

DESIGN CALCULATION

PLAN SHOWING THE PROPOSED CONSTRUCTION OF STILT FLOOR+3 FLOORS RESIDENTIAL BUILDING WITH 15 DWELLING UNITS (14.00 M HEIGHT) ANNAI INDIRA NAGAR, MEDAVAKKAM, CHENNAI. COMPRISED IN AS PER PATTA S.NO: 206/8A, 8B & 8C OF MEDAVAKKAM VILLAGE, WITHIN THE LIMITS OF ST.THOMAS MOUNT PANCHAYAT UNION

STRUCTURAL CONSULTANTS:-

Aura engineering consultants

#8, 50th st, Sarvamangala Colony,
7th Avenue,,Ashok Nagar,
Chennai - 600 083 .
Fixed Line :- 044 4859 7100
projects.auraengg@gmail.com

*Structural Design Calculation for Construction of RESIDENTIAL BUILDING(S+3)
AT ANNAI INDIRA NAGAR, MEDAVAKKAM*

CONTENTS

1.0 Design Brief	1
2.0 Design Criteria	
2.1 Project Description	1
2.2 General	1
2.3 Design Codes & Standards	1
3.0 Loading	
3.1 Dead Load	1
3.2 Live Load	2
3.3 Wind Load	2
3.4 Seismic Load	2
3.5 Loading Combinations	2
4.0 Structural Material	
4.1 Steel Material Specification	3
4.2 Concrete Material Specifications	3
4.3 Reinforcement Material Specifications	3
4.4 Concrete Cover	3
5.0 Structural Description	
5.1 Method of Analysis	4
5.2 Framing System, Analysis and Design	5
5.3 Deflection limits	5
Appendix-I	Design Calculations
Appendix-II	General Arrangement drawings

*Structural Design Calculation for Construction of RESIDENTIAL BUILDING(S+3)
AT ANNAI INDIRA NAGAR, MEDAVAKKAM*

1.0 DESIGN BRIEF:

THIS DOCUMENT PLAN SHOWING THE PROPOSED CONSTRUCTION OF STILT FLOOR+3 FLOORS RESIDENTIAL BUILDING WITH 15 DWELLING UNITS (14.00 M HEIGHT) ANNAI INDIRA NAGAR, MEDAVAKKAM, CHENNAI. COMPRISED IN AS PER PATTA S.NO: 206/8A, 8B & 8C OF MEDAVAKKAM VILLAGE, WITHIN THE LIMITS OF ST.THOMAS MOUNT PANCHAYAT UNION

2.0 GENERAL DESIGN CRITERIA

2.1. Description of the structure

The Residential Building consists of Stilt Floor + 3 Upper floors and the structure is designed as a RCC framed structure.

- | | |
|---|---|
| 1. Size of the building | : 25.02X 16.84M |
| 2. Height of the building | : 14.00M |
| 3. Number of storeys above GL | : Stilt Floor +3 upper floors |
| 4. Floor to floor height of this building | : Stilt and First floors - 3.0m
: Typical floor – 3.0m |
| 5. Type of foundation | : Isolated foundation as per geotechnical report |

2.2. Materials Used

Following materials are generally used in the design of the various components of the structure.

For Concrete Structure

- M25 grade concrete for all reinforced concrete parts of the structure
- Fe500 grade Structural reinforcement steel
- Masonry for all walls : Brick / Block

2.3. Design Codes & Standards

Following codes and specifications have been generally used in the design of the members of the structure.

- IS 456 : 2000 Code of practice for Plain and Reinforced concrete
- SP: 16 Design Aids for Reinforced concrete
- IS 875 : 1987 Design Loads for building and structures
- IS 1893 : 2002 Criteria for Earthquake Resistant design of structures
- IS 13920: 1993 Ductile Detailing of R.C structures subjected to Seismic forces
- SP: 34 Handbook on Concrete Reinforcement & Detailing
- IS 800 : 1984 Code of practice for general construction in steel
- IS 2062 : 1999 Steel for general structural purposes specification
- IS 1786: 1985 Specification for high strength deformed bars and wires for concrete reinforcement

3.0 LOADING

Primary Load:

- Dead Load (DL)
- Live Load (LL)

3.1. Dead load (DL)

Material weight

- Density of Concrete =25 kN/m³
- D.L. due to partitions

*Structural Design Calculation for Construction of RESIDENTIAL BUILDING(S+3)
AT ANNAI INDIRA NAGAR, MEDAVAKKAM*

(Light Partition as per IS 875) =1.50 kN/m²

- D.L due to floor finish 50mm thick = 0.05x25 = 1.25 kN/m²

3.2. Live load (LL)

Minimum Uniformly Distributed Live Loads:

Occupancy or use	Live Load (kn/m ²)
• All rooms and kitchens	2.00
• Toilet and bath rooms	3.00
• Corridors, passages, staircases	3.00
• Balconies	3.00
• Terrace Floor	1.50
• Basic wind speed	=50 m/sec
• Seismic Zone	=Zone III

3.5 Loading Combinations

The following combinations of Loads as per IS 1893 is considered in the STAAD Analysis

- 1.5(DL +LL)
- 1.2(DL + LL)

The below load combinations are used to check the structure in serviceability condition.

- 1.0(DL +LL)

4.0 STRUCTURAL MATERIAL:

4.1 Concrete Material Specifications:

Concrete compressive cube strength	- 25 N/mm ²
Minimum cement content	- Refer standard drawings for general & Legends
Cement type	- OPC
Free water cement ratio	- 0.5 (Maximum)
Nominal maximum size of aggregate	- 20mm UNO

4.2 Reinforcement:

Steel reinforcement shall be deformed bars, the characteristic of reinforcement bars shall conform to the following specification:

Grade of Steel	Actual Yield Strength (MPa)
Grade Fe500	Minimum 500 MPa,

4.4 Concrete cover:

Cover for Reinforcement is considered as per Table 16A of NBC, for a Fire resistance of 2 hrs.

- Raft Slab = 50mm
- Footing = 50mm
- RC Wall = 30mm
- Columns = 40mm
- Beams = 30mm

*Structural Design Calculation for Construction of RESIDENTIAL BUILDING(S+3)
AT ANNAI INDIRA NAGAR, MEDAVAKKAM*

- Slabs = 25mm

5.0 Structural Description

5.1. Method of analysis

Structure analysis & design:

The structure is analyzed as a Space frame structure in STADD Pro Vi8. Columns, Footing, Basement walls, slabs, Beams and Staircases are designed as reinforced concrete members.

5.2. Framing System, Analysis and Design

Limit State concept of design will be used as per IS: 456-2000 & SP - 16. The detailing of reinforcement shall be done satisfying the requirements of IS: 456-2000, SP-16, IS: 13920, IS: 4326-1993 and SP-34.

The Slabs and beams are checked for deflection as per IS 456:2000. Cover for Reinforcement is considered as per Table 16A of NBC, for a Fire resistance of 2 hrs.

APPENDIX I
Design Calculations
Column Design

PROJECT	RESIDENTIAL BUILDING(S+3) AT ANNAI INDIRA NAGAR, MEDAVAKKAM	DOCUMENT. NO.	DATE	DESIGNED	DATE	
TITLE	Design for a Short Column with Biaxial Bending	REVISION	DATE	CHECKED	DATE	
CL. NO.	DESIGN CALCULATIONS			REFERENCES		
1.0	Column No:					
1.1	Basic Data					
1.1	Material Data					
	Grade of Concrete		M 25			
	Grade of Steel		Fe 500			
1.2	Codal Data					
	Nominal Cover	=	40 mm			
	Diameter of the Bar	=	25 mm	≥ 12 mm	Cl 26.4.2.1,IS456:2000	
	d'	=	52.5 mm			
1.3	Basic Dimensions					
	Unsupported Length of the Column	L _{ox}	= 3000 mm			
		L _{oy}	= 3000 mm			
		L _{ex}	= 3000 mm			
		L _{ey}	= 3000 mm			
	Size of the Column	B X D	= 300 x 450 mm		Table 28, IS456:2000	
1.4	Analysis Results					
	Factored Axial Load	P _u	= 780.0 kN		STAAD OUTPUT	
	Factored Moment	M _{ux}	= 22.00 kNm			
	Factored Moment	M _{uy}	= 71.00 kNm			
2.0	Check for Slenderness					
	Slenderness Ratio about Major Axis	L _{ex} / D	= 6.667			
	Slenderness Ratio about Minor Axis	L _{ey} / B	= 10.000			
	Since Leff / LLD <12 Designed as Short Column				Cl 25.1.2, IS456:2000	
3.0	Check for Eccentricity					
	Minimum Eccentricit e _x	= L _{ox} / 500 + D / 30	= 21.0 mm	>20	Cl 25.4 IS456:2000	
	e _y	= L _{oy} / 500 + B / 30	= 16.0 mm	<20		
3.1	Moments Due to Minimum Eccentricity					
		Me _x	= 16.38 kN.m			
		Me _y	= 15.60 kN.m			
4.0	Design Moment					
	Design Moment about X axis	M _{ux}	= 22.00 kN.m			
	Design Moment about Y axis	M _{uy}	= 71.00 kN.m			

		DOCUMENT. NO.	DATE	DESIGNED	DATE
PROJECT	RESIDENTIAL BUILDING(S+3) AT ANNAI INDIRA NAGAR, MEDAVAKKAM				
TITLE	Design for a Short Column with Biaxial Bending	REVISION	DATE	CHECKED	DATE
CL. NO.	DESIGN CALCULATIONS			REFERENCES	
5.0	Uniaxial Moment Carrying capacity of the Section about X & Y- axis			Chart 43 - 46 SP 16 : 1980	
	d' / D	=	0.117		
	d' / B	=	0.175		
	Assume the Reinforcement Percentage p	=	2.00		
	p / f _{ck}	=	0.080		
	p _u / f _{ck} BD	=	0.231		
	Reinforcement distributed equally on four sides		4		
	M _{ux1} / f _{ck} BD ²	=	0.137		
	M _{uy1} / f _{ck} DB ²	=	0.119		
	Moment carrying capacity about X axis M _{ux1}	=	207.89 kN.m		
	Moment carrying capacity about Y axis M _{uy1}	=	120.61 kN.m		
	Pu < Axial Load Carrying capacity ; Hence O.K				
6.0	Calculation of P_{uz}			Cl 39.6 , IS456:2000 Cl 39.6 , IS456:2000	
	P _{uz} = 0.45 f _{ck} A _c + 0.75 f _y A _{sc}	=	2500.88 kN		
	P _u /P _{uz}	=	0.312		
	a _n	=	1.186		
7.0	Criteria for Biaxial Bending (Bresler's Formulation)			Cl 39.6 , IS456:2000	
	(M _{ux} /M _{ux1}) ^{an} + (M _{uy} /M _{uy1}) ^{an}	=	0.603 < 1		
	Hence Safe				
8.0	Longitudinal Reinforcement				
	Area of compression Steel A _{sc,reqd}	=	2700 mm ²		
	10 No Y20 + No Y20 A _{sc,pro}	=	3142 mm ²		
8.1	Check for Minimum & Maximum Area of Steel			Cl 26.5.3.1 a & b , IS 456 : 2000	
	Minimum Area of ste (0.8 % of A _{g,dir})	=	441 mm ²		
	(Based on the area of concrete reqd to resist direct stress)				
	Maximum Area of ste (4 % of A _g)	=	5400 mm ²		
	441 < 3142 < 5400 mm ²				
	Area of Steel is with in the permissible limit ; Hence O.K				
9.0	Transverse Reinforcement			Cl 26.5.3.2 c 2) ,	
9.1	Diameter of Transverse Reinforcement	=	8 mm ≥ 6 mm		
9.2	Spacing of Lateral Ties :			Cl 26.5.3.2 c 1) , IS 456 : 2000	
	i) Least Lateral Dimension of the column	=	300 mm		
	ii) 16 times the Smallest dia of Longitudinal Steel	=	320 mm		
	iii)	=	300 mm		
	Reqd. Spacing of Ties (Minimum of the above)	=	300 mm		
	Provide 8 mm dia Lateral Ties @ 300 mm Spacing				
	Provide closer spacing on either side of the column above and below beam / slab.				

*Structural Design Calculation for Construction of RESIDENTIAL BUILDING(S+3)
AT ANNAI INDIRA NAGAR, MEDAVAKKAM*

Footing Design

RESIDENTIAL BUILDING(S+3) AT ANNAI INDIRA NAGAR, MEDAVAKKAM

Design of Isolated Footing

F3

Node : 38

Basic Data:

Net Safe Bearing Capacity	150 kN/m ²
Unit wieght of Soil	18 kN/m ³
Unit wieght of Concrete	25 kN/m ³
Grade of Concrete	25 N/mm ²
Grade of Steel	500 N/mm ²
Clear Cover to Reinforcemei	50 mm
Earth Fill above FGL	0 mm
Base Area of Footing	3.78 m ²
Ixx	1.02 m ⁴
Izz	1.39 m ⁴
Weight of Footing	47.25 kN
Weight of soil	98.42 kN

Gross Bearing Pressure Calculation (kN/m²)

Critical Load Combinations	Pmax	Pmin
200	157.58	157.58333
0	38.54	38.54

Gross SB(w/o increase) 186 kN/m²

Hence **OK**

Factored Net Upward Pressure Calculation

Load Factor for Design 1.5

Critical Load Combinations	Pmax	Pmin
200	178.57	178.57143
0	0.00	0.0

Dsgn.(+ve) BM abt. X-axis M 50.22 kN.m

Dsgn.(+ve) BM abt. Z-axis M 60.77 kN.m

Dsgn.(-ve) BM abt. X-axis M 0.00 kN.m

Dsgn.(-ve) BM abt. Z-axis M 0.00 kN.m

Provided Eff. depth for Mux 432.00 mm

Provided Eff. depth for Muz 444.00 mm

Mu,lim 621 kN.m

Depth provided is **OK**

Bottom Reinforcement

Ast Required for Mux 270.6 mm²

Ast Required for Muz 319.2 mm²

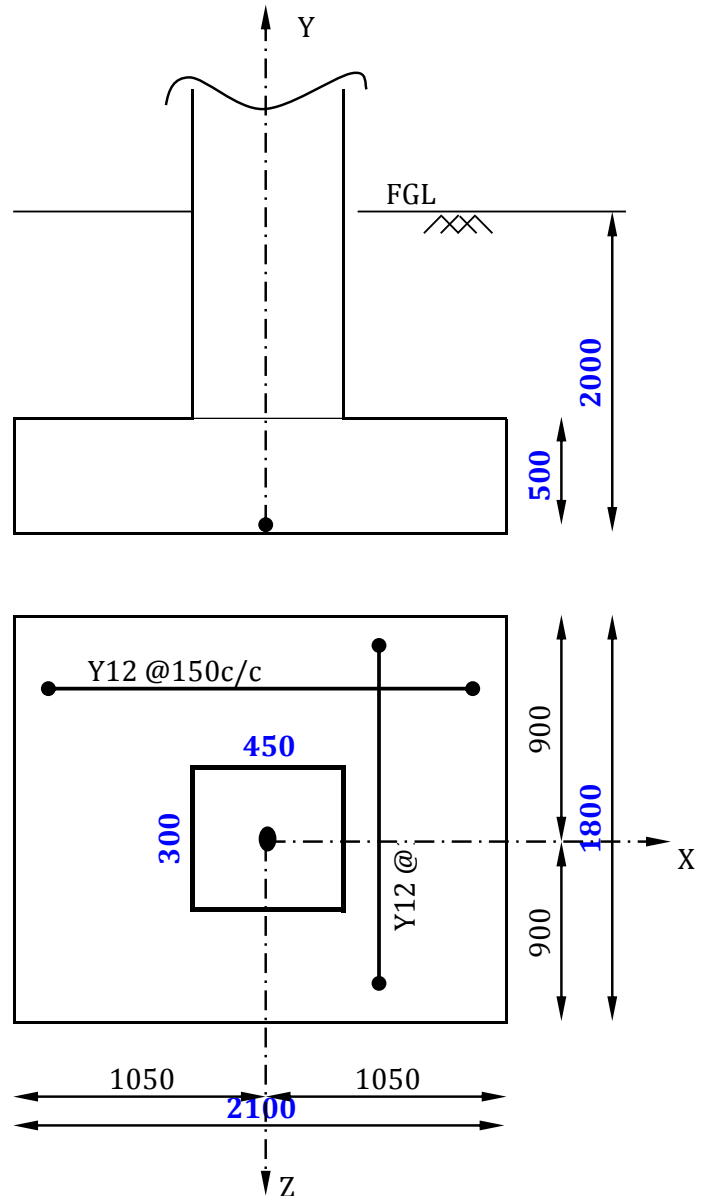
Min. Ast Req'd. 600 mm²

Bottom Reinforcement

Provide	12	@	150	C/C	along Z
Provide	12	@	150	C/C	along X

Ast Provided Ast Required

754	600.0	mm ²	Hence
754	600.0	mm ²	OK



RESIDENTIAL BUILDING(S+3) AT ANNAI INDIRA NAGAR, MEDAVAKKAM

Design of Isolated Footing

F3

Node : 38

Top Reinforcement

Ast Required for Mux 0.00 mm²

Ast Required for Muz 0.00 mm²

Min. Ast Req'd. Not Req'd mm²

Check For Flexural / Oneway Shear

	Actual	Allowable		Hence
Shear Stress (Plane ll to X)	0.131	0.311	N/mm ²	OK
Shear Stress (Plane ll to Z)	0.153	0.308	N/mm ²	OK

Check For Punching / Twoway Shear

Allowable Shear Stress 1.25 N/mm²

Actual Shear Stress 0.46 N/mm² Hence

OK

Check For Overturning

Co-efficient of friction = **0.57**

Factor of safety for overturning, slidi = **1.4**

Net Moments acting at Pad Level, M_{xx} = 0.00 kNm

Net Moments acting at Pad Level, M_{zz} = 0.00 kNm

Weight of pad = 47.25 kN

Weight of Over burden Earth = 98.42 kN

Total downward Load = 595.67 kN

Stabilizing moment along X-Dir = 595.67 x 1.05

= 625.45 kNm

Actuating moment, M_{zz} = 0.00 kNm

Factor of Safety (Along X-Dir) = 625.45 / 0.0

- > 1.40

Hence **OK**

Check For Sliding

Resistance against Sliding = 339.529 kN

Max. Shear Load @ Pad level in X-Dir = 2.5 kN

Max. Shear Load @ Pad level in Z-Dir = 5.3 kN

Factor of Safety (Along X-Dir) = 339.5 / 2.5

133.67 > 1.40

Hence **OK**

Factor of Safety (Along Z-Dir) = 339.5 / 5.3

64.06 > 1.4

Hence **OK**

*Structural Design Calculation for Construction of RESIDENTIAL BUILDING(S+3)
AT ANNAI INDIRA NAGAR, MEDAVAKKAM*

