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STRUCTURAL DESIGN BRIEF

THE PROPOSED RESIDENTIAL GROUP DEVELOPMENT BUILDINGS IN S.F.NO:365/2F AT THUDIYALUR VILLAGE, NORTH ZONE & TALUK, COIMBATORE CORPORATION.

" SREEVATSA POORNA "

SANKAR & ASSOCIATES, ARCHITECTS & PLANNERS,
COIMBATORE-641 009

CLIENT:	M/s. SREEVATSA POORNA	DESIGN:	G + 2 Floors	ARCHITECT & PLANNERS **SANKAR & ASSOCIATES** 27 SENGUPTA STREET, RAMNAGAR, COIMBATORE.
STRUCTURE NAME :	RESIDENTIAL BUILDING	TITLE: REPORT ON STRUCTURAL DESIGN.		
PLACE:	COIMBATORE			

Name of Project:		Name of the Structure:
RESIDENTIAL VILLA		RESIDENTIAL GROUP DEVELOPMENT
Report by:	**Checked by:**	**Approved by:**
N.GOWDAMAN	S.MURUGESH	V.P.PONNUSWAMI

DESCRIPTION OF THE PROJECT:

The Proposed structure belongs to M/s Sreevatsa Poorna. Purpose of this structure is to house "Residential Villa". The structure is designed for Ground floor + Two Upper floors. The structural design was carried out as per IS 456-2000. The dead load and live load are calculated based on IS 875: Part I & II. The structure was analyzed using the software STAAD-PRO V8i.

STRUCTURAL DESIGN CALCULATION

I DESIGN PARAMETERS:

1. This structure is designed for Ground floor + Two Upper floors.
2. SBC Adopted as 340 KN/sqm. (As per soil test Report provided)
3. Concrete grade adopted:
   For Footing & Columns : M25
   For Beams & Slabs : M25
   Grade of steel adopted : Fe 500.
4. Dimension of the building : 29'-3" x 57'-9"
5. Floor height : 3.20m (Typical)

II LOAD DETAILS:

DEAD LOAD:

1. Self weight of slab (Assumed as 130mm Tk.) - 3.25 KN/m^2.
2. Self weight of slab (Assumed as 150mm Tk.) - 3.750 KN/m^2.

SUPER IMPOSED DEAD LOAD:

1. Floor finish - 1.5 KN/m^2.
2. Unit wt. of brick * Tk of wall * Ht of wall
   (19 x 0.23 x (0.80 x (3.10-0.38)) - 10.00 KN/m.

SUPER IMPOSED LIVE LOAD:

1. All Rooms and Kitchen - 2 KN/m^2
2. Terrace Floor - 1.5 KN/m^2

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III LOAD COMBINATION

Loads considered for calculation of horizontal seismic load = DL + 25 % LL

Load case:

1. Seismic Load in 'X' direction (EQX)
2. Seismic load in 'Y' direction (EQY)
3. Dead Load (DL)
4. Live Load (LL)

Load combination:

1. LOAD COMB (1.0 DL + 1.0 LL)
2. LOAD COMB (1.5 DL + 1.5 LL)
3. LOAD COMB (1.2(DL + LL + EQX))
4. LOAD COMB (1.2(DL + LL + EQY))
5. LOAD COMB (1.2(DL + LL - EQX))
6. LOAD COMB (1.2(DL + LL - EQY))
7. LOAD COMB (1.5(DL + EQX))
8. LOAD COMB (1.5(DL + EQY))
9. LOAD COMB (1.5(DL - EQX))
10. LOAD COMB (1.5(DL - EQY))
11. LOAD COMB (0.9DL + 1.5 EQX)
12. LOAD COMB (0.9DL + 1.5 EQY)
13. LOAD COMB (0.9DL - 1.5 EQX)
14. LOAD COMB (0.9DL - 1.5 EQY)

Location and thickness of walls as depicted in the architectural drawings were considered for loads at appropriate locations in the analysis.

IV ANALYSIS:

The analysis is performed using software STAAD Pro V8i.

V DESIGN OF STRUCTURE:

From analysis the columns and beams were grouped as shown in centerline drawing depending on the forces. The footing, column and beams were designed for the maximum forces in-group as per IS456-2000.

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VI STRUCTURAL ARRANGEMENT:

Column arrangements, Beam & Slab layout were presented, drawing enclosed here for reference in Annexure (I) , Typical Design Calculation for Column, footing , Beam and Slab in Annexure (II)

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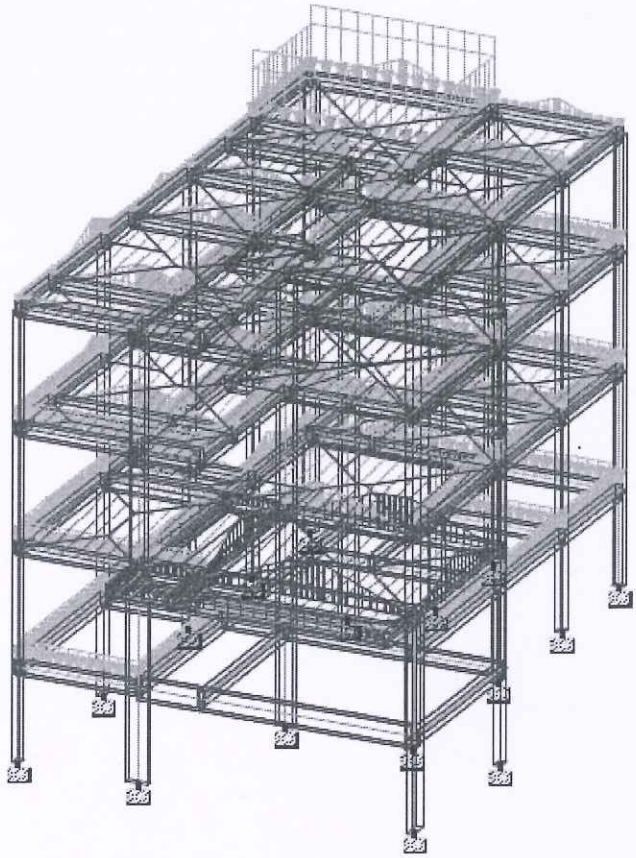
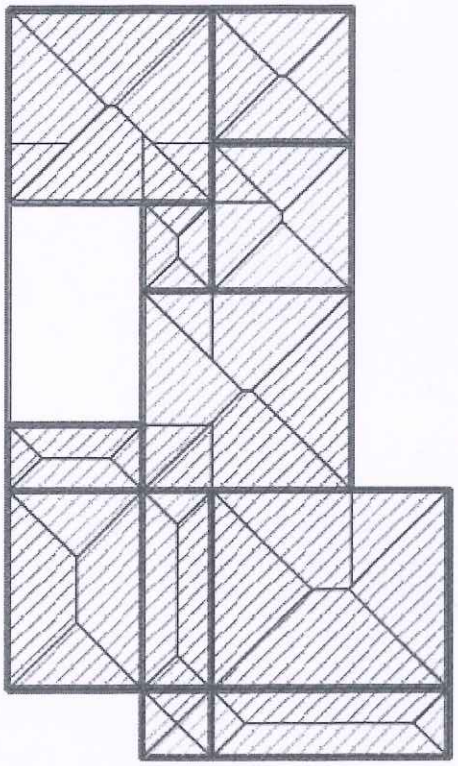
ANNEXURE – I



ISOMETRIC VIEW FROM STAAD MODEL



GROUND FLOOR ROOF LAYOUT

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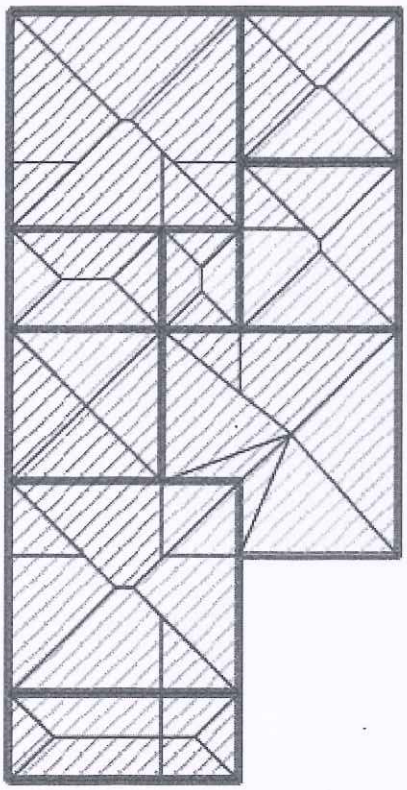
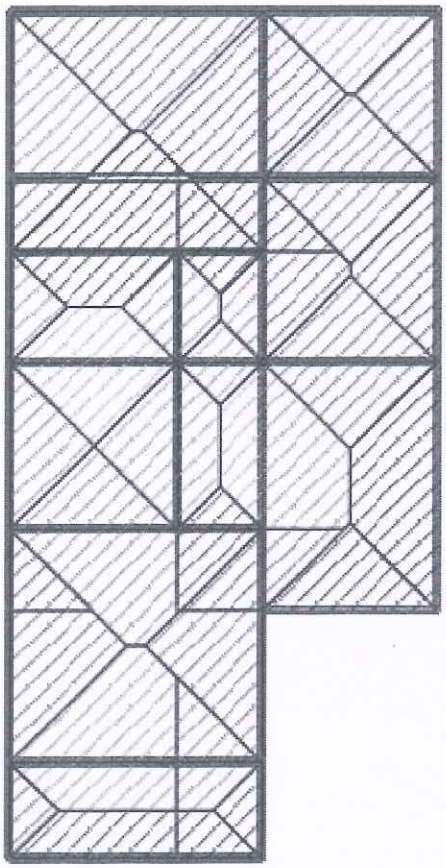


