

DESIGN CALCULATION

PLAN SHOWING THE PROPOSED CONSTRUCTION OF STILT FLOOR + 5 FLOORS (HEIGHT –18.30M) RESIDENTIAL BUILDING WITH 40 DWELLING UNITS BAJANAI KOIL 2ND STREET ,PALLAVARAM, CHENNAI 600043 COMPRISED IN OLD S.NO.346/12, 346/13 & 352/44B, 352/44A & 346/14B (DOCUMENT) AND T.S.NO.94, 95, 96, 99 & 147 (PATTA), BLOCK NO.9, WARD NO.B, ZAMIN PALLAVARAM VILLAGE, PALLAVARAM TALUK WITHIN THE LIMIT OF TAMBARAM MUNICIPAL CORPORATION

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Structural Design Calculation for Construction of RESIDENTIAL BUILDING (S+5)
BAJANAI KOIL 2ND STREET, PALLAVARAM, TAMBARAM

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1.0 DESIGN BRIEF:

THIS DOCUMENT PLAN SHOWING THE PROPOSED CONSTRUCTION OF STILT FLOOR + 5 FLOORS (HEIGHT –18.30M) RESIDENTIAL BUILDING WITH 40 DWELLING UNITS BAJANAI KOIL 2ND STREET, PALLAVARAM, CHENNAI 600043 COMPRISED IN OLD S.NO.346/12, 346/13 & 352/44B, 352/44A & 346/14B (DOCUMENT) AND T.S.NO.94, 95, 96, 99 & 147 (PATTA), BLOCK NO.9, WARD NO.B, ZAMIN PALLAVARAM VILLAGE, PALLAVARAM TALUK WITHIN THE LIMIT OF TAMBARAM MUNICIPAL CORPORATION

2.0 GENERAL DESIGN CRITERIA

2.1. Description of the structure

The Residential Building consists of Stilt Floor + 5 Upper floors and the structure is designed as a RCC framed structure.

- | | |
|---|---|
| 1. Size of the building | : 36.94 X 47.68M |
| 2. Height of the building | : 18.30M |
| 3. Number of storeys above GL | : Stilt Floor +5 upper floors |
| 4. Floor to floor height of this building | : Stilt and First floors - 3.05m
: Typical floor – 3.05m |
| 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


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- D.L. due to partitions
(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


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- Beams = 30mm
- 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.

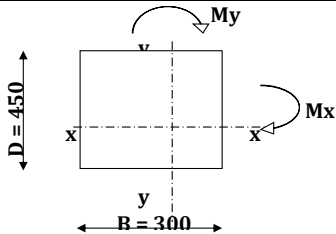


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APPENDIX I
Design Calculations
Column Design



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PROJECT	RESIDENTIAL BUILDING (S+5) BAJANAI KOIL 2ND STREET, PALLAVARAM, TAMBARAM	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:			CRITICAL LOAD CASE:	
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		Cl 26.4.2.1,IS456:2000
	Diameter of the Bar	=	25 mm	≥ 12 mm	
	d'	=	52.5 mm		
1.3	Basic Dimensions				
	Unsupported Length of the Column	L _{ox}	=	3000 mm	Table 28 , IS456:2000
		L _{oy}	=	3000 mm	
		L _{ex}	=	3000 mm	
		L _{ey}	=	3000 mm	
	Size of the Column	B X D	=	300 x 450 mm	
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	CI 25.1.2, IS456:2000
	Slenderness Ratio about Minor Axis	L _{ey} / B	=	10.000	
	Since Leff / LLD <12 Designed as Short Column				
3.0	Check for Eccentricity				
	Minimum Eccentricit e _x	= L _{ox} / 500 + D / 30	=	21.0 mm >20	CI 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	

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CL. NO.	DESIGN CALCULATIONS	REFERENCES			
5.0	Uniaxial Moment Carrying capacity of the Section about X & Y- axis $d' / D = 0.117$ $d' / B = 0.175$ 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 $M_{ux1} / f_{ck}BD^2 =$ $M_{uy1} / f_{ck}DB^2 =$ Moment carrying capacity about X axis $M_{ux1} =$ kN.m Moment carrying capacity about Y axis $M_{uy1} =$ kN.m Pu < Axial Load Carrying capacity ; Hence O.K	Chart 43 - 46 SP 16 : 1980			
6.0	Calculation of P_{uz} $P_{uz} = 0.45 f_{ck} A_c + 0.75 f_y A_{sc} = 2500.88 \text{ kN}$ $P_u / P_{uz} = 0.312$ $a_n = 1.186$	CI 39.6 , IS456:2000 CI 39.6 , IS456:2000			
7.0	Criteria for Biaxial Bending (Bresler's Formulation) $(M_{ux}/M_{ux1})^{an} + (M_{uy}/M_{uy1})^{an} = 1$	CI 39.6 , IS456:2000			
8.0	Longitudinal Reinforcement Area of compression Steel $A_{sc,reqd} = 2700 \text{ mm}^2$ 10 No Y20 + No Y20 $A_{sc,pro} = 3142 \text{ mm}^2$				
8.1	Check for Minimum & Maximum Area of Steel Minimum Area of ste (0.8 % of A_g ,dir) $= 441 \text{ mm}^2$ (Based on the area of concrete reqd to resist direct stress) Maximum Area of ste (4 % of A_g) $= 5400 \text{ mm}^2$ 441 < 3142 < 5400 mm^2 Area of Steel is with in the permissible limit ; Hence O.K	CI 26.5.3.1 a & b , IS 456 : 2000			
9.0	Transverse Reinforcement				
9.1	Diameter of Transverse Reinforcement $= 8 \text{ mm} \geq 6 \text{ mm}$	CI 26.5.3.2 c 2) ,			
9.2	Spacing of Lateral Ties : i) Least Lateral Dimension of the column $= 300 \text{ mm}$ ii) 16 times the Smallest dia of Longitudinal Steel $= 320 \text{ mm}$ iii) $= 300 \text{ mm}$ Reqd. Spacing of Ties (Minimum of the above) $= 300 \text{ mm}$ Provide 8 mm dia Lateral Ties @ 300 mm Spacing Provide closer spacing on either side of the column above and below beam / slab.	CI 26.5.3.2 c 1) , IS 456 : 2000			


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Footing Design



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RESIDENTIAL BUILDING (S+5) BAJANAI KOIL 2ND STREET, PALLAVARAM, TAMBARAM

Design of Isolated Footing

F2

Node : **38**

Basic Data:

Net Safe Bearing Capacity	150 kN/m ²
Unit weight of Soil	18 kN/m ³
Unit weight of Concrete	25 kN/m ³
Grade of Concrete	25 N/mm ²
Grade of Steel	500 N/mm ²
Clear Cover to Reinforcement	50 mm
Earth Fill above FGL	0 mm
Base Area of Footing	3.78 m ²
I _{xx}	1.02 m ⁴
I _{zz}	1.39 m ⁴
Weight of Footing	47.25 kN
Weight of soil	85.29 kN

Gross Bearing Pressure Calculation (kN/m²)

Critical Load Combinations	P _{max}	P _{min}
200	154.11	154.111905
0	35.06	35.06

Gross SB (w/o increase) 182.4 kN/m²

Hence **OK**

Factored Net Upward Pressure Calculation

Load Factor for Design 1.5

Critical Load Combinations	P _{max}	P _{min}
200	178.57	178.571429
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 M_{ux} 432.00 mm

Provided Eff. depth for M_{uz} 444.00 mm

M_{u,lim} ##### kN.m

Depth provided is #####

Bottom Reinforcement

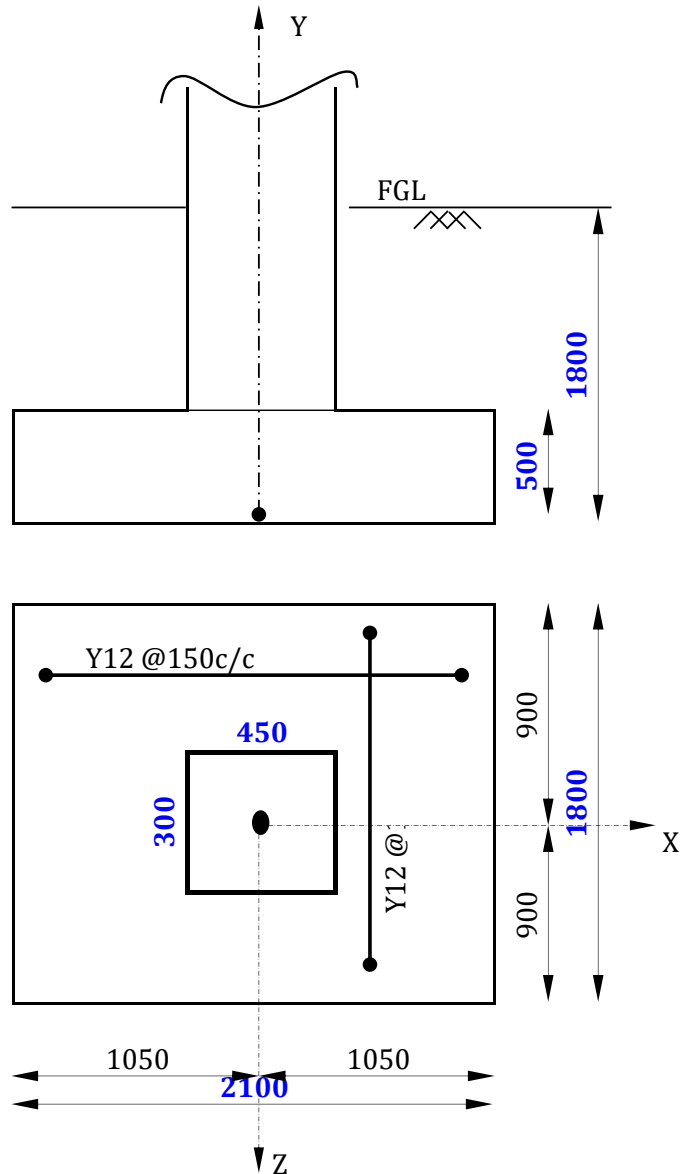
A_{st} Required for M_{ux} ##### mm²

A_{st} Required for M_{uz} ##### mm²

Min. A_{st} Req'd. 600 mm²

Bottom Reinforcement

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



A _{st} Provided	A _{st} Required	
754	#NAME? mm ²	Hence
754	#NAME? mm ²	#####


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Design of Isolated Footing

F2

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	#NAME?	N/mm ²	#NAME?
Shear Stress (Plane ll to Z)	0.153	#NAME?	N/mm ²	#NAME?

