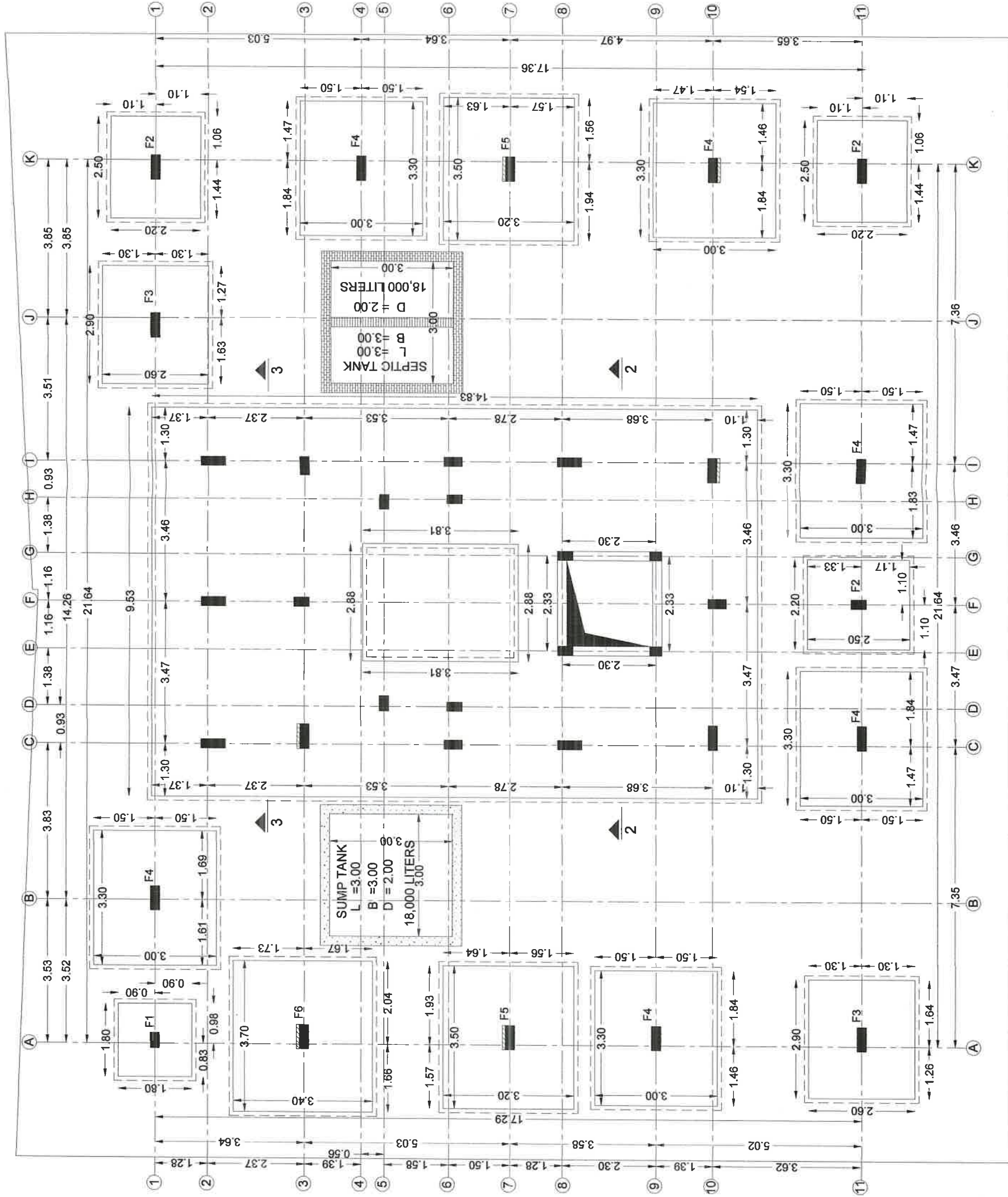


DRAWING NAME

FOOTING MARKING LAYOUT

DRAWING NUMBER

PJ-2016/002-046-001-/B&W/ST-002



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DESIGNED NTV 02-01-16

DETAILED RRS 02-01-16

SCALE 1:100

SHEET A3



R0

DRAWING NAME

FOOTING MARKING
REINFORCEMENT DETAILS

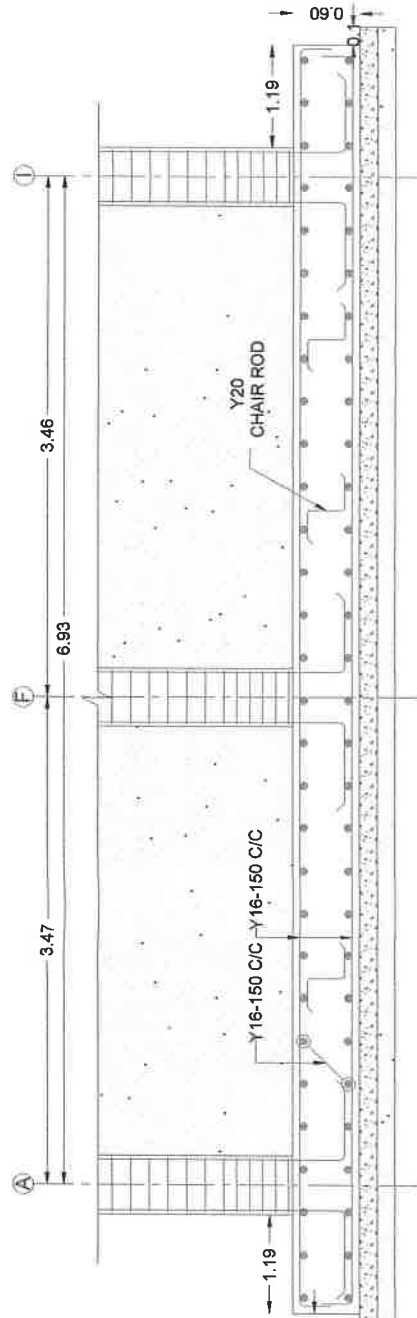
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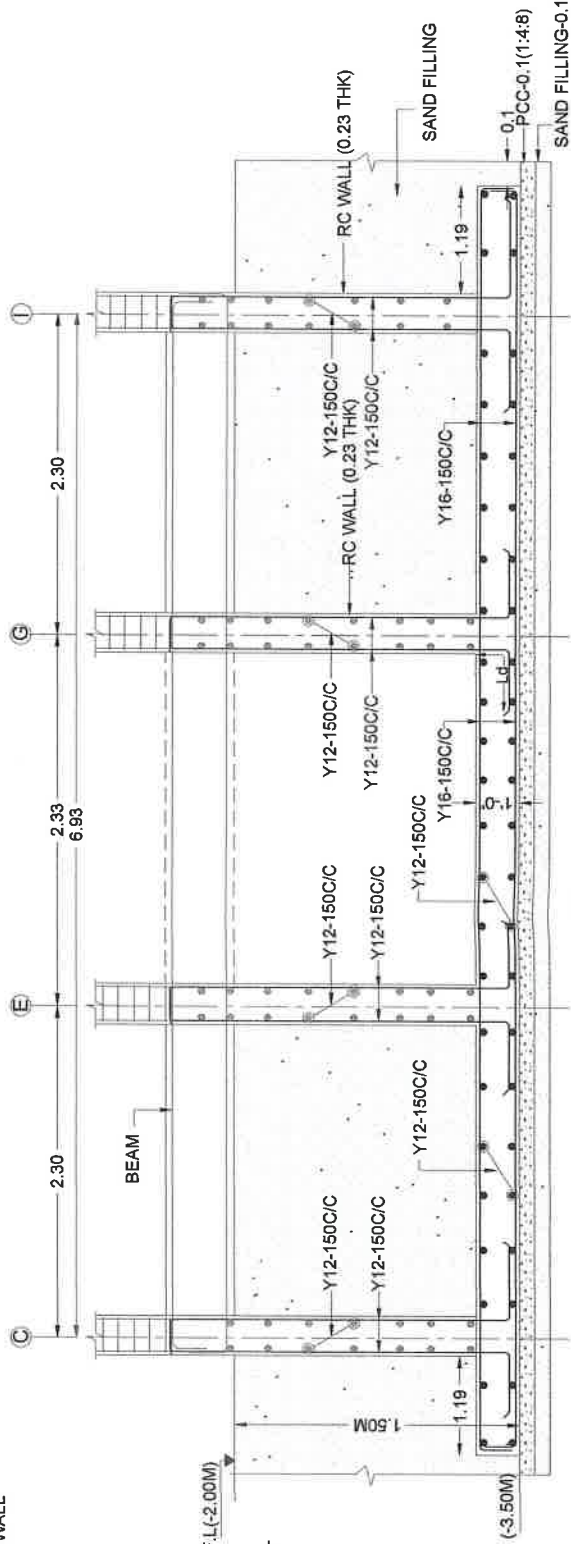
SCHEDULE OF COMBINED FOUNDATIONS

FOOTING	SIZE L X B	DEPTH D1	NO. OF FOOTING		BOTTOM MAIN REINFORCEMENT			TOP MAIN REINFORCEMENT		
					A	B	C	D		
F1	1.80X1.80	0.38	01		Y10-175C/C	Y10-175C/C	Y10-175C/C	Y10-175C/C	Y10-175C/C	Y10-175C/C
F2	2.50X2.20	0.45	03		Y10-150C/C	Y10-150C/C	Y10-150C/C	Y10-150C/C	Y10-150C/C	Y10-150C/C
F3	2.90X2.60	0.45	02		Y10-125C/C	Y10-125C/C	Y10-125C/C	Y10-125C/C	Y10-125C/C	Y10-125C/C
F4	3.30X3.00	0.60	06		Y12-150C/C	Y12-150C/C	Y12-150C/C	Y12-150C/C	Y12-150C/C	Y12-150C/C
F5	3.50X3.20	0.60	02		Y12-150C/C	Y12-150C/C	Y12-150C/C	Y12-150C/C	Y12-150C/C	Y12-150C/C
F6	3.70X3.40	0.60	01		Y12-125C/C	Y12-125C/C	Y12-125C/C	Y12-125C/C	Y12-125C/C	Y12-125C/C

TOTAL = 15



SECTION (3-3)
RAFT FOOTING SECTION



SECTION (2-2)
LIFT PIT (TYP.)