FIRST FLOOR ROOF LAYOUT



SECOND FLOOR ROOF LAYOUT

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ANNEXURE – II

TYPICAL COLUMN DESIGN

Input Data

Breadth	b	=	200.00	mm
Depth	D	=	460.00	mm
Clear cover	cc	=	40.00	mm
Effective cover	d'	=	58.00	mm
Effective Breadth	b'	=	142.00	mm
Effective Depth	D'	=	402.00	mm
Length of column	L	=	3.20	m
Depth of Beam/Slab framing into coln (Major)	Bd	=	0.38	m
Depth of Beam/Slab Framing into coln (Minor)	Bd	=	0.38	m
Clear length in major axis	Lc or Lo	=	2.82	m
Clear height in minor axis	Lc or Lo	=	2.82	m
Effective length factor	β	=	0.80	
Effective length of column	Leff (x-dir)	=	2.26	m
Effective length of column	Leff (y-dir)	=	2.26	m
Axial Load (Factored)	N	=	1150.00	KN
Moment about major axis (Factored)	Mx	=	5.00	KN-m
Moment about minor axis (Factored)	My	=	15.00	KN-m
Characteristic strength of concrete	fck	=	25.00	N/mm^2
Characteristic strength of steel	fy	=	500	N/mm^2

Design Calculations:

Step1: Check for Slenderness ratio : Leff/D = 4.90 <12

Check for Slenderness ratio : Leff/b = 11.28 <12

Design as Short Column

	eax	=	0.00	mm
	eay	=	0.00	mm
Slenderness limits for column Lo < 60 b	2.82 m	<	12.00	m

Step:2 Check for moment due to minimum eccentricity

Minimum Eccentricity (L/500 + d or b/30) or 20 (whichever is<	ex	=	20.00	mm
	ey	=	12.31	mm
A.) Moments due to Min eccentricity	Mex	=	23.00	KN-m
	Mey	=	14.15	KN-m

Step:3 Calculation of Additional Moments

Percentage of Reinforcement IN Staad pro v8i	p	=	2.19	%
Reinforcement Equally Distributed on	Four Face			
	Puz	=	1790.55	KN
	d'/d along x-dir	=	0.15	
	d'/b along y-dir	=	0.20	
	Along x-direction			
	k1	=	0.196	
	k2	=	0.256	

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Along y-direction

	k1	=	0.184	
	k2	=	0.04	
Pb=(k1 + k2 p/Fck)Fck b d)	Pbx	=	502.38	KN
	Pby	=	431.26	KN
k = (Puz - Pu)/(Puz - Pb)	Kx	=	0.50	
	Ky	=	0.47	
B.) Additional Moments	Max	=	0.00	KN-m
	May	=	0.00	KN-m

Step:4 Total Moments for which the column is to be designed are

D.) Final Moment	**Mux**	**=**	**23.00**	KN-m
	Muy	**=**	**15.00**	KN-m

Step:5

Pu / Fck bd		=	0.50
p/Fck		=	0.09

*Refer CHART 49 From SP 16 : 1980 for red values

Pu / Fck bD= 0.50 p/Fck= 0.0876 d'/D = 0.15

	Mux1 / Fck bD^2	=	0.086	
	Mux1	=	**90.99**	KN-m

*Refer CHART 50 From SP 16 : 1980 for red values

Pu / Fck 0.50 p/Fck= 0.0876 d'/b = 0.20

	Muy1 / Fck bD^2	=	0.08	
	Muy1	=	**36.80**	KN-m
	Mux/Mux1	=	0.25	
	Muy/Muy1	=	0.41	
	Pu/Puz	=	0.64	
	αn	=	1.74	
(Mux/Mux1)^αn + (Muy/Muy1)^αn		**=**	**0.30**	**<1**

Step:6 Longitudinal Reinforcemer Area of steel Required Asc = 2014.80 mm^2

Larger dia		**Smaller dia**		
Select Bar dia	20 mm	Select Bar dia	=	16 mm
No. of bars Prov	4	No. of bars Prov	=	6
Area Prov.	1256.64	Area Prov.	=	1206

Area of Steel Provided Asc (pro) = 2463.01 mm^2

Percentage of Steel Provided = 2.68 %

Provide 4Y20+ 6Y16 as longitudinal reinforcement

Step:7 Lateral Ties

1. Pitch: (take whichever is lesser)

i. 16x smaller dia of main steel		=	250.00 mm
ii. 200 mm		=	200.00 mm
	Pi	=	200.00 mm

2. Diameter (whichever is greater)

i. 1/4 x largest dia of main steel		=	5.00 mm
ii. 10mm		=	8.00 mm
	Dia	=	8.00 mm

Therefore provide Y8 @200c/c as Lateral ties.

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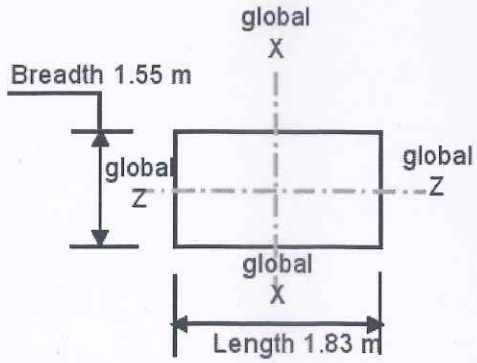
TYPICAL FOOTING DESIGN

COLUMN

Length (l, dim. || Z axis) =	460	mm
Breadth (b, dim. || X axis) =	200	mm



Footing Dimensions

FOOTING

Foot length (L, dim. || Z axis) =	1.83	m
Foot Breadth (B, dim. || X axis) =	1.55	m
Thickness of footing (t) =	530	mm
Clear cover of footing =	50	mm
Main bar dia of footing =	12	mm
Effective depth of footing =	**474**	mm
Selfweight of the footing =	**37.58**	KN
Area of Footing(A) =	**2.84**	m^2
Sect mod of foot about Z axis (Zz) =	**0.73**	m^3
Sec mod of foot about X axis (Zx) =	**0.87**	m^3

MATERIALS OF CONSTRUCTION

Grade of concrete f_{ck} =	25	N/mm^2
Grade of steel f_y =	500	N/mm^2

CHECK FOR GROSS BEARING PRESSURE

Safe **NET** bearing pressure =	340	KN/m^2	
Safe gross bearing pr. =	**388.07**	KN/m^3	(net pr. + depth of foot * soil unit wt)
Unfactored load case number =	0		
Axial load from output (P1) =	766.67	KN	
Moment about Z axis (M_z) =	5.00	KN-m	
Moment about X axis (M_x) =	5.00	KN-m	
Depth of top of foot. from ground =	2	m	
Unit wt of soil =	19	KN/m^3	
Weight of soil retained above foot =	**104.29**	KN	
P = (P1+soil+foot self wt) =	**908.54**	KN	
Maximum bearing pressure =	**332.91**	KN/m^2	$\frac{P}{A} \pm \frac{M_y}{Z_y} \pm \frac{M_x}{Z_x}$
Minimum bearing pressure =	**307.70**	**KN/m^2**	

Hence footing is safe against max gross bearing pr.

DESIGN FORCES

Factored load comb. no.	5	
Axial load:(P_u) =	1150.005	**KN**
Moment about Z axis (M_{uz}) =	7.5	**KN-m**
Moment about X axis (M_{ux}) =	7.5	**KN-m**
Maximum effective soil pressure $p_{e\,max}$		
(Pu/Area+ Muz/Zz + Mux/Zx) =	**424.34**	**KN/m^2**
Minimum effective soil pressure $p_{e\,min}$		
(Pu/Area - Muz/Zz - Mux/Zx) =	**386.53**	**KN/m^2**

Design of footing is done using above maximum effective soil pressure

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CALCULATION FOR BOTTOM STEEL

Mu about X1 X1 = (pe max x length^2/2)= **99.55** KN-m per meter

Mulimit = **747.19** KN-m per meter

$$A_{st} = \frac{0.5 f_{ck}}{f_y}\left[1 - \sqrt{1 - \frac{4.6 M_u}{f_{ck} b d^2}}\right] bd$$

The section is singly reinforced

Hence, Ast = **493.339** mm^2

Min Ast = **568.800** mm^2 (0.12 % for slab, cl 26.5.2.1)

Spacing = **198.83** mm (considering max of above two calculated values of Ast)

pt provided = **0.12** %

Hence provide 12 mm dia bar @ 198 mm c/c parellel to length of footing (|| to Z)

Mu about N1 N1 = (pe max x length^2/2)= **96.67** KN-m per meter

Calc. Ast = **478.739** mm^2 The section is singly reinforced

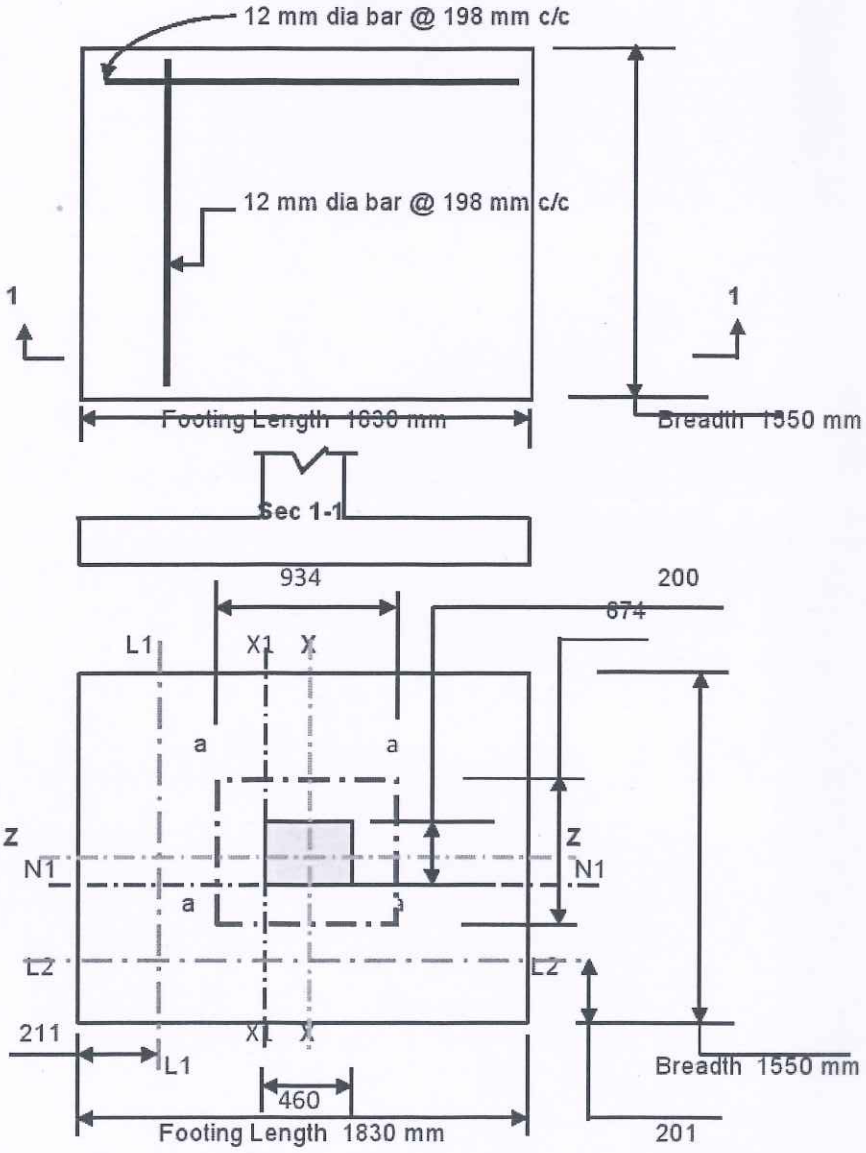
Min Ast = **568.8** mm^2 (0.12 % for slab, cl 26.5.2.1)