Plinth Beam Design

PROJECT	RESIDENTIAL BUILDING(S+3) AT ANNAI INDIRA NAGAR, MEDAVAKKAM		DOCUMENT. NO	DATE	DESIGNED RMK	DATE															
TITLE			REVISION	DATE	CHECKED RMK	DATE															
CL. NO.	BEAM DESIGN CALCULATIONS				REFERENCES																
1.1	<u>Geometry Data</u> Beam Number = PB1 Type of Beam = Rectangular Beam Support Condition = Continuous Beam Width of beam b = 230 mm Overall Depth of Beam D = 380 mm Dia of bar Φ = 25 mm Nominal Cover cc = 30 mm Effective Depth d = 337.5 mm Effective Cover = 42.5 mm Effective Span of beam l _{eff} = 4500 mm Concrete grade = M 25 Steel Grade = Fe 500 p _{t,lim} = 0.944 % p _{t,min} = 0.170 % p _t & p _{cmax} = 4.00 %				IS 456:2000 Table 19 IS 456:2000 Cl 23.0 IS 456:2000 Cl 26.5.1.1																
1.2	<u>Force Input</u> Left negative moment (Support 1) = 84 kNm Mid span positive moment = 84 kNm Right negative moment (Support 2) = 84 kNm Shear @ (Support 1) = 149 kN Shear @ (Span) = 149 kN Shear @ (Support 2) = 149 kN																				
1.3	<u>Limiting Moment</u> M _{ulim} = 0.133 f _{ck} b d ² = 87.11 kNm																				
1.4	<u>Area of Steel</u> Minimum Area of Steel = 0.17% b d = 131.963 mm ² <u>Support 1</u> Negative moment (Support 1) = 84 kNm Hence the Section is designed as Singly Reinforced Section M _u /bd ² = 3.206 Percentage of tension steel reqd p _t = 0.028 % Percentage of compression steel reqd p _c = 0 % Required Area of tension steel A _{st reqd} = 131.96 mm ² Required Area of compression steel A _{sc reqd} = 0.00 mm ² <u>Detail of bars</u> <table><tr><td></td><td colspan="2">I st Layer</td><td colspan="2">II nd Layer</td></tr><tr><td></td><td>Nos</td><td>Dia</td><td>Nos</td><td>Dia</td></tr><tr><td>Tension Reinforcement</td><td>3</td><td>16</td><td></td><td></td></tr></table> A _{st} provided = 603.19 mm ²					I st Layer		II nd Layer			Nos	Dia	Nos	Dia	Tension Reinforcement	3	16				
	I st Layer		II nd Layer																		
	Nos	Dia	Nos	Dia																	
Tension Reinforcement	3	16																			

PROJECT	RESIDENTIAL BUILDING(S+3) AT ANNAI INDIRA NAGAR, MEDAVAKKAM		DOCUMENT. NO	DATE	DESIGNED RMK	DATE
TITLE			REVISION	DATE	CHECKED RMK	DATE
CL. NO.	BEAM DESIGN CALCULATIONS				REFERENCES	
	Nos 3 Dia 16 Compression Reinforcement A_{sc} provided Nos 0 Dia mm = 603.19 Percentage of tension steel provided p_t = 0.777 % Hence O.K Percentage of compression steel provided p_c = 0.777 % Hence O.K Check for Shear Shear = 149 kN Nominal Shear Stress t_v = 1.92 N/mm² Permissible Shear Stress t_c = 0.92 N/mm² Maximum Shear Stress $t_{c,max}$ = 2.5 N/mm² Diameter of the Stirrup bar = 8 mm Number of Legs = 2 Spacing of Shear reinforcement Required = 190.0 Maximum Spacing of Shear Reinforcement = 250 Provide 8 mm dia 2 legged stirrups @ 190mm c/c spacing				CI 40.1, IS456:2000 $\beta = 1.000$ Table 19, IS456:2000 Table 20, IS456:2000 CI 40.4, IS456:2000 CI 26.5.1.5,IS456:2000	
	Support 2 Negative moment = 84 kNm Hence the Section is designed as Doubly Reinforced Section M_u/bd^2 = 3.206 Percentage of tension steel reqd p_t = 0.028 % Percentage of compression steel reqd p_c = 0 % Required Area of tension steel $A_{st\ reqd}$ = 131.96 mm² Required Area of compression steel $A_{sc\ reqd}$ = 0 mm² Detail of bars I st Layer Nos 3 Dia 16 Tension Reinforcement A_{st} provided II nd Layer Nos 0 Dia mm = 603.19 Compression Reinforcement Nos 3 Dia 16 A_{sc} provided = 603.19 mm Percentage of tension steel provided p_t = 0.777 % Hence O.K Percentage of compression steel provided p_c = 0.777 % Hence O.K Check for Shear Shear = 149 kN Nominal Shear Stress t_v = 1.92 N/mm² Permissible Shear Stress t_c = 0.92 N/mm² Maximum Shear Stress $t_{c,max}$ = 2.5 N/mm² Diameter of the Stirrup bar = 8 mm				CI 40.1, IS456:2000 $\beta = 1.000$ Table 19, IS456:2000 Table 20, IS456:2000	

PROJECT	RESIDENTIAL BUILDING(S+3) AT ANNAI INDIRA NAGAR, MEDAVAKKAM	DOCUMENT. NO	DATE	DESIGNED RMK	DATE																														
TITLE		REVISION	DATE	CHECKED RMK	DATE																														
CL. NO.	BEAM DESIGN CALCULATIONS			REFERENCES																															
	Number of Legs = 2 Spacing of Shear reinforcement Required = 190.0 Maximum Spacing of Shear Reinforcement = 250 Provide 8 mm dia 2 legged stirrups @ 190mm c/c spacing			Cl 40.4, IS456:2000 Cl 26.5.1.5,IS456:2000																															
	Span Positive moment (Span) = 84 kNm Hence the Section is designed as Singly Reinforced Section M_u/bd^2 = 3.325 Percentage of tension steel reqd p_t = 0.029 % Percentage of compression steel reqd p_c = 0 % Required Area of tension steel $A_{st \text{ reqd}}$ = 131.96 mm ² Required Area of compression steel $A_{sc \text{ reqd}}$ = 0 mm ²																																		
	Detail of bars <table><thead><tr><th></th><th colspan="2">I st Layer</th><th colspan="2">II nd Layer</th></tr><tr><th></th><th>Nos</th><th>Dia</th><th>Nos</th><th>Dia</th></tr></thead><tbody><tr><td>Tension Reinforcement</td><td>3</td><td>16</td><td>0</td><td>0</td></tr><tr><td></td><td colspan="2">$A_{st} \text{ provided}$</td><td colspan="2">= 603.19 mm²</td></tr><tr><td>Compression Reinforcement</td><td>3</td><td>16</td><td>0</td><td>0</td></tr><tr><td></td><td colspan="2">$A_{sc} \text{ provided}$</td><td colspan="2">= 603.19 mm²</td></tr></tbody></table>				I st Layer		II nd Layer			Nos	Dia	Nos	Dia	Tension Reinforcement	3	16	0	0		$A_{st} \text{ provided}$		= 603.19 mm ²		Compression Reinforcement	3	16	0	0		$A_{sc} \text{ provided}$		= 603.19 mm ²			
	I st Layer		II nd Layer																																
	Nos	Dia	Nos	Dia																															
Tension Reinforcement	3	16	0	0																															
	$A_{st} \text{ provided}$		= 603.19 mm ²																																
Compression Reinforcement	3	16	0	0																															
	$A_{sc} \text{ provided}$		= 603.19 mm ²																																
	Percentage of tension steel provided p_t = 0.777 % Hence O.K Percentage of compression steel provided p_c = 0.777 % Hence O.K																																		
	Check for Shear Shear = 149 kN Nominal Shear Stress τ_v = 1.92 N/mm ² Permissible Shear Stress τ_c = 0.92 N/mm ² Maximum Shear Stress $\tau_{c,max}$ = 2.5 N/mm ² Diameter of the Stirrup bar = 8 mm Number of Legs = 2 Spacing of Shear reinforcement Required = 190.0 Maximum Spacing of Shear Reinforcement = 250 Provide 8 mm dia 2 legged stirrups @ 190mm c/c spacing			Cl 40.1, IS456:2000 β = 1.000 Table 19, IS456:2000 Table 20, IS456:2000 Cl 40.4, IS456:2000 Cl 26.5.1.5,IS456:2000																															
	Check For Deflection Basic Value = 26 Service Stress in Steel f_s = 63.44 N/mm ² Modification Factor(Tension Reinforcement) F_1 = 2.00 Allowable Span/Depth = 52.00 Actual Span/Depth = 13.33 Hence Safe			Cl.23.2, IS456:2000																															

*Structural Design Calculation for Construction of RESIDENTIAL BUILDING(S+3)
AT ANNAI INDIRA NAGAR, MEDAVAKKAM*

Floor Beam Design

PROJECT	RESIDENTIAL BUILDING(S+3) AT ANNAI INDIRA NAGAR, MEDAVAKKAM	DOCUMENT. NO.	DATE	DESIGNED RMK	DATE																																			
TITLE		REVISION	DATE	CHECKED RMK	DATE																																			
CL. NO.	BEAM DESIGN CALCULATIONS			REFERENCES																																				
1.1	<u>Geomentrv Data</u> Beam Number = B3 Type of Beam = Rectangular Beam Support Condition = Continuous Beam Width of beam b = 300 mm Overall Depth of Beam D = 525 mm Dia of bar Φ = 25 mm Nominal Cover cc = 30 mm Effective Depth d = 482.5 mm Effective Cover = 42.5 mm Effective Span of beam l_{eff} = 3700 mm Concrete grade = M 25 Steel Grade = Fe 500 $p_{t,lim}$ = 0.944 % $p_{t,min}$ = 0.170 % p_t & p_{cmax} = 4.00 %			IS 456:2000 Table 19 IS 456:2000 Cl 23.0 IS 456:2000 Cl 26.5.1.1																																				
1.2	<u>Force Input</u> Left negative moment (Support 1) = 254 kNm Mid span positive moment = 254 kNm Right negative moment (Support 2) = 254 kNm Shear @ (Support 1) = 241 kN Shear @ (Span) = 241 kN Shear @ (Support 2) = 241 kN																																							
1.3	<u>Limiting Moment</u> $M_{ulim} = 0.133 f_{ck} b d^2 = 232.22 \text{ kNm}$																																							
1.4	<u>Area of Steel</u> Minimum Area of Steel = 0.17% b d = 246.075 mm ² <u>Support 1</u> Negative moment (Support 1) = 254 kNm Hence the Section is designed as Doubly Reinforced Section $M_u/bd^2 = 3.637$ Percentage of tension steel reqd $p_t = 1.023 \%$ Percentage of compression steel reqd $p_c = 0.085 \%$ Required Area of tension steel $A_{st \text{ reqd}} = 1480.79 \text{ mm}^2$ Required Area of compression steel $A_{sc \text{ reqd}} = 123.04 \text{ mm}^2$ <u>Detail of bars</u> <table> <thead> <tr> <th></th><th colspan="2">I st Layer</th><th></th><th colspan="2">II nd Layer</th></tr> <tr> <th></th><th>Nos</th><th>Dia</th><th></th><th>Nos</th><th>Dia</th></tr> </thead> <tbody> <tr> <td>Tension Reinforcement</td><td>3</td><td>20</td><td rowspan="2">A_{st} provided =</td><td>3</td><td>20</td></tr> <tr> <td></td><td></td><td></td><td></td><td></td></tr> <tr> <td></td><td>Nos</td><td>Dia</td><td></td><td>Nos</td><td>Dia</td></tr> <tr> <td>Compression Reinforcement</td><td>3</td><td>20</td><td></td><td>3</td><td>20</td></tr> </tbody> </table>				I st Layer			II nd Layer			Nos	Dia		Nos	Dia	Tension Reinforcement	3	20	A _{st} provided =	3	20							Nos	Dia		Nos	Dia	Compression Reinforcement	3	20		3	20		
	I st Layer			II nd Layer																																				
	Nos	Dia		Nos	Dia																																			
Tension Reinforcement	3	20	A _{st} provided =	3	20																																			
	Nos	Dia		Nos	Dia																																			
Compression Reinforcement	3	20		3	20																																			

PROJECT	RESIDENTIAL BUILDING(S+3) AT ANNAI INDIRA NAGAR, MEDAVAKKAM		DOCUMENT. NO.	DATE	DESIGNED RMK	DATE
TITLE			REVISION	DATE	CHECKED RMK	DATE
CL. NO.	BEAM DESIGN CALCULATIONS				REFERENCES	
	A_{sc} provided = 1884.96 mm² Percentage of tension steel provided p_t = 1.302 % Hence O.K Percentage of compression steel provided p_c = 1.302 % Hence O.K Check for Shear Shear = 241 kN Nominal Shear Stress t_v = 1.66 N/mm² Permissible Shear Stress t_c = 0.92 N/mm² Maximum Shear Stress $t_{c,max}$ = 2.5 N/mm² Diameter of the Stirrup bar = 8 mm Number of Legs = 2 Spacing of Shear reinforcement Required = 190.0 Maximum Spacing of Shear Reinforcement = 300 Provide 8 mm dia 2 legged stirrups @ 190mm c/c spacing Support 2 Negative moment = 254 kNm Hence the Section is designed as Doubly Reinforced Section M_u/bd^2 = 3.637 Percentage of tension steel reqd p_t = 1.023 % Percentage of compression steel reqd p_c = 0.085 % Required Area of tension steel $A_{st reqd}$ = 1480.79 mm² Required Area of compression steel $A_{sc reqd}$ = 123.04 mm² Detail of bars I st Layer Nos Dia Tension Reinforcement 3 20 A_{st} provided = 1884.956 mm² Nos Dia Compression Reinforcement 3 20 A_{sc} provided = 1884.96 mm² Percentage of tension steel provided p_t = 1.302 % Hence O.K Percentage of compression steel provided p_c = 1.302 % Hence O.K Check for Shear Shear = 241 kN Nominal Shear Stress t_v = 1.66 N/mm² Permissible Shear Stress t_c = 0.92 N/mm² Maximum Shear Stress $t_{c,max}$ = 2.5 N/mm² Diameter of the Stirrup bar = 8 mm Number of Legs = 2 Spacing of Shear reinforcement Required = 190.0 Maximum Spacing of Shear Reinforcement = 300 CI 40.1, IS456:2000 β = 1.000 Table 19, IS456:2000 Table 20, IS456:2000 CI 40.4, IS456:2000 CI 26.5.1.5, IS456:2000					

PROJECT	RESIDENTIAL BUILDING(S+3) AT ANNAI INDIRA NAGAR, MEDAVAKKAM		DOCUMENT. NO.	DATE	DESIGNED RMK	DATE
TITLE			REVISION	DATE	CHECKED RMK	DATE
CL. NO.	BEAM DESIGN CALCULATIONS				REFERENCES	
	Provide 8 mm dia 2 legged stirrups @ 190mm c/c spacing					
	Span					
	Positive moment (Span)		=	254 kNm		
	Hence the Section is designed as Doubly Reinforced Section					
	M_u/bd^2		=	3.325		
	Percentage of tension steel reqd p_t		=	1.023 %		
	Percentage of compression steel reqd p_c		=	0.085 %		
	Required Area of tension steel $A_{st\ reqd}$		=	1480.79 mm ²		
	Required Area of compression steel $A_{sc\ reqd}$		=	123.04 mm ²		
	Detail of bars					
	I st Layer					
	Nos		Dia		Nos Dia	
	Tension Reinforcement 3		20		3 20	
	A_{st} provided		=	1884.96 mm ²		
	II nd Layer					
	Nos		Dia		Nos Dia	
	Compression Reinforcement 3		20		3 20	
	A_{sc} provided		=	1884.96 mm ²		
	Percentage of tension steel provided p_t		=	1.302 %	Hence O.K	
	Percentage of compression steel provided p_c		=	1.302 %	Hence O.K	
	Check for Shear					
	Shear		=	241 kN		
	Nominal Shear Stress t_v		=	1.66 N/mm ²	Cl 40.1, IS456:2000	
	Permissible Shear Stress t_c		=	0.92 N/mm ²	$\beta = 1.000$	
	Maximum Shear Stress $t_{c,max}$		=	2.5 N/mm ²	Table 19, IS456:2000	
	Diameter of the Stirrup bar		=	8 mm	Table 20, IS456:2000	
	Number of Legs		=	2		
	Spacing of Shear reinforcement Required		=	190.0	Cl 40.4, IS456:2000	
	Maximum Spacing of Shear Reinforcement		=	300	Cl 26.5.1.5,IS456:2000	
	Provide 8 mm dia 2 legged stirrups @ 190mm c/c spacing					
	Check For Deflection					
	Basic Value		=	26	Cl.23.2, IS456:2000	
	Service Stress in Steel f_s		=	227.82 N/mm ²		
	Modification Factor(Tension Reinforcement) F_1		=	0.97		
	Allowable Span/Depth		=	25.22		
	Actual Span/Depth		=	7.67	Hence Safe	

*Structural Design Calculation for Construction of RESIDENTIAL BUILDING(S+3)
AT ANNAI INDIRA NAGAR, MEDAVAKKAM*