NOTES FOR COLUMN:

d - DIAMETER OF BAR
C - COLUMN

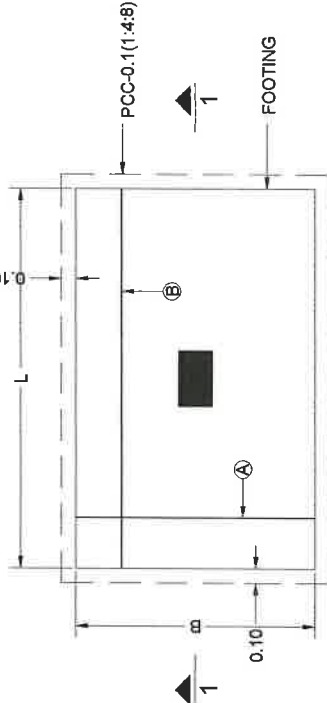
GENERAL NOTES:

- P.L - PARKING LEVEL
- N.G.L - NATURAL GROUND LEVEL
- B.L - BASEMENT LEVEL
- P.C.C - PLAIN CEMENT CONCRETE
- G.F.R - GROUND FLOOR ROOF
- F.F.R - FIRST FLOOR ROOF
- Ld - DEVELOPED LENGTH

NOTES FOR FOOTING:

- F - FOOTING
- D - THICKNESS OF FOOTING

TYPICAL FOOTING DETAILS



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DESIGNED NTV 02-01-16

DETAILED RRS 02-01-16

SCALE 1:100

SHEET A3



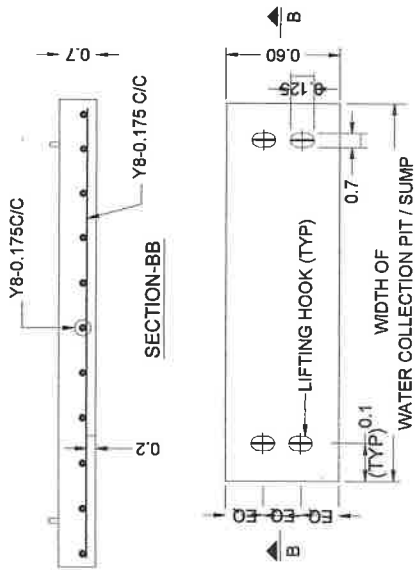
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DRAWING NAME

SUMP LAYOUT & REINFORCEMENT DETAILS

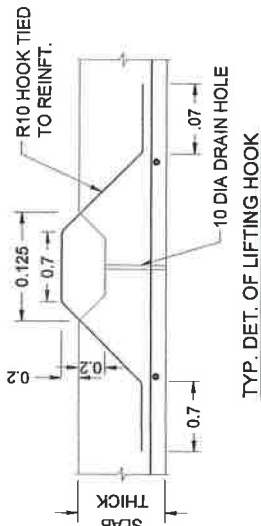
DRAWING NUMBER

PJ-2016/002-046-001-B&W/ST-002(b)

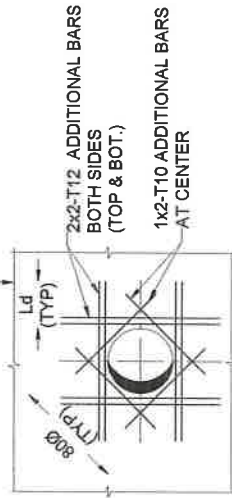
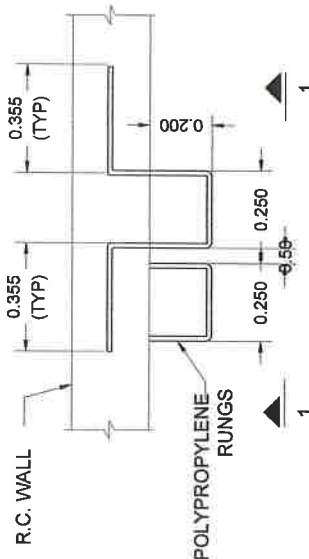


PLAN

TYP. DET. OF PRECAST COVERS SLAB



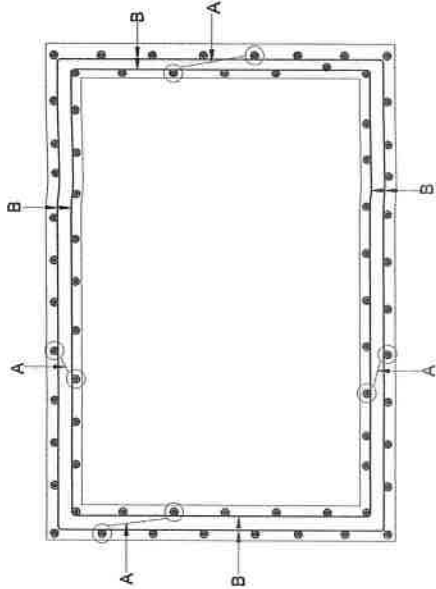
R.C.WALL/FLOOR SLAB



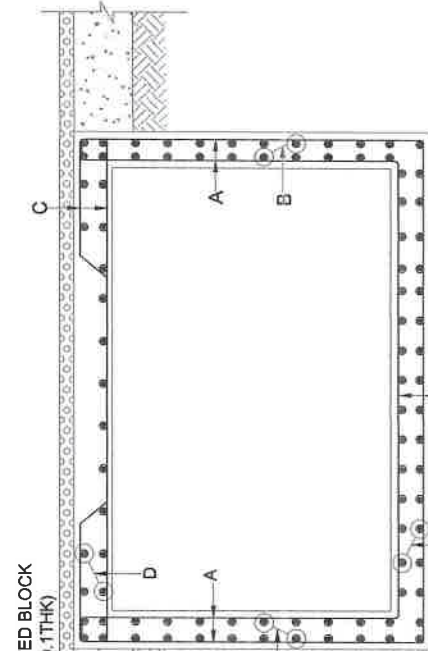
TYP. PLAN OF RUNGS

NOTE:

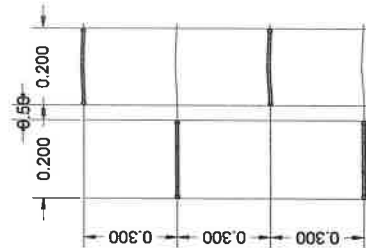
M.H - MANHOLE - 0.60X0.60
FF - FREE BOARD - 0.300 DEPTH
P.C.S - PRECAST MANHOLE COVER



TOP VIEW- REINFORCEMENT DETAIL



SECTION-A-A REINFORCEMENT DETAIL



VIEW 1-1

SCHEDULE OF SUMP DETAILS

SUMP TANK L = 3.00 B = 3.00 D = 2.00 18,000 LITERS	MAIN REINFORCEMENT		DISTRIBUTOR REINFORCEMENT	
	WALL	THK	A	B
	W1	0.23	Y10-150C/C	Y10-150C/C
	W2	0.23	Y10-150C/C	Y10-150C/C
SLAB	MAIN REINFORCEMENT		DISTRIBUTOR REINFORCEMENT	
	THK	C	D	
	S1	0.23	Y10-150C/C	Y10-150C/C
	S2	0.150	Y10-150C/C	Y10-150C/C

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 - 5) Pile - 50mm
 - 6) Pile cap - 75mm
 - 7) Staircase waist slab - 20mm
 - 8) RCC wall - 40mm
06. As per soil test report No: BOLTTSAS/1353/2014-15 SBC of soil is taken as 110 kN/m² at a depth 2.00M
07. Foundation & column are designed for G+3 only.

CLIENT

MR. MANIKKAM
MADURAI

PROJECT

RESIDENTIAL BUILDING AT
ALWARTHIRUNAGAR, CHENNAI

CONSULTANT

bolitas

BOLLTAS GEO-MARINE ENGINEERING-CONSULTANTS
No-72, Defence Officers Colony, Ekkattuthangal, Chennai. 600032

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 bwstructuraldesign@gmail.com
 www.bwstructuraldesign.com

DESIGNED	NTV 02-01-16
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DETAIL	ED	RBS 02-01-16
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SCALE	1:100	DO
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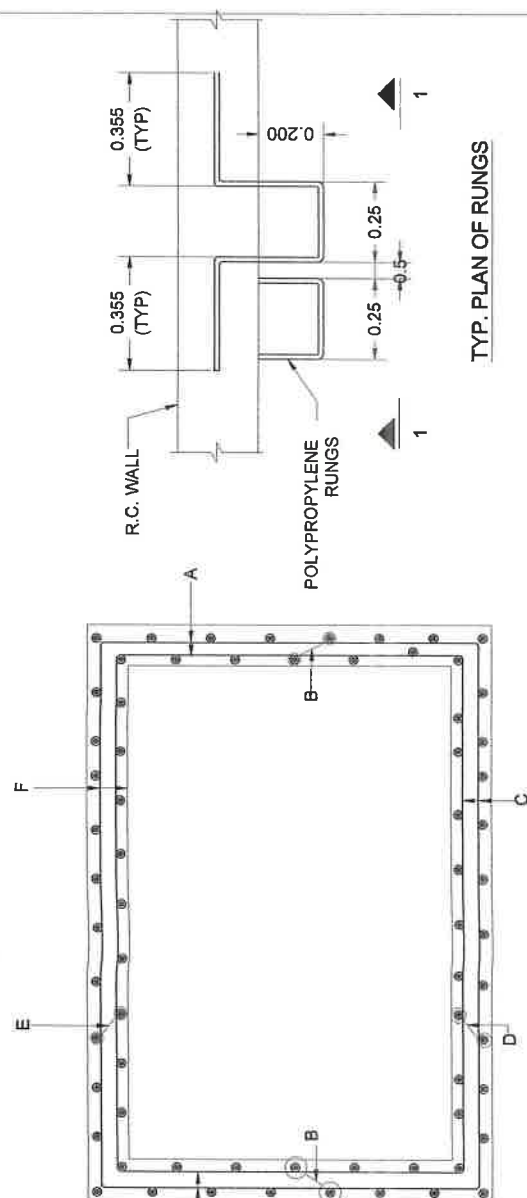
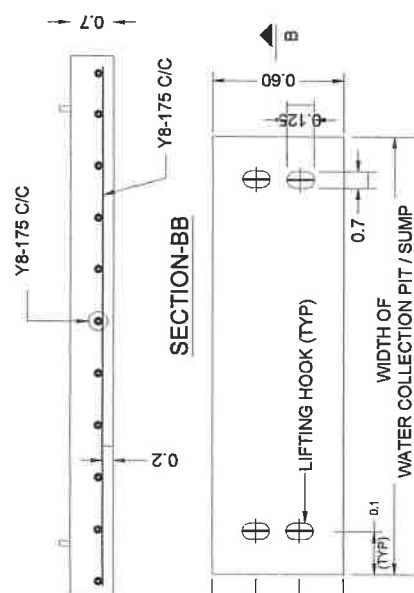
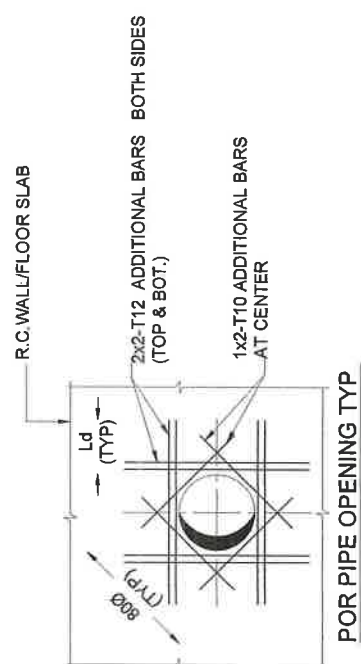
NO	SHEET	A3
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DRAWING NAME