Spacing = **198.83** mm (considering max of above two calculated values of Ast)

pt provided = **0.12** %

Hence provide 12 mm dia bar @ 198 mm c/c parellel to breadth of footing (|| to X)

Arrangement of bottom reinforcement as per above design is shown below



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CHECK FOR ONE WAY SHEAR :

One way shear at critical section L1- L1

Distance of critical sec. from edge of footing = **0.211** m

Shear force Vs =pe max x 0.211 x 1m width of footing = **89.535** KN

Shear stress τ_v = Vs/bd = **0.189** N/mm^2

τ_c = **0.26** N/mm^2

tv < tc hence O.K.

One way shear at critical section L2- L2

Distance of critical sec. from edge of footing = **0.201** m

Shear force Vs =pe max x 0.201 x 1m width of footing = **85.291** KN

Shear stress τ_v = Vs/bd = **0.180** N/mm^2

τ_c = **0.26** N/mm^2

tv < tc hence O.K.

CHECK FOR TWO WAY SHEAR

Ref. cl 34.2.4 and cl.31.6.3 of IS 456 : 2000

Allowable shear stress $\tau_{v\ allowable}$ = $k_s \tau_c$

k_s = (0.5 + bc) = **1.68065** >1

Hence, k_s= **1**

$\tau_c = 0.25\ (fck)^{0.5}$ = **1.25** N/mm^2

$\tau_{v\ allowable} = k_s \times \tau_c$ = **1.25** N/mm^2

Shear force Vs = 424.335 (1.83 x 1.55 - 0.934 x 0.674) = **936.50** KN

Length of critical section = 2 x (934 + 674) = **3216** mm

Area of the critical section (length of critical sec x eff. d) = **1524384** mm^2

Hence shear stress τ_v = **0.614** N/mm^2

tv < allowable hence O.K.

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TYPICAL BEAM DESIGN

SECTION DETAILS Floor Level

Width of the beam	B	=	200.00	mm
Depth of the beam	D	=	600.00	mm
Clear cover of the beam	C_v	=	25	mm
Grade of concrete	f_{ck}	=	25	N/mm^2
Grade of steel	F_y		500	
Effective length of the beam	L	=	7.01	m

FORCE DETAILS FROM STAAD :

Max. sagging moment of the beam	=	114.00	kN m
LHS Support moment of the beam	=	164.00	kN m
RHS Support moment of the beam	=	164.00	KN m
Torsional Moment	=	0.01	KN m
Shear force at LHS of the beam	=	177.00	KN
Shear force at RHS of the beam	=	177.00	KN
Shear force at concentrated load location	=	0.00	KN

Design of beam at LHS section

Tension Reinf.

Bending Mt $(M_u)_L$	=	164.02	kN m
Breath of the beam (B	=	200	mm
Effective cover $(d')_L$	=	43.0	mm
Effective depth $(d)_L$	=	557.00	mm
x_u max/d	=	0.4560	
$K_L = M_{UL}/(bd^2 f_{ck})$	=	0.1322	(2.644)
K'_L	=	0.1338	

Hence comp. reinf. NOT reqd.

Eff. Cover d' (Comp)	=	43.0	mm
A_{st} lim	=	846	mm^2
ΔA_{st}	=	0	mm^2
fsc	=	0.0	N/mm^2
A_{st} reqd	=	833	mm^2

Layer	1st	2nd	3rd
Dia of reinf	20	16	12
Reqd No.	2.7	0	0
Provided	4	0	0
Ast prov.	1257	0	0

$A_{st\,provided}$ = 1257 mm^2

Compression Reinf.

$A_{st\,required}$	=	0	mm^2
$A_{st\,min}$	=	628	mm^2

Layer	1st	2nd	3rd
Dia of reinf	20	12	12
Reqd No.	2	0	0
Provided	2	0	0
Ast prov.	628	0	0

$A_{st\,provided}$ = 628 mm^2

Shear Check

Shear force V_{UR}	=	177.00	kN
$\zeta_v = V_{UL}/bd$	=	1.59	N/mm^2
% of reinf provided	=	1.13	%
Design Stress	=	0.65	N/mm^2
ζ_c max	=	2.77	N/mm^2

2 Legged 8 mm Dia stirrups

Design Shear reinf.

Reqd. stirrup spac.	=	232.83	mm
Proived stirrup spac.	=	150	mm

Design of beam at Max sagging section

Tension Reinf.

Bending Mt $(M_u)_M$	=	114.00	kN m
Breath of the beam (B	=	200	mm
Effective cover $(d)_M$	=	43.0	mm
Effective depth $(d)_M$	=	557.00	mm
x_u max/d	=	0.4560	
$K_M = M_{UM}/(bd^2 f_{ck})$	=	0.0919	(1.838)
K'_M	=	0.1338	

Hence comp. reinf. NOT reqd.

Eff. Cover d' (Comp)	=	43.0	mm
A_{st} lim	=	846	mm^2
ΔA_{st}	=	0	mm^2
fsc	=	0.0	N/mm^2
A_{st} reqd	=	1084	mm^2

Layer	1st	2nd	3rd
Dia of reinf	20	12	12
Reqd No.	3.5	0	0
Provided	4	0	0
Ast prov.	1257	0	0

$A_{st\,provided}$ = 1257 mm^2

Compression Reinf.

$A_{st\,required}$	=	0	mm^2
$A_{st\,min}$	=	314	mm^2

Layer	1st	2nd	3rd
Dia of reinf	20	12	12
Reqd No.	1	0	0
Provided	2	0	0
Ast prov.	628	0	0

$A_{st\,provided}$ = 628 mm^2

Torsional Reinforcement

Torsional Moment	=	0.01	kNm
ζ_{ve}	=	1.59	N/mm^2
ζ_c max	=	2.77	N/mm^2
M_t	=	0.02	kNm
M_{t2}	=	0.00	kNm
Stirrup spacing reqd	=	232.54	mm
Sideface. Reinf reqd	=	0.00	mm^2
Provide 0 Nos of 12 mm on EVF			
Ast prov.	=	0.0	mm^2

Design of beam at RHS section

Tension Reinf.

Bending Mt $(M_u)_R$	=	164.02	kN m
Breath of the beam (B	=	200	mm
Effective cover $(d')_R$	=	43.0	mm
Effective depth $(d)_R$	=	557.00	mm
x_u max/d		0.4560	
$K_R = M_{UR}/(bd^2 f_{ck})$	=	0.1322	(2.644)
K'_R	=	0.1338	

Hence comp. reinf. NOT reqd.

Eff. Cover d' (Comp)	=	43.0	mm
A_{st} lim	=	846	mm^2
ΔA_{st}	=	0	mm^2
fsc	=	0.0	N/mm^2
A_{st} reqd	=	833	mm^2

Layer	1st	2nd	3rd
Dia of reinf	20	16	12
Reqd No.	2.7	0	0
Provided	4	0	0
Ast prov.	1257	0	0

$A_{st\,provided}$ = 1257 mm^2

Compression Reinf.

$A_{st\,required}$	=	0	mm^2
$A_{st\,min}$	=	628	mm^2

Layer	1st	2nd	3rd
Dia of reinf	20	12	12
Reqd No.	2	0	0
Provided	2	0	0
Ast prov.	628	0	0

$A_{st\,provided}$ = 628 mm^2

Shear Check

Shear force V_{UL}	=	177.00	kN
$\zeta_v = V_{UL}/bd$	=	1.59	N/mm^2
% of reinf provided	=	1.13	%
Design Stress	=	0.65	N/mm^2
ζ_c max	=	2.77	N/mm^2

2 Legged 8 mm Dia stirrups

Design Shear reinf.