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_x = 0.00 kNm

Net Moments acting at Pad Level, M_z = 0.00 kNm

Weight of pad = 47.25 kN

Weight of Over burden Earth = 85.29 kN

Total downward Load = 582.54 kN

Stabilizing moment along X-Dir = 582.54 x 1.05

= 611.67 kNm

Actuating moment, M_{zz} = 0.00 kNm

Factor of Safety (Along X-Dir) = 611.67 / 0.0
- > 1.40

Hence **OK**

Check For Sliding

Resistance against Sliding = 332.05 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) = 332.0 / 2.5
130.73 > 1.40

Hence **OK**

Factor of Safety (Along Z-Dir) = 332.0 / 5.3
62.65 > 1.4

Hence **OK**

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Plinth Beam Design


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TITLE		REVISION	DATE	CHECKED RMK	DATE															
CL. NO.	BEAM DESIGN CALCULATIONS			REFERENCES																
1.1	<u>Geometry Data</u> Beam Number = PB2 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 = 131.96 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																		


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				RMK																																				
TITLE		REVISION	DATE	CHECKED	DATE																																			
				RMK																																				
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 $A_{st\ reqd} = 131.96$ mm ² Required Area of compression steel $A_{sc\ reqd} = 0$ mm ²																																							
	Detail of bars <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>0</td><td>0</td></tr><tr><td></td><td colspan="4">$A_{st\ provided} = 603.19$ mm²</td></tr><tr><td></td><td>Nos</td><td>Dia</td><td>Nos</td><td>Dia</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="4">$A_{sc\ provided} = 603.19$ mm²</td></tr></table> Percentage of tension steel provided $p_t = 0.777$ % Hence O.K Percentage of compression steel provid $p_c = 0.777$ % Hence O.K				I st Layer		II nd Layer			Nos	Dia	Nos	Dia	Tension Reinforcement	3	16	0	0		$A_{st\ provided} = 603.19$ mm ²					Nos	Dia	Nos	Dia	Compression Reinforcement	3	16	0	0		$A_{sc\ provided} = 603.19$ mm ²					
	I st Layer		II nd Layer																																					
	Nos	Dia	Nos	Dia																																				
Tension Reinforcement	3	16	0	0																																				
	$A_{st\ provided} = 603.19$ mm ²																																							
	Nos	Dia	Nos	Dia																																				
Compression Reinforcement	3	16	0	0																																				
	$A_{sc\ provided} = 603.19$ mm ²																																							
	Check for Shear Shear = 149 kN Nominal Shear Stress $t_v = 1.92$ N/mm ² Permissible Shear Stress $t_c = 0.92$ N/mm ² Maximum Shear Stress $t_{c,max} = 2.5$ 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 $\beta = 1.000$ 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 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																																				

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Structural Design Calculation for Construction of RESIDENTIAL BUILDING (S+5)
BAJANAI KOIL 2ND STREET, PALLAVARAM, TAMBARAM

Floor Beam Design



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PROJECT	RESIDENTIAL BUILDING (S+5) BAJANAI KOIL 2ND STREET, PALLAVARAM, TAMBARAM	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 = B3 Type of Beam = Rectangular Beam Support Condition = Continuous Beam Width of beam b = 230 mm Overall Depth of Beam D = 530 mm Dia of bar Φ = 25 mm Nominal Cover cc = 30 mm Effective Depth d = 487.5 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 = 181.75 kNm																																		
1.4	<u>Area of Steel</u> Minimum Area of Ste = 0.17% b d = 190.6125 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 = 4.647 Percentage of tension steel reqd p _t = 1.277 % Percentage of compression steel reqd p _c = 0.359 % Required Area of tension steel A _{st reqd} = 1431.84 mm ² Required Area of compression steel A _{sc reqd} = 402.53 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>20</td><td>3</td><td>20</td></tr><tr><td></td><td></td><td>A_{st} provided</td><td>=</td><td>1884.96 mm²</td></tr><tr><td></td><td>Nos</td><td>Dia</td><td>Nos</td><td>Dia</td></tr><tr><td>Compression Reinforcement</td><td>3</td><td>20</td><td>3</td><td>20</td></tr></table>				I st Layer		II nd Layer			Nos	Dia	Nos	Dia	Tension Reinforcement	3	20	3	20			A _{st} provided	=	1884.96 mm ²		Nos	Dia	Nos	Dia	Compression Reinforcement	3	20	3	20		
	I st Layer		II nd Layer																																
	Nos	Dia	Nos	Dia																															
Tension Reinforcement	3	20	3	20																															
		A _{st} provided	=	1884.96 mm ²																															
	Nos	Dia	Nos	Dia																															
Compression Reinforcement	3	20	3	20																															


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PROJECT	RESIDENTIAL BUILDING (S+5) BAJANAI KOIL 2ND STREET, PALLAVARAM, TAMBARAM	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 = 1.681 % Hence O.K Percentage of compression steel provided p_c = 1.681 % Hence O.K Check for Shear Shear = 241 kN Nominal Shear Stress t_v = 2.15 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 = 150.0 Maximum Spacing of Shear Reinforcement = 300 Provide 8 mm dia 2 legged stirrups @ 150mm c/c spacing Support 2 Negative moment = 254 kNm Hence the Section is designed as Doubly Reinforced Section M_u/bd^2 = 4.647 Percentage of tension steel reqd p_t = 1.277 % Percentage of compression steel reqd p_c = 0.359 % Required Area of tension steel $A_{st\ reqd}$ = 1431.84 mm² Required Area of compression steel $A_{sc\ reqd}$ = 402.53 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 = 1.681 % Hence O.K Percentage of compression steel provided p_c = 1.681 % Hence O.K Check for Shear Shear = 241 kN Nominal Shear Stress t_v = 2.15 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 = 150.0 Maximum Spacing of Shear Reinforcement = 300 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				


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TITLE			REVISION	DATE	CHECKED RMK	DATE
CL. NO.	BEAM DESIGN CALCULATIONS				REFERENCES	
	Provide 8 mm dia 2 legged stirrups @ 150mm 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		=	1.277 %		
	Percentage of compression steel reqd p_c		=	0.359 %		
	Required Area of tension steel $A_{st\ reqd}$		=	1431.84 mm ²		
	Required Area of compression steel $A_{sc\ reqd}$		=	402.53 mm ²		
	Detail of bars					
	I st Layer		II nd Layer			
	Nos	Dia	Nos	Dia		
	Tension Reinforcement 3	20	3	20		
		A_{st} provided	=	1884.96 mm ²		
	Nos	Dia	Nos	Dia		
	Compression Reinforcement 3	20	3	20		
		A_{sc} provided	=	1884.96 mm ²		
	Percentage of tension steel provided p_t		=	1.681 %	Hence O.K	
	Percentage of compression steel provided p_c		=	1.681 %	Hence O.K	
	Check for Shear					
	Shear		=	241 kN		
	Nominal Shear Stress τ_v		=	2.15 N/mm ²	Cl 40.1, IS456:2000	
	Permissible Shear Stress τ_c		=	0.92 N/mm ²	$\beta = 1.000$	
	Maximum Shear Stress $\tau_{c,max}$		=	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		=	150.0	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 @ 150mm c/c spacing					
	Check For Deflection					
	Basic Value		=	26	Cl.23.2, IS456:2000	
	Service Stress in Steel f_s		=	220.29 N/mm ²		
	Modification Factor(Tension Reinforcement) F_1		=	0.93		
	Allowable Span/Depth		=	24.18		
	Actual Span/Depth		=	7.59	Hence Safe	


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Structural Design Calculation for Construction of RESIDENTIAL BUILDING (S+5)
BAJANAI KOIL 2ND STREET, PALLAVARAM, TAMBARAM

Floor Slab Design



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PROJECT	RESIDENTIAL BUILDING (S+5) BAJANAI KOIL 2ND STREET, PALLAVARAM, TAMBARAM	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				Table 16 Cl.26.4.2 , IS 456 -2000
	Unit weight of concrete = 25 KN/m ³				Cl 19.2.1, IS 456-2000
	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				Cl D-1.11, IS 456-2000
	Edge Condition One Long edge Discontinuous				
1.0.2	<u>Load Data</u>				
	Self Weight of Slab = 0.150 x 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				IS 875 (Part 2) -1987
	Extra Load, (if Any) = 0.000 KN/m ²				
	Total load = 8.250 KN/m ²				
	Design load (W_u) = 1.5 x 8.25 = 12.375 KN/m ²				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 → 0.051				Table 26 Cl D-1.1, IS 456 -2000
	1.75 → 0.059				
	for 1.54 a_x = 0.052				
	Positive moment 0.052 x 12.38 x 5 ^2 = 16.17 KN-m				
	a_x for negative moment 1.5 → 0.067				Table 26 Cl D-1.1, IS 456 -2000
	1.75 → 0.077				
	for 1.54 a_x = 0.069				
	Negative moment 0.069 x 12.38 x 5 ^2 = 21.22 KN-m				