SEPTIC TANK REINFORCEMENT DETAILS

DRAWING NUMBER

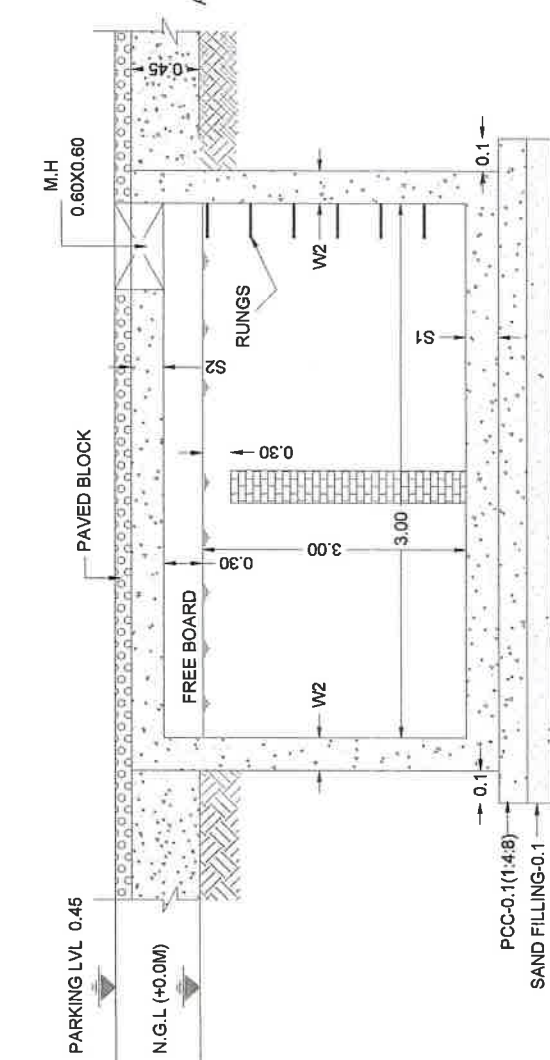
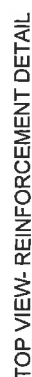
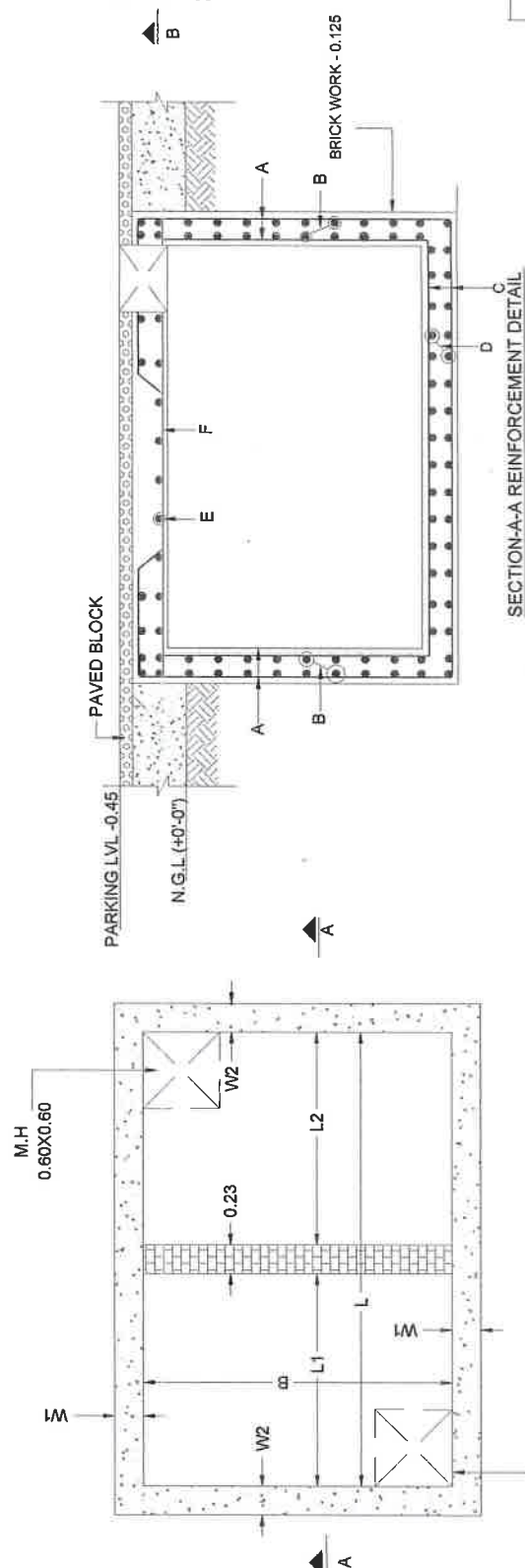
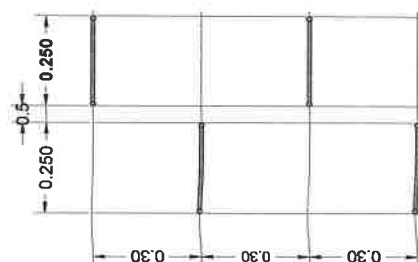
PJ-2016/002-046-001-/B&W/ST-002(c)



NOTE:

M.H - MANHOLE - 0.60X0.60

P.C.S - PRECAST MANHOLE COVER



SCHEDULE OF SEPTIC TANK DETAILS

	WALL	THK	MAIN REINFORCEMENT			DISTRIBUTOR REINFORCEMENT		
			A	C		B	D	
SEPTIC TANK B - 3.00	W1	0.150	Y10-150C/C	Y10-150C/C		Y10-150C/C	Y10-150C/C	
	W2	0.150	Y10-150C/C	Y10-150C/C		Y10-150C/C	Y10-150C/C	
L - 3.00 D - 2.00	SLAB	THK	MAIN REINFORCEMENT			DISTRIBUTOR REINFORCEMENT		
			C			D		
18,000 LITERS	S1	0.230	Y10-150C/C			Y10-150C/C		
	S2	0.150	F			E		
			Y10-150C/C			Y10-150C/C		

RELEASED FOR	☐ PRILIMINARY	☐ TENDER	☐ INFORMATION	☐ APPROVAL	☒ CONSTRUCTION
--------------	--------------------------------------	---------------------------------	--------------------------------------	-----------------------------------	--

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06. As per soil test report No: BOLTAS/1353/2014-15 SBC of soil is taken as 110 kN/m² at a depth 2.00M
07. Foundation & column are designed for G+3 only.

CLIENT

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MADURAI

PROJECT

RESIDENTIAL BUILDING AT
ALWARTHIRUNAGAR, CHENNAI

CONSULTANT

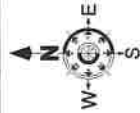


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www.bwstructuraldesign.com

DESIGNED	MT	02-01-16
DETAILED	RRS	02-01-16
SCALE	1:100	R0
SHEET	A3	

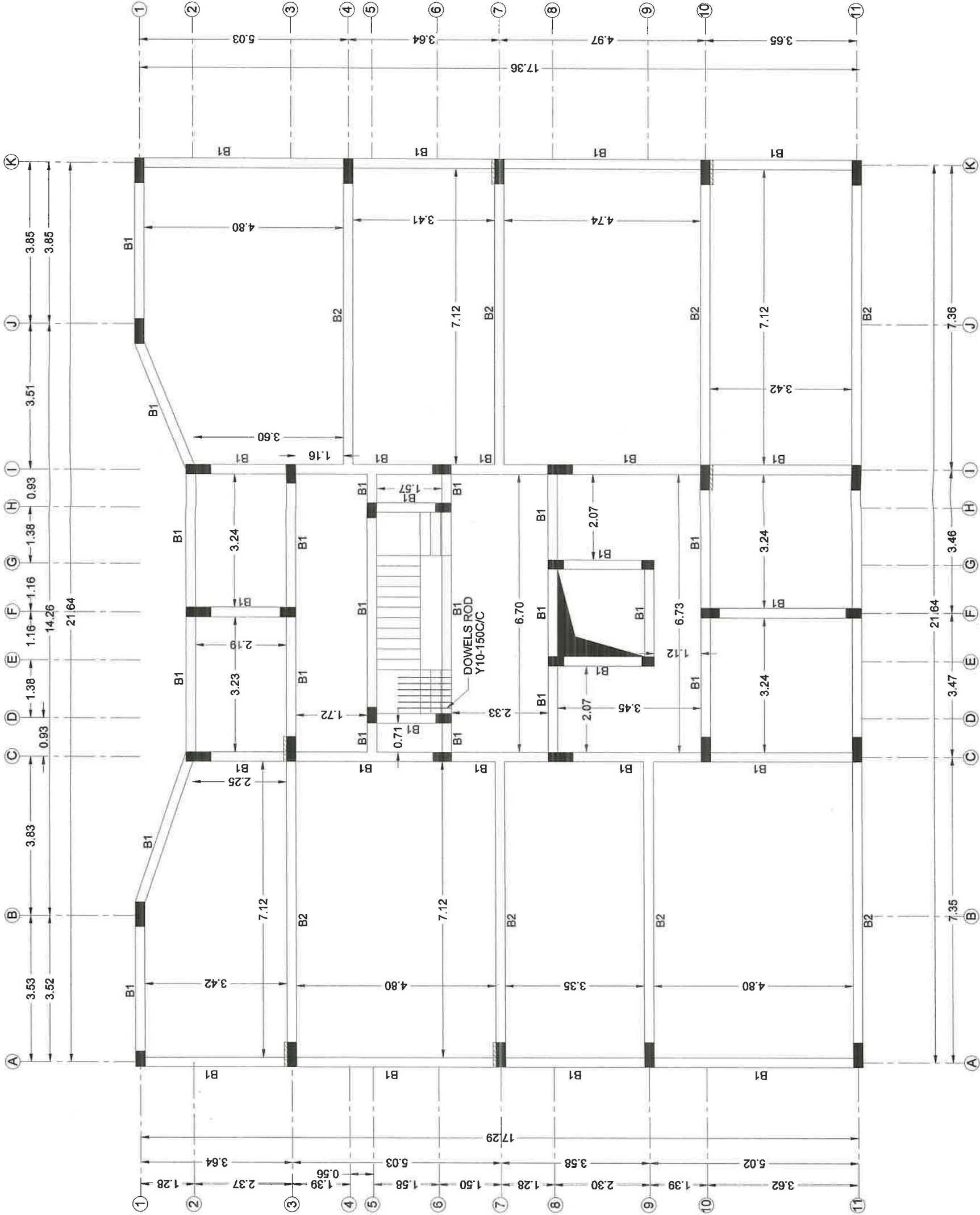


DRAWING NAME

GRADE BEAM LAYOUT

DRAWING NUMBER

PJ-2016/002-046-001-B&W/ST-003



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DESIGNED NTV	02-01-16
DETAILED RRS	02-01-16
SCALE	1:100
SHEET	A3