Floor Slab Design

PROJECT	RESIDENTIAL BUILDING(S+3) AT ANNAI INDIRA NAGAR, MEDAVAKKAM	DOCUMENT NO	DATE	DESIGNED	DATE
TITLE	TWO WAY SLAB DESIGN	REVISION	DATE	CHECKED	DATE
CL. NO.	DESIGN CALCULATIONS			REFERENCES	
1.0	<u>Design of Two Way Slab S3</u>				
1.0.1	<u>Basic Input Data</u> Grade of concrete = M 25 Grade of steel = Fe 500 Thickness of slab D = 150 mm Clear cover cc = 25 mm Effective thickness of slab (d_{eff}) $150 - 25 - 5 = 120$ mm Unit weight of concrete = 25 KN/m ³ Effective Shorter Span $L_x = 5$ m Effective Longer Span $L_y = 7.7$ m Aspect ratio $L_y/L_x = 1.54 < 2$ Hence designed as Two way slab Edge Condition One Long edge Discontinuous			Table 16 Cl.26.4.2 , IS 456 -2000 Cl 19.2.1, IS 456-2000 Cl D-1.11, IS 456-2000	
1.0.2	<u>Load Data</u> Self Weight of Slab = $0.150 \times 25 = 3.750$ KN/m ² Floor finish = 1.500 KN/m ² Partition Load = 0.000 KN/m ² Sunken Filling = 0.000 KN/m ² Imposed Load = 3.000 KN/m ² Extra Load, (if Any) = 0.000 KN/m ² Total load = $\frac{8.250}{}$ KN/m ² Design load (W_u) = $1.5 \times 8.25 = 12.375$ KN/m ²			IS 875 (Part 2) -1987 Table 18 Cl 36.4.1 IS 456 -2000	
1.0.3	<u>Moment and Shear Calculations</u> Short Span Direction a_x for positive moment $1.5 \rightarrow 0.051$ $1.75 \rightarrow 0.059$ for $1.54 a_x = 0.052$ Positive moment $0.052 \times 12.38 \times 5^2 = 16.17$ KN-m a_x for negative moment $1.5 \rightarrow 0.067$ $1.75 \rightarrow 0.077$ for $1.54 a_x = 0.069$ Negative moment $0.069 \times 12.38 \times 5^2 = 21.22$ KN-m			Table 26 Cl D-1.1, IS 456 -2000 Table 26 Cl D-1.1, IS 456 -2000	

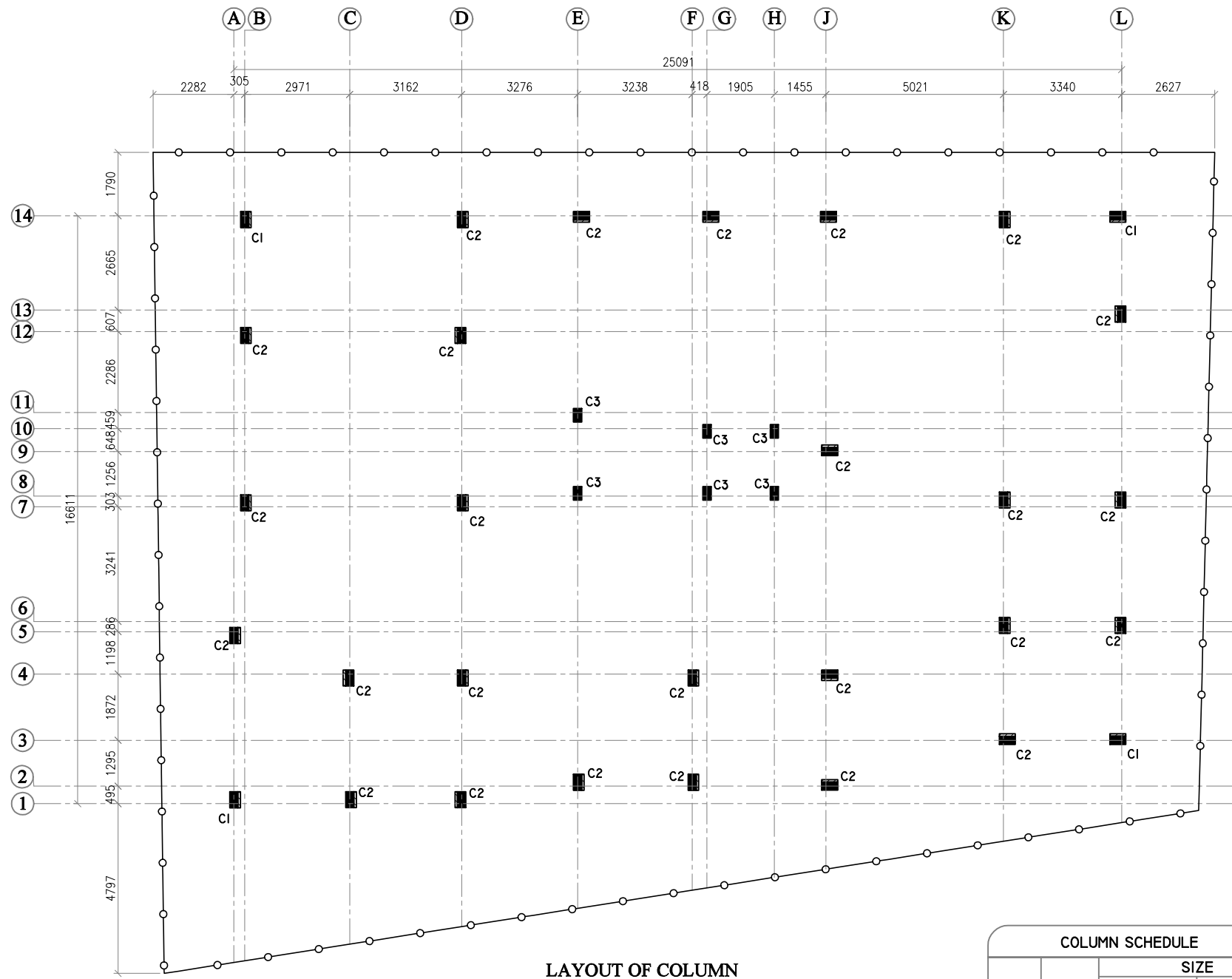
PROJECT	RESIDENTIAL BUILDING(S+3) AT ANNAI INDIRA NAGAR, MEDAVAKKAM	DOCUMENT.N	DATE	DESIGNED	DATE	
TITLE	TWO WAY SLAB DESIGN	REVISION	DATE	CHECKED	DATE	
CL. NO.	DESIGN CALCULATIONS			REFERENCES		
1.0.4	Long Span Direction For positive moment $a_y = 0.028$ Positive moment $0.028 \times 12.38 \times 5^2 = 8.66$ KN-m For negative moment $a_y = 0.037$ Negative moment $0.037 \times 12.38 \times 5^2 = 11.45$ KN-m Shear force $V = 12.38 \times 5 \times 1 = 30.94$ KN <u>Check Effective Depth for Max.Bending Moment</u> Depth require $= (M, (0.133 \times f_{ck} \times b))^{1/2} = 79.89$ mm Depth provide $= 150 - 25 - 10 / 2 = 120$ mn > ### mn Hence the section is Safe against Bending			Table 26 Cl D-1.1, IS 456 -2000 Table 26 Cl D-1.1, IS 456 -2000 Table C,SP 16 :1980 Cl 2.3		
1.0.5	<u>Check Depth for Shear</u> Nominal Shear Stress $t_v = V_u / b d = 0.26$ N/mm² Design shear stre (t_c) $= 0.46$ N/mm² $k = 1.30$ $k * t_c = 0.60$ N/mm² $t_v < k * t_c$ Hence the section is Safe against Shear			Cl.40.1, IS 456:2000 Table 19 , IS 456:2000 Cl.40.2.1.1, IS 456:2000		
1.0.6	<u>Check for Maximum Shear Stress:</u> Nominal Shear Stress $t_v = V_u / b d = 0.26$ N/mm² Maximum Shear Stre ($t_{c , max}$) $= 3.1$ N/mm² $\# t_{c , max} = 1.55$ N/mm² $t_v < 1 t_{c , max}$ Hence the section is Safe against Max.Shear Stress			Cl.40.1, IS 456:2000 Table 20 , IS 456:2000 Cl.40.2.3.1, IS 456:2000		
1.0.7	<u>Reinforcement calculations</u> Short Span Direction @ Support $M_u/bd = \frac{21.22 \times 10^6}{1000 \times \# \times 120} = 1.474$ $P_t = 0.37$ %			Table 2-4, SP16 :1980		

PROJECT	RESIDENTIAL BUILDING(S+3) AT ANNAI INDIRA NAGAR, MEDAVAKKAM	DOCUMENT NO	DATE	DESIGNED	DATE	
TITLE	TWO WAY SLAB DESIGN	REVISION	DATE	CHECKED	DATE	
CL. NO.	DESIGN CALCULATIONS			REFERENCES		
	Area of steel , = 0.0037 x 1000 x 120 = 439 mm² Minimum area of 0.001 x 1000 x 150 = ##### mm² Spacing of # bar 78.54 x 1000 / 438.88 = 179 mm Check for Spacing Minimum of 1) 3d = 360 mm 2) = 300 mm 3) = 178.86 mm Therefore provide # @ 170 mm C/C Short Span Direction @ Mid Span $M_u/bd = \frac{16.17 \times 10^6}{1000 \times \# \times 120} = 1.123$ Pt = 0.273 % Area of steel , = 0.0027 x 1000 x 120 = 328 mm² Minimum area of 0.001 x 1000 x 150 = ##### mm² Spacing of # bar 78.54 x 1000 / 327.93 = 239 mm Check for Spacing Minimum of 1) 3d = 360 mm 2) = 300 mm 3) = 239.38 mm Therefore provide # @ 150 mm C/C Provided % of Tension Reinforcement (pt) = 0.436 % Long Span Direction @ Support $M_u/bd = \frac{11.45 \times 10^6}{1000 \times \# \times 120} = 0.795$ Pt = 0.190 % Area of steel , = 0.0019 x 1000 x 120 = 228 mm² Minimum area of 0.001 x 1000 x 150 = ##### mm² Spacing of # bar 78.54 x 1000 / 228.07 = 344 mm			Cl:26.5.2.1 IS 456 -2000 Cl:26.3.3.(b).1 IS 456 -2000 SP16 :1980 Table 2-4 IS 456:2000 Cl:26.5.2.1 IS 456:2000 Cl:26.3.3.(b).1 SP16 :1980 Table 2-4 IS 456:2000 Cl:26.5.2.1		

PROJECT	RESIDENTIAL BUILDING(S+3) AT ANNAI INDIRA NAGAR, MEDAVAKKAM	DOCUMENT NO	DATE	DESIGNER	DATE
TITLE	TWO WAY SLAB DESIGN	REVISION	DATE	CHECKED	DATE
CL. NO.	DESIGN CALCULATIONS			REFERENCES	
1.0.8	Check for Spacing				
	Minimum of			IS 456:2000	
	1) 3d = 360 mm			Cl:26.3.3.(b).1	
	2) = 300 mm				
	3) = 344.20 mm				
	Therefore provide # @ 300 mm C/C				
	Long Span Direction @ mid Span				
	$M_u/bd = \frac{8.66 \times 10^6}{1000 \times \# \times 120} = 0.602$				
	Pt = 0.142 %			SP16 :1980 Table 2-4	
	Area of steel , = 0.0014 x 1000 x 120 = 171 mm ²			IS 456:2000	
	Minimum area of 0.001 x 1000 x 150 = ##### mm ²			Cl:26.5.2.1	
	Spacing of # bar 78.54 x 1000 / 180.00 = 436 mm				
	Check for Spacing				
	Minimum of			IS 456:2000	
	1) 3d = 360 mm			Cl:26.3.3.(b).1	
	2) = 300 mm				
	3) = 436.11 mm				
	Therefore provide # @ 300 mm C/C				
	Check for Deflection: (Simplified Approach)				
	Basic Span/depth Ratio = 26			IS 456:2000 Cl:23.2.1	
	% of Tension Reinforcement provided (p _t) = 0.436 %				
	Service stress of steel 0.58 f _y (A _{st_R} /A _{st_P}) = 181.63 N/mm ²			IS456:2000 Fig 4	
	Modification Factor for Tension Reinforcen = 1.71			Page 38	
	Allowable Span / Effective Depth Ratio = 44.47			IS 456:2000 Cl:23.2.1	
	Actual Span/Eff Dept = 5 x 1000 / 120 = 41.67				
	Hence Safe against Deflection				

APPENDIX II
GENERAL ARRANGEMENT DRAWINGS

THIS DRAWING IS THE PROPERTY OF M/s. AURA ENGINEERING CONSULTANTS, AND MUST NOT BE COPIED WITHOUT THEIR WRITTEN CONSENT, NOR MADE KNOWN TO THE THIRD PARTY



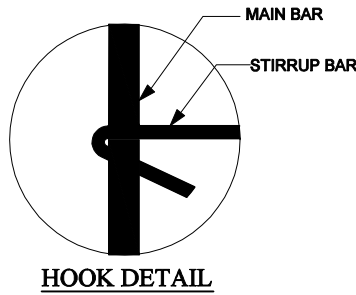
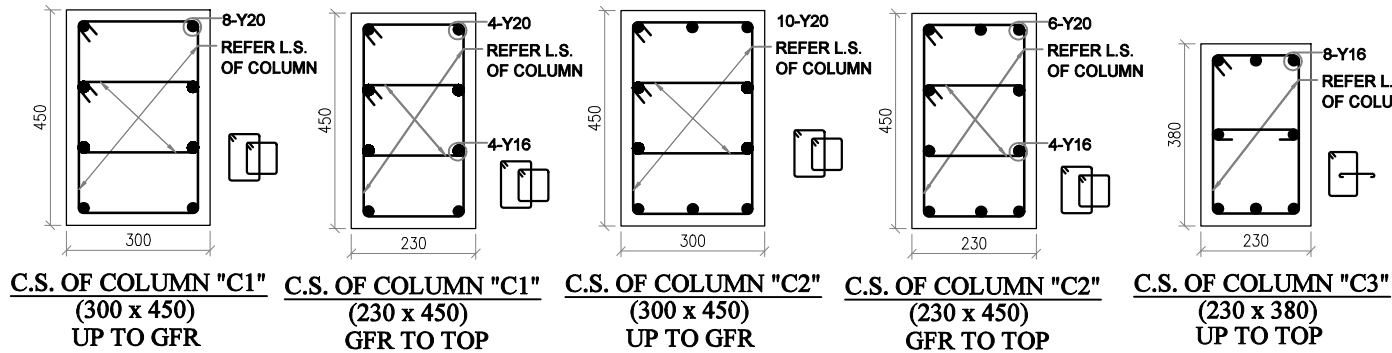
LAYOUT OF COLUMN

COLUMN SCHEDULE			
S.NO.	NAME	SIZE	
		UPTO STILT ROOF	STILT ROOF TO TOP
1.	C1	300 X 450	230 X 450
2.	C2	300 X 450	230 X 450
3.	C3	230 X 380	230 X 380

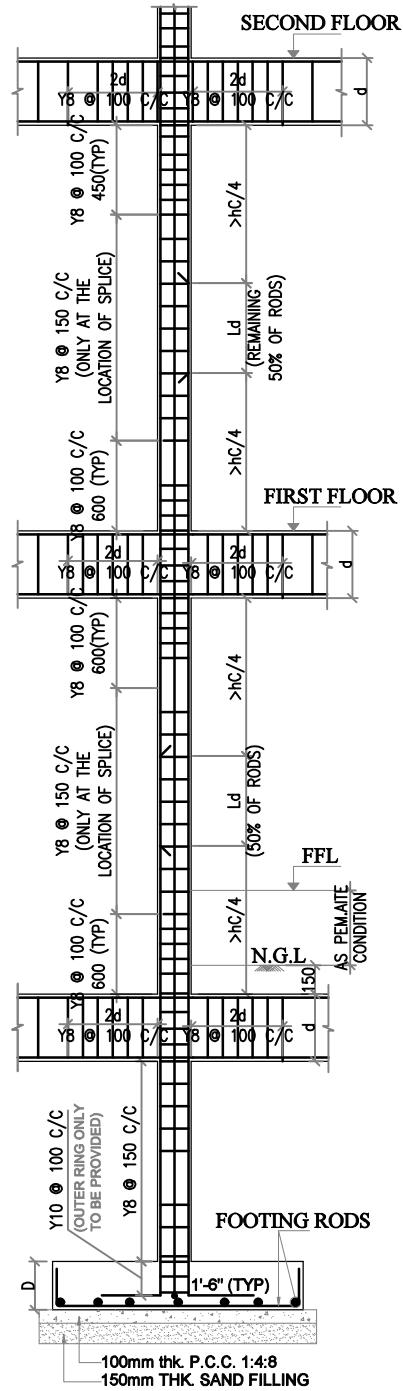
NOTE:

N.G.L - NATURAL GROUND LEVEL.

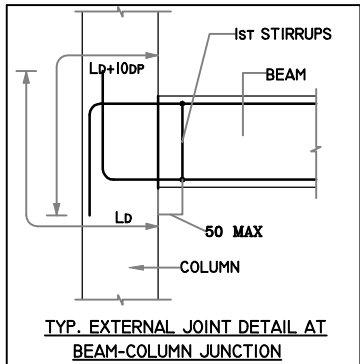
ALL HOOKS SHOULD BE BENT TO AN ANGLE OF 135° WITH A LENGTH NOT LESS THAN 75 MM



FOR APPROVAL ONLY



REINFORCEMENT DETAILING COLUMN
(ALTERNATE RODS TO BE LAPPED
IN ALTERNATE FLOORS)



GENERAL NOTES:

REMOVAL OF FORMWORK(SHUTTERING) :

SHUTTERING OF ANY PART OF THE STRUCTURE SHALL NOT BE REMOVED UNTIL THE CONCRETE ATTAINS 70% THE SPECIFIED STRENGTH OF CONCRETE. HOWEVER THE FOLLOWING MINIMUM PERIOD (AFTER FINAL POUR) SHALL BE ALLOWED BEFORE REMOVAL OF SHUTTERING AS PER CLAUSE II.3.1, IS 456:2000

A) VERTICAL SIDE OF SHUTTERING OF COLUMNS,WALLS

LAP JOINTS FOR REINFORCEMENT BARS :

i) AT ANY CROSS SECTION OF THE MEMBER,NOT MORE THAN 50 % THE BARS SHALL BE LAPPED.

ii) LAPS SHALL BE STAGGERED WITH A MINIMUM CENTRE TO CENTRE DISTANCE OF 1.3 TIMES LAP LENGTH OF THE BAR FOR TENSION & COMPRESSION MEMBERS.

iii) DEVELOPMENT LENGTH (LD) SHALL BE AS PER (SP:34-1999) TABLE BELOW:

A) DEVELOPMENT LENGTH FOR COLUMN BARS -40D
B) DEVELOPMENT LENGTH FOR BEAM BARS -50D

iv) LAPS IN COLUMNS SHALL BE PROVIDED AT MID HEIGHT OF FLOOR AND NOT AT SLAB LEVEL .

vii) DETAILING OF REBARS SHALL CONFIRM TO IBC

EXCAVATION AND BACKFILL

i) BACKFILL FOR FOUNDATIONS AND PITS SHALL BE PLACED EVENLY LAYERS OF 300 MM THICKNESS AND SHALL BE WELL COMPACTED. THE FILL SHALL CONTAIN NO STONES WITH A DIAMETER GREATER THAN 100 MM. THE DEGREE OF COMPACTION OF BACKFILL SHALL BE 95% OF THE MAXIMUM DRY DENSITY AT OPTIMUM MOISTURE CONTENT OBTAINED BY THE MODIFIED PROCTOR COMPACTION TEST.

ii) UNSUITABLE MATERIALS LIKE ROCKS/ EXISTING FOOTINGS ARE DETECTED BELOW FOUNDATION LEVEL IN AREAS OF CUT SHALL BE EXCAVATED TO FIRM GROUND. THE RESULTANT EXCAVATION SHALL BE FILLED TO THE REQUIRED LEVELS WITH MASS CONCRETE GRADE M10. ALSO WHEREVER EXCAVATION OCCURS BELOW THE FOUNDATION LEVEL STATED ON THE DESIGN DRAWING THE RESULTING VOID SHALL BE BACK FILLED WITH MASS CONCRETE GRADE-M10.

iii) BEFORE CASTING FOUNDATIONS, ANY IMMEDIATE OR ADJACENT AREAS OF DISTURBED OR SOFT SOIL MUST BE REMOVED AND REPLACED WITH MASS CONCRETE OF GRADE M10

iv) A LAYER OF BLINDING CONCRETE 100 MM THICK SHALL BE PLACED UNDER ALL FOUNDATIONS. BLINDING CONCRETE SHALL HAVE A CHARACTERISTIC STRENGTH OF 10 N/MM² AT 28 DAYS.

v) EXCAVATED FINE-GRAINED SOIL ENCOUNTERED AT SHALLOW DEPTHS SHALL BE IN NO CASE USED FOR BACK FILLING PURPOSES.