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PROJECT	RESIDENTIAL BUILDING (S+5) BAJANAI KOIL 2ND STREET, PALLAVARAM, TAMBARAM	DOCUMENT NO.	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			Table 26 Cl D-1.1, IS 456 -2000	
	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			Table 26 Cl D-1.1, IS 456 -2000	
1.0.5	Check Effective Depth for Max.Bending Moment				
	Depth require $= (M_u / (0.133 \times f_{ck} \times b))^{\frac{1}{3}} = 79.89$ mm Depth provide $= 150 - 25 - 10 / 2 = 120$ mm > ### mm			Table C,SP 16 :1980 Cl 2.3	
	Hence the section is Safe against Bending				
1.0.6	Check Depth for Shear				
	Nominal Shear Stress $t_v = V_u / b d = 0.26$ N/mm ² Design shear stress (t_c) $= 0.46$ N/mm ² $k = 1.30$ $k * t_c = 0.60$ N/mm ²			Cl.40.1, IS 456:2000 Table 19, IS 456:2000 Cl.40.2.1.1, IS 456:2000	
	$t_v < k * t_c$ Hence the section is Safe against Shear				
1.0.7	Check for Maximum Shear Stress:				
	Nominal Shear Stress $t_v = V_u / b d = 0.26$ N/mm ² Maximum Shear Stress ($t_{c, max}$) $= 3.1$ N/mm ² $\# t_{c, max} = 1.55$ N/mm ²			Cl.40.1, IS 456:2000 Table 20, IS 456:2000	
	$t_v < 1 t_{c, max}$ Hence the section is Safe against Max.Shear Stress			Cl.40.2.3.1, IS 456:2000	
1.0.7	Reinforcement calculations				
	Short Span Direction @ Support				
	$M_u / b d = \frac{21.22 \times 10^6}{1000 \times \# \times 120} = 1.474$ $P_t = 0.37$ %			Table 2-4, SP16 :1980	


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TITLE	TWO WAY SLAB DESIGN	REVISION	DATE	CHECKED	DATE	
CL. NO.	DESIGN CALCULATIONS			REFERENCES		
	Area of steel $\therefore = 0.0037 \times 1000 \times 120 = 439 \text{ mm}^2$ Minimum area of $0.001 \times 1000 \times 150 = \text{####} \text{ mm}^2$ Spacing of # bar $78.54 \times 1000 / 438.88 = 179 \text{ mm}$ Check for Spacing Minimum of 1) $3d = 360 \text{ mm}$ 2) $= 300 \text{ mm}$ 3) $= 178.86 \text{ mm}$ 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 $\therefore = 0.0027 \times 1000 \times 120 = 328 \text{ mm}^2$ Minimum area of $0.001 \times 1000 \times 150 = \text{####} \text{ mm}^2$ Spacing of # bar $78.54 \times 1000 / 327.93 = 239 \text{ mm}$ Check for Spacing Minimum of 1) $3d = 360 \text{ mm}$ 2) $= 300 \text{ mm}$ 3) $= 239.38 \text{ mm}$ 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 $\therefore = 0.0019 \times 1000 \times 120 = 228 \text{ mm}^2$ Minimum area of $0.001 \times 1000 \times 150 = \text{####} \text{ mm}^2$ Spacing of # bar $78.54 \times 1000 / 228.07 = 344 \text{ mm}$			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		


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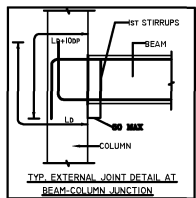
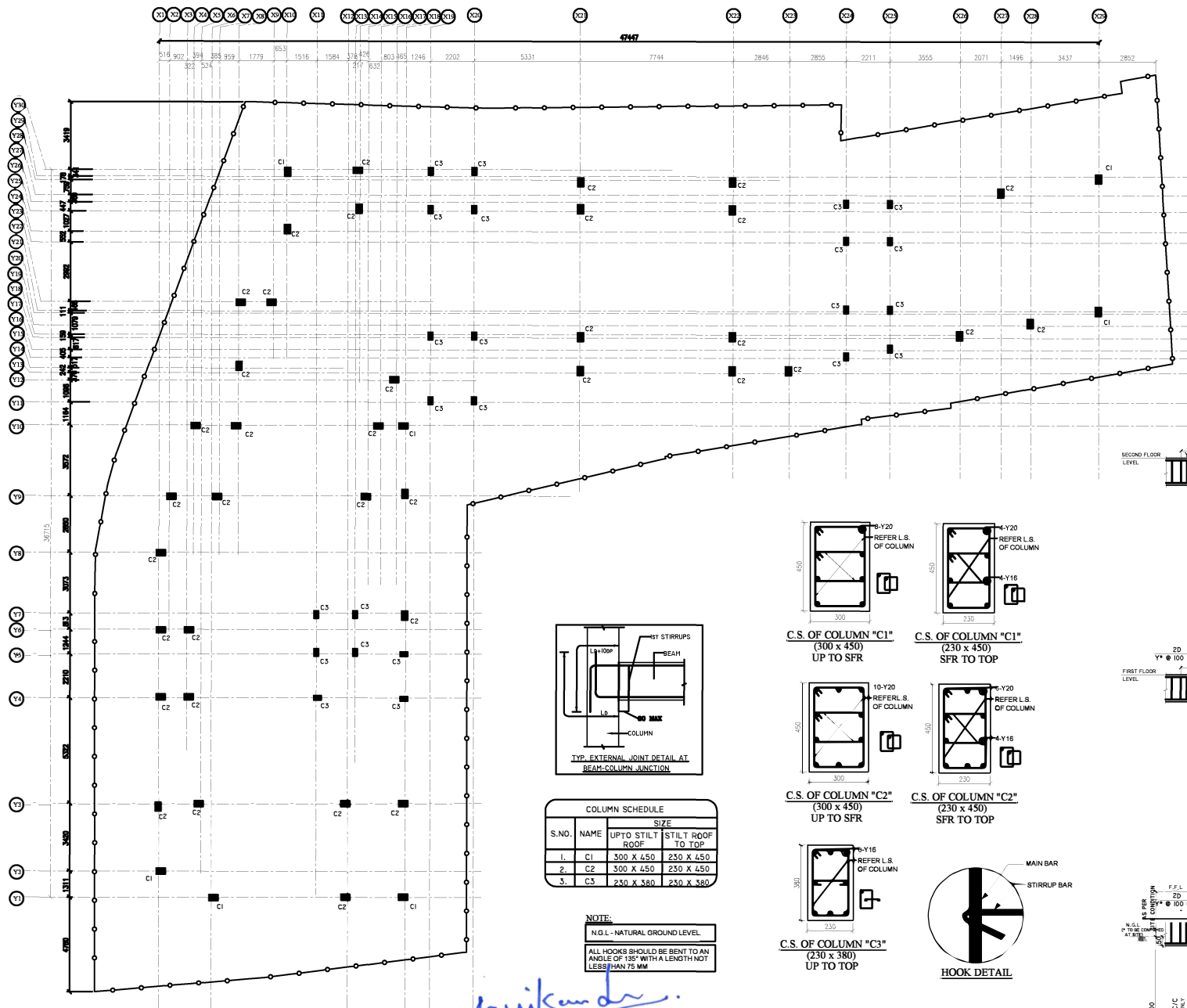
PROJECT	RESIDENTIAL BUILDING (S+5) BAJANAI KOIL 2ND STREET, PALLAVARAM, TAMBARAM	DOCUMENT NO.	DATE	DESIGNED	DATE
TITLE	TWO WAY SLAB DESIGN	REVISION	DATE	CHECKED	DATE
CL. NO.	DESIGN CALCULATIONS			REFERENCES	
1.0.8	Check for Spacing				
	Minimum of			IS 456:2000	
	1) 3d = 360 mm			Cl:26.3.3.(b).1	
	2) = 300 mm				
	3) = 344.20 mm				
	Therefore provide # @ 300 mm C/C				
	Long Span Direction @ mid Span				
	$M_u/bd = \frac{8.66 \times 10^6}{1000 \times \# \times 120} = 0.602$			SP16 :1980 Table 2-4	
	Pt = 0.142 %				
	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				
	1.0.8 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 fy (Ast_R/Ast_P) = 181.63 N/mm ²			IS456:2000 Fig 4	
	Modification Factor for Tension Reinforcement = 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				


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APPENDIX II
GENERAL ARRANGEMENT DRAWINGS

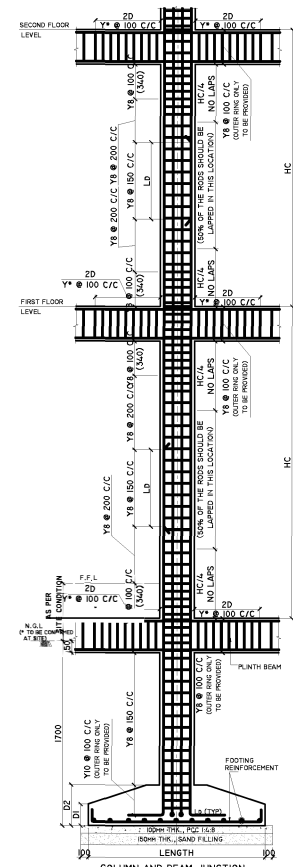
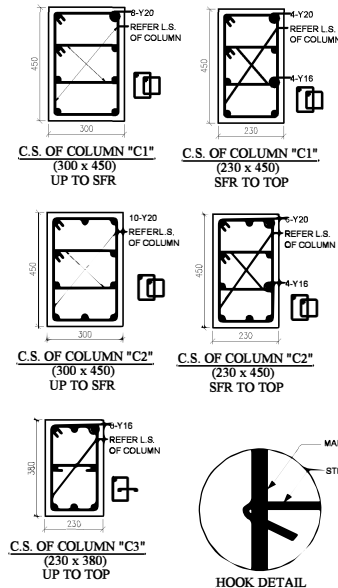

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COLUMN SCHEDULE				
S.NO.	NAME	UP TO STILT FLOOR	STILT FLOOR TO ROOF	TO TOP
1.	C1	300 X 450	230 X 450	
2.	C2	300 X 450	230 X 450	
3.	C3	230 X 380	230 X 380	

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.