DRAWING NAME

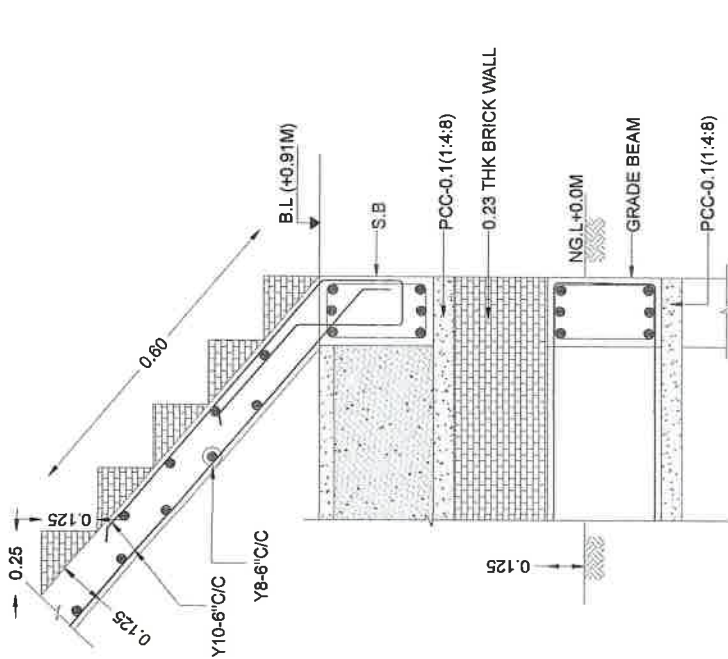
GRADE BEAM
REINFORCEMENT DETAILS

DRAWING NUMBER

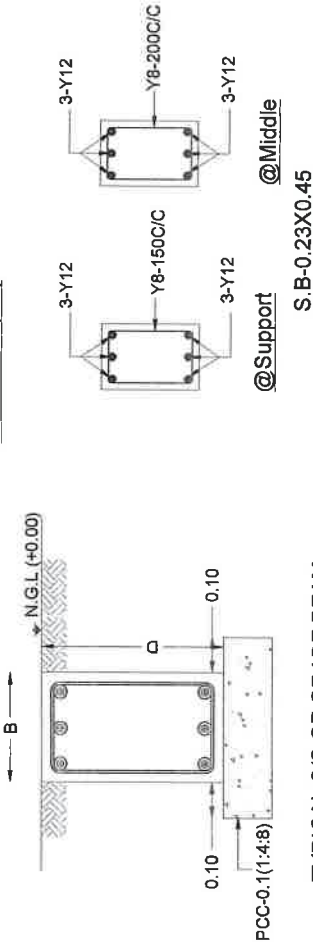
PJ-2016/002-046-001-/B&W/ST-003(a)

GRADE REINFORCEMENT SCHEDULE

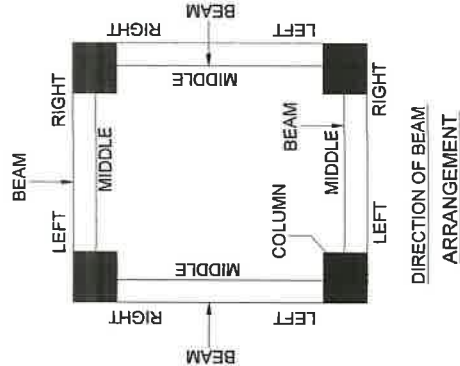
BEAM SIZE & NO.	DETAIL @ LEFT SUPPORT	DETAIL @ MIDDLE	DETAIL @ RIGHT SUPPORT	DETAIL @ CANTILEVER BEAM
(0.23 X 0.38) B1				-----
(0.23 X 0.45) B2				-----



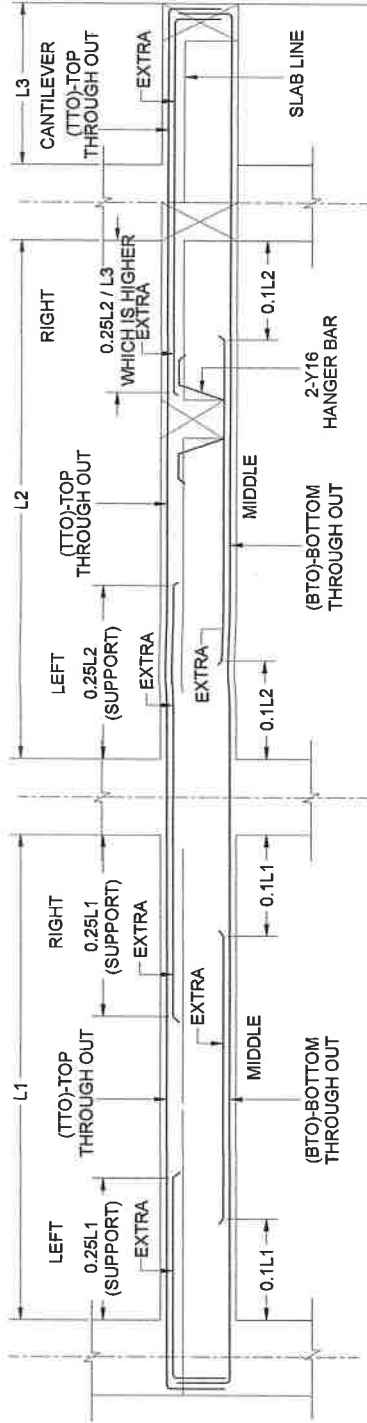
SECTION - (1-1)



TYPICAL C/S OF GRADE BEAM



TYPICAL L/S OF BEAM



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MADURAI

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www.bwstructuraldesign.com

DESIGNED NTV 02-01-16

DETAILED RRS 02-01-16

SCALE 1:100

SHEET A3



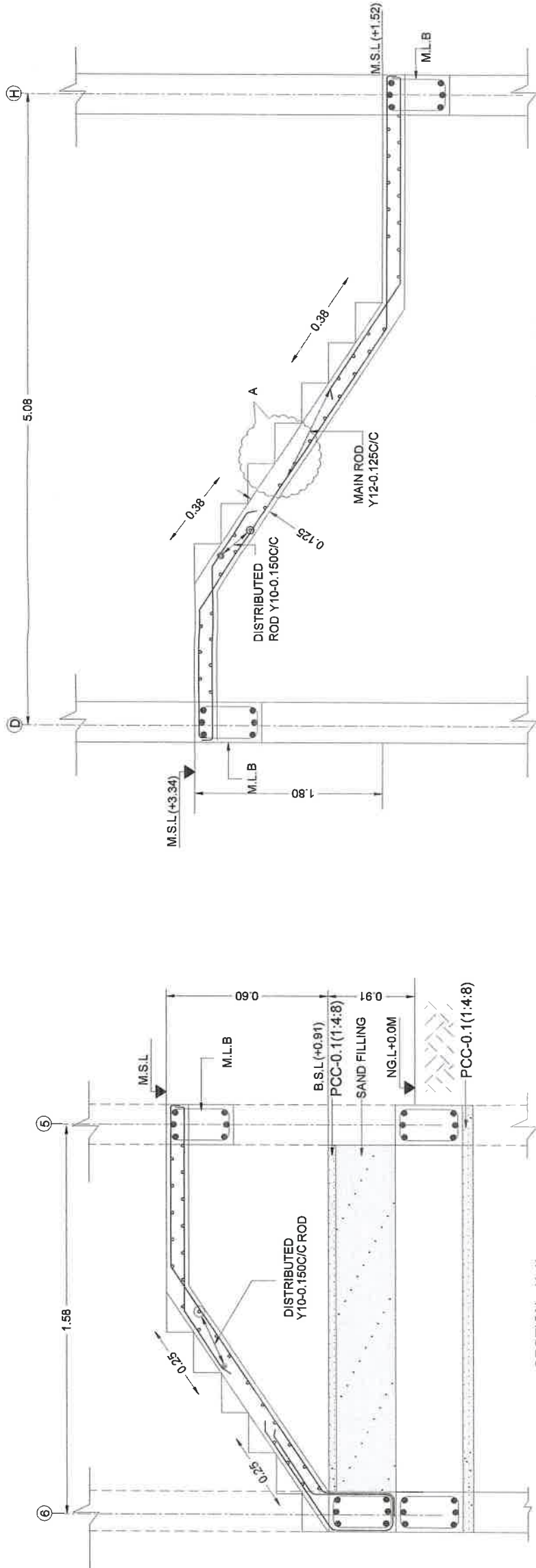
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DRAWING NAME

STAIRCASE & HEAD ROOM LAYOUT
& REINFORCEMENT DETAILS

DRAWING NUMBER

PJ-2016/002-046-001-B&W/ST-003(b)

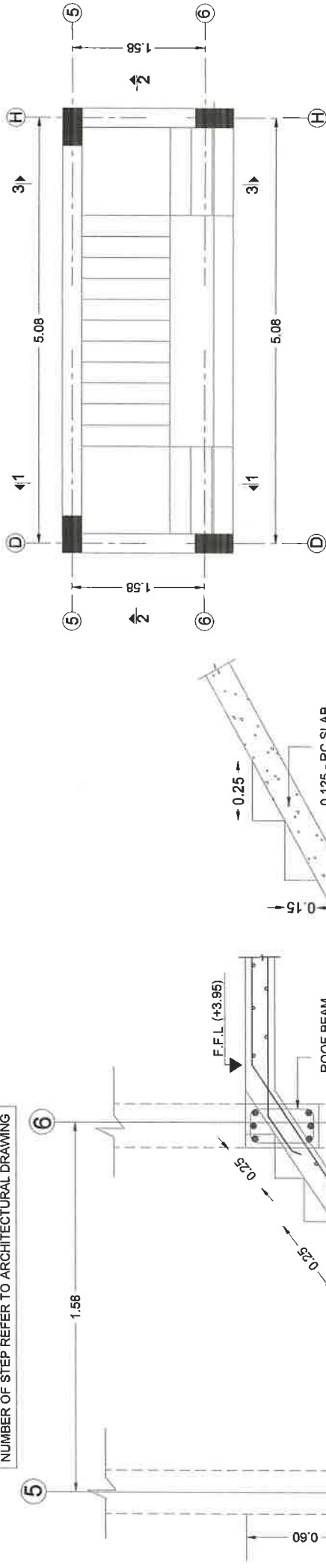


SECTION - (1-1)

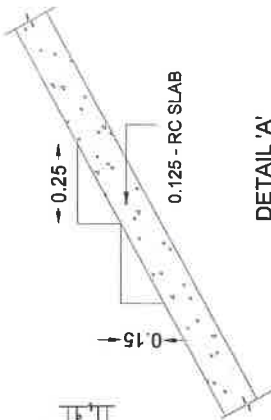
SECTION - (2-2)

LEGENDS

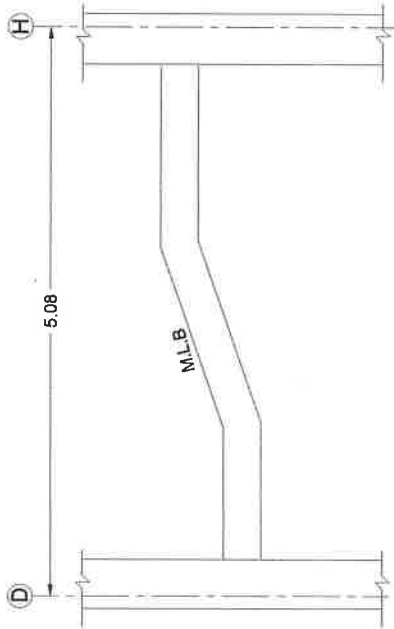
NUMBER OF STEP REFER TO ARCHITECTURAL DRAWING



STAIRCASE LAYOUT



DETAIL 'A'



SECTION - (3-3)