GENERAL NOTES:

1. ALL DIMENSIONS ARE IN MM.

2. CONCRETE GRADE SHALL BE M25 CONFIRMING TO IS 456:2000

3. GRADE OF REINFORCEMENT MARKED THUS (Y) SHALL BE Fe 500 CONFIRMING TO IS 1786-2008

4. CLEAR COVER FOR REINFORCEMENT

A) COLUMN = 40MM

5. THIS DRG. READ IN CONJECTION WITH ARCH.DRGS.

6. COLUMNS AND FOOTINGS ARE DESIGNED FOR S+3 FLOOR LOADS AND SBC OF THE SOIL IS 150KN/ SQM. @ 1800 BELOW N.G.L.

7. STRUCTURAL ENGINEER RESPONSIBILITY IS LIMITED TO DESIGN & ISSUAL OF STRUCTURAL DRAWING ONLY

8.ONUS OF CONSTRUCTION LIES WITH CONTRACTOR/OWNER

REV.	DESCRIPTIONS	DRN	CHK	DATE
00	ISSUE FOR APPROVAL	R.P	R.M	18.08.25

PROJECT :-

PLAN SHOWING THE PROPOSED CONSTRUCTION OF STILT FLOOR+3 FLOORS RESIDENTIAL BUILDING WITH 15 DWELLING UNITS (14.00 M HEIGHT) ANNAI INDIRA NAGAR, MEDAVAKKAM, CHENNAI. COMPRISED IN AS PER PATTAS.NO: 206/8A, 8B & 8C OF MEDAVAKKAM VILLAGE, WITHIN THE LIMITS OF ST.THOMAS MOUNT PANCHAYAT UNION.

DRAWING TITLE :-

LAYOUT & R.C DETAILS OF COLUMN

DATE	SCALE	JOB.NO	DRG.NO
18.08.25	1 : 120	—	001

ARCHITECT / CONSULTANTS :-

STRUCTURAL CONSULTANTS :-

AURA ENGINEERING CONSULTANTS

#8, 50th St. Sarvamangala Colony, 7th Avenue, ASHOK NAGAR, CHENNAI- 600 083.

Fixed Line :- 044 4859 7100

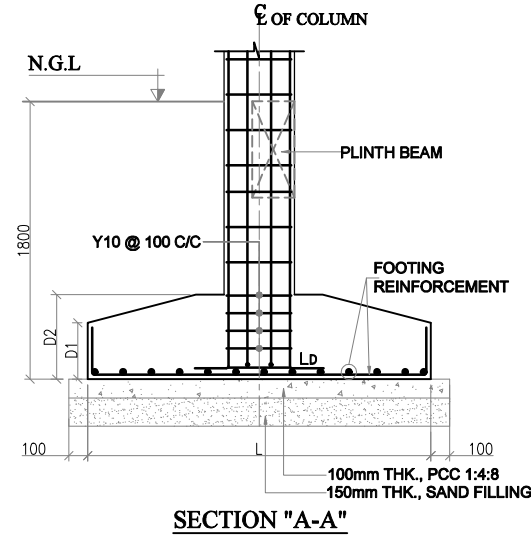
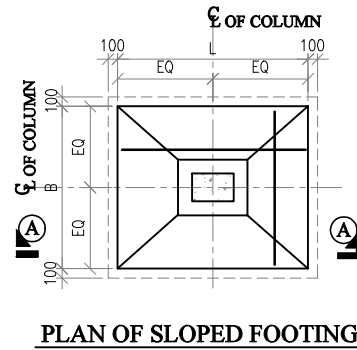
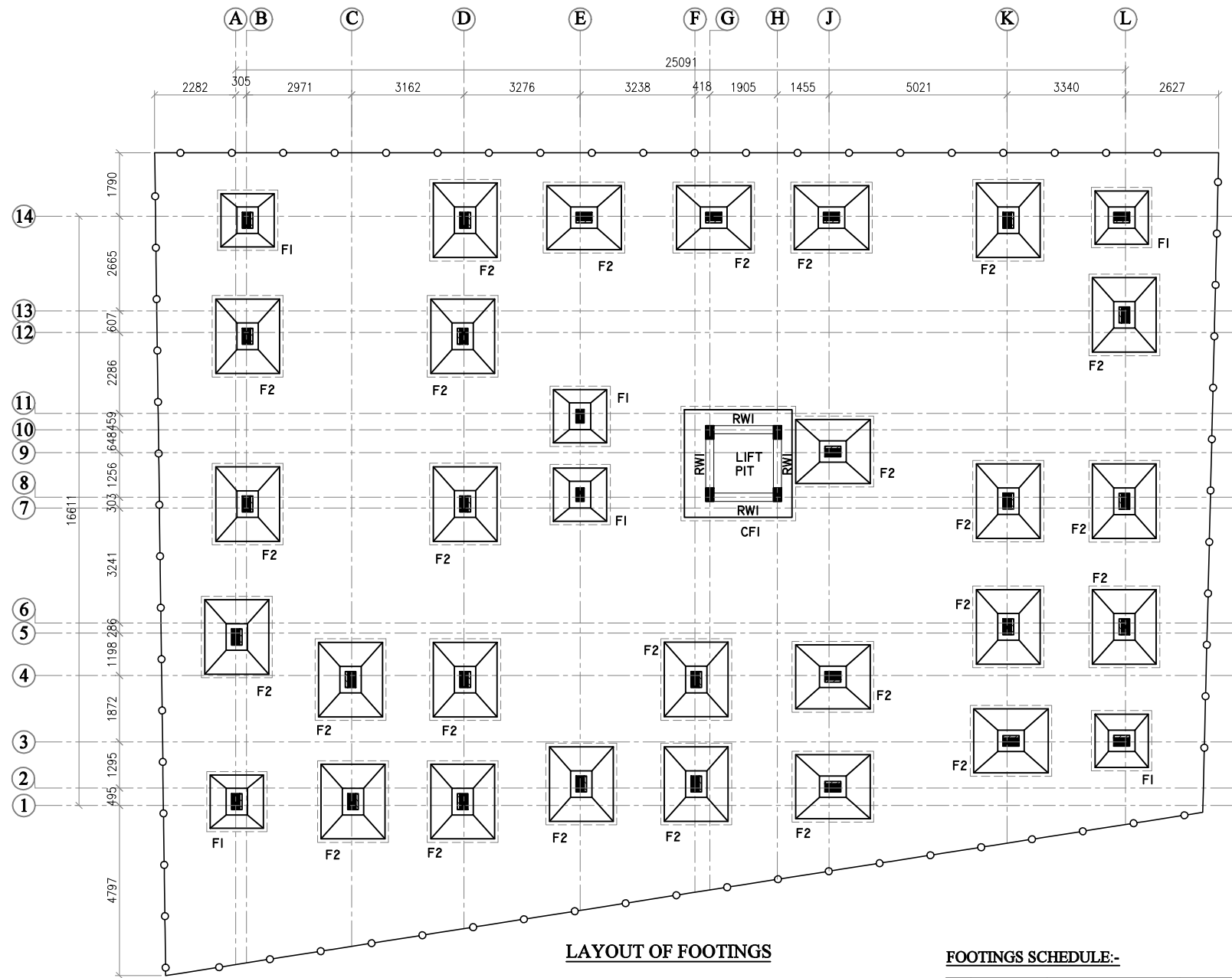
projects.auraengg@gmail.com

projects@auraengineers.co.in

http://auraengineers.co.in/



THIS DRAWING IS THE PROPERTY OF M/s. AURA ENGINEERING CONSULTANTS. AND MUST NOT BE COPIED WITHOUT THEIR WRITTEN CONSENT, NOR MADE KNOWN TO THE THIRD PARTY



COMBINED FOOTINGS SCHEDULE:-

SI.	FOOTING NAME	FOOTING SIZE	FOOTING REINFORCEMENT
01	CF1	2600 X 1500 D=380	Y12 @ 150 C/C @ BOTHWAYS TOP & BOTTOM

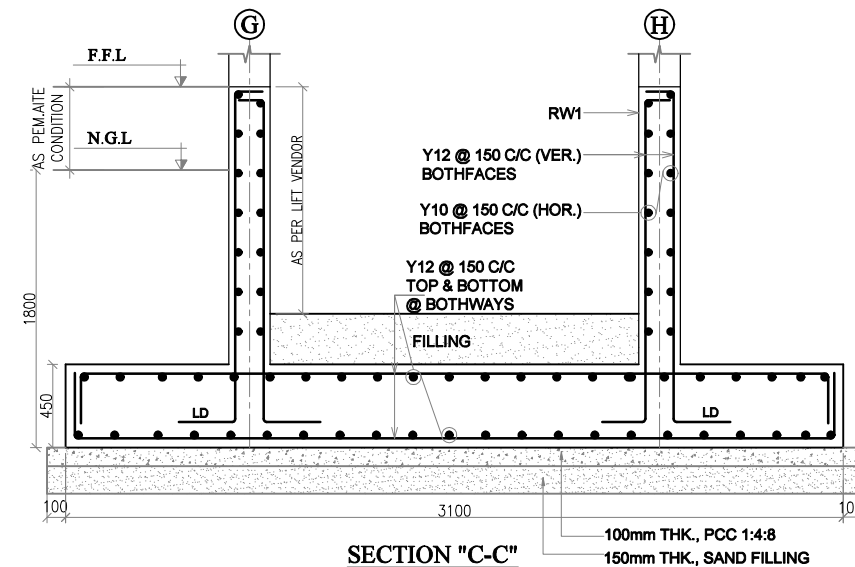
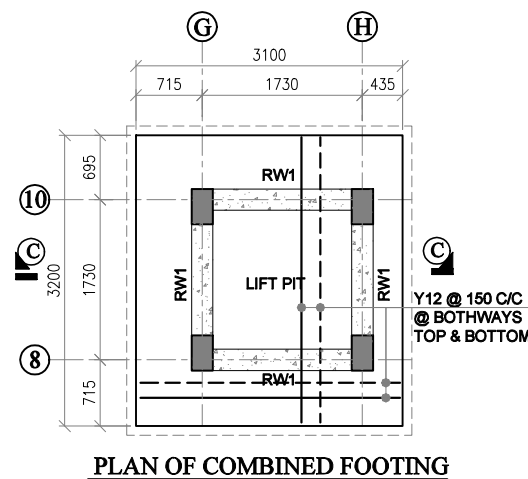
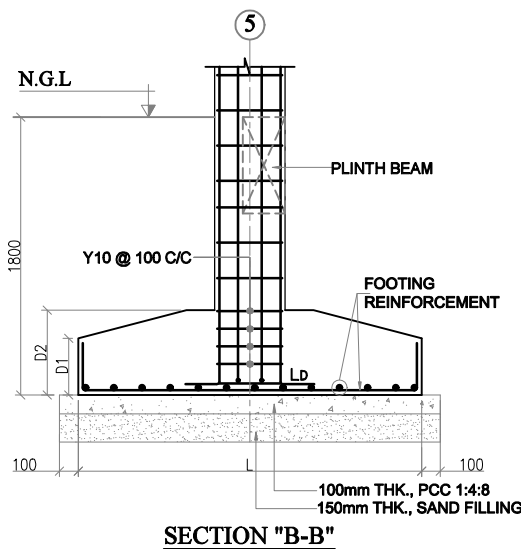
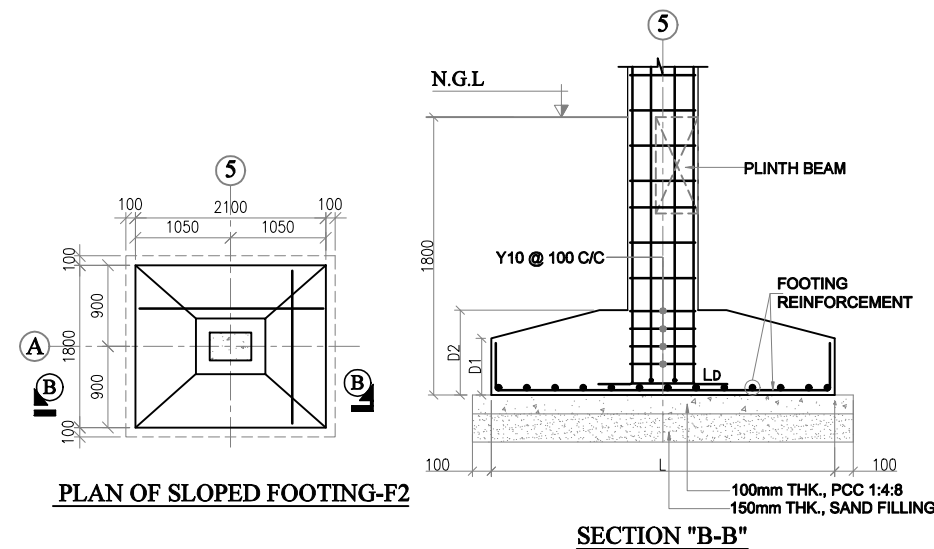
FOOTINGS SCHEDULE:-

SI.	FOOTING NAME	FOOTING SIZE	FOOTING REINFORCEMENT
01	F1	1500 X 1500 SLOPED FOOTING D1=250, D2=450	Y10 @ 150 C/C BOTHWAYS @ BOTTOM
02	F2	1800 X 2100 SLOPED FOOTING D1=300, D2=550	Y12 @ 150 C/C BOTHWAYS @ BOTTOM

FOR APPROVAL ONLY

NOTE:

N.G.L. - NATURAL GROUND LEVEL.



GENERAL NOTES:

REMOVAL OF FORMWORK(SHUTTERING) :

SHUTTERING OF ANY PART OF THE STRUCTURE SHALL NOT BE REMOVED UNTIL THE CONCRETE ATTAINS 70% THE SPECIFIED STRENGTH OF CONCRETE. HOWEVER THE FOLLOWING MINIMUM PERIOD (AFTER FINAL POUR) SHALL BE ALLOWED BEFORE REMOVAL OF SHUTTERING AS PER CLAUSE II.3.1, IS 456:2000

A) VERTICAL SIDE OF SHUTTERING OF COLUMNS,WALLS

LAP JOINTS FOR REINFORCEMENT BARS :

i) AT ANY CROSS SECTION OF THE MEMBER,NOT MORE THAN 50% THE BARS SHALL BE LAPPED.

ii) LAPS SHALL BE STAGGERED WITH A MINIMUM CENTRE TO CENTRE DISTANCE OF 1.3 TIMES LAP LENGTH OF THE BAR FOR TENSION & COMPRESSION MEMBERS.

iii) DEVELOPMENT LENGTH (LD) SHALL BE AS PER (SP:34-1999) TABLE BELOW:

A) DEVELOPMENT LENGTH FOR COLUMN BARS -40D

B) DEVELOPMENT LENGTH FOR BEAM BARS -50D

iv) LAPS IN COLUMNS SHALL BE PROVIDED AT MID HEIGHT OF FLOOR AND NOT AT SLAB LEVEL .

vii) DETAILING OF REBARS SHALL CONFIRM TO IBC

EXCAVATION AND BACKFILL

i) BACKFILL FOR FOUNDATIONS AND PITS SHALL BE PLACED EVENLY LAYERS OF 300 MM THICKNESS AND SHALL BE WELL COMPACTED. THE FILL SHALL CONTAIN NO STONES WITH A DIAMETER GREATER THAN 100 MM. THE DEGREE OF COMPACTION OF BACKFILL SHALL BE 95% OF THE MAXIMUM DRY DENSITY AT OPTIMUM MOISTURE CONTENT OBTAINED BY THE MODIFIED PROCTOR COMPACTION TEST.

ii) UNSUITABLE MATERIALS LIKE ROCKS/ EXISTING FOOTINGS ARE DETECTED BELOW FOUNDATION LEVEL IN AREAS OF CUT SHALL BE EXCAVATED TO FIRM GROUND. THE RESULTANT EXCAVATION SHALL BE FILLED TO THE REQUIRED LEVELS WITH MASS CONCRETE GRADE M10. ALSO WHEREVER EXCAVATION OCCURS BELOW THE FOUNDATION LEVEL STATED ON THE DESIGN DRAWING THE RESULTING VOID SHALL BE BACK FILLED WITH MASS CONCRETE GRADE-M10.

iii) BEFORE CASTING FOUNDATIONS, ANY IMMEDIATE OR ADJACENT AREAS OF DISTURBED OR AFT SOIL MUST BE REMOVED AND REPLACED WITH MASS CONCRETE OF GRADE M10

iv) A LAYER OF BLINDING CONCRETE 100 MM THICK SHALL BE PLACED UNDER ALL FOUNDATIONS. BLINDING CONCRETE SHALL HAVE A CHARACTERISTIC STRENGTH OF 10 N/MM² AT 28 DAYS.

v) EXCAVATED FINE-GRAINED SOIL ENCOUNTERED AT SHALLOW DEPTHS SHALL BE IN NO CASE USED FOR BACK FILLING PURPOSES.