Reqd. stirrup spac.	=	232.83	mm
Proived stirrup spac.	=	150	mm

CHECK FOR DEFLECTION : As per IS 456

Provided area of reinforcement	=	1257	Design service stress	=	250.16
Mu/bd^2	=	1.84	Modification factor - Tension reinf.	=	1.24
Actual Span / Effective depth Ratio	=	12.59	Modification factor - Comp. reinf.	=	1.16
Support Condition	=	Continuous	Allowable Span /Effective depth Ratio	=	37.36

===<<< Hence SAFE in Deflection >>>===

Beam No	Size	Bottom steel		Top steel			Stirrups		Side Face Reinf.
		Straight	Curtail	Middle	LHS	RHS	Ends	Mid	
RB8	200 x 600	4Y20	---	2Y20	4Y20	4Y20	2L Y8/150	2L Y8/200	

CLIENT:	M/s. SREEVATSA POORNA	DESIGN:	G + 2 Floors	ARCHITECT & PLANNERS **SANKAR & ASSOCIATES** 27 SENGUPTA STREET, RAMNAGAR, COIMBATORE.
STRUCTURE NAME :	RESIDENTIAL BUILDING	TITLE: REPORT ON STRUCTURAL DESIGN.		
PLACE:	COIMBATORE			

TYPICAL SLAB DESIGN

SPANS :

Shorter span c/c w.r.to beam	B	=	1.50	m
Longer span c/c w.r.to beam	L	=	5.10	m
Width of support - shorter span - Left	bxl	=	200	mm
Width of support - shorter span - Right	bxr	=	200	mm
Width of support - longer span - Left	byl	=	200	mm
Width of support - longer span - Right	byr	=	200	mm
Clear Cover of slab	cv	=	20	mm
Ratio Ly / Lx	ly/lx	=	3.40	> 2

LOAD CALCULATION :

Assume the thickness of the slab	=	125.00	mm
Effective Depth of the of the slab	=	101.00	mm
Self Weight of slab	=	3.125	KN / m^2
Weathering course / Floor finishing	=	2.500	KN / m^2
Wall load	=	1.000	KN / m^2
Live Load	=	3.000	KN / m^2
D.L+L.L	=	9.625	KN / m^2
1.5D.L+1.5L.L	=	14.438	KN / m^2

DESIGN AS ONE WAY SLAB

Support Condition ONE SHORT END CONTINUOUS

EFFECTIVE SPANS :

Shorter span: (Lx)

Clear span + effective depth	=	1.40	m
Center to centre of supports	=	1.50	m
Effective span	=	1.50	m

Longer span: (Ly)

Clear span + effective depth	=	5.00	m
Center to centre of supports	=	5.10	m
Effective span	=	5.10	m
Aspect Ratio Ly / Lx	=	3.40	> 2

+ ve Alpha - x	=	0.100
- ve Alpha - x	=	0.100
+ ve Alpha - y	=	0.000
- ve Alpha - y	=	0.000

Compressive Stength of Concrete	=	25.00	N/mm^2
Grade of steel	=	500.00	N/mm^2

BENDING MOMENTS:

Positive moment along Shorter dir.	Mx +ve =	3.25	KNm / m	dx+	=	101.00	mm	Kx+	=	0.016	Zx+	=	95.950	mm
Negative moment along Shorter dir.	Mx -ve =	3.25	KNm / m	dx-	=	101.00	mm	Kx-	=	0.016	Zx-	=	95.950	mm
Positive moment along Longer dir.	My +ve =	0.00	KNm / m	dy+	=	93.00	mm	Ky+	=	0.000	Zy+	=	88.350	mm
Negative moment along Longer dir	My -ve =	0.00	KNm / m	dy-	=	101.00	mm	Ky-	=	0.000	Zy-	=	95.950	mm

EFFECTIVE DEPTH OF SLAB

REQUIRED AREA OF STEEL :

Ast req. at midspan along x- dir.	ast +ve x =	75.35	mm^2
Ast req. at midspan along y- dir.	ast +ve y =	0.00	mm^2
Ast req. at support along x- dir.	ast -ve x =	75.35	mm^2
Ast req. at support along y- dir.	ast -ve y =	0.00	mm^2
Minimum Ast required	ast min =	150.00	mm^2

REQUIRED SPACING OF STEEL:

8 mm dia at midspan along x- dir.	=	335	mm c/c
8 mm dia at midspan along y- dir.	=	335	mm c/c
8 mm dia at support along x- dir.	=	335	mm c/c
8 mm dia at support along y- dir.	=	335	mm c/c
8 mm dia for distribution steel	=	335	mm c/c
0 mm dia for top of mid span	=	150	mm c/c

PROVIDED SPACING OF STEEL

Bottom reinforcement along x- dir.	Y	8	150	mm c/c
Bottom reinforcement along y- dir.	Y	8	200	mm c/c
Top reinforcement along x- dir.	Y	8	150	mm c/c
Top reinforcement along y- dir.	Y	8	200	mm c/c
Distribution Steel	Y	8	200	mm c/c

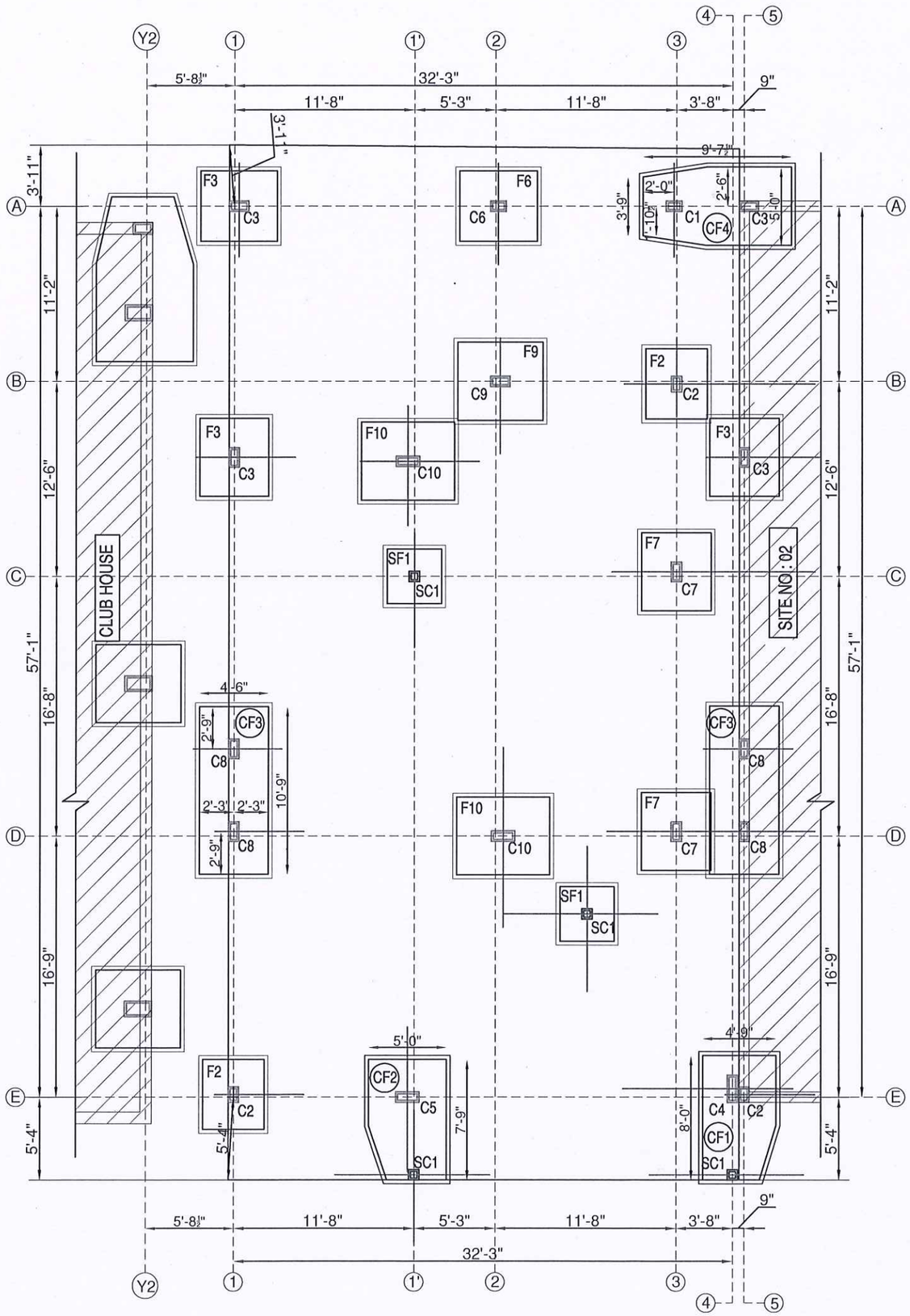
CHECK FOR DEFLECTION :

Provided Ast (Bottom)	=	335.10	mm^2
Provided Ast (Top)	=	0.00	mm^2
Mu/bd^2	=	0.32	
Actual Span / Effective depth Ratio	=	14.85	
Design service stress	=	65.21	
Modification factor - Tension reinf.	=	2.00	
Modification factor - Comp. reinf.	=	1.00	
Allowable Span /Effective depth Ratio	=	46.00	

===<<< Hence SAFE in Deflection >>>===

SANKAR & ASSOCIATES COIMBATORE

CLIENT:	M/s. SREEVATSA POORNA	DESIGN:	G + 2 Floors	ARCHITECT & PLANNERS SANKAR & ASSOCIATES 27 SENGUPTA STREET, RAMNAGAR, COIMBATORE.
STRUCTURE NAME :	RESIDENTIAL BUILDING	TITLE: REPORT ON STRUCTURAL DESIGN.		
PLACE:	COIMBATORE			



SCHEDULE OF COLUMNS AND FOOTINGS

COLUMN TYPE	COLUMN SIZE	FOOTING TYPE	FOTING SIZE	PIT SIZE
C1	8" x 1'-0"	F1	3'-9" x 4'-0"	4'-3" x 4'-6"
C2	8" x 1'-0"	F2	4'-0" x 4'-6"	4'-6" x 5'-0"
C3	8" x 1'-3"	F3	4'-6" x 5'-0"	5'-0" x 5'-6"
C4	8" x 1'-9"	F4	Refer Combined Footing-CF1	
C5	8" x 1'-6"	F5	Refer Combined Footing-CF2	
C6	8" x 1'-0"	F6	4'-6" x 5'-0"	5'-0" x 5'-6"
C7	8" x 1'-3"	F7	4'-6" x 5'-0"	5'-0" x 5'-6"
C8	8" x 1'-3"	F8	4'-6" x 5'-6"	5'-0" x 6'-0"
C9	8" x 1'-3"	F9	5'-0" x 5'-6"	5'-6" x 6'-0"
C10	8" x 1'-6"	F10	5'-0" x 6'-0"	5'-6" x 6'-6"
SF1	8" x 8" Terminated @ Plinth Top Level	SF1	3'-6" x 3'-6"	4'-0" x 4'-0"
C2 + C4 + SC1		CF1	AS PER LAYOUT	
C5 + SC1		CF2	AS PER LAYOUT	
C8+ C8		CF3	AS PER LAYOUT	
C1+ C3		CF4	AS PER LAYOUT	

NOTES :

1. THE DIMENSIONS ARE NOT TO BE SCALED.
2. ALL DIMENSIONS ARE TO BE VERIFIED PROPERLY AT SITE.
3. ALL DRAWINGS ARE TO BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT DRAWINGS.
4. ϕ - DIA OF TOR STEEL
5. CLEAR COVER TO MAIN REINFORCEMENT
   a) FOR COLUMNS = 40 mm, b) FOR FOOTINGS : BOTTOM : 50mm, SIDES : 75mm
6. LAPPING:
   a) LAP LENGTH SHALL BE = 50 x DIA OF BAR.
   b) DEVELOPMENT LENGTH SHALL BE = 48 x DIA OF BAR.
7. ALL ISOLATED FOOTINGS SHALL BE CONCENTRIC WITH COLUMN UNLESS OTHERWISE SPECIFIED
8. GRADE OF CONCRETE : COLUMN : M25, FOOTING : M25
9. GRADE OF REINFORCING STEEL IS Fe 500
10. ASSUMED SBC OF SOIL = 340 KN / Sqm.
11. MINIMUM DEPTH OF FOUNDATION = 2.0M BELOW NGL
12. THIS STRUCTURE IS DESIGNED FOR GROUND + 2 FLOORS

PLAN SHOWING THE PROPOSED RESIDENTIAL GROUP DEVELOPMENT BUILDINGS IN S.F.NO:365/2F AT THUDIYALUR VILLAGE, NORTH ZONE & TALUK, COIMBATORE CORPORATION.