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CLIENT

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PROJECT

RESIDENTIAL BUILDING AT ALWARTHIRUNAGAR, CHENNAI

CONSULTANT



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DESIGNED NTV 02-01-16

DETAILED RRS 02-01-16

SCALE 1:100

SHEET A3

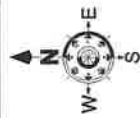
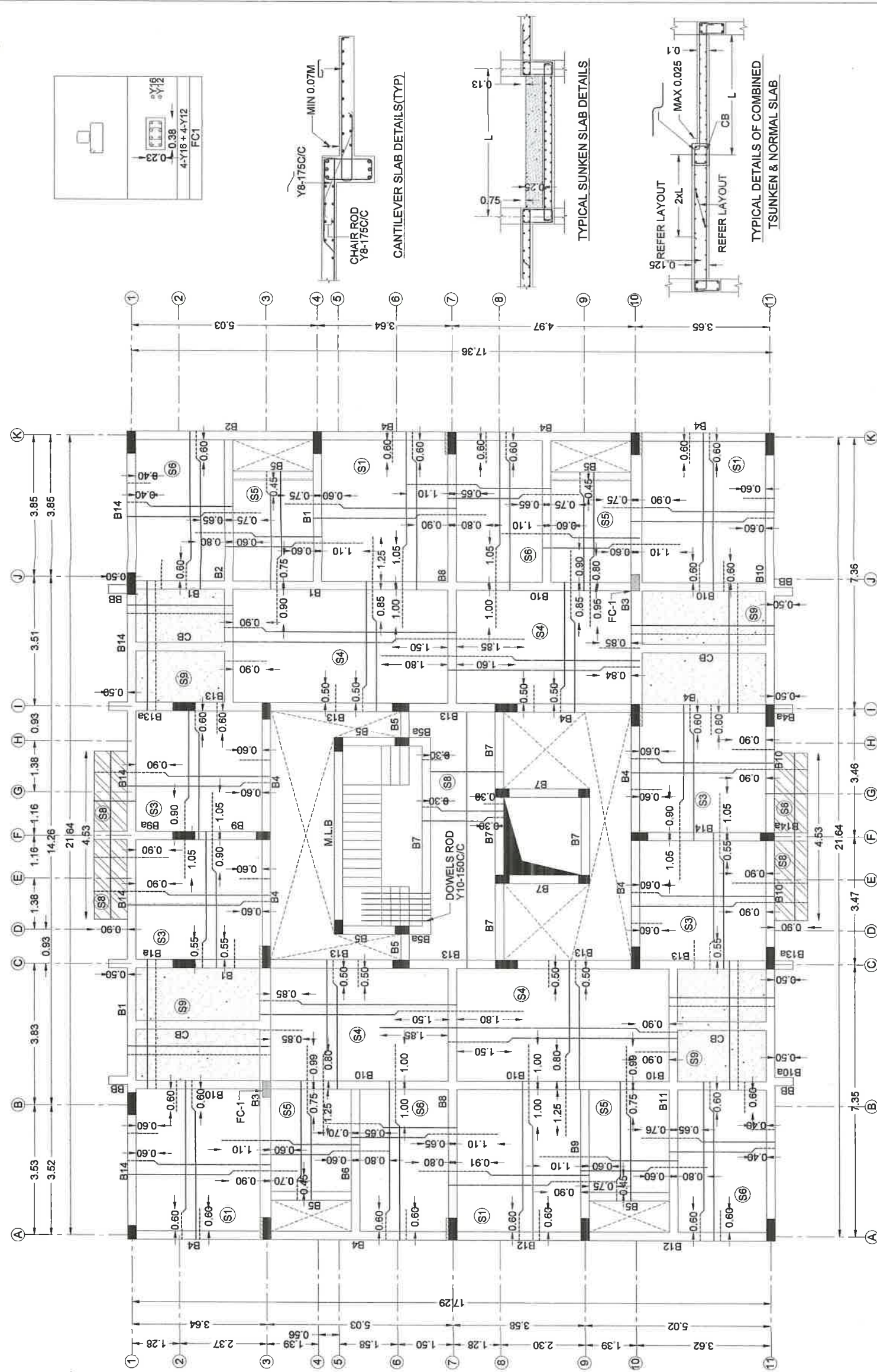
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DRAWING NAME

GROUND FLOOR ROOF BEAM LAYOUT & SLAB REINFORCEMENT DETAILS

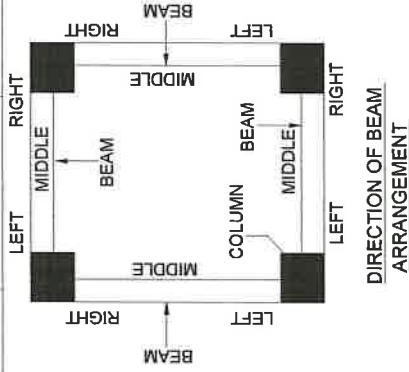
DRAWING NUMBER

PJ-2016/002-046-001-/B&W/ST-004



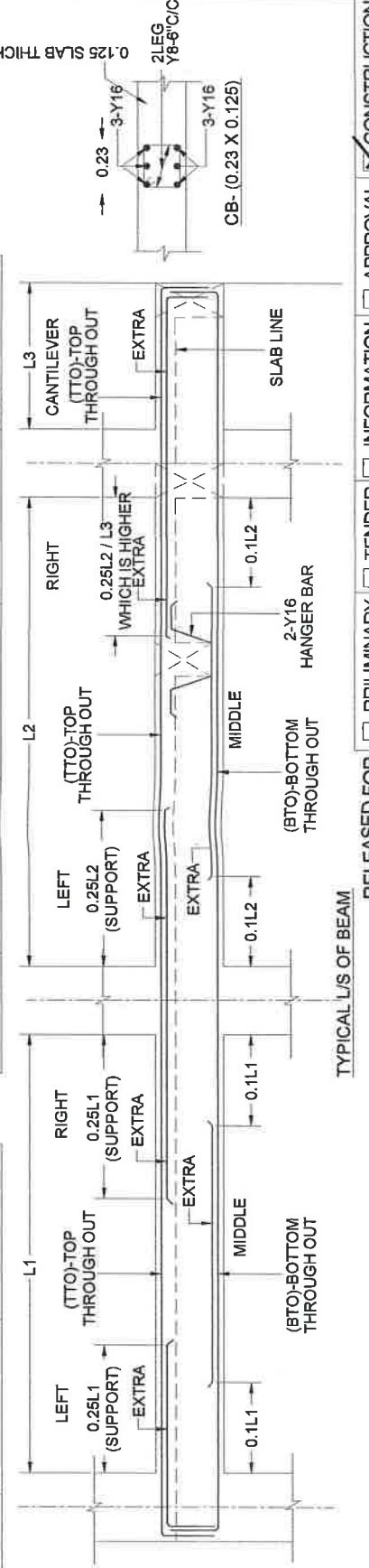
GROUND FLOOR ROOF BEAM REINFORCEMENT SCHEDULE

BEAM SIZE & NO.	DETAIL @ LEFT SUPPORT	DETAIL @ MIDDLE	DETAIL @ RIGHT SUPPORT	DETAIL @ CANTILEVER BEAM
(0.23 X 0.45) B1				
(0.23 X 0.60) B2				
(0.30 X 0.75) B3				
(0.23 X 0.45) B4				
(0.23 X 0.38) B5				
(0.23 X 0.38) B6				
(0.23 X 0.38) B7				



GROUND FLOOR ROOF BEAM REINFORCEMENT SCHEDULE

BEAM SIZE & NO.	DETAIL @ LEFT SUPPORT	DETAIL @ MIDDLE	DETAIL @ RIGHT SUPPORT	DETAIL @ CANTILEVER BEAM
(0.30 X 0.60) B8				
(0.23 X 0.45) B9				
(0.23 X 0.45) B10				
(0.23 X 0.45) B11				
(0.23 X 0.45) B12				
(0.23 X 0.60) B13				
(0.23 X 0.45) B14				



DIRECTION OF BEAM ARRANGEMENT

TYPICAL US OF BEAM

RELEASED FOR ☐ PRELIMINARY ☐ TENDER ☐ INFORMATION ☐ APPROVAL ☒ CONSTRUCTION

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DESIGNED NTV	02-01-16
DETAILED RRS	02-01-16
SCALE	1:100
SHEET	A3



DRAWING NAME

GROUND FLOOR ROOF BEAM
REINFORCEMENT DETAILS

DRAWING NUMBER

PJ-2016/002-046-001-/B&W/ST-004(a)