GENERAL NOTES:

1. ALL DIMENSIONS ARE IN MM.

2. CONCRETE GRADE SHALL BE M25 CONFIRMING TO IS 456:2000

3. GRADE OF REINFORCEMENT MARKED THUS (Y) SHALL BE FE 500 CONFIRMING TO IS 1786-2008

4. CLEAR COVER FOR REINFORCEMENT

A) FOOTING = 50MM B) R.C WALL = 25MM

5. THIS DRG. READ IN CONJUNCTION WITH ARCH.DRGS.

6. COLUMNS AND FOOTINGS ARE DESIGNED FOR S+3 FLOOR LOADS AND SBC OF THE SOIL IS 150KN/ SQM. @ 1800 BELOW N.G.L.

7. STRUCTURAL ENGINEER RESPONSIBILITY IS LIMITED TO DESIGN & ISSUAL OF STRUCTURAL DRAWING ONLY

8.ONUS OF CONSTRUCTION LIES WITH CONTRACTOR/OWNER

00 ISSUE FOR APPROVAL R.P R.M 18.08.25
REV. DESCRIPTIONS DRN CHK DATE

00	ISSUE FOR APPROVAL	R.P	R.M	18.08.25
REV.	DESCRIPTIONS	DRN	CHK	DATE

PROJECT :-

PLAN SHOWING THE PROPOSED CONSTRUCTION OF STILT FLOOR+3 FLOORS RESIDENTIAL BUILDING WITH 15 DWELLING UNITS (14.00 M HEIGHT) ANNAI INDIRA NAGAR, MEDAVAKKAM, CHENNAI. COMPRISED IN AS PER PATTAS NO: 206/8A, 8B & 8C OF MEDAVAKKAM VILLAGE, WITHIN THE LIMITS OF ST.THOMAS MOUNT PANCHAYAT UNION.

DRAWING TITLE :-

LAYOUT & R.C DETAILS OF FOOTING

DATE	SCALE	JOB.NO	DRG.NO
18.08.25	1 : 140	—	002

ARCHITECT / CONSULTANTS :-

STRUCTURAL CONSULTANTS :-

AURA ENGINEERING CONSULTANTS

#8, 50th St, Sarvamangala Colony, 7th Avenue, ASHOK NAGAR, CHENNAI- 600 083.

Fixed Line :- 044 4859 7100

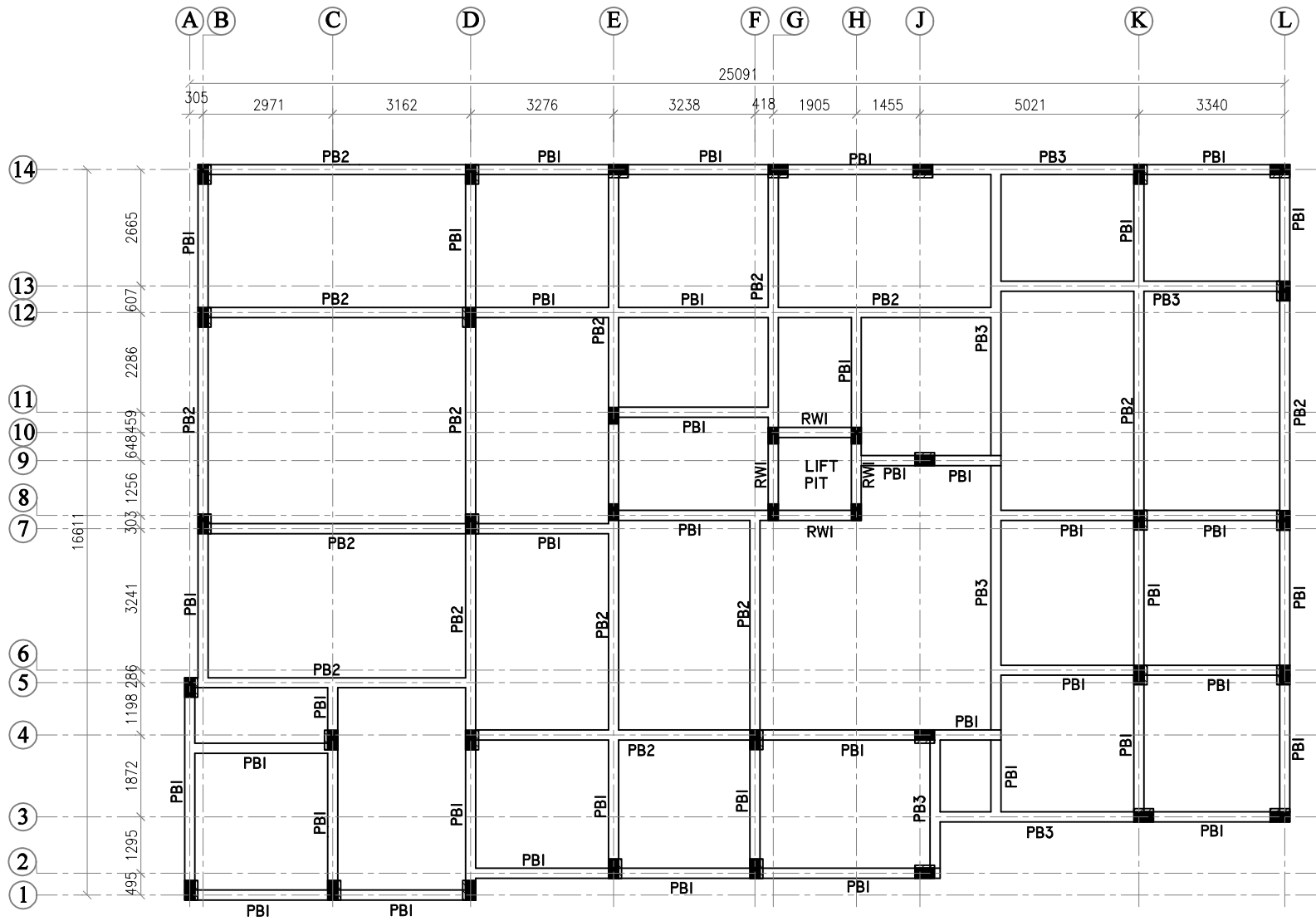
projects.auraengg@gmail.com

projects@auraengineers.co.in

http://auraengineers.co.in/



THIS DRAWING IS THE PROPERTY OF M/s. AURA ENGINEERING CONSULTANTS. AND MUST NOT BE COPIED WITHOUT THEIR WRITTEN CONSENT, NOR MADE KNOWN TO THE THIRD PARTY



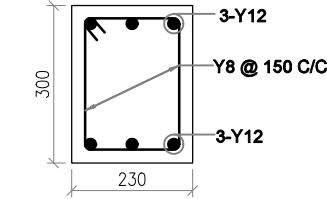
LAYOUT OF PLINTH BEAM

BEAM SCHEDULE		
SL.NO	NAME	SIZE
01	PB1	230 x 300
02	PB2	230 x 380
03	PB3	230 x 450

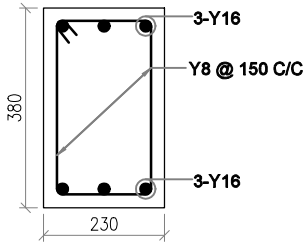
NOTE:

N.G.L - NATURAL GROUND LEVEL.

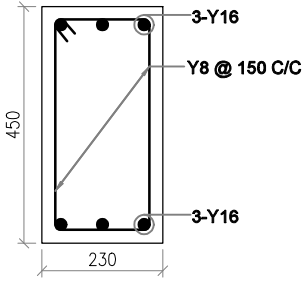
F.F.L - FLOOR FINISH LEVEL



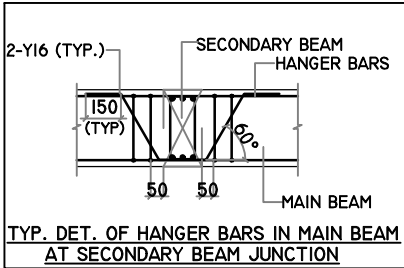
C.S. OF BEAM "PB1"
(230 x 300)



C.S. OF BEAM "PB2"
(230 x 380)

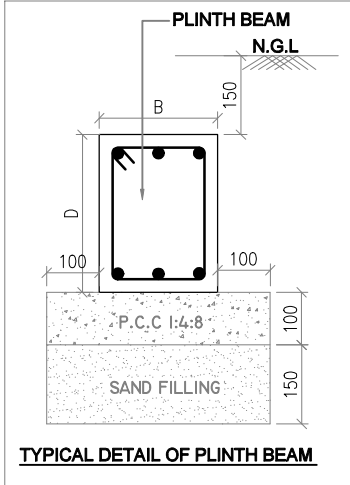
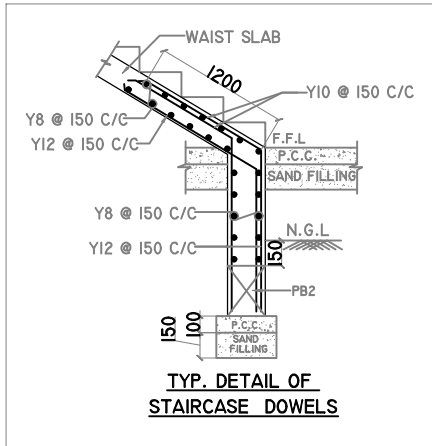
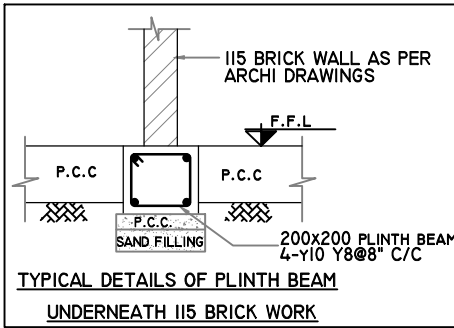
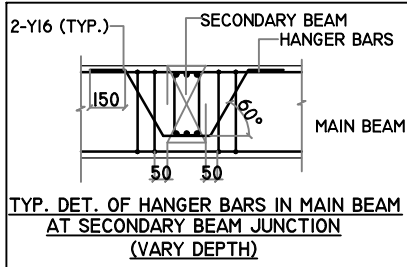
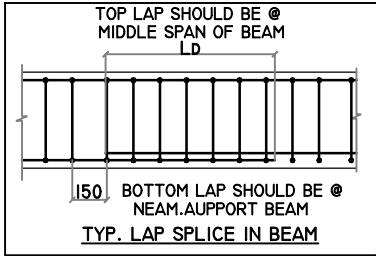


C.S. OF BEAM "PB3"
(230 x 450)



TYP. DET. OF HANGER BARS IN MAIN BEAM
AT SECONDARY BEAM JUNCTION

FOR APPROVAL ONLY



GENERAL NOTES:

REMOVAL OF FORMWORK(SHUTTERING) :

SHUTTERING OF ANY PART OF THE STRUCTURE SHALL NOT BE REMOVED UNTIL THE CONCRETE ATTAINS 70% THE SPECIFIED STRENGTH OF CONCRETE. HOWEVER THE FOLLOWING MINIMUM PERIOD (AFTER FINAL POUR) SHALL BE ALLOWED BEFORE REMOVAL OF SHUTTERING AS PER CLAUSE II.3.1, IS 456:2000
A) VERTICAL SIDE OF SHUTTERING OF COLUMNS,WALLS

LAP JOINTS FOR REINFORCEMENT BARS :

- AT ANY CROSS SECTION OF THE MEMBER,NOT MORE THAN 50 % THE BARS SHALL BE LAPPED.
- LAPS SHALL BE STAGGERED WITH A MINIMUM CENTRE TO CENTRE DISTANCE OF 1.3 TIMES LAP LENGTH OF THE BAR FOR TENSION & COMPRESSION MEMBERS.
- DEVELOPMENT LENGTH (Ld) SHALL BE AS PER (SP:34-1999) TABLE BELOW:
A) DEVELOPMENT LENGTH FOR COLUMN BARS -40D
B) DEVELOPMENT LENGTH FOR BEAM BARS -50D
- LAPS IN COLUMNS SHALL BE PROVIDED AT MID HEIGHT OF FLOOR AND NOT AT SLAB LEVEL .
- DETAILING OF REBARS SHALL CONFIRM TO IBC

EXCAVATION AND BACKFILL

- BACKFILL FOR FOUNDATIONS AND PITS SHALL BE PLACED EVENLY LAYERS OF 300 MM THICKNESS AND SHALL BE WELL COMPACTED. THE FILL SHALL CONTAIN NO STONES WITH A DIAMETER GREATER THAN 100 MM. THE DEGREE OF COMPACTION OF BACKFILL SHALL BE 95% OF THE MAXIMUM DRY DENSITY AT OPTIMUM MOISTURE CONTENT OBTAINED BY THE MODIFIED PROCTOR COMPACTION TEST.
- UNSUITABLE MATERIALS LIKE ROCKS/ EXISTING FOOTINGS ARE DETECTED BELOW FOUNDATION LEVEL IN AREAS OF CUT SHALL BE EXCAVATED TO FIRM GROUND. THE RESULTANT EXCAVATION SHALL BE FILLED TO THE REQUIRED LEVELS WITH MASS CONCRETE GRADE M10. ALSO WHEREVER EXCAVATION OCCURS BELOW THE FOUNDATION LEVEL STATED ON THE DESIGN DRAWING THE RESULTING VOID SHALL BE BACK FILLED WITH MASS CONCRETE GRADE-M10.
- BEFORE CASTING FOUNDATIONS, ANY IMMEDIATE OR ADJACENT AREAS OF DISTURBED OR SOFT SOIL MUST BE REMOVED AND REPLACED WITH MASS CONCRETE OF GRADE M10
- A LAYER OF BLINDING CONCRETE 100 MM THICK SHALL BE PLACED UNDER ALL FOUNDATIONS. BLINDING CONCRETE SHALL HAVE A CHARACTERISTIC STRENGTH OF 10 N/MM² AT 28 DAYS.
- EXCAVATED FINE-GRAINED SOIL ENCOUNTERED AT SHALLOW DEPTHS SHALL BE IN NO CASE USED FOR BACK FILLING PURPOSES.

GENERAL NOTES:

- ALL DIMENSIONS ARE IN MM.
- CONCRETE GRADE SHALL BE M25 CONFIRMING TO IS 456:2000
- GRADE OF REINFORCEMENT MARKED THUS (Y) SHALL BE Fe 500 CONFIRMING TO IS 1786-2008
- CLEAR COVER FOR REINFORCEMENT
A) BEAM = 30MM B) R.C WALL = 25MM
- THIS DRG. READ IN CONJUNCTION WITH ARCH.DRGS.
- COLUMNS AND FOOTINGS ARE DESIGNED FOR S+3 FLOOR LOADS AND SBC OF THE SOIL IS 150KN/ SQM. @ 1800 BELOW N.G.L.
- STRUCTURAL ENGINEER RESPONSIBILITY IS LIMITED TO DESIGN & ISSUAL OF STRUCTURAL DRAWING ONLY
- ONUS OF CONSTRUCTION LIES WITH CONTRACTOR/OWNER

REV.	DESCRIPTIONS	DRN	CHK	DATE
00	ISSUE FOR APPROVAL	R.P	R.M	18.08.25

PROJECT :-

PLAN SHOWING THE PROPOSED CONSTRUCTION OF STILT FLOOR+3 FLOORS RESIDENTIAL BUILDING WITH 15 DWELLING UNITS (14.00 M HEIGHT) ANNAI INDIRA NAGAR, MEDAVAKKAM, CHENNAI. COMPRISED IN AS PER PATTAS.NO: 206/8A, 8B & 8C OF MEDAVAKKAM VILLAGE, WITHIN THE LIMITS OF ST.THOMAS MOUNT PANCHAYAT UNION.

DRAWING TITLE :-

LAYOUT & R.C DETAILS OF PLINTH BEAM

DATE	SCALE	JOB.NO	DRG.NO
18.08.25	1 : 100	---	003

ARCHITECT / CONSULTANTS :-

STRUCTURAL CONSULTANTS :-

AURA ENGINEERING CONSULTANTS

#8, 50th St, Sarvamangala Colony, 7th Avenue, ASHOK NAGAR, CHENNAI- 600 083.