REV.,	DESCRIPTION	REV BY.,	DATE	APP BY.,

RELEASE STATUS	DATE	SIGNATURE
PRELIMINARY/ TENDER		
FOR CONSTRUCTION		

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- ANY MODIFICATION IN THE DESIGNER'S STRUCTURAL SYSTEM BEFORE/AFTER COMPLETION OF WORK SHALL BE IMMEDIATELY INTIMATED TO THE CONSULTANT
- CLIENT / BUILDER ENSURES THAT STRICT ADHERENCE TO THE GOOD CONSTRUCTION PRACTICE IS FOLLOWED AT SITE AS PER THE RELEVANT B.I.S. CODES.
- STRUCTURAL ENGINEER'S RESPONSIBILITY IS LIMITED TO DESIGNING & ISSUAL OF STRUCTURAL DRAWINGS ONLY.

S. MURUGESH, M.E.,FIE.,
Chartered Engineer F-1279323
Structural Engineer Grade-I
(Coimbatore LPA/SE/Gr.-I/19-04-19)

STRUCTURAL ENGINEER

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CLIENT:- SREEVATSA POORNA AT THUDIYALUR

REFERENCE:

FOR APPROVAL PURPOSE ONLY

N

BUILDING: EAST FACING VILLA - SITE NO: 01

DETAIL: COLUMN AND FOOTING LAYOUT

SCALE: 1"= 8'-0"	JOB NO: SREL-24-01	REV	DRN BY: UMA
DATE: 24.04.2024	DRG NO: ST-FL-001		CKD BY: GOWDAMAN
	SHEET NO:		APD BY: MURUGESH

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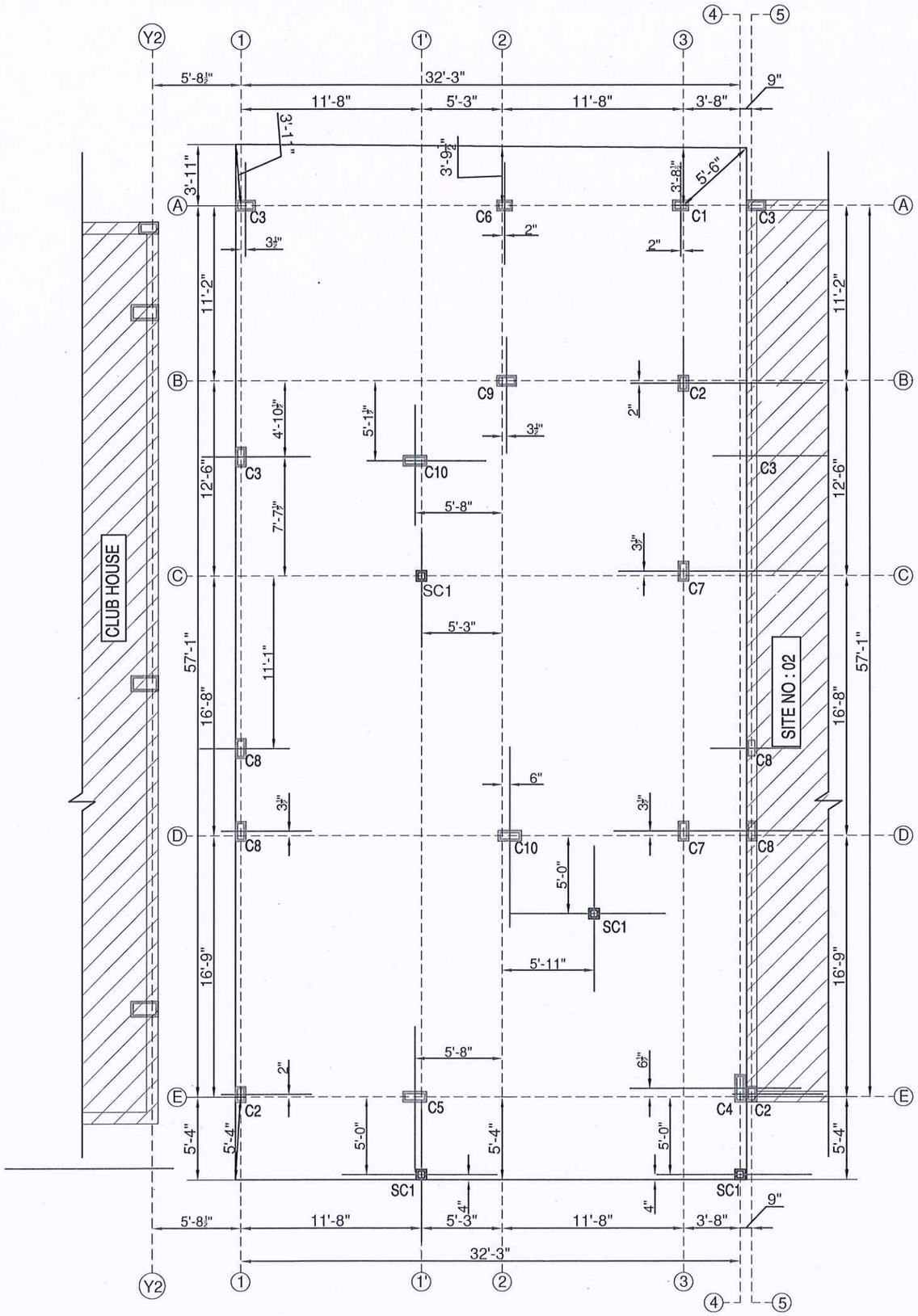
Ashok Nagar, Chennai - 600 083
E-mail : admin@sankarassociates.in
Website : www.sankarassociates.in

A3 - F



SCHEDULE OF COLUMNS

TYPE	COLUMN SIZE
C1	8" x 1'-0"
C2	8" x 1'-0"
C3	8" x 1'-3"
C4	8" x 1'-9"
C5	8" x 1'-6"
C6	8" x 1'-0"
C7	8" x 1'-3"
C8	8" x 1'-3"
C9	8" x 1'-3"
C10	8" x 1'-6"
** SC1	8" x 8" Terminated @ Plinth Top Level

NOTES :

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4. ϕ - DIA OF TOR STEEL
5. CLEAR COVER TO MAIN REINFORCEMENT
   a) FOR COLUMNS = 40 mm,
6. LAPPING:
   a) LAP LENGTH SHALL BE = 50 x DIA OF BAR.
   b) DEVELOPMENT LENGTH SHALL BE = 48 x DIA OF BAR.
7. ALL ISOLATED FOOTINGS SHALL BE CONCENTRIC WITH COLUMN UNLESS OTHERWISE SPECIFIED
8. GRADE OF CONCRETE : COLUMN : M25,
9. GRADE OF REINFORCING STEEL IS Fe 500
10. ASSUMED SBC OF SOIL = 340 KN / Sqm.
11. MINIMUM DEPTH OF FOUNDATION = 2.0M BELOW NGL
12. THIS STRUCTURE IS DESIGNED FOR GROUND + 2 FLOORS

PLAN SHOWING THE PROPOSED RESIDENTIAL GROUP DEVELOPMENT BUILDINGS IN S.F.NO:365/2F AT THUDIYALUR VILLAGE, NORTH ZONE & TALUK, COIMBATORE CORPORATION.

REV.,	DESCRIPTION	REV BY.,	DATE	APP BY.,

RELEASE STATUS	DATE	SIGNATURE
PRELIMINARY/ TENDER		
FOR CONSTRUCTION		

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Structural Engineer Grade-I
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STRUCTURAL ENGINEER

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CLIENT:- SREEVATSA POORNA AT THUDIYALUR

REFERENCE:

FOR APPROVAL PURPOSE ONLY

N

BUILDING: EAST FACING VILLA - SITE NO :01

DETAIL: COLUMN CENTRE LINE LAYOUT

SCALE: 1"= 8'-0"	JOB NO: SREL-24-01	REV	DRN BY: UMA
DATE: 24.04.2024	DRG NO: ST-CL-002		CKD BY: GOWDAMAN
	SHEET NO:		APD BY: MURUGESH

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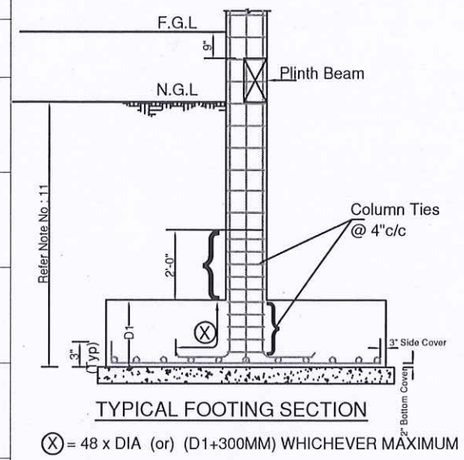
Website : www.sankarassociates.in