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DESIGNED NTV 02-01-16

DETAILED RRS 02-01-16

SCALE 1:100

SHEET A3

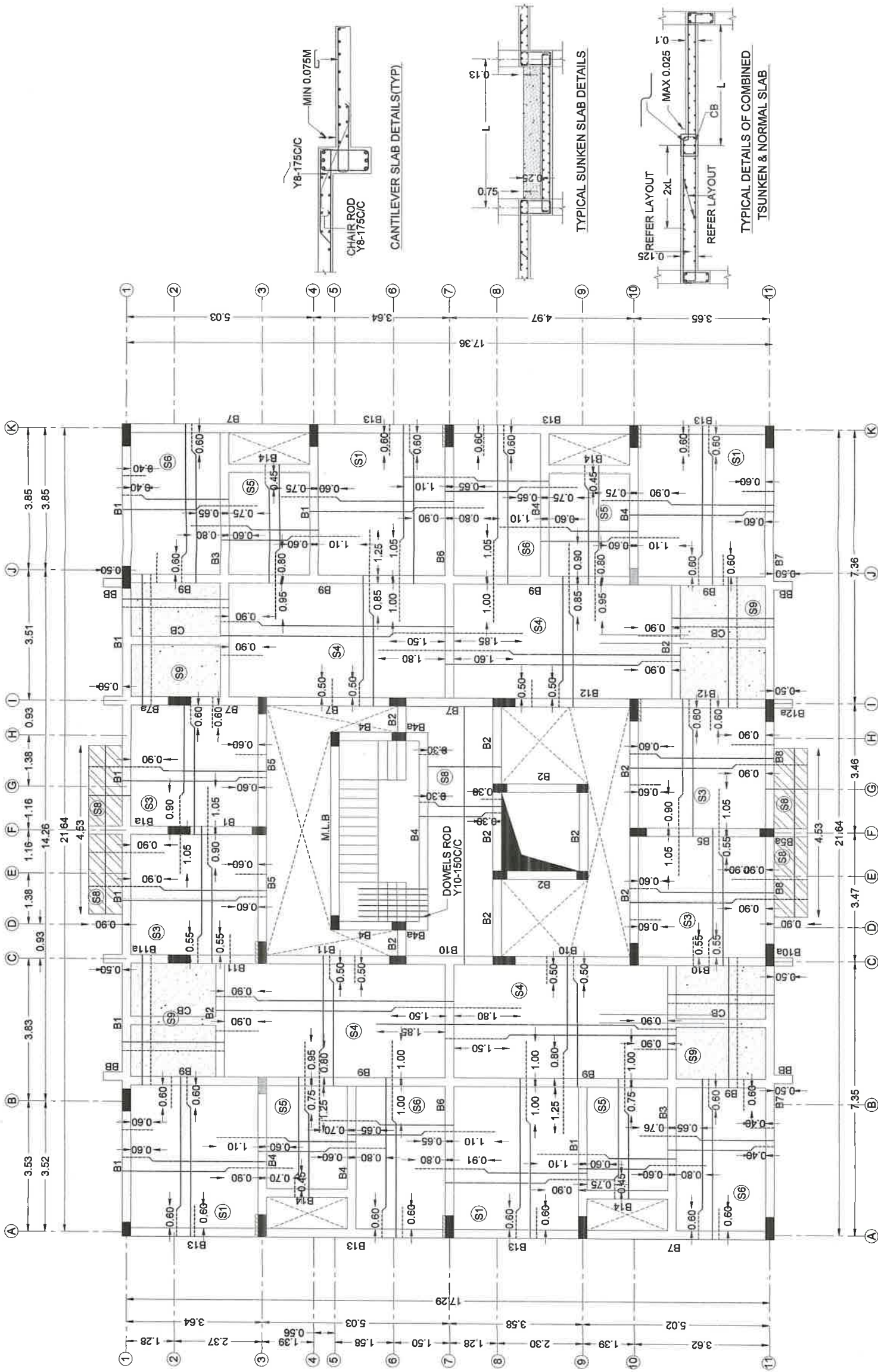


DRAWING NAME

FIRST FLOOR ROOF BEAM LAYOUT &
SLAB REINFORCEMENT DETAILS

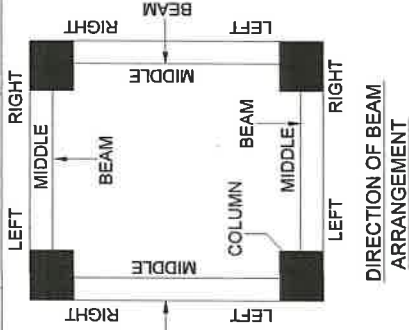
DRAWING NUMBER

PJ-2016/002-046-001-B&W/ST-005



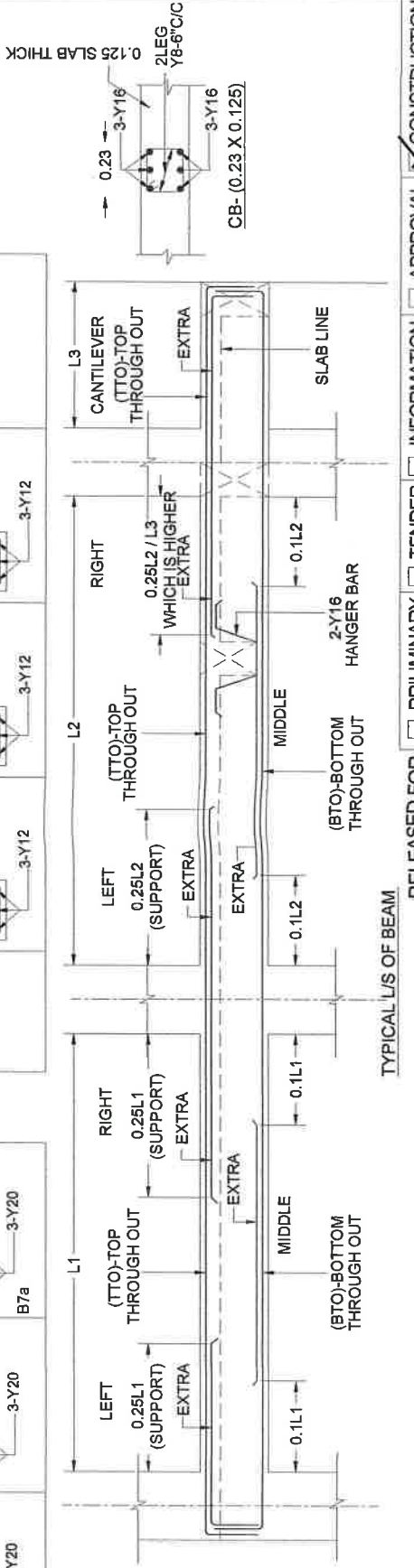
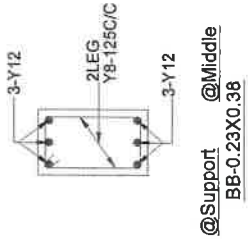
FIRST FLOOR ROOF BEAM REINFORCEMENT SCHEDULE

BEAM SIZE & NO.	DETAIL @ LEFT SUPPORT	DETAIL @ MIDDLE	DETAIL @ RIGHT SUPPORT	DETAIL @ CANTILEVER BEAM
(0.23 X 0.45) B1				
(0.23 X 0.38) B2				
(0.23 X 0.60) B3				
(0.23 X 0.38) B4				
(0.23 X 0.45) B5				
(0.23 X 0.60) B6				
(0.23 X 0.60) B7				



FIRST FLOOR ROOF BEAM REINFORCEMENT SCHEDULE

BEAM SIZE & NO.	DETAIL @ LEFT SUPPORT	DETAIL @ MIDDLE	DETAIL @ RIGHT SUPPORT	DETAIL @ CANTILEVER BEAM
(0.23 X 0.45) B8				
(0.23 X 0.45) B9				
(0.23 X 0.60) B10				
(0.23 X 0.45) B11				
(0.23 X 0.45) B12				
(0.23 X 0.45) B13				
(0.23 X 0.45) B14				



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TECHNICAL NOTES

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- All dimensions are in M and mm unless other wise mentioned.
- Grade of concrete - M25 (1:1:2) conform to IS:456:2000.
- Grade of steel (Y) - Fe-500 conform to IS:1786:1985.
- Clear cover for reinforcement
 - Slab - 20mm
 - Beam - 25mm
 - Column - 40mm
 - Foundation - 50mm
 - Pile - 50mm
 - Pile cap - 75mm
 - Staircase waist slab - 20mm
 - RCC wall - 40mm
- As per soil test report No: BOLTAS/1353/2014-15 SBC of soil is taken as 110 kN/m² at a depth 2.00M
- Foundation & column are designed for G+3 only.

CLIENT

MR.MANIKKAM
MADURAI

PROJECT

RESIDENTIAL BUILDING AT
ALWARTHURUNAGAR, CHENNAI

CONSULTANT



BOLLTAS GEO-MARINE ENGINEERING
CONSULTANTS
No-72, Defence Officers
Colony, Ekkattuthangal, Chennai. 600032

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(Near Central Bank of India) Velachery-42
+9677044466, 04422430309
bwstructuraldesign@gmail.com
www.bwstructuraldesign.com

DESIGNED NTV 02-01-16

DETAILED RRS 02-01-16

SCALE 1:100

SHEET A3

R0



DRAWING NAME

FIRST FLOOR ROOF BEAM
REINFORCEMENT DETAILS

DRAWING NUMBER

PJ-2016/002-046-001-B&W/ST-005(a)

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- 06. As per soil test report No: BOLT TAS/1353/ 2014-15 SBC of soil is taken as 110 kN/m2 at a depth 2.00M
- 07. Foundation & column are designed for G+3 only.

CLIENT

MR.MANIKKAM MADURAI

PROJECT

RESIDENTIAL BUILDING AT ALWARTHIRUNAGAR, CHENNAI

CONSULTANT



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DESIGNED NTY 02-01-16

DETAILED RRS 02-01-16

SCALE 1:100

SHEET A3

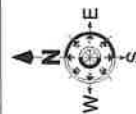
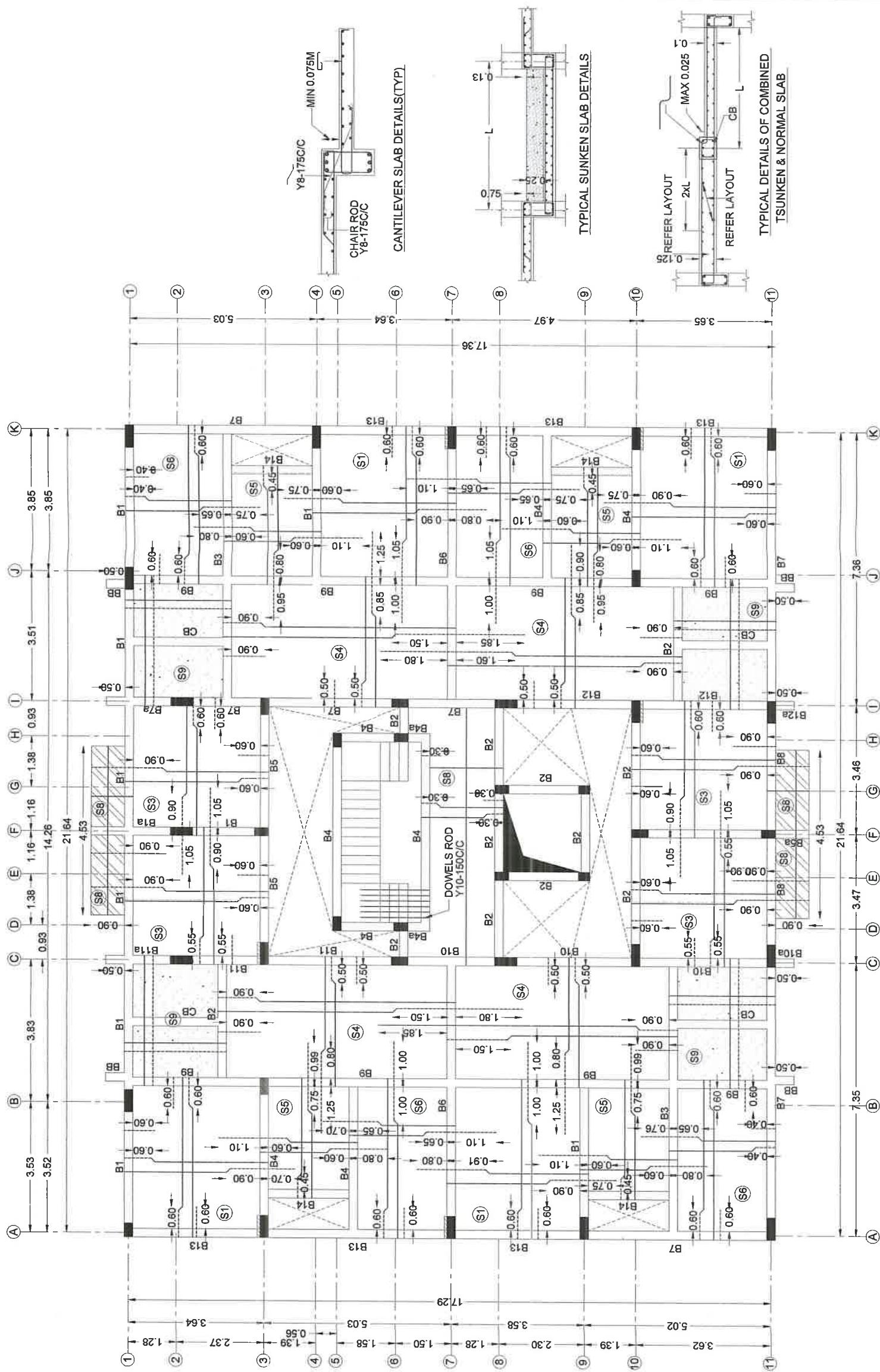
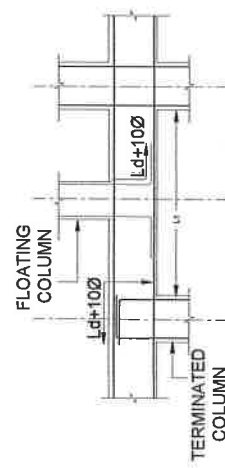
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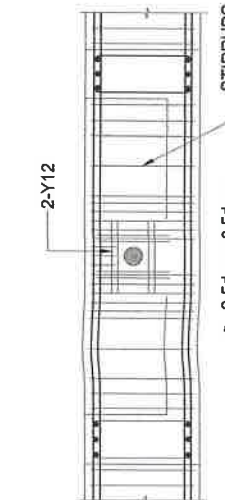
SECOND FLOOR ROOF BEAM LAYOUT & SLAB REINFORCEMENT DETAILS