GENERAL NOTES:
REMOVAL OF FORMWORK (SHUTTERING):
SHUTTERING OF ANY PART OF THE STRUCTURE SHALL NOT BE REMOVED UNTIL THE CONCRETE ATTAINS 70% OF THE SPECIFIED STRENGTH OF CONCRETE. HOWEVER THE FOLLOWING MINIMUM PERIOD (AFTER FINAL POUR) SHALL BE ALLOWED BEFORE REMOVAL OF SHUTTERING AS PER CLAUSE 11.3.1, IS 456:2000
A) VERTICAL SIDE OF SHUTTERING OF COLUMNS, WALLS
B) 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 (L_d) SHALL BE AS PER (SP-34-1999) TABLE BELOW:
A) DEVELOPMENT LENGTH FOR COLUMN BARS -400
B) DEVELOPMENT LENGTH FOR BEAM BARS -500
iv) LAPS IN COLUMNS SHALL BE PROVIDED AT MID HEIGHT OF FLOOR AND NOT AT SLAB LEVEL
v) DETAILING OF REBARS SHALL CONFORM TO IRC
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:**
- 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) COLUMN = 40MM
 - THIS DRG. READ IN CONJUNCTION WITH ARCH.DRGS.
 - COLUMNS AND FOOTINGS ARE DESIGNED FOR S+5 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 / NOT FIT FOR CONSTRUCTION	J.V	R.M	20.04.26

PROJECT :-
PLAN SHOWING THE PROPOSED CONSTRUCTION OF STILT FLOOR + 5 FLOORS (HEIGHT -18.30M) RESIDENTIAL BUILDING WITH 40 DWELLING UNITS AFFORDABLE HOUSING AT DR.SOLOMON STREET AND BAJANAI KOIL 2ND STREET, PALLAVARAM, CHENNAI 600043 COMPRISED IN OLD S.NO.346/12, 346/13 & 352/44B, 352/44A, & 346/14B (DOCUMENT) AND T.S.NO.94, 95, 96, 99 & 1147 (PATTU), BLOCK NO.9, WARD NO.8, ZAMIN PALLAVARAM VILLAGE, PALLAVARAM TALUK WITHIN THE LIMIT OF TAMBARAM MUNICIPAL CORPORATION

DRAWING TITLE :-			
LAYOUT & R.C DETAILS OF COLUMN			
DATE	SCALE	JOB.NO	DRG.NO
20.04.26	1 : 120	-----	001

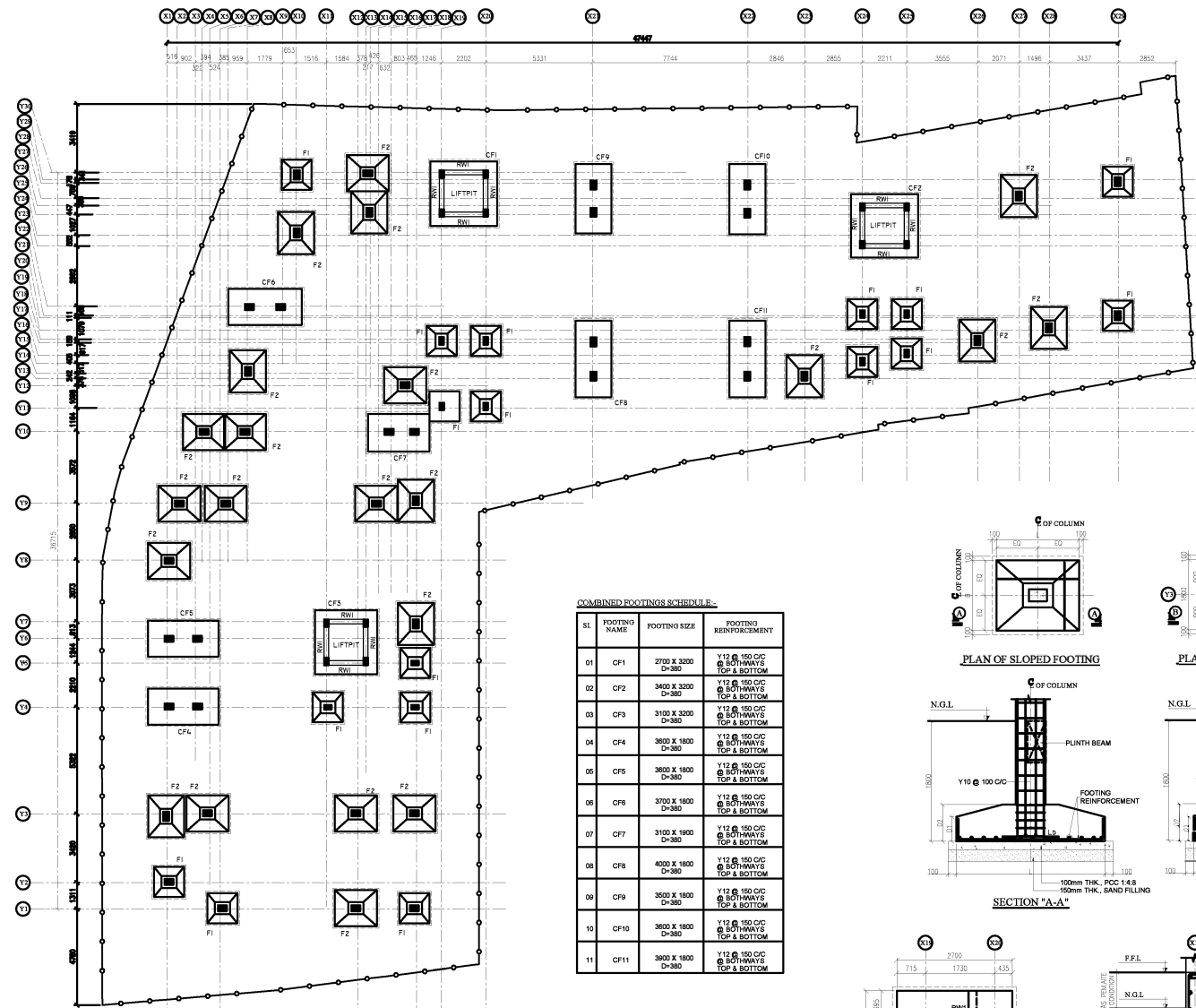
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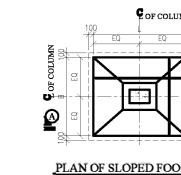
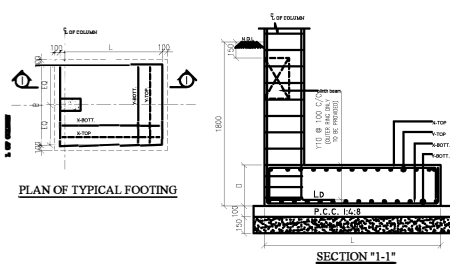


COMBINED FOOTINGS SCHEDULE:-

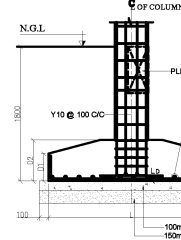
SL.	FOOTING NAME	FOOTING SIZE	FOOTING REINFORCEMENT
01	CF1	2700 X 3200 D=380	Y12 @ 150 C/C @ BOTHWAYS TOP & BOTTOM
02	CF2	3400 X 3200 D=380	Y12 @ 150 C/C @ BOTHWAYS TOP & BOTTOM
03	CF3	3100 X 3200 D=380	Y12 @ 150 C/C @ BOTHWAYS TOP & BOTTOM
04	CF4	3600 X 1800 D=380	Y12 @ 150 C/C @ BOTHWAYS TOP & BOTTOM
05	CF5	3600 X 1800 D=380	Y12 @ 150 C/C @ BOTHWAYS TOP & BOTTOM
06	CF6	3700 X 1800 D=380	Y12 @ 150 C/C @ BOTHWAYS TOP & BOTTOM
07	CF7	3100 X 1900 D=380	Y12 @ 150 C/C @ BOTHWAYS TOP & BOTTOM
08	CF8	4000 X 1800 D=380	Y12 @ 150 C/C @ BOTHWAYS TOP & BOTTOM
09	CF9	3600 X 1800 D=380	Y12 @ 150 C/C @ BOTHWAYS TOP & BOTTOM
10	CF10	3600 X 1800 D=380	Y12 @ 150 C/C @ BOTHWAYS TOP & BOTTOM
11	CF11	3800 X 1800 D=380	Y12 @ 150 C/C @ BOTHWAYS TOP & BOTTOM

FOOTINGS SCHEDULE:-

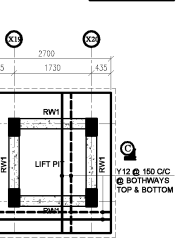
SL.	FOOTING NAME	FOOTING SIZE	FOOTING REINFORCEMENT
01	F1	1500 X 1500 SLOPED FOOTING D=250, D2=450	Y10 @ 150 C/C @ BOTHWAYS TOP & BOTTOM
02	F2	1800 X 2100 SLOPED FOOTING D1=300, D2=550	Y12 @ 150 C/C @ BOTHWAYS TOP & BOTTOM



PLAN OF SLOPED FOOTING

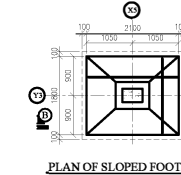


SECTION "A-A"