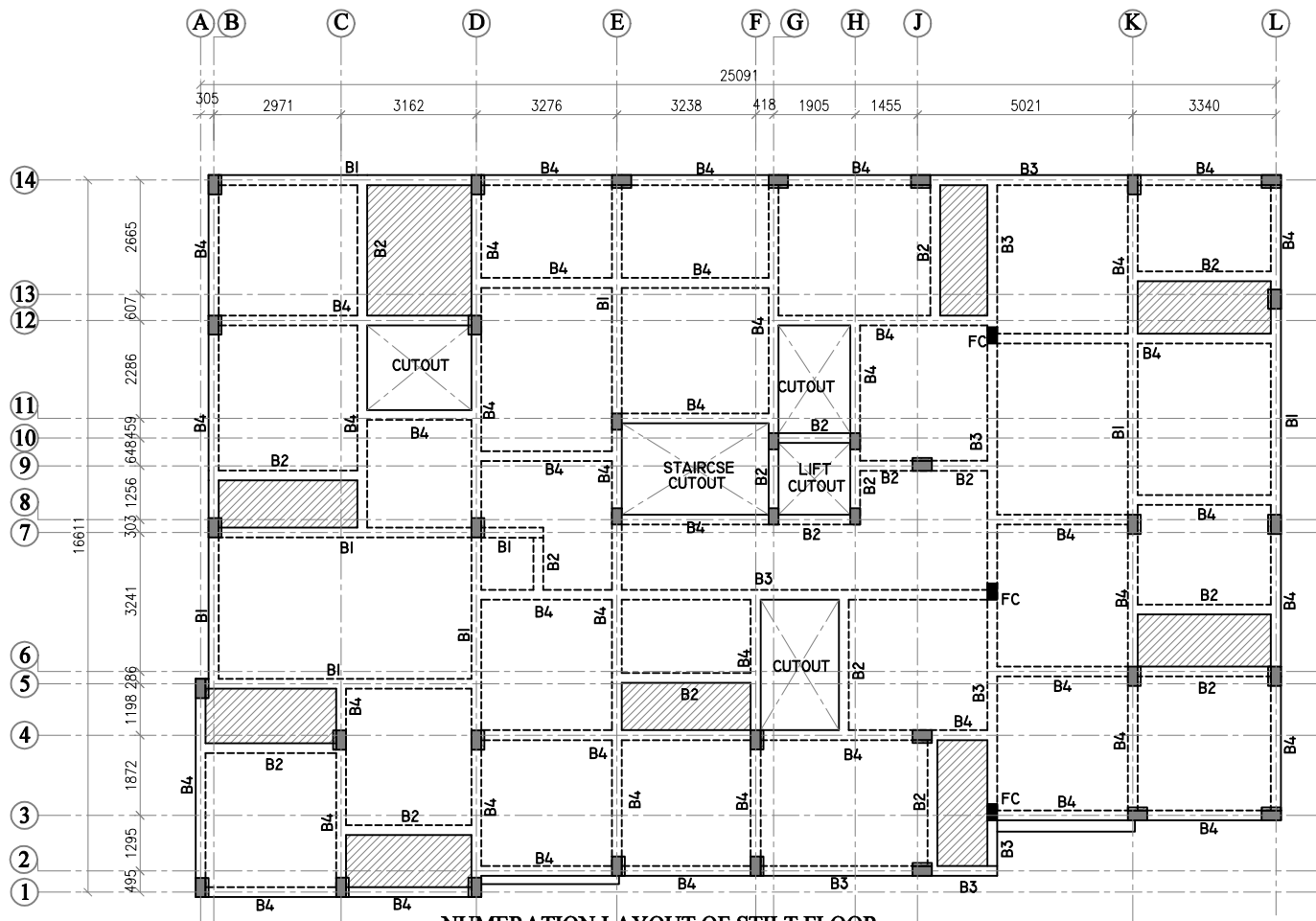
Fixed Line :- 044 4859 7100

projects.auraengg@gmail.com

projects@auraengineers.co.in

http://auraengineers.co.in/





NUMERATION LAYOUT OF STILT FLOOR

ROOF SLAB & BEAM

BEAM SCHEDULE		
SL.NO	NAME	SIZE
01	B1	230 x 450
02	B2	230 x 450
03	B3	230 x 530
04	B4	230 x 450

SLAB SCHEDULE		
SL.NO	NAME	THICK
01	S1	150 THK.
02	S2	150 THK.

FOR APPROVAL ONLY

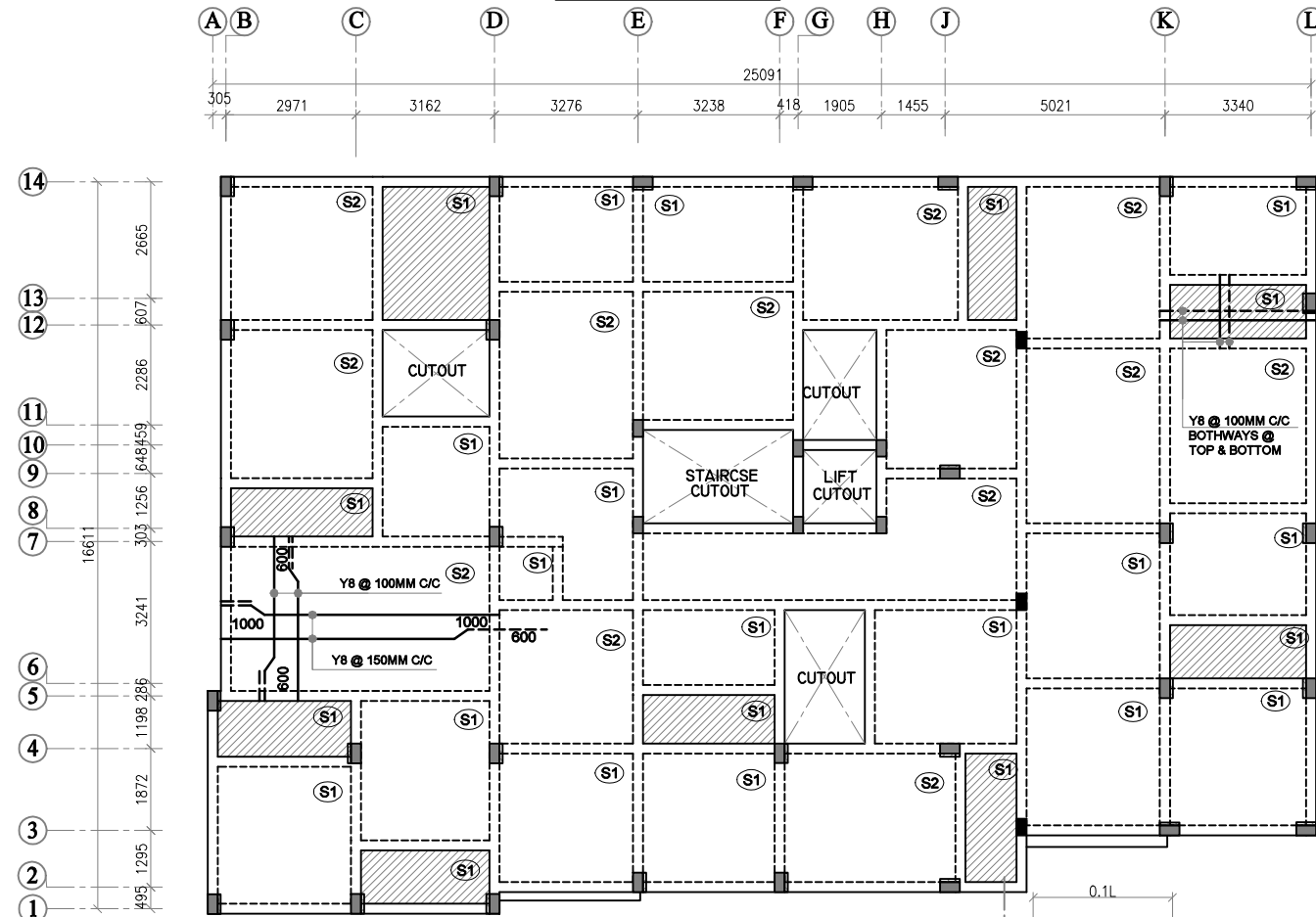
NOTE:

SLAB SUNK BY 0'-10"

PROVIDE Y8 @ 8" C/C AS DISTRIBUTORS WHERE EVER REQUIRED

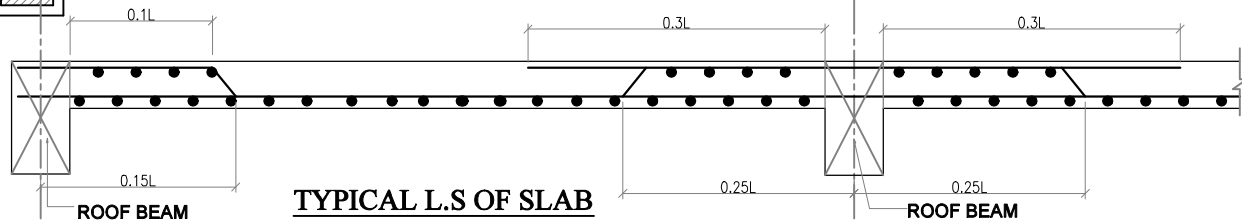
COLUMN CURTAILED TO BE BEND IN TO TOP OF THE SLAB

FOR BEAM REINFORCEMENT DETAILS REFER DWG.NO : 007



R.C LAYOUT OF STILT FLOOR

ROOF SLAB & BEAM



TYPICAL L.S OF SLAB

GENERAL NOTES:

REMOVAL OF FORMWORK(SHUTTERING) :

SHUTTERING OF ANY PART OF THE STRUCTURE SHALL NOT BE REMOVED UNTIL THE CONCRETE ATTAINS 70% THE SPECIFIED STRENGTH OF CONCRETE. HOWEVER THE FOLLOWING MINIMUM PERIOD (AFTER FINAL POUR) SHALL BE ALLOWED BEFORE REMOVAL OF SHUTTERING AS PER CLAUSE II.3.1, IS 456:2000

A) VERTICAL SIDE OF SHUTTERING OF COLUMNS,WALLS

LAP JOINTS FOR REINFORCEMENT BARS :

- AT ANY CROSS SECTION OF THE MEMBER,NOT MORE THAN 50 % THE BARS SHALL BE LAPPED.
- LAPS SHALL BE STAGGERED WITH A MINIMUM CENTRE TO CENTRE DISTANCE OF 1.3 TIMES LAP LENGTH OF THE BAR FOR TENSION & COMPRESSION MEMBERS.
- DEVELOPMENT LENGTH (Ld) SHALL BE AS PER (SP:34-1999) TABLE BELOW:
A) DEVELOPMENT LENGTH FOR COLUMN BARS -40D
B) DEVELOPMENT LENGTH FOR BEAM BARS -50D
- LAPS IN COLUMNS SHALL BE PROVIDED AT MID HEIGHT OF FLOOR AND NOT AT SLAB LEVEL .
- DETAILING OF REBARS SHALL CONFIRM TO IBC

EXCAVATION AND BACKFILL

- BACKFILL FOR FOUNDATIONS AND PITS SHALL BE PLACED EVENLY LAYERS OF 300 MM THICKNESS AND SHALL BE WELL COMPACTED. THE FILL SHALL CONTAIN NO STONES WITH A DIAMETER GREATER THAN 100 MM. THE DEGREE OF COMPACTION OF BACKFILL SHALL BE 95% OF THE MAXIMUM DRY DENSITY AT OPTIMUM MOISTURE CONTENT OBTAINED BY THE MODIFIED PROCTOR COMPACTION TEST.
- UNSUITABLE MATERIALS LIKE ROCKS/ EXISTING FOOTINGS ARE DETECTED BELOW FOUNDATION LEVEL IN AREAS OF CUT SHALL BE EXCAVATED TO FIRM GROUND. THE RESULTANT EXCAVATION SHALL BE FILLED TO THE REQUIRED LEVELS WITH MASS CONCRETE GRADE M10. ALSO WHEREVER EXCAVATION OCCURS BELOW THE FOUNDATION LEVEL STATED ON THE DESIGN DRAWING THE RESULTING VOID SHALL BE BACK FILLED WITH MASS CONCRETE GRADE-M10.
- BEFORE CASTING FOUNDATIONS, ANY IMMEDIATE OR ADJACENT AREAS OF DISTURBED OR SOFT SOIL MUST BE REMOVED AND REPLACED WITH MASS CONCRETE OF GRADE M10
- A LAYER OF BLINDING CONCRETE 100 MM THICK SHALL BE PLACED UNDER ALL FOUNDATIONS. BLINDING CONCRETE SHALL HAVE A CHARACTERISTIC STRENGTH OF 10 N/MM² AT 28 DAYS.
- EXCAVATED FINE-GRAINED SOIL ENCOUNTERED AT SHALLOW DEPTHS SHALL BE IN NO CASE USED FOR BACK FILLING PURPOSES.

GENERAL NOTES:

- ALL DIMENSIONS ARE IN MM.
- CONCRETE GRADE SHALL BE M25 (1:1.5:3) CONFIRMING TO IS 456:2000
- GRADE OF REINFORCEMENT MARKED THUS (Y) SHALL BE FE 500 CONFIRMING TO IS 1786-2008
- CLEAR COVER FOR REINFORCEMENT
A) BEAM = 30MM B) SLAB = 20MM
- THIS DRG. READ IN CONJECTION WITH ARCH.DRGS.
- STRUCTURAL ENGINEER RESPONSIBILITY IS LIMITED TO DESIGN & ISSUAL OF STRUCTURAL DRAWING ONLY
- ONUS OF CONSTRUCTION LIES WITH CONTRACTOR/OWNER

REV.	ISSUE FOR APPROVAL	R.P	R.M	18.08.25
REV.	DESCRIPTIONS	DRN	CHK	DATE

PROJECT :-

PLAN SHOWING THE PROPOSED CONSTRUCTION OF STILT FLOOR+3 FLOORS RESIDENTIAL BUILDING WITH 15 DWELLING UNITS (14.00 M HEIGHT) ANNAI INDIRA NAGAR, MEDAVAKKAM, CHENNAI. COMPRISED IN AS PER PATTAS.NO: 206/8A, 8B & 8C OF MEDAVAKKAM VILLAGE, WITHIN THE LIMITS OF ST.THOMAS MOUNT PANCHAYAT UNION.

DRAWING TITLE :-

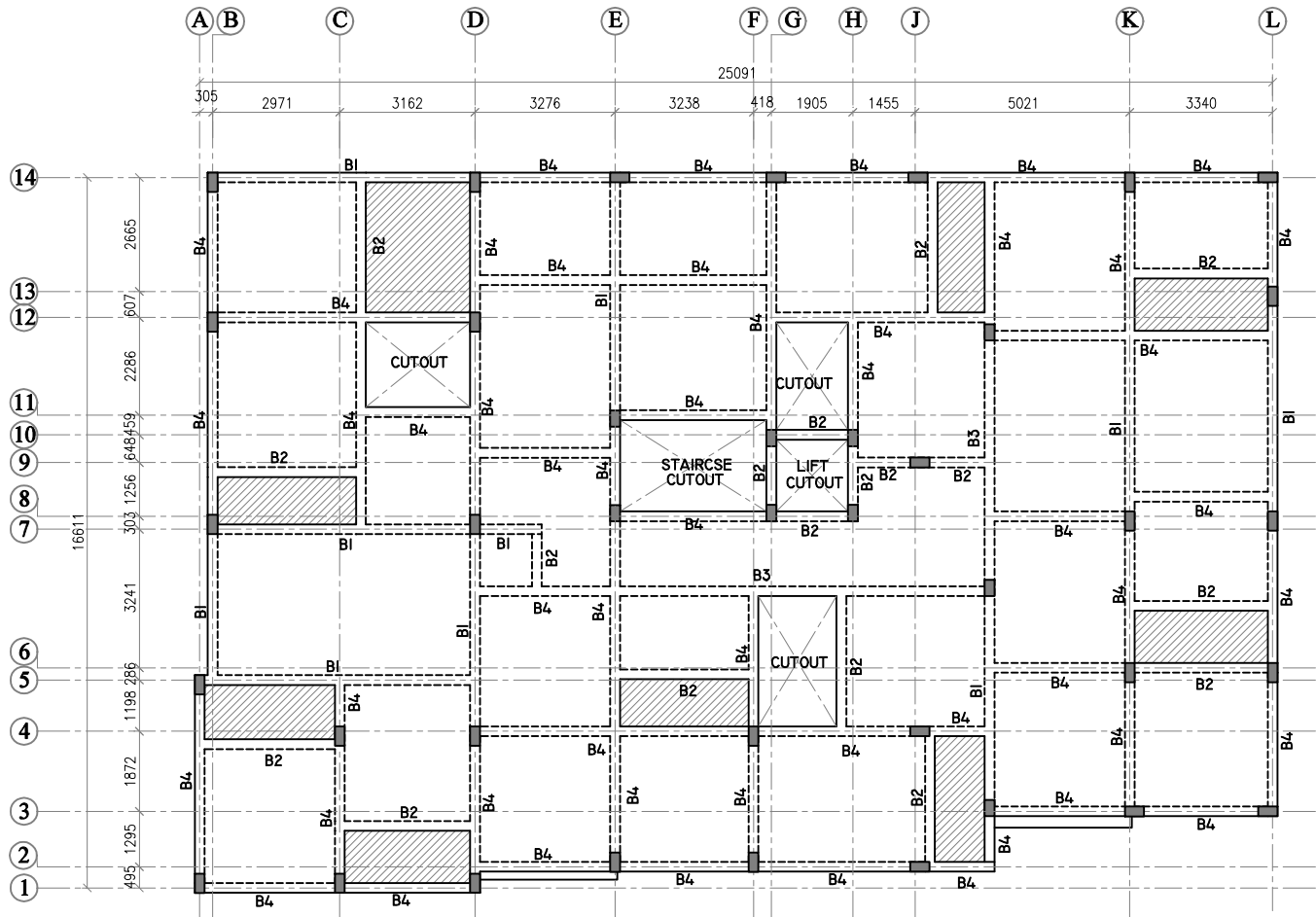
NUMERATION LAYOUT & R.C LAYOUT OF STILT FLOOR ROOF SLAB & BEAMS

DATE	SCALE	JOB.NO	DRG.NO
18.08.25	1 : 100	—	004

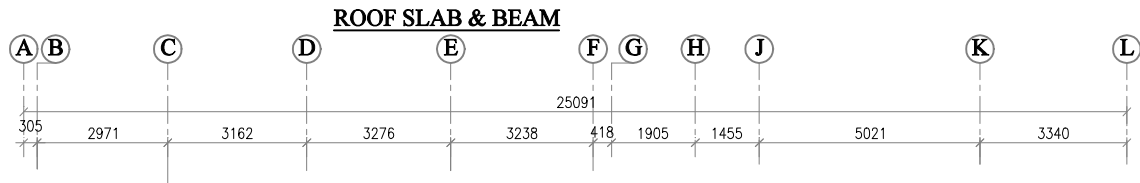
ARCHITECT / CONSULTANTS :-

STRUCTURAL CONSULTANTS :-

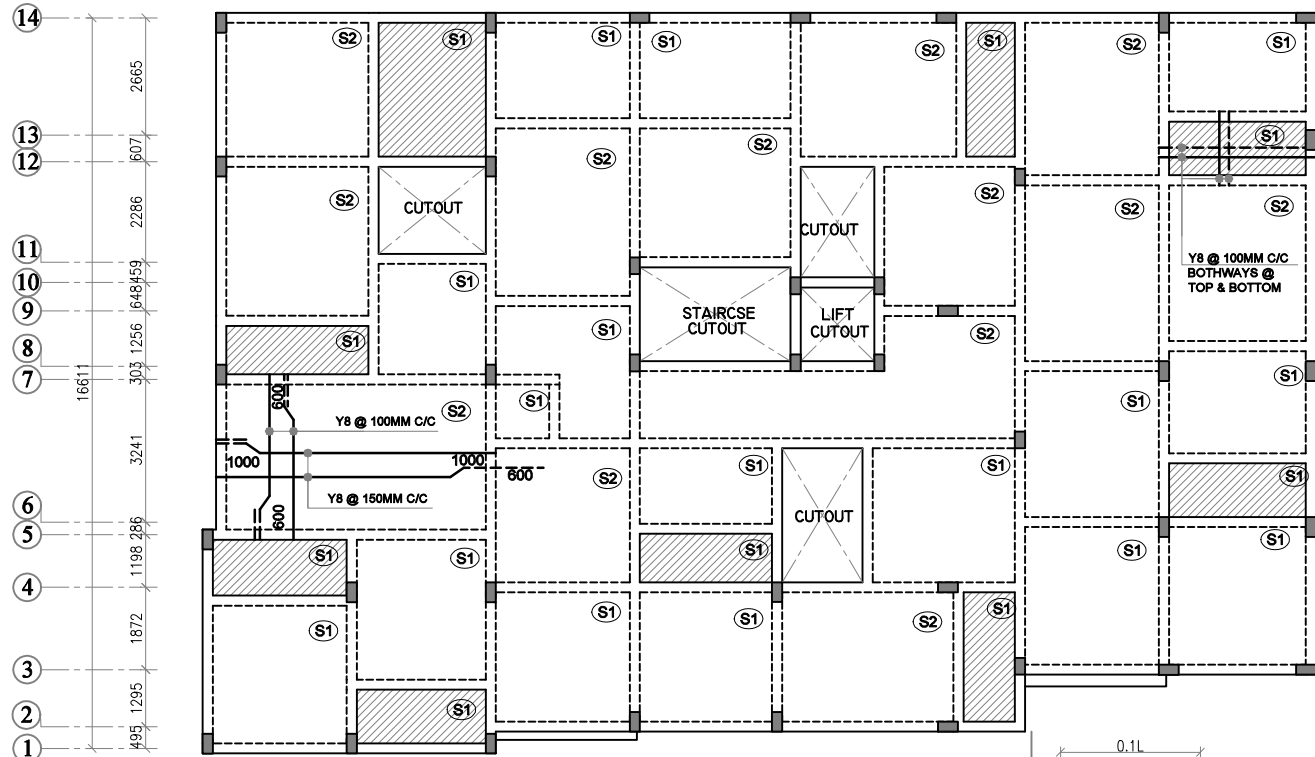
AURA ENGINEERING CONSULTANTS
#8, 50th St, Sarvamangala Colony, 7th Avenue, ASHOK NAGAR, CHENNAI- 600 083.
Fixed Line :- 044 4859 7100
projects.auraengg@gmail.com
projects@auraengineers.co.in
http://auraengineers.co.in/