DRAWING NUMBER

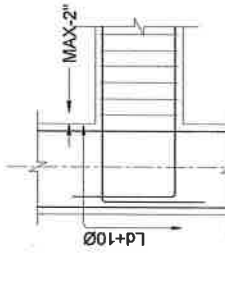
PJ-2016/002-046-001-B&W/ST-006



FLOATING COLUMN DETAILS



TYPICAL DETAILS OF OPENING IN WEB OF BEAM



TYPICAL ANCHORAGE DETAILS

SLAB THICKNESS		REINFORCEMENT		TOP ROD	
		SHORTER DIRECTION	LONGER DIRECTION	SHORTER DIRECTION	LONGER DIRECTION
S1	0.125	Y8-0.175C/C	Y8-0.175C/C	-	-
S2	0.125	Y8-0.175C/C	Y8-0.175C/C	-	-
S3	0.125	Y8-0.175C/C	Y8-0.175C/C	-	-
S4	0.125	Y8-0.150C/C	Y8-0.150C/C	-	-
S5	0.125	Y8-0.175C/C	Y8-0.175C/C	-	-
S6	0.125	Y8-0.175C/C	Y8-0.175C/C	-	-
S7	0.125	Y8-0.175C/C	Y8-0.175C/C	-	-
S8	0.125	Y8-0.175C/C	Y8-0.175C/C	-	-
S9	0.150	Y10-0.150C/C	Y10-0.150C/C	-	-

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04. Grade of steel (Y) - Fe-500 conform to IS:1786:1985.
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 - 7) Staircase waist slab - 20mm
 - 8) RCC wall - 40mm
06. As per soil test report No: BOLT/TAS/1353/2014-15 SBC of soil is taken as 110 kN/m² at a depth 2.00M
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MADURAI

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RESIDENTIAL BUILDING AT
ALWARTHIRUNAGAR, CHENNAI

CONSULTANT

bolitas

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DESIGNED NTV 02-01-16

01	10	20	A	N	T	E	R	S	
01	10	20	B	B	D				

DETAILED	KRS 02-01-10
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SCALE 1:100

DRAWING NAME

SECOND FLOOR ROOF BEAM REINFORCEMENT DETAILS

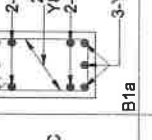
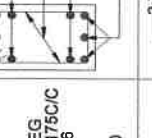
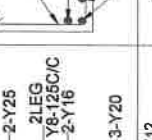
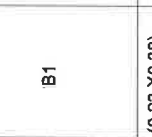
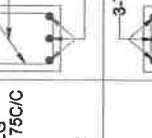
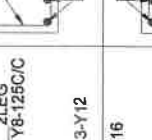
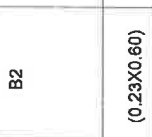
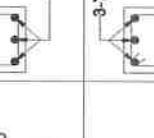
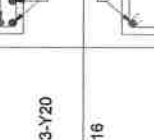
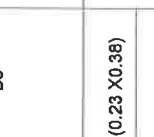
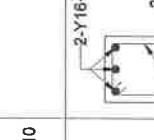
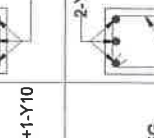
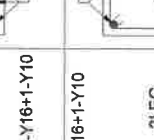
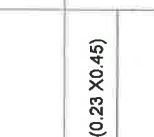
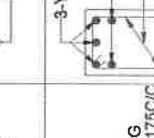
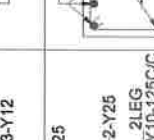
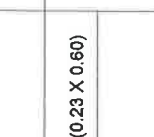
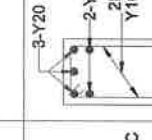
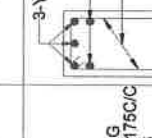
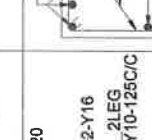
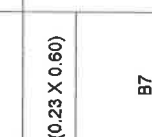
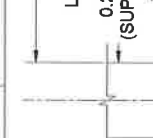
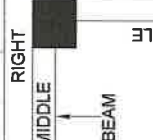
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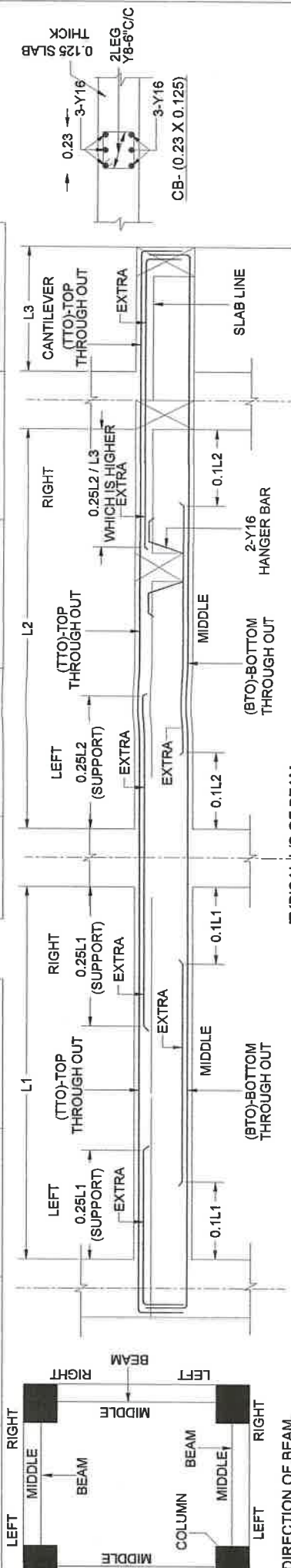
PJ-2016/002-046-001-B&W/ST-006(a)

SECOND FLOOR ROOF BEAM REINFORCEMENT SCHEDULE

BEAM SIZE & NO.	DETAIL @ LEFT SUPPORT	DETAIL @ MIDDLE	DETAIL @ RIGHT SUPPORT	DETAIL @ CANTILEVER BEAM
(0.23 X 0.45)				
B8				
(0.23 X 0.45)				
B9				
(0.23 X 0.60)				
B10				
(0.23 X 0.45)				
B11				
(0.23 X 0.45)				
B12				
(0.23 X 0.45)				
B13				
(0.23 X 0.45)				
B14				

SECOND FLOOR ROOF BEAM REINFORCEMENT SCHEDULE

BEAM SIZE & NO.	DETAIL @ LEFT SUPPORT	DETAIL @ MIDDLE	DETAIL @ RIGHT SUPPORT	DETAIL @ CANTILEVER BEAM
(0.23 X 0.45)				
B1				B1a
(0.23 X 0.38)				
B2				
(0.23X0.60)				
B3				
(0.23 X 0.38)				
B4				
(0.23 X 0.45)				
B5				B5a
(0.23 X 0.60)				
B6				
(0.23 X 0.60)				
B7				B7a



TYPICAL I/L/S OF BEAM

RELEASED FOR	☐ PRILIMINARY	☐ TENDER	☐ INFORMATION	☐ APPROVAL	☒ CONSTRUCTION
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CLIENT

MR.MANIKKAM
MADURAI

PROJECT

RESIDENTIAL BUILDING AT
ALWARTHURUNAGAR, CHENNAI

CONSULTANT

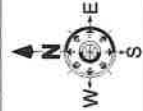


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DESIGNED	NTV	02-01-16
DETAILED	RRS	02-01-16
SCALE	1:100	
SHEET	A3	

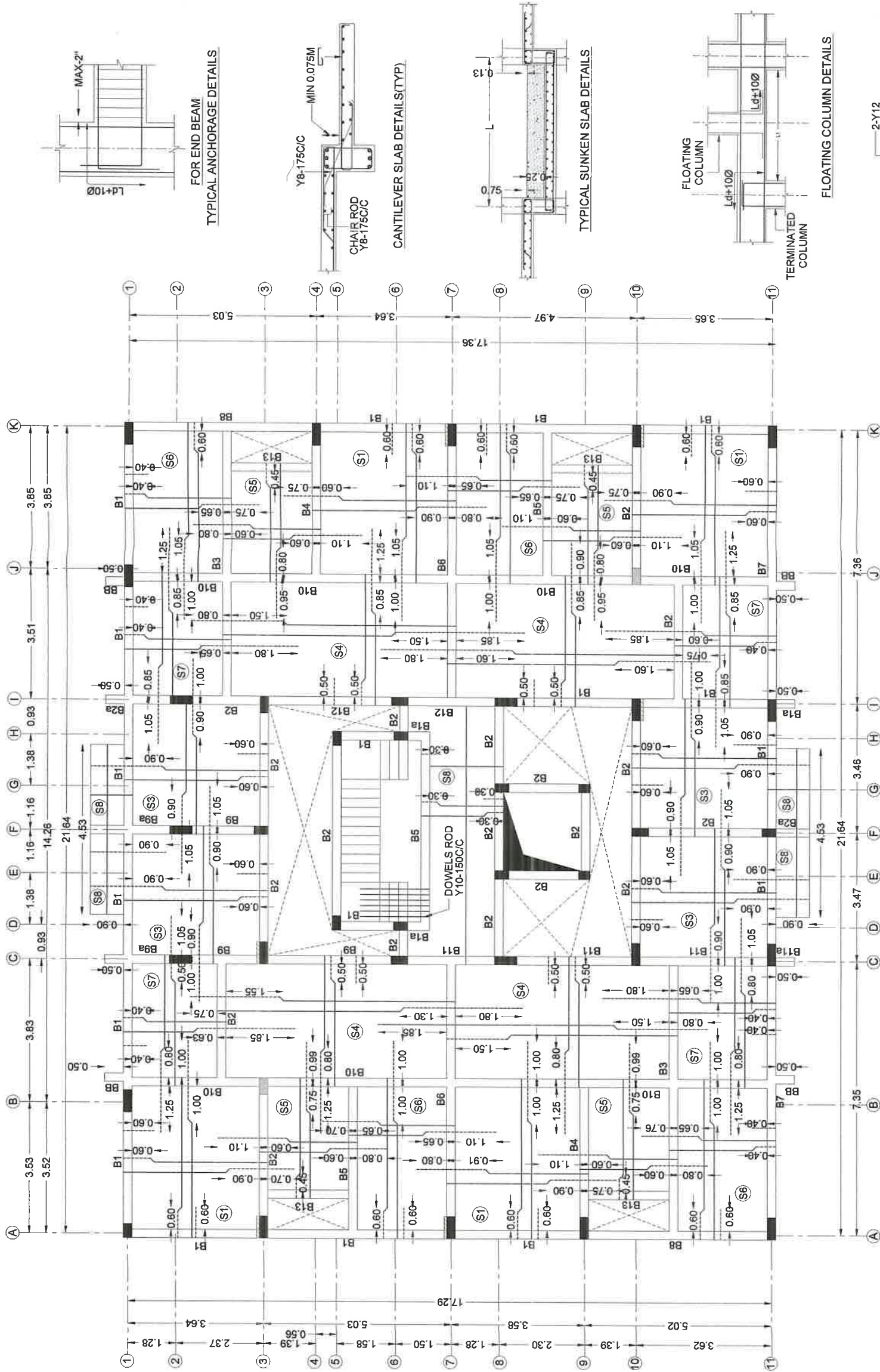


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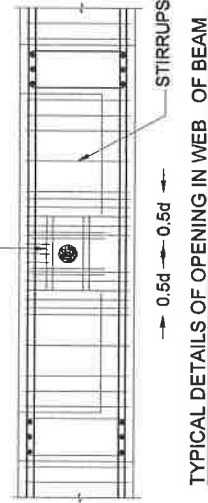
TERRACE FLOOR ROOF BEAM LAYOUT &
SLAB REINFORCEMENT DETAILS