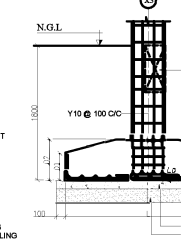


PLAN OF COMBINED FOOTING

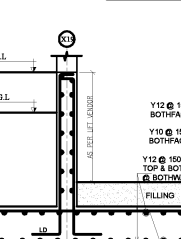
NOTE:
N.G.L. - NATURAL GROUND LEVEL



PLAN OF SLOPED FOOTING-F2



SECTION "B-B"



SECTION "C-C"

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 -400
B) DEVELOPMENT LENGTH FOR BEAM BARS -500
IV) LAPS IN COLUMNS SHALL BE PROVIDED AT MID HEIGHT OF FLOOR AND NOT AT SLAB LEVEL
V) DETAILING OF REBARS SHALL CONFORM TO IRC
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-10.
III) BEFORE CASTING FOUNDATIONS, ANY IMMEDIATE OR ADJACENT AREAS OF DISTURBED OR AOPT SOIL MUST BE REMOVED AND REPLACED WITH MASS CONCRETE OF GRADE 10
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** CONFORMING TO IS 456:2000
3. GRADE OF REINFORCEMENT MARKED THUS (Y) SHALL BE **FE 500** CONFORMING 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+5 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

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DRAWING TITLE :-
LAYOUT & R.C DETAILS OF FOOTING

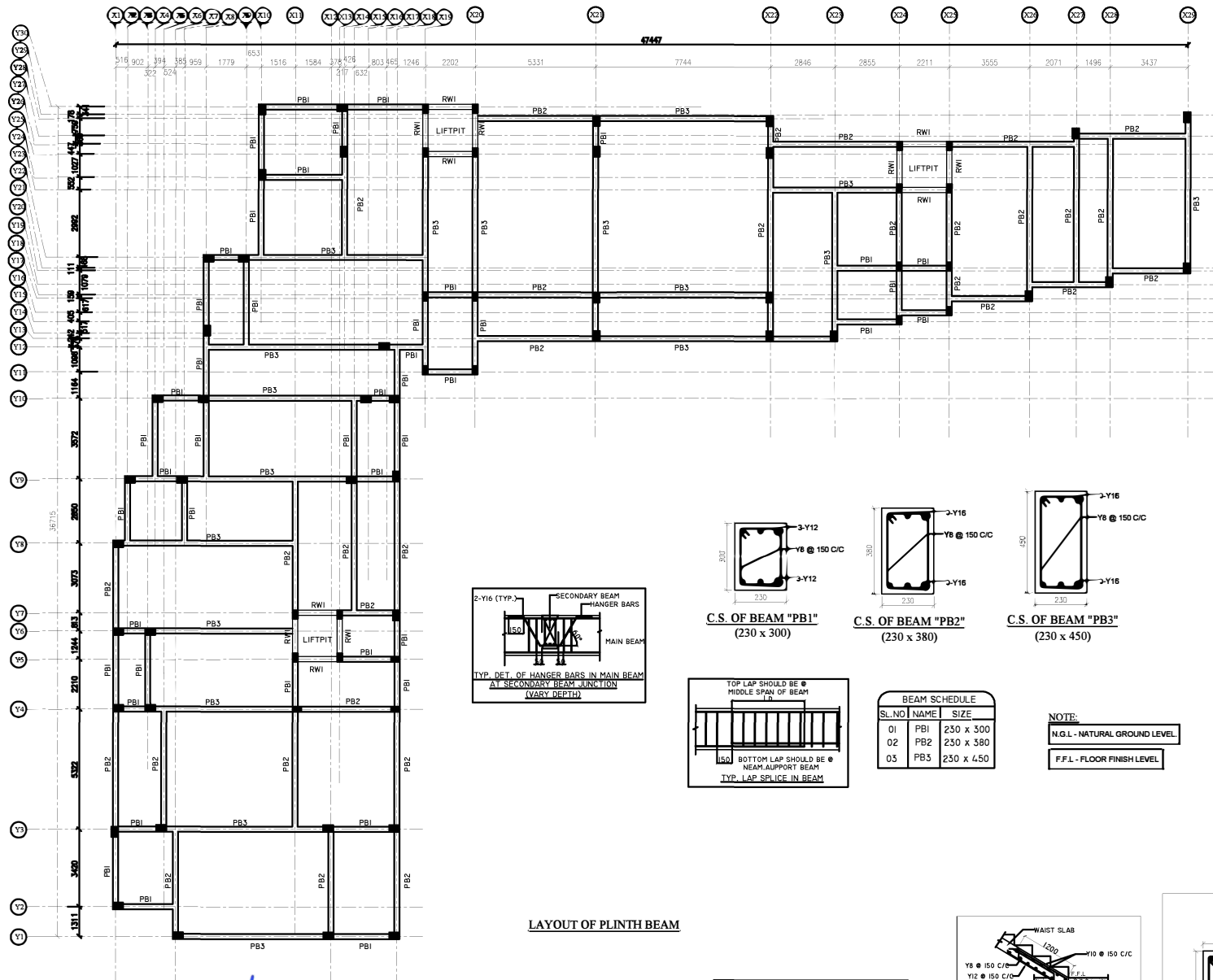
DATE	SCALE	JOB.NO	DRG.NO
20.04.26	1 : 140	-----	002

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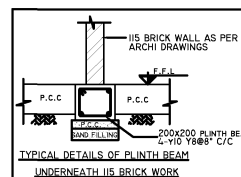
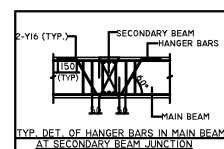
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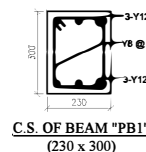


LAYOUT OF PLINTH BEAM

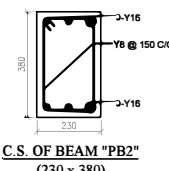


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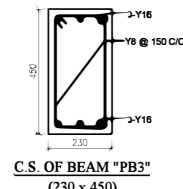
ISSUE FOR APPROVAL / NOT FIT FOR CONSTRUCTION



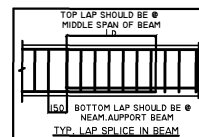
C.S. OF BEAM "PB1"
(230 x 300)



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



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

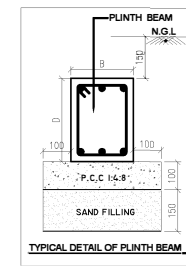
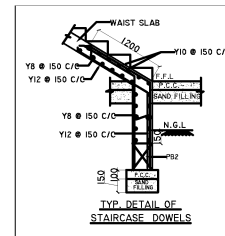


BEAM SCHEDULE		
SL.NO	NAME	SIZE
01	PB1	230 x 300
02	PB2	230 x 380
03	PB3	230 x 450

NOTE:

N.G.L - NATURAL GROUND LEVEL

F.F.L - FLOOR FINISH LEVEL



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 11.3.1, 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 1.5 TIMES LAP LENGTH OF THE BAR FOR TENSION & COMPRESSION MEMBERS.

iii) DEVELOPMENT LENGTH (L_d) 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

v) DETAILING OF REBARS SHALL CONFIRM TO IRC

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.

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- 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
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DRAWING TITLE :-

LAYOUT & R.C DETAILS OF PLINTH BEAM

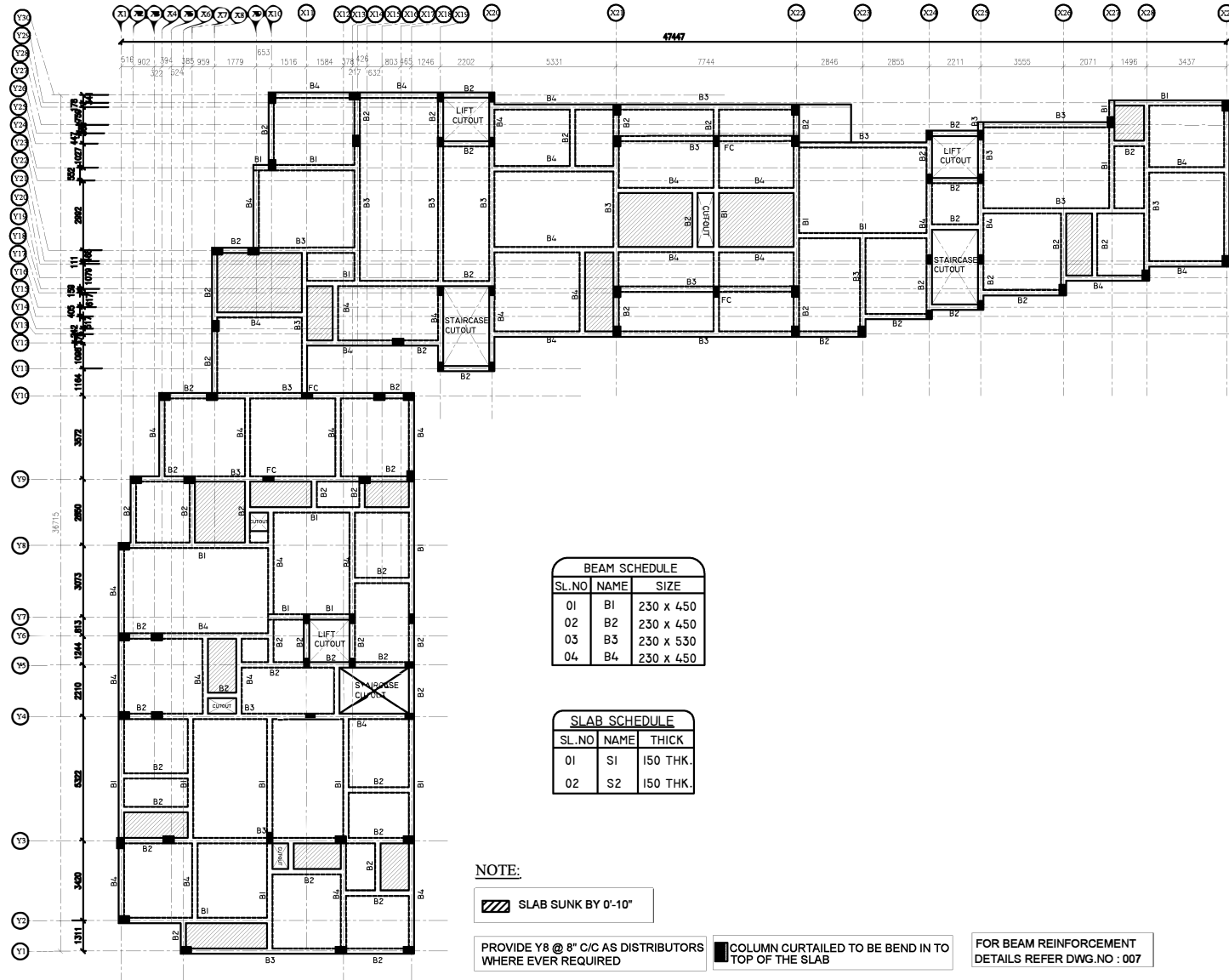
DATE	SCALE	JOB.NO	DRG.NO
20.04.26	1 : 100	-----	003