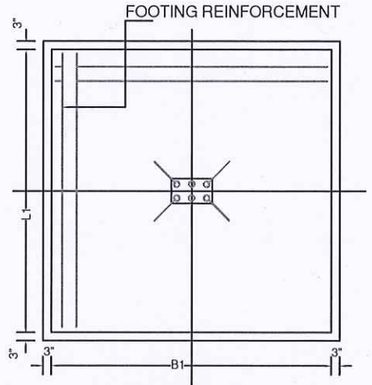
A3 - F

COLUMN TYPE	COLUMN REINFORCEMENT	TIES	FOOTING TYPE	L1	B1	D1	LONGER DIRECTION	SHORTER DIRECTION
C1	8" 1'-0" 6 # 12 ϕ	8 ϕ @ 6" c/c (1Tie + 1 Link)	F1	4'-0"	3'-9"	1'-0"	10 ϕ @ 7" c/c	10 ϕ @ 7" c/c
C2	8" 1'-0" 4 # 16 ϕ 2 # 12 ϕ (•)	8 ϕ @ 6" c/c (1Tie + 1 Link)	F2	4'-6"	4'-0"	1'-3"	10 ϕ @ 5" c/c	10 ϕ @ 6" c/c
C3	8" 1'-3" 4 # 16 ϕ 4 # 12 ϕ (•)	8 ϕ @ 6" c/c (2 Ties)	F3	5'-0"	4'-6"	1'-6"	10 ϕ @ 6" c/c	10 ϕ @ 6" c/c
C4	8" 1'-9" 4 # 20 ϕ 4 # 16 ϕ (•) 2 # 12 ϕ (•)	8 ϕ @ 6" c/c (2Ties + 1 Link)	REFER COMBINED FOOTING-CF1					
C5	8" 1'-6" 10 # 16 ϕ	8 ϕ @ 6" c/c (2Ties + 1 Link)	REFER COMBINED FOOTING-CF1					
C6	8" 1'-0" 4 # 16 ϕ 4 # 12 ϕ (•)	8 ϕ @ 6" c/c (2 Ties)	F6	5'-0"	4'-6"	1'-6"	10 ϕ @ 8" c/c	10 ϕ @ 8" c/c
C7	8" 1'-3" 4 # 16 ϕ 2 # 12 ϕ (•)	8 ϕ @ 6" c/c (1Tie + 1 Link)	F7	5'-0"	4'-6"	1'-6"	10 ϕ @ 6" c/c	10 ϕ @ 6" c/c
C8	8" 1'-3" 4 # 16 ϕ 6 # 12 ϕ (•)	8 ϕ @ 6" c/c (2Ties + 1 Link)	F8	5'-6"	4'-6"	1'-6"	10 ϕ @ 5" c/c	10 ϕ @ 7" c/c
C9	8" 1'-3" 8 # 16 ϕ 2 # 12 ϕ (•)	8 ϕ @ 6" c/c (2Ties + 1 Link)	F9	5'-6"	5'-0"	1'-6"	10 ϕ @ 5" c/c	10 ϕ @ 5" c/c
C10	8" 1'-6" 4 # 20 ϕ 6 # 16 ϕ (•)	8 ϕ @ 6" c/c (2Ties + 1 Link)	F10	6'-0"	5'-0"	1'-9"	12 ϕ @ 6" c/c	12 ϕ @ 7" c/c
SC1	8" 8" 4 # 12 ϕ	8 ϕ @ 6" c/c (1Tie)	SF1	3'-6"	3'-6"	1'-0"	10 ϕ @ 8" c/c	10 ϕ @ 8" c/c
C2 + C4 + SC1			CF1	As Per Layout			10 ϕ @ 6" c/c	10 ϕ @ 6" c/c
C5 + SC1			CF2	As Per Layout			10 ϕ @ 6" c/c	10 ϕ @ 6" c/c
C7+ C8			CF3	As Per Layout		1'-6"	10 ϕ @ 5" c/c	10 ϕ @ 7" c/c
C7+ C3			CF4	As Per Layout		1'-6"	10 ϕ @ 6" c/c	10 ϕ @ 6" c/c
C2+ C6			CF5	As Per Layout		1'-6"	10 ϕ @ 5" c/c	10 ϕ @ 6" c/c
C1+ C3			CF6	As Per Layout		1'-6"	10 ϕ @ 6" c/c	10 ϕ @ 6" c/c



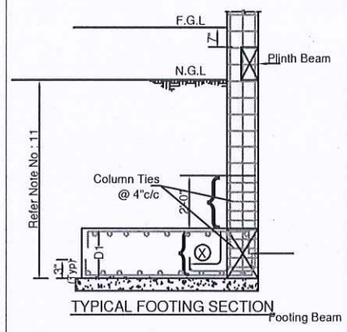
TYPICAL FOOTING SECTION

X = 48 x DIA (or) (D1+300MM) WHICHEVER MAXIMUM

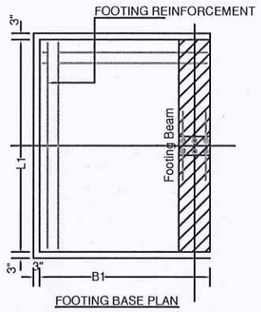


FOOTING BASE PLAN

TYPICAL FOOTING DETAILS

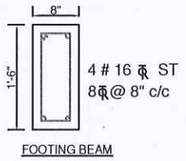


TYPICAL FOOTING SECTION

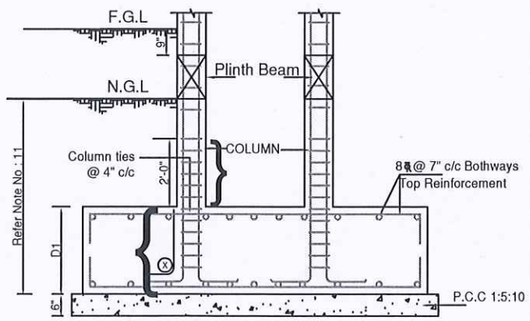


FOOTING BASE PLAN

TYPICAL ECCENTRIC FOOTING DETAILS

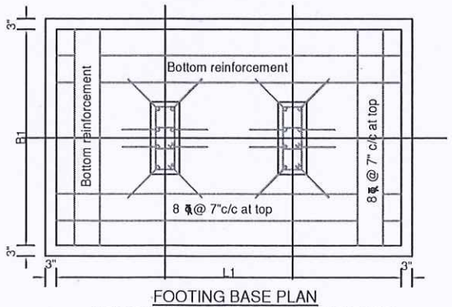


FOOTING BEAM



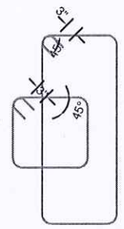
X = 48 x DIA (or) (D1+300MM) WHICHEVER IS MAXIMUM

TYPICAL SECTION

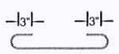


FOOTING BASE PLAN

TYPICAL COMBINED FOOTING DETAILS



TYPICAL TIE DETAIL



TYPICAL LINK DETAIL

NOTES :

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4. ϕ - DIA OF TOR STEEL
5. CLEAR COVER TO MAIN REINFORCEMENT
   a) FOR COLUMNS = 40 mm, b) FOR FOOTINGS : BOTTOM : 50mm, SIDES : 75mm
6. LAPPING:
   a) LAP LENGTH SHALL BE = 50 x DIA OF BAR.
   b) DEVELOPMENT LENGTH SHALL BE = 48 x DIA OF BAR.
7. ALL ISOLATED FOOTINGS SHALL BE CONCENTRIC WITH COLUMN UNLESS OTHERWISE SPECIFIED
8. GRADE OF CONCRETE : COLUMN : M25, FOOTING : M25
9. GRADE OF REINFORCING STEEL IS Fe 500
10. ASSUMED SBC OF SOIL = 340 KN / Sqm.
11. MINIMUM DEPTH OF FOUNDATION = 2.0M BELOW NGL
12. THIS STRUCTURE IS DESIGNED FOR GROUND + 2 FLOORS

PLAN SHOWING THE PROPOSED RESIDENTIAL GROUP DEVELOPMENT BUILDINGS IN S.F.NO:365/2F AT THUDIYALUR VILLAGE, NORTH ZONE & TALUK, COIMBATORE CORPORATION.

REV.,	DESCRIPTION	REV BY.,	DATE	APP BY.,

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FOR CONSTRUCTION		

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STRUCTURAL ENGINEER

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SREEVATSA POORNA
AT
THUDIYALUR

CLIENT:-

REFERENCE:

FOR APPROVAL PURPOSE ONLY

BUILDING: EAST FACING VILLA - SITE NO 1

DETAIL: COLUMN AND FOOTING REINFORCEMENT DETAILS

SCALE: 1"= 4'-0"	JOB NO: SREL-24-01	REV	DRN BY: UMA
DATE: 24.04.2024	DRG NO: ST-FL-002		CKD BY: GOWDAMAN
	SHEET NO:		APD BY: MURUGESH