DRAWING NUMBER

PJ-2016/002-046-001-B&W/ST-007



SLAB THICKNESS	REINFORCEMENT			
	BOTTOM ROD		TOP ROD	
	SHORTER DIRECTION	LONGER DIRECTION	SHORTER DIRECTION	LONGER DIRECTION
S1	Y8-0.175C/C	Y8-0.175C/C	Y8-0.175C/C	Y8-0.175C/C
S2	Y8-0.175C/C	Y8-0.175C/C	Y8-0.175C/C	Y8-0.175C/C
S3	Y8-0.175C/C	Y8-0.175C/C	Y8-0.175C/C	Y8-0.175C/C
S4	Y8-0.150C/C	Y8-0.150C/C	Y8-0.150C/C	Y8-0.150C/C
S5	Y8-0.175C/C	Y8-0.175C/C	Y8-0.175C/C	Y8-0.175C/C
S6	Y8-0.175C/C	Y8-0.175C/C	Y8-0.175C/C	Y8-0.175C/C
S7	Y8-0.175C/C	Y8-0.175C/C	Y8-0.175C/C	Y8-0.175C/C
S8	Y8-0.175C/C	Y8-0.175C/C	Y8-0.175C/C	Y8-0.175C/C



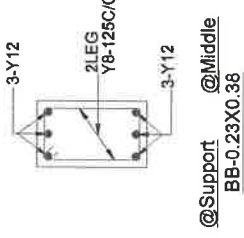
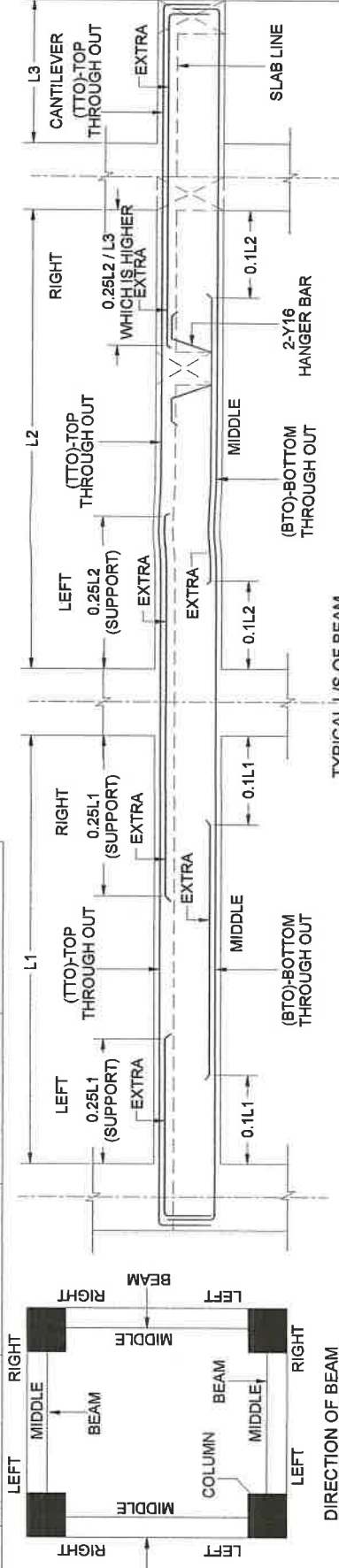
TYPICAL DETAILS OF OPENING IN WEB OF BEAM

THIRD FLOOR ROOF BEAM REINFORCEMENT SCHEDULE

BEAM SIZE & NO.	DETAIL @ LEFT SUPPORT	DETAIL @ MIDDLE	DETAIL @ RIGHT SUPPORT	DETAIL @ CANTILEVER BEAM
(0.23 X 0.45) B1				
(0.23 X 0.38) B2				
(0.23 X 0.60) B3				
(0.23 X 0.38) B4				
(0.23 X 0.38) B5				
(0.23 X 0.60) B6				
(0.23 X 0.60) B7				

THIRD FLOOR ROOF BEAM REINFORCEMENT SCHEDULE

BEAM SIZE & NO.	DETAIL @ LEFT SUPPORT	DETAIL @ MIDDLE	DETAIL @ RIGHT SUPPORT	DETAIL @ CANTILEVER BEAM
(0.23 X 0.60) B8				
(0.23 X 0.45) B9				
(0.23 X 0.60) B10				
(0.23 X 0.60) B11				
(0.23 X 0.60) B12				
(0.23 X 0.45) B13				



TYPICAL L/S OF BEAM

RELEASED FOR ☐ PRELIMINARY ☐ TENDER ☐ INFORMATION ☐ APPROVAL ☒ CONSTRUCTION

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8) RCC wall - 40mm
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07. Foundation & column are designed for G+3 only.

CLIENT

MR. MANIKKAM
MADURAI

PROJECT

RESIDENTIAL BUILDING AT
ALWARTHIRUNAGAR, CHENNAI

CONSULTANT

boltas

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DESIGNED NTV/02-01-16

DETAILED RRS/02-01-16

SCALE 1:100

SHEET A3

R0

DRAWING NAME

TERRACE FLOOR ROOF BEAM
REINFORCEMENT DETAILS

DRAWING NUMBER

PJ-2016/002-046-001-B&W/ST-007(a)



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DESIGNED NTV	02-01-16
DETAILED RRS	02-01-16
SCALE	1:100
SHEET	A3
R0	

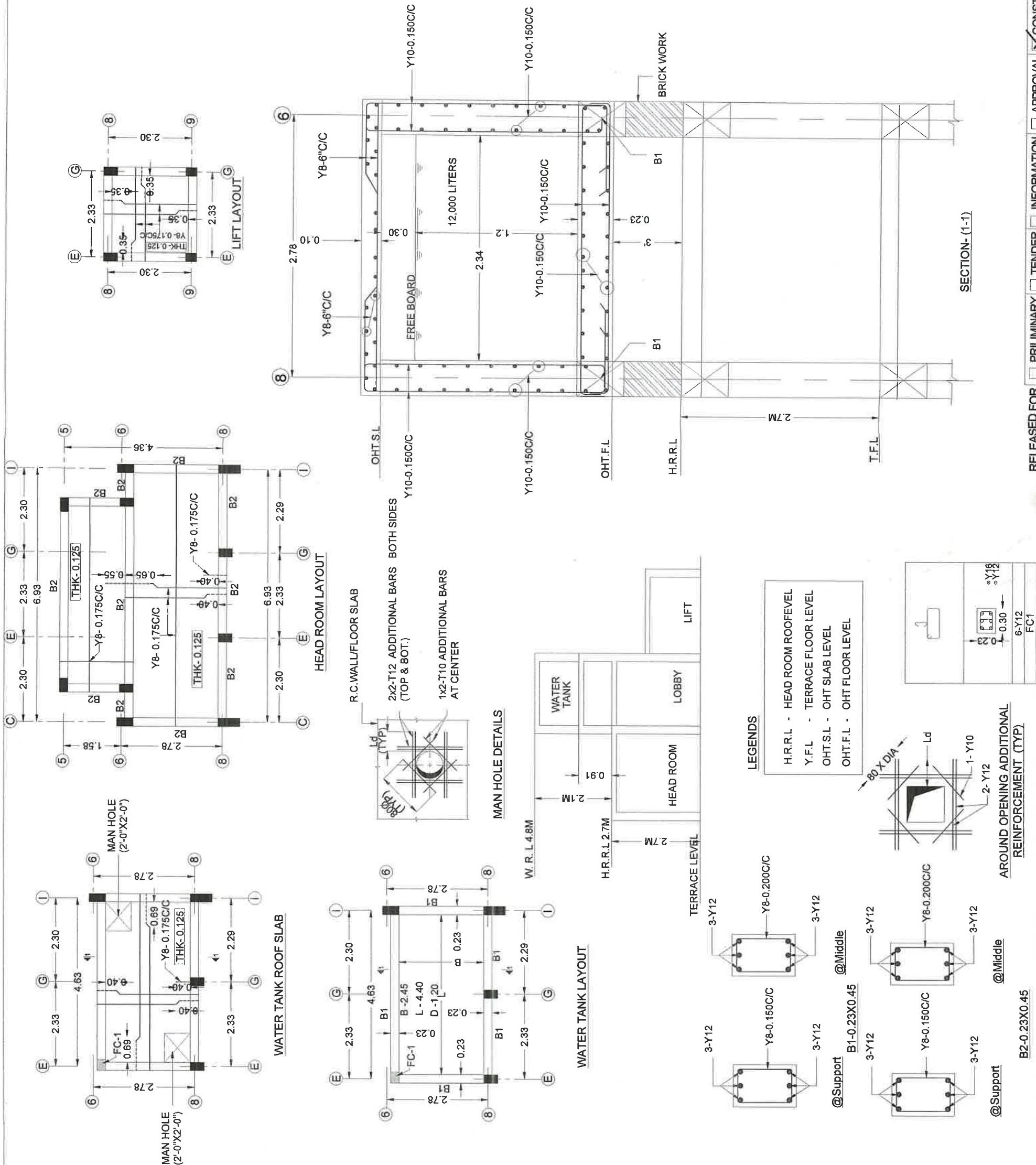


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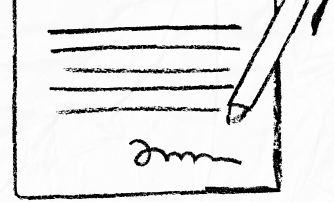
LIFT & HEAD ROO, WATER TANK LAYOUT
REINFORCEMENT DETAILS

DRAWING NUMBER

PJ-2016/002-046-001-B&W/ST-007(b)



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Certified EC, Patta, legal opinions, property verification, due diligence, litigation solutions, and legal heir certificates.



Property Development & Approvals

Building plan approvals, construction, layout and sub-division approvals, zone conversion, and occupancy certification.



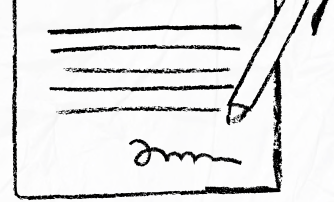
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Escrow Services, Rentals, Litigation Solutions, Property Valuation and Property Management



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Land Use Zone Finder, CRZ Zone Check, Aquifer Zone Check, CBA Check, EWS Check, Road Width Check, Proposed Road Widening Check, FSI Calculator



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