ARCHITECT / CONSULTANTS :-

STRUCTURAL CONSULTANTS :-

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**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 11.3.1, 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 -400
b) DEVELOPMENT LENGTH FOR BEAM BARS -500

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

vii) DETAILING OF REBARS SHALL CONFORM TO IRC

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.

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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

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DRAWING TITLE :-

NUMERATION LAYOUT OF STILT FLOOR ROOF SLAB & BEAMS

DATE	SCALE	JOB.NO	DRG.NO
20.04.26	1 : 100	-----	004

ARCHITECT / CONSULTANTS :-**STRUCTURAL CONSULTANTS :-**

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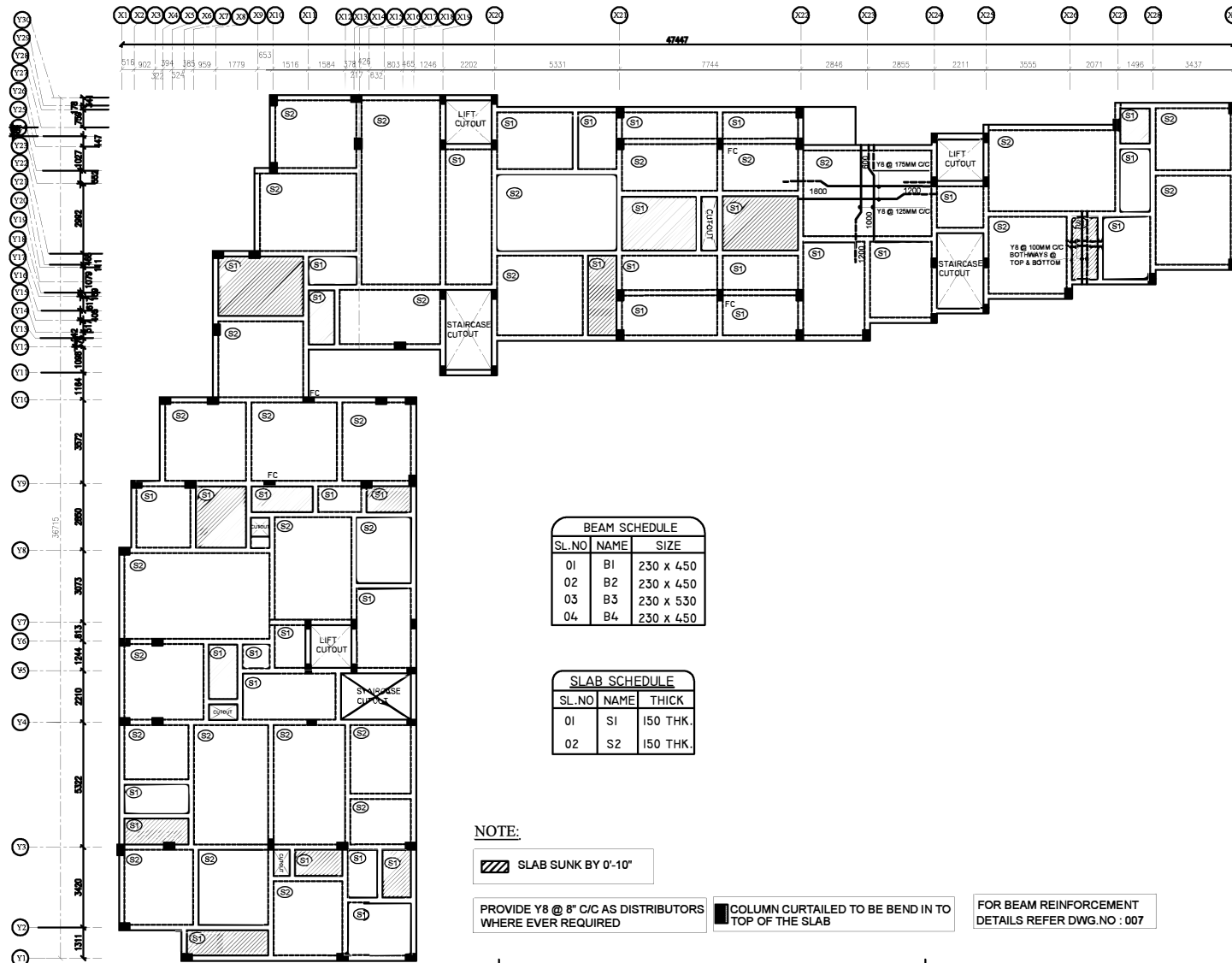


NUMERATION LAYOUT OF STILT FLOOR ROOF SLAB & BEAM

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NOTE:

ISSUE FOR APPROVAL / NOT FIT FOR CONSTRUCTION

R.C LAYOUT OF STILT FLOOR
ROOF SLAB & BEAM

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GENERAL NOTES:**REMOVAL OF FORMWORK(SHUTTERING):**

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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 -400
b) DEVELOPMENT LENGTH FOR BEAM BARS -500

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

vii) DETAILING OF REBARS SHALL CONFIRM TO IRC

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 (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 / NOT FIT FOR CONSTRUCTION	J.V	R.M	20.04.26
REV.	DESCRIPTIONS	DRN	CHK	DATE

PROJECT :-

PLAN SHOWING THE PROPOSED CONSTRUCTION OF STILT FLOOR + 5 FLOORS (HEIGHT -18.30M) RESIDENTIAL BUILDING WITH 40 DWELLING UNITS AFFORDABLE HOUSING AT DR.SOLOMON STREET AND BAJANAI KOIL 2ND STREET, PALLAVARAM, CHENNAI 600043 COMPRISED IN OLD S.NO.346/12, 346/13 & 352/44B, 352/44A & 346/14B (DOCUMENT) AND T.S.NO.94, 95, 96, 99 & 147 (PATTI), BLOCK NO.9, WARD NO.B, ZAMIN PALLAVARAM VILLAGE, PALLAVARAM TALUK WITHIN THE LIMIT OF TAMBARAM MUNICIPAL CORPORATION