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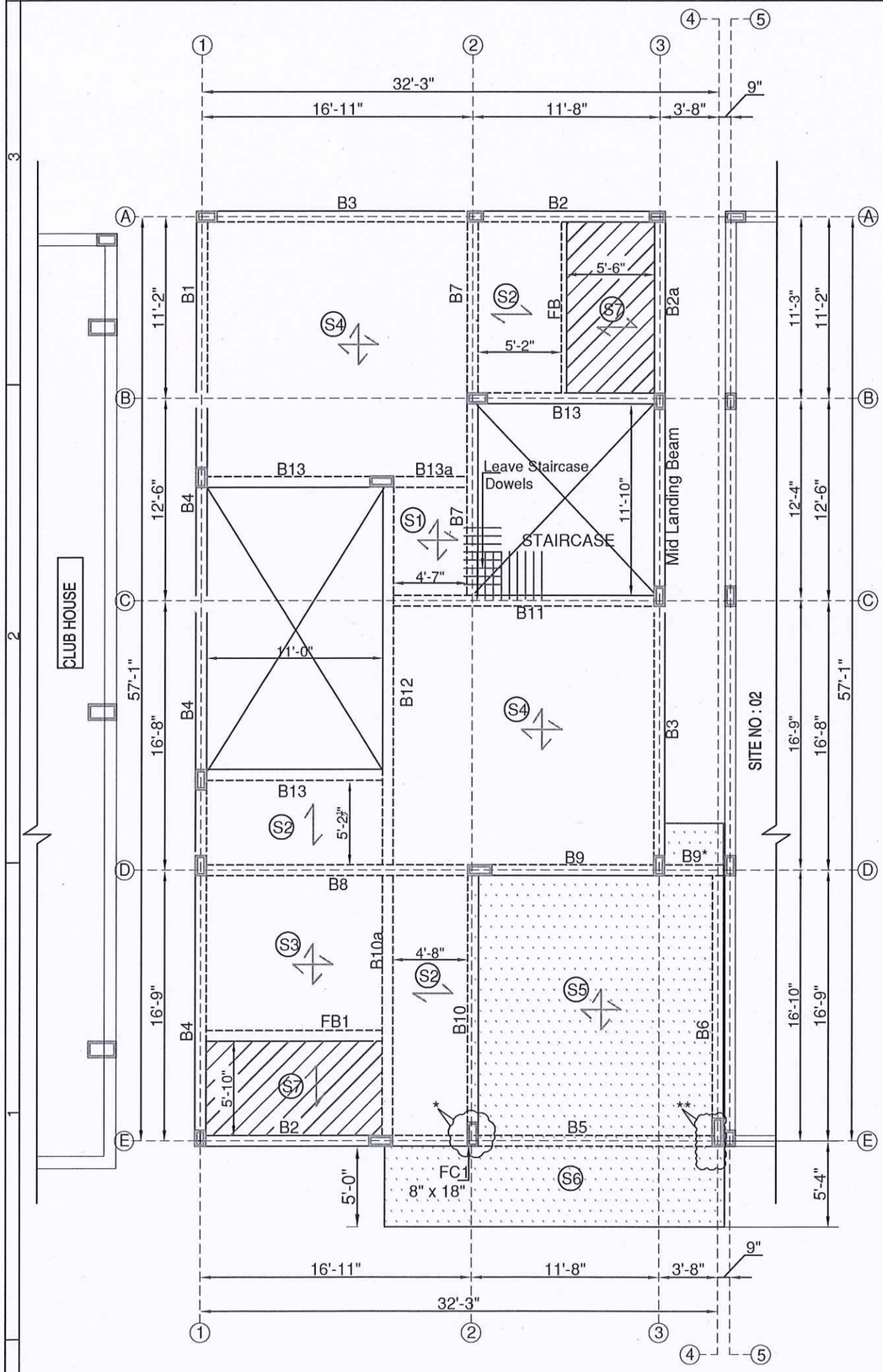
Website : www.sankarassociates.in

A3 - F



SCHEDULE OF GROUND ROOF BEAMS

FLOOR TO FLOOR HEIGHT : 10'-8", SLAB TOP LVL -10'-6", FLOOR FINISH : 2"

BEAM NO.	BEAM SIZE	BEAM BOTTOM LVL
B1	8" / 1'-3"	+ 9'-3" LVL
B2	8" / 1'-3"	+ 9'-3" LVL
B3	8" / 1'-3"	+ 9'-3" LVL
B4	8" / 1'-6"	+ 9'-0" LVL
B5	8" / 2'-0"	+ 8'-0" LVL
B6	8" / 2'-0"	+ 8'-0" LVL
B7	8" / 1'-3"	+ 9'-3" LVL
B8	8" / 2'-0"	+ 8'-6" LVL
B9	8" / 1'-6"	+ 9'-0" LVL
B9*	8" / 2'-0"	+ 8'-0" LVL
B10	8" / 1'-3"	+ 9'-3" LVL
B10a	8" / 1'-3"	+ 9'-3" LVL
B11	8" / 1'-6"	+ 9'-0" LVL
B12	8" / 2'-0"	+ 8'-6" LVL
B13	8" / 1'-3"	+ 9'-3" LVL
B13a	8" / 1'-3"	+ 9'-3" LVL
FB	4" / 1'-3"	+ 9'-3" LVL
FB1	8" / 1'-3"	+ 9'-3" LVL

SLAB TYPE	SLAB THICK	SLAB BOTTOM LVL
S1	5"	+ 10'-1" LVL
S2	5"	+ 10'-1" LVL
S3	5"	+ 10'-1" LVL
S4	6"	+ 10'-0" LVL
S5	6"	+ 9'-6" LVL
S6	6"	+ 9'-6" LVL
S7	5"	+ 9'-3" LVL

ONE WAY SLAB

TWO WAY SLAB

Toilet Sunken 10"

Terrace Sunken 6"

NOTES :

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2. ALL DIMENSIONS ARE TO BE VERIFIED PROPERLY AT SITE.
3. ALL DRAWINGS ARE TO BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT DRAWINGS.
4. ϕ - DIA OF TOR STEEL
5. CLEAR COVER TO MAIN REINFORCEMENT
   a) FOR BEAMS = 25 mm b) FOR SLABS = 20 mm
6. LAPPING:
   a) LAP LENGTH SHALL BE = 50 x DIA OF BAR.
   b) DEVELOPMENT LENGTH SHALL BE = 50 x DIA OF BAR.
7. PROVIDE CHAIR RODS WHEREVER NECESSARY
8. PROVIDE SPACER RODS OF 25mm ø (min) AT 1000mm C/C
9. GRADE OF CONCRETE IS M25
10. GRADE OF REINFORCING STEEL IS Fe 500
11. ALL THE LEVELS MENTIONED ARE FROM THE F.F.L. OF RESPECTIVE FLOOR

* 8" x 1'-6" FLOATING COLUMN ABOVE THIS ROOF
** COLUMN TO BE TERMINATED THIS ROOF

PLAN SHOWING THE PROPOSED RESIDENTIAL GROUP DEVELOPMENT BUILDINGS IN S.F.NO:365/2F AT THUDIYALUR VILLAGE,NORTH ZONE & TALUK, COIMBATORE CORPORATION.

REV.,	DESCRIPTION	REV BY.,	DATE	APP BY.,

RELEASE STATUS	DATE	SIGNATURE
PRELIMINARY/ TENDER		
FOR CONSTRUCTION		

IMPORTANT NOTES:-

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- CLIENT / BUILDER ENSURES THAT STRICT ADHERENCE TO THE GOOD CONSTRUCTION PRACTICE IS FOLLOWED AT SITE AS PER THE RELEVANT B.I.S. CODES.
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S. MURUGESH, M.E.,FIE.,
Chartered Engineer F-1279323
Structural Engineer Grade-I
(Coimbatore LPA/SE/Gr.-I/19-04-19)

STRUCTURAL ENGINEER

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PROPOSED VILLA FOR SREEVATSA @ THUDIYALUR

CLIENT:-

REFERENCE:

FOR APPROVAL PURPOSE ONLY

N

BUILDING: EAST FACING VILLA -SITE NO: 01

DETAIL: GROUND FLOOR ROOF SLAB & BEAM SHUTTERING LAYOUT

SCALE: 1"= 8'-0"	JOB NO:	REV	DRN BY: UMA
DATE: 05.04.2024	DRG NO: ST-RF-00F-001		CKD BY: GOWDAMAN
	SHEET NO:		APD BY: MURUGESH

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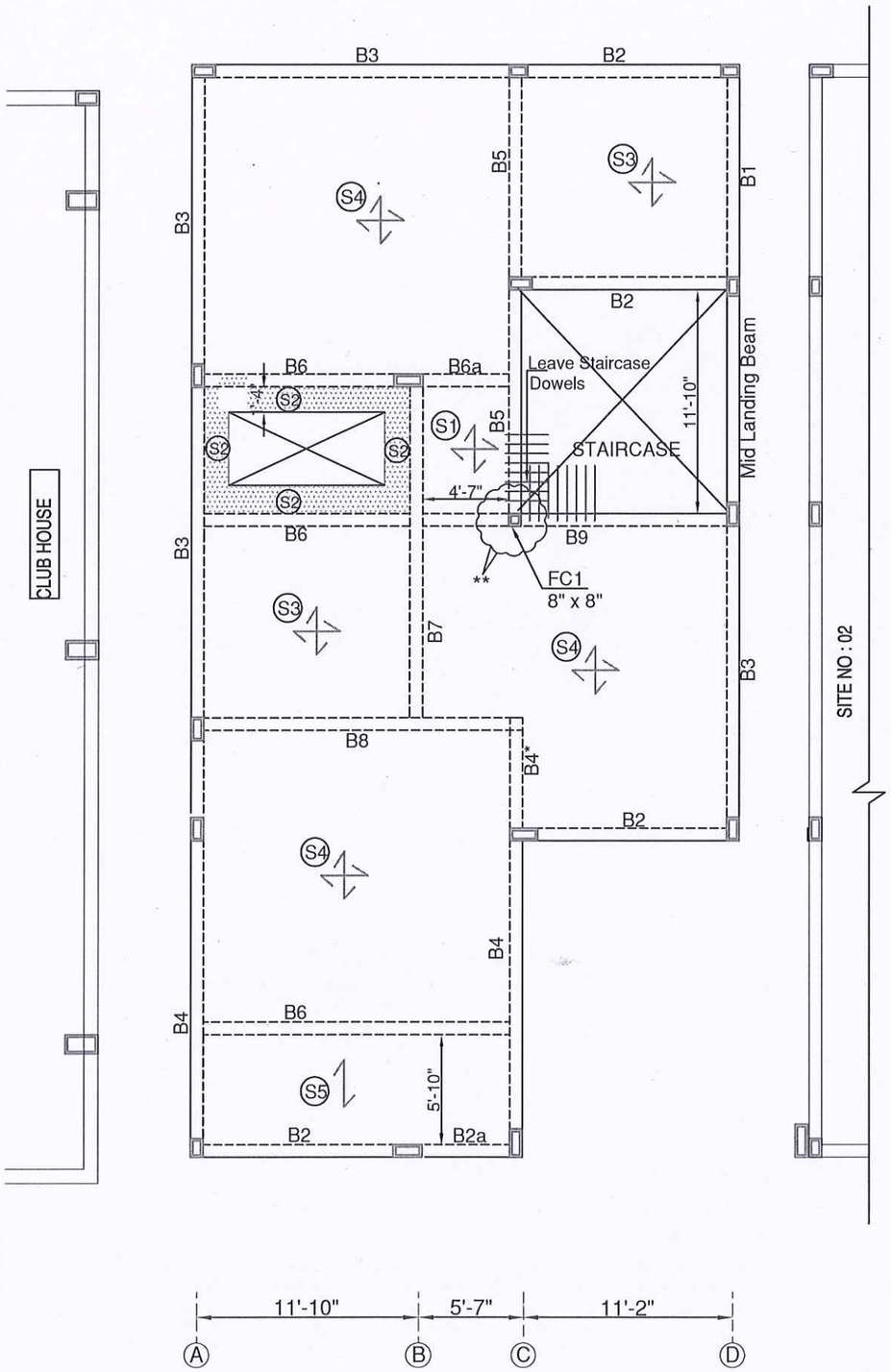
A3 - R