NUMERATION LAYOUT OF TYPICAL FLOOR

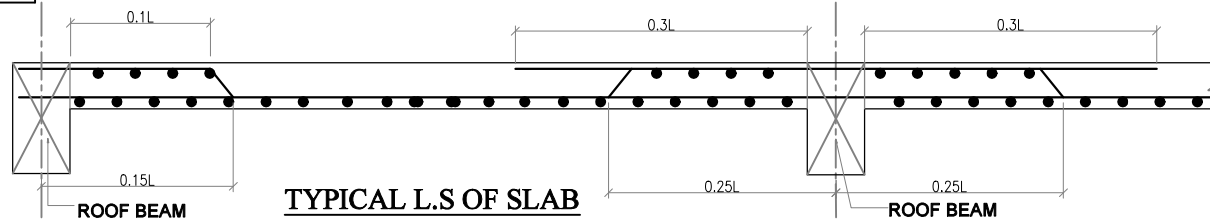


ROOF SLAB & BEAM



R.C LAYOUT OF TYPICAL FLOOR

ROOF SLAB & BEAM



TYPICAL L.S OF SLAB

BEAM SCHEDULE		
SL.NO	NAME	SIZE
01	B1	230 x 450
02	B2	230 x 450
03	B3	230 x 530
04	B4	230 x 450

SLAB SCHEDULE		
SL.NO	NAME	THICK
01	S1	150 THK.
02	S2	150 THK.

FOR APPROVAL ONLY

NOTE:

SLAB SUNK BY 0'-10"

PROVIDE Y8 @ 8" C/C AS DISTRIBUTORS WHERE EVER REQUIRED

FOR BEAM REINFORCEMENT DETAILS REFER DWG.NO : 007

GENERAL NOTES:

REMOVAL OF FORMWORK(SHUTTERING) :

SHUTTERING OF ANY PART OF THE STRUCTURE SHALL NOT BE REMOVED UNTIL THE CONCRETE ATTAINS 70% THE SPECIFIED STRENGTH OF CONCRETE. HOWEVER THE FOLLOWING MINIMUM PERIOD (AFTER FINAL POUR) SHALL BE ALLOWED BEFORE REMOVAL OF SHUTTERING AS PER CLAUSE II.3.1, IS 456:2000

A) VERTICAL SIDE OF SHUTTERING OF COLUMNS,WALLS

LAP JOINTS FOR REINFORCEMENT BARS :

i) AT ANY CROSS SECTION OF THE MEMBER,NOT MORE THAN 50 % THE BARS SHALL BE LAPPED.

ii) LAPS SHALL BE STAGGERED WITH A MINIMUM CENTRE TO CENTRE DISTANCE OF 1.3 TIMES LAP LENGTH OF THE BAR FOR TENSION & COMPRESSION MEMBERS.

iii) DEVELOPMENT LENGTH (Ld) SHALL BE AS PER (SP:34-1999) TABLE BELOW:

A) DEVELOPMENT LENGTH FOR COLUMN BARS -40D
B) DEVELOPMENT LENGTH FOR BEAM BARS -50D

iv) LAPS IN COLUMNS SHALL BE PROVIDED AT MID HEIGHT OF FLOOR AND NOT AT SLAB LEVEL .

vii) DETAILING OF REBARS SHALL CONFIRM TO IBC

EXCAVATION AND BACKFILL

i) BACKFILL FOR FOUNDATIONS AND PITS SHALL BE PLACED EVENLY LAYERS OF 300 MM THICKNESS AND SHALL BE WELL COMPACTED. THE FILL SHALL CONTAIN NO STONES WITH A DIAMETER GREATER THAN 100 MM. THE DEGREE OF COMPACTION OF BACKFILL SHALL BE 95% OF THE MAXIMUM DRY DENSITY AT OPTIMUM MOISTURE CONTENT OBTAINED BY THE MODIFIED PROCTOR COMPACTION TEST.

ii) UNSUITABLE MATERIALS LIKE ROCKS/ EXISTING FOOTINGS ARE DETECTED BELOW FOUNDATION LEVEL IN AREAS OF CUT SHALL BE EXCAVATED TO FIRM GROUND. THE RESULTANT EXCAVATION SHALL BE FILLED TO THE REQUIRED LEVELS WITH MASS CONCRETE GRADE M10. ALSO WHEREVER EXCAVATION OCCURS BELOW THE FOUNDATION LEVEL STATED ON THE DESIGN DRAWING THE RESULTING VOID SHALL BE BACK FILLED WITH MASS CONCRETE GRADE-M10.

iii) BEFORE CASTING FOUNDATIONS, ANY IMMEDIATE OR ADJACENT AREAS OF DISTURBED OM.AOFT SOIL MUST BE REMOVED AND REPLACED WITH MASS CONCRETE OF GRADE M10

iv) A LAYER OF BLINDING CONCRETE 100 MM THICK SHALL BE PLACED UNDER ALL FOUNDATIONS. BLINDING CONCRETE SHALL HAVE A CHARACTERISTIC STRENGTH OF 10 N/MM AT 28 DAYS.

v) EXCAVATED FINE-GRAINED SOIL ENCOUNTERED AT SHALLOW DEPTHS SHALL BE IN NO CASE USED FOR BACK FILLING PURPOSES.

GENERAL NOTES:

1. ALL DIMENSIONS ARE IN MM.

2. CONCRETE GRADE SHALL BE M25 (1:1.5:3) CONFIRMING TO IS 456:2000

3. GRADE OF REINFORCEMENT MARKED THUS (Y) SHALL BE Fe 500 CONFIRMING TO IS 1786-2008

4. CLEAR COVER FOR REINFORCEMENT
A) BEAM = 30MM B) SLAB = 20MM

5. THIS DRG. READ IN CONJECTION WITH ARCH.DRGS.

6. STRUCTURAL ENGINEER RESPONSIBILITY IS LIMITED TO DESIGN & ISSUAL OF STRUCTURAL DRAWING ONLY

7. ONUS OF CONSTRUCTION LIES WITH CONTRACTOR/OWNER

00	ISSUE FOR APPROVAL	R.P	R.M	18.08.25
REV.	DESCRIPTIONS	DRN	CHK	DATE

PROJECT :-

PLAN SHOWING THE PROPOSED CONSTRUCTION OF STILT FLOOR+3 FLOORS RESIDENTIAL BUILDING WITH 15 DWELLING UNITS (14.00 M HEIGHT) ANNAI INDIRA NAGAR, MEDAVAKKAM, CHENNAI. COMPRISED IN AS PER PATTAS.NO: 206/8A, 8B & 8C OF MEDAVAKKAM VILLAGE, WITHIN THE LIMITS OF ST.THOMAS MOUNT PANCHAYAT UNION.

DRAWING TITLE :-

NUMERATION LAYOUT & R.C LAYOUT OF TYPICAL FLOOR ROOF SLAB & BEAMS

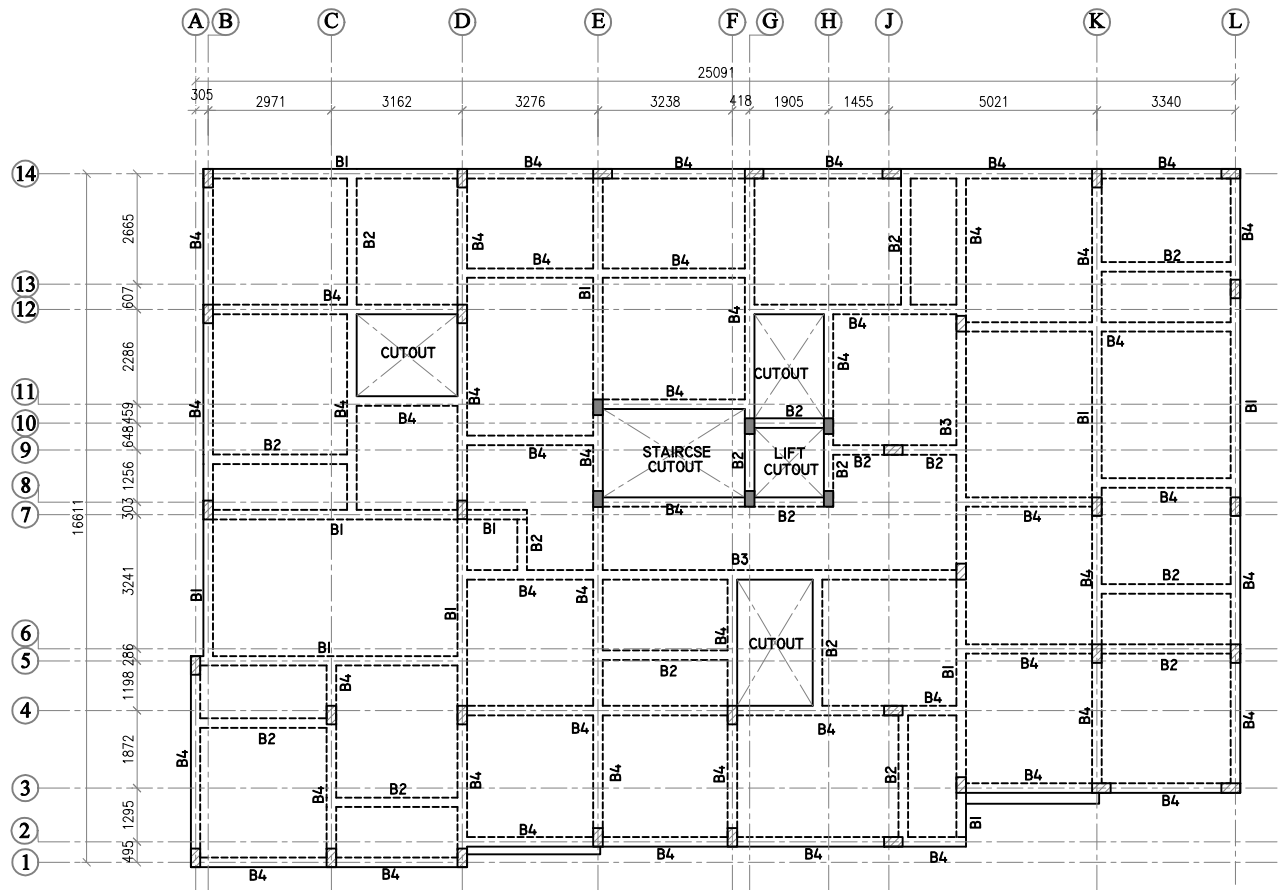
DATE	SCALE	JOB.NO	DRG.NO
18.08.25	1 : 100	—	005

ARCHITECT / CONSULTANTS :-

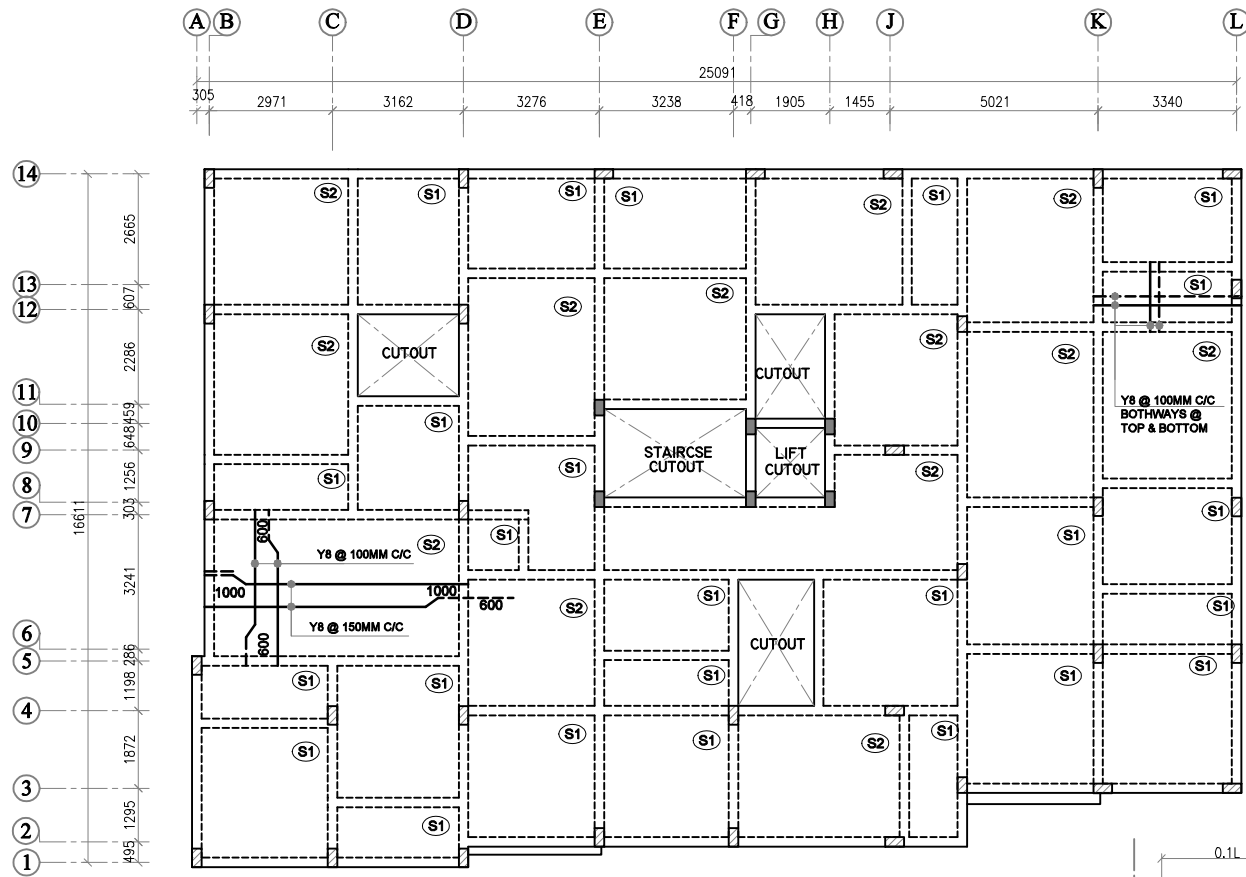
STRUCTURAL CONSULTANTS :-

AURA ENGINEERING CONSULTANTS
#8, 50th St, Sarvamangala Colony, 7th Avenue, ASHOK NAGAR, CHENNAI- 600 083.
Fixed Line :- 044 4859 7100
projects.auraengg@gmail.com
projects@auraengineers.co.in
http://auraengineers.co.in/

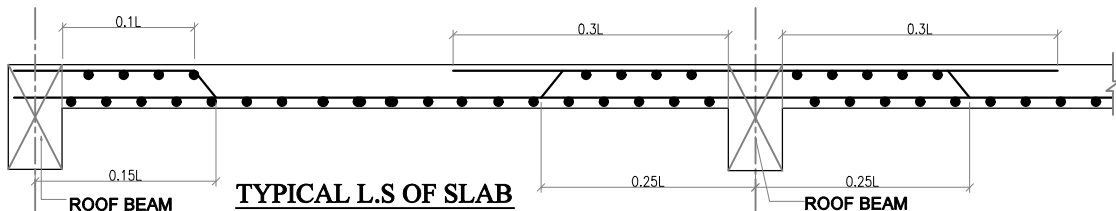




NUMERATION LAYOUT OF TERRACE
FLOOR SLAB & BEAM



R.C LAYOUT OF TERRACE
FLOOR SLAB & BEAM



BEAM SCHEDULE		
SL.NO	NAME	SIZE
01	B1	230 x 450
02	B2	230 x 450
03	B3	230 x 530
04	B4	230 x 450

SLAB SCHEDULE		
SL.NO	NAME	THICK
01	S1	150 THK.
02	S2	150 THK.