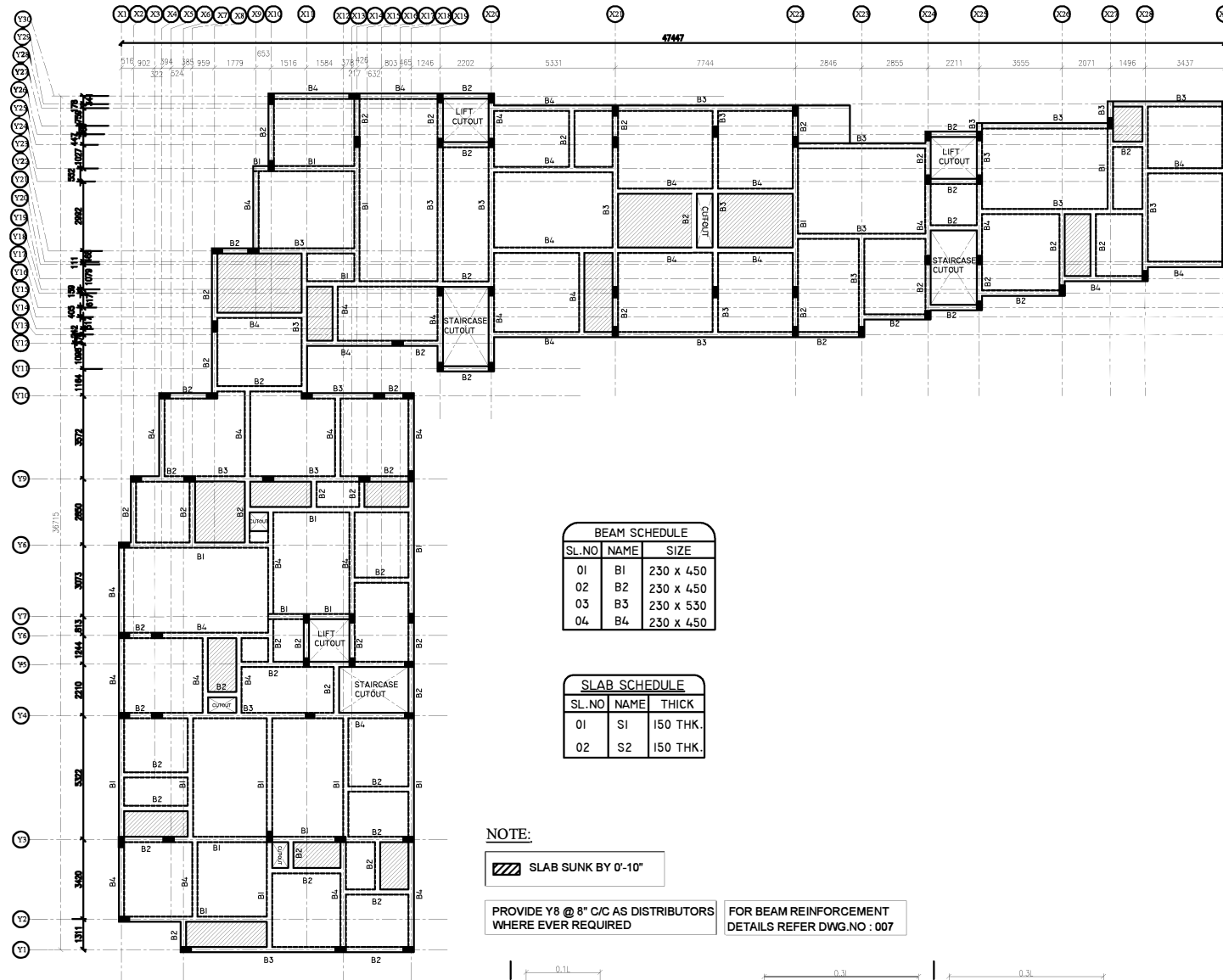
DRAWING TITLE :-

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

DATE	SCALE	JOB.NO	DRG.NO
20.04.26	1 : 100	-----	004A

ARCHITECT / CONSULTANTS :-**STRUCTURAL CONSULTANTS :-**

AURA ENGINEERING CONSULTANTS
#8, 50th St, Sarvamangala Colony, 7th A
ASHOK NAGAR, CHENNAI- 600 083.
Fixed Line :- 044 4859 7100
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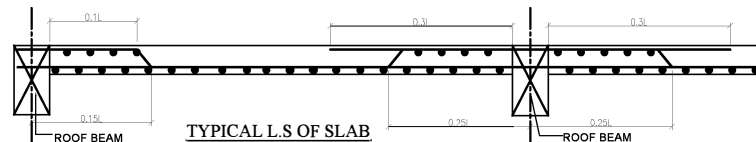
NUMERATION LAYOUT OF TYPICAL FLOOR
ROOF SLAB & BEAM

NOTE:

SLAB SUNK BY 0'-10"

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

FOR BEAM REINFORCEMENT
DETAILS REFER DWG.NO : 007



NOTE:

ISSUE FOR APPROVAL / NOT FIT FOR CONSTRUCTION

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 11.3.1, 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 -400
b) DEVELOPMENT LENGTH FOR BEAM BARS -500

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

v) DETAILING OF REBARS SHALL CONFIRM TO IRC

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-10.

iii) BEFORE CASTING FOUNDATIONS, ANY IMMEDIATE OR ADJACENT AREAS OF DISTURBED OR AFT SOIL MUST BE REMOVED AND REPLACED WITH MASS CONCRETE OF GRADE 10

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** (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.

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DRAWING TITLE :-

NUMERATION LAYOUT OF FIRST FLOOR ROOF SLAB & BEAMS

DATE	SCALE	JOB.NO	DRG.NO
20.04.26	1 : 100	-----	005

ARCHITECT / CONSULTANTS :-

STRUCTURAL CONSULTANTS :-

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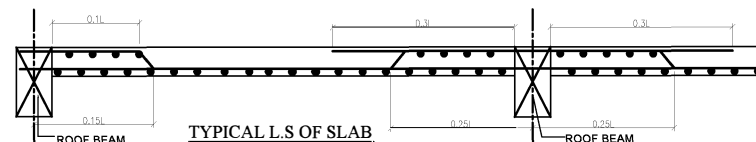
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Ashok Nagar, Chennai-600 083.

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NOTE:

ISSUE FOR APPROVAL / NOT FIT FOR CONSTRUCTION

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 11.3.1, 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 -400
b) DEVELOPMENT LENGTH FOR BEAM BARS -500

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

v) DETAILING OF REBARS SHALL CONFIRM TO IRC

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-10.

iii) BEFORE CASTING FOUNDATIONS, ANY IMMEDIATE OR ADJACENT AREAS OF DISTURBED OR AFT SOIL MUST BE REMOVED AND REPLACED WITH MASS CONCRETE OF GRADE 10

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 (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

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PROJECT :-

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DRAWING TITLE :-

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

DATE	SCALE	JOB.NO	DRG.NO
20.04.26	1 : 100	-----	005A

ARCHITECT / CONSULTANTS :-**STRUCTURAL CONSULTANTS :-**

AURA ENGINEERING CONSULTANTS

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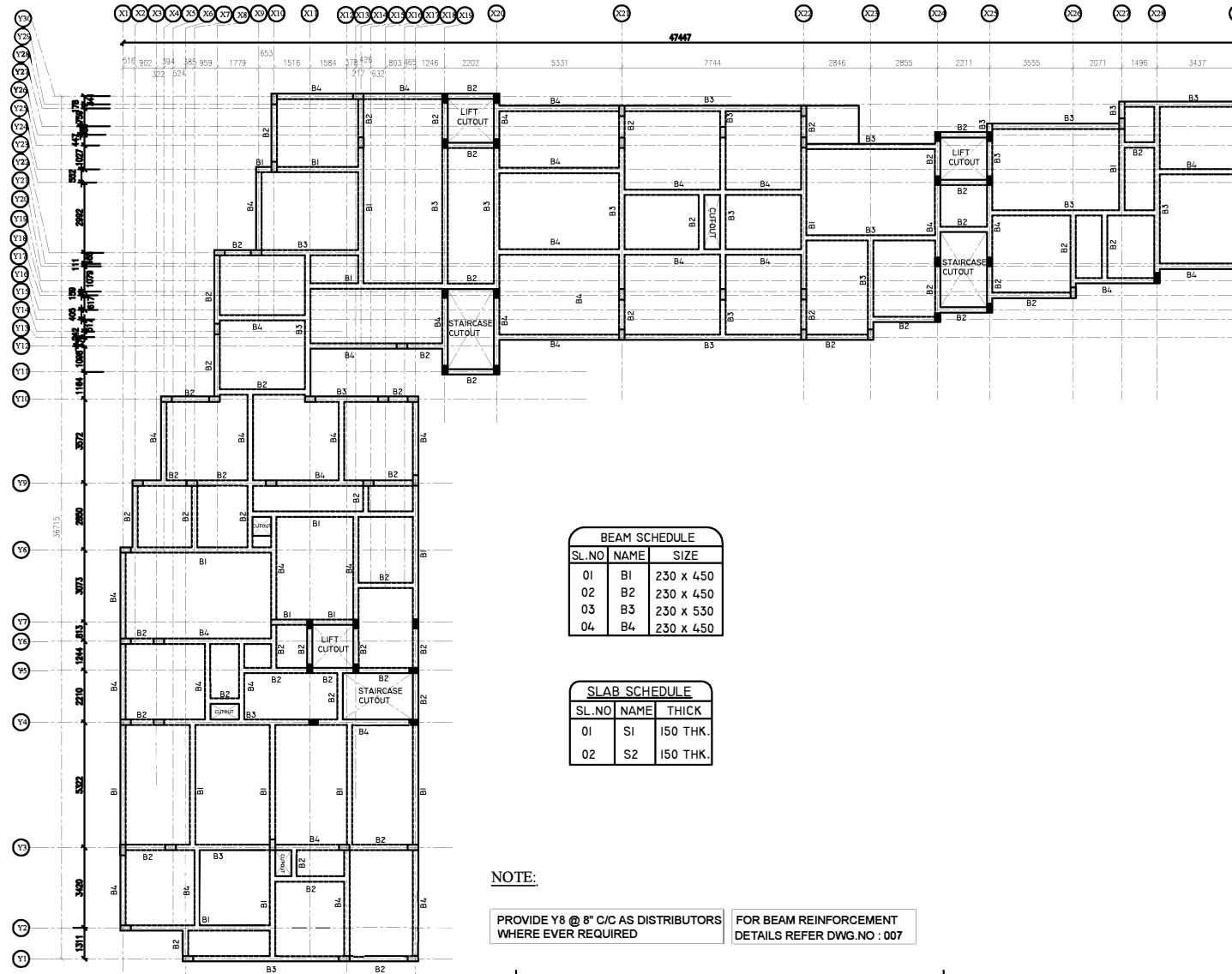
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R.C LAYOUT OF TYPICAL FLOOR ROOF SLAB & BEAM

R. MANIKANDAN, M.Tech.(Structures)
Registered Structural Engineer Grade I
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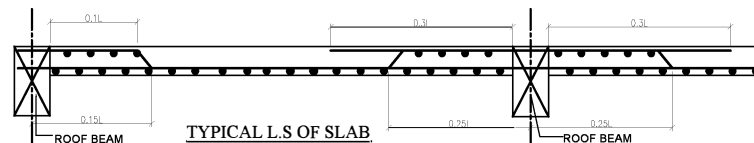
Ph: 044-48597100 Cell: 9790751378



NOTE:

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

FOR BEAM REINFORCEMENT DETAILS REFER DWG.NO : 007



NOTE:

ISSUE FOR APPROVAL / NOT FIT FOR CONSTRUCTION

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 11.3.1, 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 -400
b) DEVELOPMENT LENGTH FOR BEAM BARS -500

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

v) DETAILING OF REBARS SHALL CONFIRM TO IRC

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 (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 / NOT FIT FOR CONSTRUCTION	J.V	R.M	20.04.26
REV.	DESCRIPTIONS	DRN	CHK	DATE