SCHEDULE OF FIRST ROOF BEAMS

FLOOR TO FLOOR HEIGHT : 10'-8", SLAB TOP LVL -10'-6", FLOOR FINISH : 2"

BEAM NO.	BEAM SIZE	BEAM BOTTOM LVL
B1	8" × 1'-3"	+ 9'-3" LVL
B2	8" × 1'-3"	+ 9'-3" LVL
B3	8" × 1'-3"	+ 9'-3" LVL
B4	8" × 1'-6"	+ 9'-0" LVL
B5	8" × 1'-3"	+ 9'-3" LVL
B6	8" × 1'-3"	+ 9'-3" LVL
B6a	8" × 1'-3"	+ 9'-3" LVL
B7	8" × 2'-0"	+ 8'-6" LVL
B8	8" × 2'-0"	+ 8'-6" LVL
B9	8" × 1'-6"	+ 9'-0" LVL

SLAB TYPE	SLAB THICK	SLAB BOTTOM LVL
S1	5"	+ 10'-1" LVL
S2	5"	+ 10'-1" LVL
S3	5"	+ 10'-1" LVL
S4	6"	+ 10'-0" LVL
S5	5"	+ 10'-1" LVL

ONE WAY SLAB

TWO WAY SLAB

Slab @ Beam Top

NOTES :

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2. ALL DIMENSIONS ARE TO BE VERIFIED PROPERLY AT SITE.
3. ALL DRAWINGS ARE TO BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT DRAWINGS.
4. ϕ - DIA OF TOR STEEL
5. CLEAR COVER TO MAIN REINFORCEMENT
   a) FOR BEAMS = 25 mm b) FOR SLABS = 20 mm
6. LAPPING:
   a) LAP LENGTH SHALL BE = 50 x DIA OF BAR.
   b) DEVELOPMENT LENGTH SHALL BE = 50 x DIA OF BAR.
7. PROVIDE CHAIR RODS WHEREVER NECESSARY
8. PROVIDE SPACER RODS OF 25mm ø (min) AT 1000mm C/C
9. GRADE OF CONCRETE IS M25
10. GRADE OF REINFORCING STEEL IS Fe 500
11. ALL THE LEVELS MENTIONED ARE FROM THE F.F.L. OF RESPECTIVE FLOOR

PLAN SHOWING THE PROPOSED RESIDENTIAL GROUP DEVELOPMENT BUILDINGS IN S.F.NO:365/2F AT THUDIYALUR VILLAGE,NORTH ZONE & TALUK, COIMBATORE CORPORATION.

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PROPOSED VILLA FOR
SREEVATSA @ THUDIYALUR

CLIENT:-

REFERENCE:

FOR APPROVAL PURPOSE ONLY

N

BUILDING: EAST FACING VILLA -SITE NO: 01

DETAIL: FIRST FLOOR ROOF SLAB & BEAM SHUTTERING LAYOUT

SCALE: 1"= 8'-0"	JOB NO:	REV	DRN BY: UMA
DATE: 20.11.2023	DRG NO: ST-RF-01F-001		CKD BY: GOWDAMAN
	SHEET NO:		APD BY: MURUGESH

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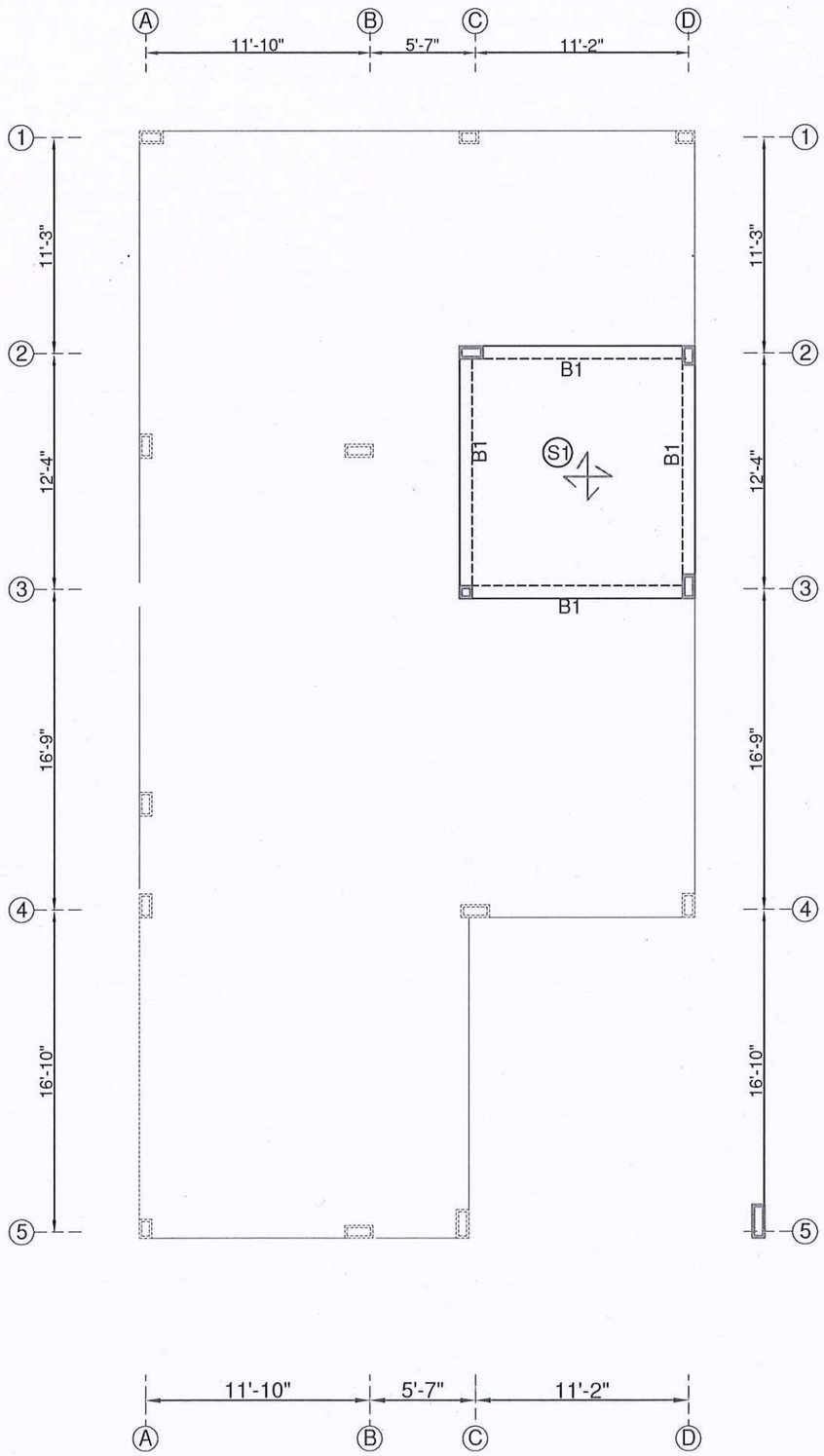
A3 - R



SCHEDULE OF SECOND ROOF BEAMS

FLOOR TO FLOOR HEIGHT : 10'-8", SLAB TOP LVL -10'-6", FLOOR FINISH : 2"

BEAM NO.	BEAM SIZE	BEAM BOTTOM LVL	SLAB TYPE	SLAB THICK	SLAB BOTTOM LVL
B1	8" × 1'-3"	+ 9'-3" LVL	S1	5"	+ 10'-1" LVL

ONE WAY SLAB

TWO WAY SLAB

NOTES :
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3. ALL DRAWINGS ARE TO BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT DRAWINGS.
4. ϕ - DIA OF TOR STEEL
5. CLEAR COVER TO MAIN REINFORCEMENT (MILD EXPOSURE)
   a) FOR BEAMS = 25 mm b) FOR SLABS = 20 mm
6. LAPPING:
   a) LAP LENGTH SHALL BE = 50 x DIA OF BAR.
   b) DEVELOPMENT LENGTH SHALL BE = 50 x DIA OF BAR.
7. PROVIDE CHAIR RODS WHEREVER NECESSARY
8. PROVIDE SPACER RODS OF 25mm ø (min) AT 1000mm C/C
9. GRADE OF CONCRETE IS M25
10. GRADE OF REINFORCING STEEL IS Fe 500
11. ALL THE LEVELS MENTIONED ARE FROM THE F.F.L. OF RESPECTIVE FLOOR

PLAN SHOWING THE PROPOSED RESIDENTIAL GROUP DEVELOPMENT BUILDINGS IN S.F.NO:365/2F AT THUDIYALUR VILLAGE,NORTH ZONE & TALUK, COIMBATORE CORPORATION.

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PROPOSED VILLA FOR
SREEVATSA @ THUDIYALUR

CLIENT:-

REFERENCE:

FOR APPROVAL PURPOSE ONLY

N

BUILDING: EAST FACING VILLA -SITE NO: 01

DETAIL: SECOND FLOOR ROOF SLAB & BEAM SHUTTERING LAYOUT

SCALE: 1"= 8'-0"	JOB NO:	REV	DRN BY: UMA
DATE: 20.11.2023	DRG NO:ST-RF-01F-001		CKD BY: GOWDAMAN
	SHEET NO:		APD BY: MURUGESH

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A3 - R

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