FOR APPROVAL ONLY

NOTE:

1 COLUMN CURTAILED TO BE BEND IN TO TOP OF THE SLAB

PROVIDE Y8 @ 8" C/C AS DISTRIBUTORS WHERE EVER REQUIRED

FOR BEAM REINFORCEMENT DETAILS REFER DWG.NO : 007

GENERAL NOTES:

REMOVAL OF FORMWORK(SHUTTERING) :

SHUTTERING OF ANY PART OF THE STRUCTURE SHALL NOT BE REMOVED UNTIL THE CONCRETE ATTAINS 70% THE SPECIFIED STRENGTH OF CONCRETE. HOWEVER THE FOLLOWING MINIMUM PERIOD (AFTER FINAL POUR) SHALL BE ALLOWED BEFORE REMOVAL OF SHUTTERING AS PER CLAUSE II.3.1, IS 456:2000

A) VERTICAL SIDE OF SHUTTERING OF COLUMNS,WALLS

LAP JOINTS FOR REINFORCEMENT BARS :

- AT ANY CROSS SECTION OF THE MEMBER,NOT MORE THAN 50 % THE BARS SHALL BE LAPPED.
- LAPS SHALL BE STAGGERED WITH A MINIMUM CENTRE TO CENTRE DISTANCE OF 1.3 TIMES LAP LENGTH OF THE BAR FOR TENSION & COMPRESSION MEMBERS.
- DEVELOPMENT LENGTH (Ld) SHALL BE AS PER (SP:34-1999) TABLE BELOW:
A) DEVELOPMENT LENGTH FOR COLUMN BARS -40D
B) DEVELOPMENT LENGTH FOR BEAM BARS -50D
- LAPS IN COLUMNS SHALL BE PROVIDED AT MID HEIGHT OF FLOOR AND NOT AT SLAB LEVEL .
- DETAILING OF REBARS SHALL CONFIRM TO IBC

EXCAVATION AND BACKFILL

- BACKFILL FOR FOUNDATIONS AND PITS SHALL BE PLACED EVENLY LAYERS OF 300 MM THICKNESS AND SHALL BE WELL COMPACTED. THE FILL SHALL CONTAIN NO STONES WITH A DIAMETER GREATER THAN 100 MM. THE DEGREE OF COMPACTION OF BACKFILL SHALL BE 95% OF THE MAXIMUM DRY DENSITY AT OPTIMUM MOISTURE CONTENT OBTAINED BY THE MODIFIED PROCTOR COMPACTION TEST.
- UNSUITABLE MATERIALS LIKE ROCKS/ EXISTING FOOTINGS ARE DETECTED BELOW FOUNDATION LEVEL IN AREAS OF CUT SHALL BE EXCAVATED TO FIRM GROUND. THE RESULTANT EXCAVATION SHALL BE FILLED TO THE REQUIRED LEVELS WITH MASS CONCRETE GRADE M10. ALSO WHEREVER EXCAVATION OCCURS BELOW THE FOUNDATION LEVEL STATED ON THE DESIGN DRAWING THE RESULTING VOID SHALL BE BACK FILLED WITH MASS CONCRETE GRADE-M10.
- BEFORE CASTING FOUNDATIONS, ANY IMMEDIATE OR ADJACENT AREAS OF DISTURBED OM.AOFT SOIL MUST BE REMOVED AND REPLACED WITH MASS CONCRETE OF GRADE M10
- A LAYER OF BLINDING CONCRETE 100 MM THICK SHALL BE PLACED UNDER ALL FOUNDATIONS. BLINDING CONCRETE SHALL HAVE A CHARACTERISTIC STRENGTH OF 10 N/MM² AT 28 DAYS.
- EXCAVATED FINE-GRAINED SOIL ENCOUNTERED AT SHALLOW DEPTHS SHALL BE IN NO CASE USED FOR BACK FILLING PURPOSES.

GENERAL NOTES:

- ALL DIMENSIONS ARE IN MM.
- CONCRETE GRADE SHALL BE M25 (1:1.5:3) CONFIRMING TO IS 456:2000
- GRADE OF REINFORCEMENT MARKED THUS (Y) SHALL BE FE 500 CONFIRMING TO IS 1786-2008
- CLEAR COVER FOR REINFORCEMENT
A) BEAM = 30MM B) SLAB = 20MM
- THIS DRG. READ IN CONJECTION WITH ARCH.DRGS.
- STRUCTURAL ENGINEER RESPONSIBILITY IS LIMITED TO DESIGN & ISSUAL OF STRUCTURAL DRAWING ONLY
- ONUS OF CONSTRUCTION LIES WITH CONTRACTOR/OWNER

REV.	DESCRIPTIONS	DRN	CHK	DATE
00	ISSUE FOR APPROVAL	R.P	R.M	18.08.25

PROJECT :-

PLAN SHOWING THE PROPOSED CONSTRUCTION OF STILT FLOOR+3 FLOORS
RESIDENTIAL BUILDING WITH 15 DWELLING UNITS (14.00 M HEIGHT)
ANNAI INDIRA NAGAR, MEDAVAKKAM, CHENNAI. COMPRISED IN AS PER PATTIA
S.NO: 206/8A, 8B & 8C OF MEDAVAKKAM VILLAGE, WITHIN THE LIMITS OF
ST.THOMAS MOUNT PANCHAYAT UNION.

DRAWING TITLE :-

NUMERATION LAYOUT & R.C LAYOUT OF
TERRACE FLOOR SLAB & BEAMS

DATE	SCALE	JOB.NO	DRG.NO
18.08.25	1 : 100	—	006

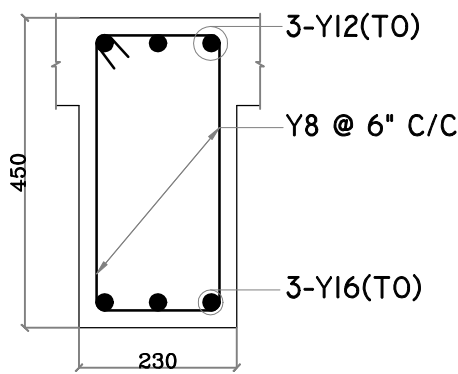
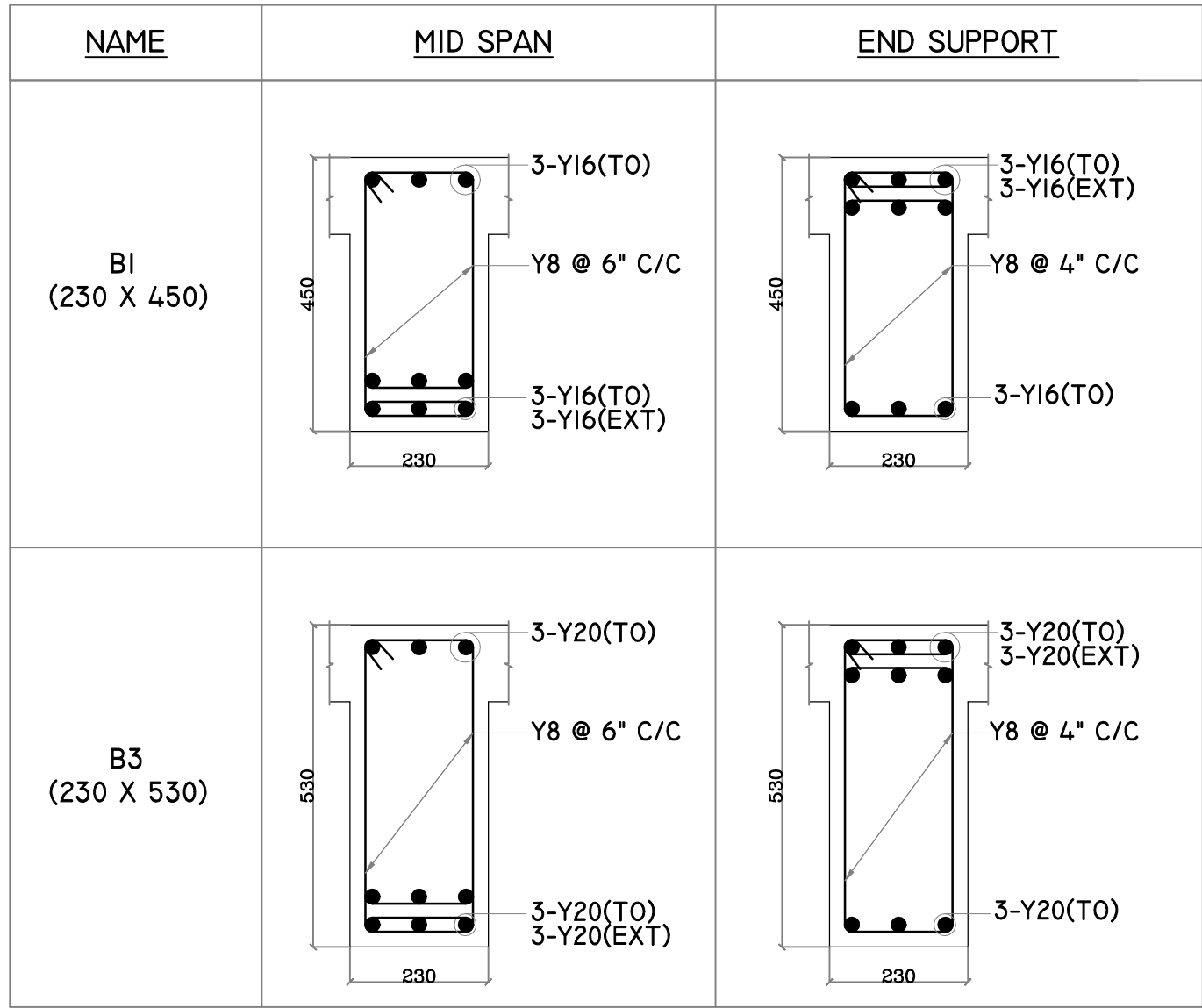
ARCHITECT / CONSULTANTS :-

STRUCTURAL CONSULTANTS :-

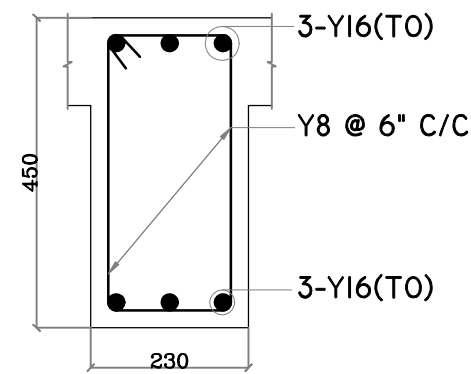
AURA ENGINEERING CONSULTANTS
#8, 50th St, Sarvamangala Colony, 7th Avenue,
ASHOK NAGAR, CHENNAI- 600 083.
Fixed Line :- 044 4859 7100
projects.auraengg@gmail.com
projects@auraengineers.co.in
http://auraengineers.co.in/



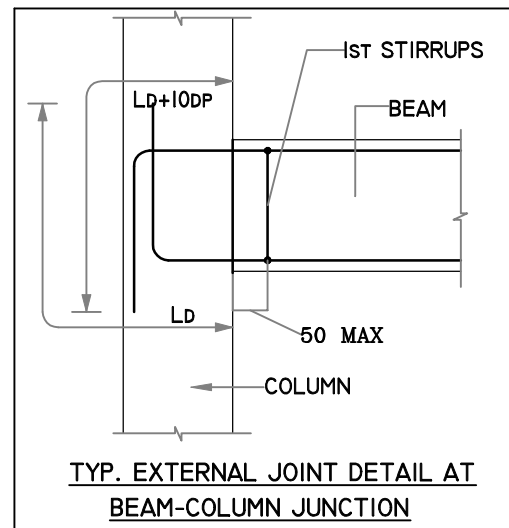
THIS DRAWING IS THE PROPERTY OF M/s. AURA ENGINEERING CONSULTANTS, AND MUST NOT BE COPIED WITHOUT THEIR WRITTEN CONSENT, NOR MADE KNOWN TO THE THIRD PARTY



C.S. OF BEAM "B2"
(230 X 450)

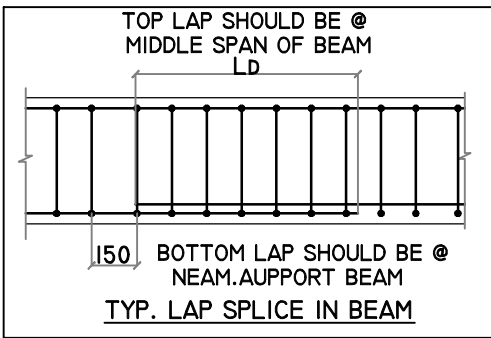


C.S. OF BEAM "B4"
(230 X 450)

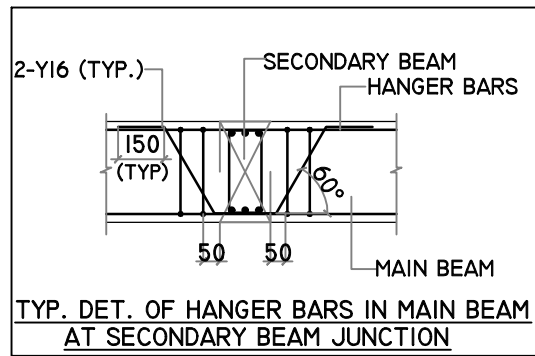


TYP. EXTERNAL JOINT DETAIL AT
BEAM-COLUMN JUNCTION

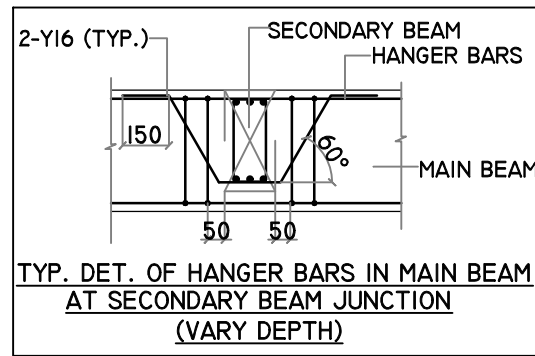
BEAM SCHEDULE		
SL.NO	NAME	SIZE
01	B1	230 x 450
02	B2	230 x 450
03	B3	230 x 530
04	B4	230 x 450



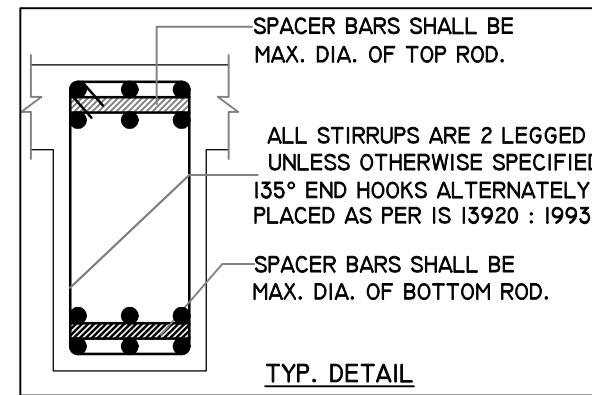
TYP. LAP SPLICE IN BEAM



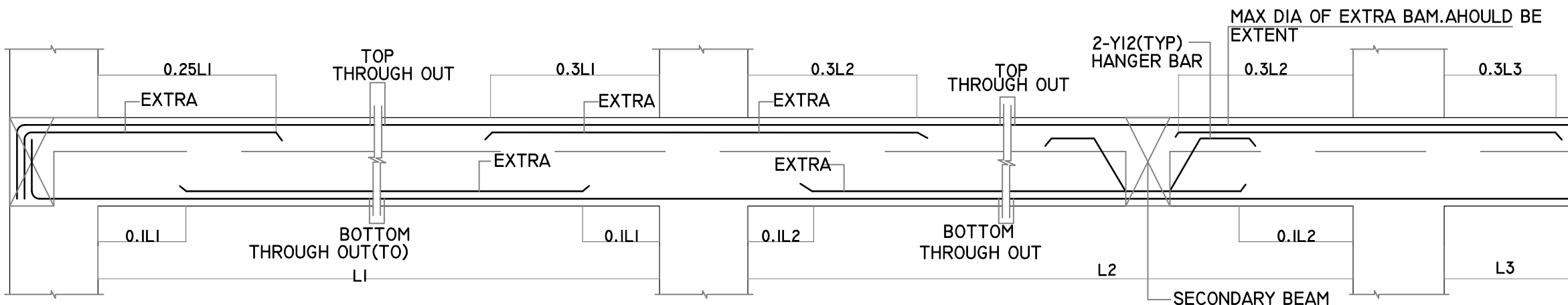
TYP. DET. OF HANGER BARS IN MAIN BEAM
AT SECONDARY BEAM JUNCTION



TYP. DET. OF HANGER BARS IN MAIN BEAM
AT SECONDARY BEAM JUNCTION
(VARY DEPTH)



TYP. DETAIL



TYPICAL L.S OF ROOF BEAM

GENERAL NOTES:

- ALL DIMENSIONS ARE IN FOOT UNITS.
- CONCRETE GRADE SHALL BE M25 CONFIRMING TO IS 456:2000
- GRADE OF REINFORCEMENT MARKED THUS (Y) SHALL BE Fe 500 CONFIRMING TO IS 1786-2008
- CLEAR COVER FOR REINFORCEMENT
A) COLUMN = 1½" B) BEAM = 1"
C) SLAB = ¾"
- THIS DRG. READ IN CONJECTION WITH ARCH.DRGS.
- STRUCTURAL ENGINEER RESPONSIBILITY IS LIMITED TO DESIGN & ISSUAL OF STRUCTURAL DRAWING ONLY
- DEVELOPMENT LENGTH (LD) SHALL BE AS PER (SP:34-1999) TABLE BELOW:

DEVELOPMENT LENGTH FOR COLUMNS	= 40d
DEVELOPMENT LENGTH FOR BEAMS	= 50d
- DETAILING OF REBARS SHALL CONFIRM TO SP-34 & IS 13920.

00	ISSUE FOR APPROVAL	R.P	R.M	18.08.25
REV.	DESCRIPTIONS	DRN	CHK	DATE

PROJECT :-

PLAN SHOWING THE PROPOSED CONSTRUCTION OF STILT FLOOR+3 FLOORS RESIDENTIAL BUILDING WITH 15 DWELLING UNITS (14.00 M HEIGHT) ANNAI INDIRA NAGAR, MEDAVAKKAM, CHENNAI. COMPRISED IN AS PER PATT A.S.NO: 206/8A, 8B & 8C OF MEDAVAKKAM VILLAGE, WITHIN THE LIMITS OF ST.THOMAS MOUNT PANCHAYAT UNION.

DRAWING TITLE :- R.C. DETAILS FOR ALL FLOOR BEAMS

DATE	SCALE	JOB.NO	DRG.NO
18.08.25	1 : 130	---	007

ARCHITECT / CONSULTANTS :-

STRUCTURAL CONSULTANTS :-



AURA ENGINEERING CONSULTANTS
#8, 50th St, Sarvamangala Colony, 7th Avenue,
ASHOK NAGAR, CHENNAI- 600 083.
Fixed Line :- 044 4859 7100
projects.auraengg@gmail.com
projects@auraengineers.co.in
http://auraengineers.co.in/