PROJECT :-

PLAN SHOWING THE PROPOSED CONSTRUCTION OF STILT FLOOR + 5 FLOORS (HEIGHT -18.30M) RESIDENTIAL BUILDING WITH 40 DWELLING UNITS AFFORDABLE HOUSING AT DR.SOLOMON STREET AND BAJANAI KOIL 2ND STREET, PALLAVARAM, CHENNAI 600043 COMPRISED IN OLD S.NO.346/12, 346/13 & 352/44B, 352/44A & 346/14B (DOCUMENT) AND T.S.NO.94, 95, 96, 99 & 147 (PATTA), BLOCK NO.9, WARD NO.B, ZAMIN PALLAVARAM VILLAGE, PALLAVARAM TALUK WITHIN THE LIMIT OF TAMBARAM MUNICIPAL CORPORATION

DRAWING TITLE :-

NUMERATION LAYOUT OF TERRACE FLOOR SLAB & BEAMS

DATE	SCALE	JOB.NO	DRG.NO
20.04.26	1 : 100	-----	006

ARCHITECT / CONSULTANTS :-

STRUCTURAL CONSULTANTS :-

AURA ENGINEERING CONSULTANTS

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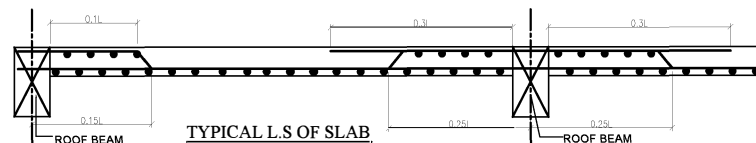


NUMERATION LAYOUT OF TERRACE FLOOR
SLAB & BEAM

R. Manikandan
R. MANIKANDAN, M.Tech.(Structures)
Registered Structural Engineer Grade I
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R.C LAYOUT OF TERRACE FLOOR
SLAB & BEAM

NOTE:

PROVIDE Y8 @ 8" C/C AS DISTRIBUTORS
WHERE EVER REQUIREDFOR BEAM REINFORCEMENT
DETAILS REFER DWG.NO : 007

NOTE:

ISSUE FOR APPROVAL / NOT FIT FOR CONSTRUCTION

GENERAL NOTES:

REMOVAL OF FORMWORK(SHUTTERING):

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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.

v) DETAILING OF REBARS SHALL CONFIRM TO IRC

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.

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DRAWING TITLE :-

NUMERATION R.C LAYOUT OF TERRACE
FLOOR SLAB & BEAMS

DATE	SCALE	JOB.NO	DRG.NO
20.04.26	1 : 100	-----	006A

ARCHITECT / CONSULTANTS :-

STRUCTURAL CONSULTANTS :-

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http://auraengineers.co.in/



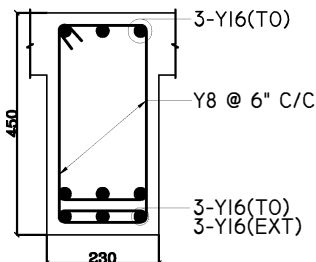
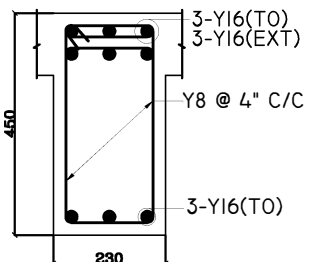
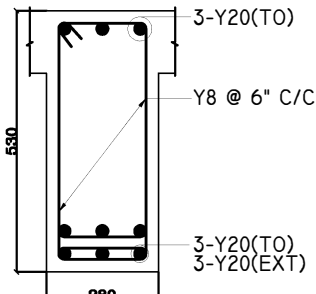
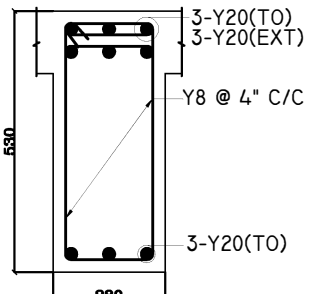
Engineering Consultants

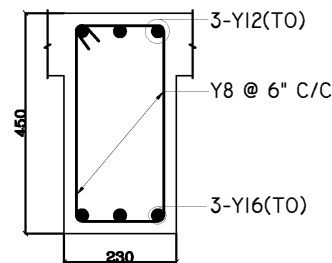
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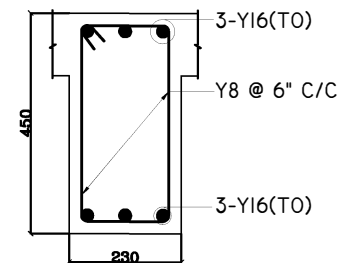
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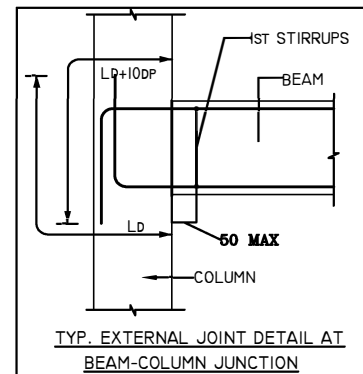
NAME	MID SPAN	END SUPPORT
B1 (230 X 450)		
B3 (230 X 530)		



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

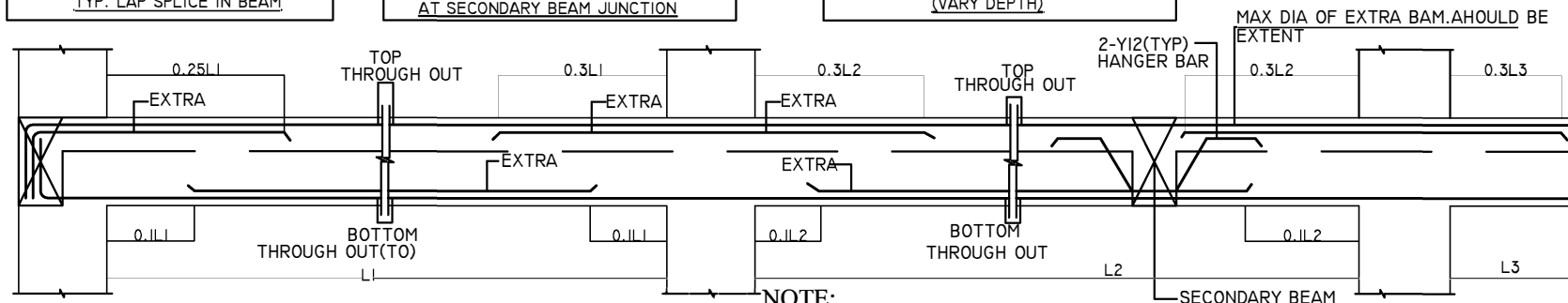
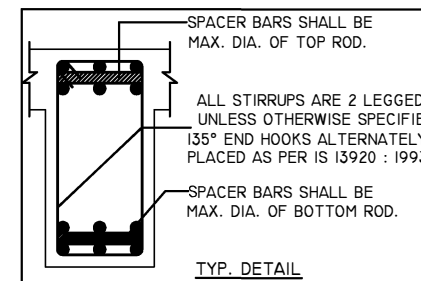
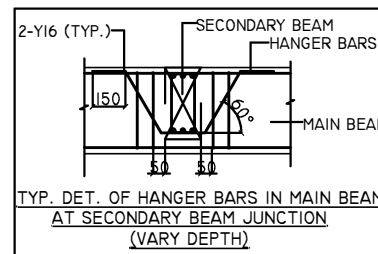
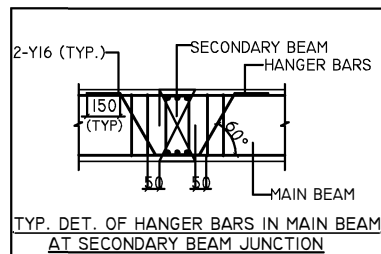
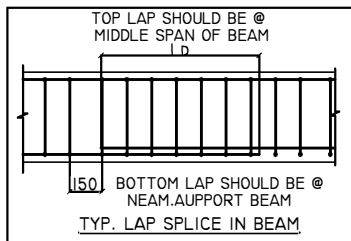


C.S. OF BEAM "B4"
(230 X 450)



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



TYPICAL L.S. OF ROOF BEAM

NOTE:

ISSUE FOR APPROVAL / NOT FIT FOR CONSTRUCTION

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 = 1 1/2" B) BEAM = 1"
C) SLAB = 3/4"
- THIS DRG. READ IN CONJUNCTION 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.

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REV.	DESCRIPTIONS	DRN	CHK	DATE
00	ISSUE FOR APPROVAL / NOT FIT FOR CONSTRUCTION	J.V	R.M	20.04.26

PROJECT :-

PLAN SHOWING THE PROPOSED CONSTRUCTION OF STILT FLOOR + 5 FLOORS (HEIGHT -18.30M) RESIDENTIAL BUILDING WITH 40 DWELLING UNITS AFFORDABLE HOUSING AT DR.SOLOMON STREET AND BAJANAI KOIL 2ND STREET, PALLAVARAM, CHENNAI 600043 COMPRISED IN OLD S.NO.346/12, 346/13 & 352/44B, 352/44A & 346/14B (DOCUMENT) AND T.S.NO.94, 95, 96, 99 & 147 (PATT), BLOCK NO.9, WARD NO.8, ZAMIN PALLAVARAM VILLAGE, PALLAVARAM TALUK WITHIN THE LIMIT OF TAMBARAM MUNICIPAL CORPORATION

DRAWING TITLE :-

R.C. DETAILS FOR ALL
FLOOR BEAMS

DATE	SCALE	JOB.NO	DRG.NO
20.04.26	1 : 130	-----	007

ARCHITECT / CONSULTANTS :-

STRUCTURAL CONSULTANTS :-

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