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DIGITALLY VERIFIED RECORD

STABILITY CALCULATIONS FOR `AVITTAM NAYANMAR 'THE PROPOSED CONSTRUCTION OF GROUP DEVELOPMENT WITH TWO BLOCKS BLOCK-1 STILT FLOOR+5 FLOORS (HEIGHT 18.3 M)RESIDENTIAL BUILDING WITH 65 DWELLING BLOCK-2-STILT+5 FLOORS (HEIGHT 18.3M) RESIDENTIAL BUILDING WITH 50 DWELLING UNITS.TOATALLY 115 DWELLING UNITS FOR AFFORDABLE HOUSING AT DARKAST ROAD(KISHKINDAMAIN ROAD),KANNADAPALAYAM,WEST TAMBARAM,CHENNAI-600045 COMPRISED IN OLD S.NO.268/2,268/3,&268/4&T.S NOS106/1,107/2,107/3,108/2,&108/3,BLOCK NO.21,WARD NO. C OF TAMBARAM VILLAGE,TAMBARAM VILLAGE,TAMBATAM TALUKWITH IN THE LIMITS OF TAMBARAM MUNICIPAL CORPORATION

Design Data Report :

Footing Data:

Soil Parameters :

SBC of soil	=250.00 kN/m²
SBC Increment Factor for Seismic Load	= 1.500
SBC Increment Factor for Wind Load	= 1.500
Angle of friction,(phi)	= 30.00 degrees
Cohesion	= 60.00
Permissible factor of safty	= 1.400
Depth From Ground	= 2500 mm

Material Properties :

fck	= 25.00 N/mm²
fy	= 500.00 N/mm²

Footing Parameters :

Minimum steel Percentage	= 0.12
Minimum spacing between bars	= 100 mm
Maximum spacing between bars	= 200 mm
Diameters of selected bars	= 10 mm , 12 mm .
Bottom Cover	= 50 mm
End Cover	= 50 mm
Minimum Footing Depth	= 150 mm
Top Offset	= 50 mm
Bottom PCCOffset	= 150 mm
Bottom PCCDepth	= 150 mm
Pedestal Offset	= 150 mm
Pedestal Depth	= 150 mm
Size RoundingFactor	= 25 mm

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Depth RoundingFactor	= 25 mm
Number of Steps	= 1
Minimum Step Depth	= 150 mm

Column Data:

Material Properties :

fck	= 25.00 N/mm²
fy	= 500.00 N/mm²
fy - Stirrups	= 500.00 N/mm²

Column Parameters :

Effective Length Factor (X - Axis)	= 1.00
Effective Length Factor (Y - Axis)	= 1.00
Minimum Eccentricity @ X-Axis	= 20 mm
Minimum Eccentricity @ Y-Axis	= 20 mm
Clear Cover	= 40 mm

Design Considerations :

Design is done as per IS 456.

Detailing is done as per IS 13920.

Confinement reinforcement is provided.

Live Load reduction is considered.

Minimum steel percentage is based on provided section.

Reinforcement Details :

Steel Ratio(AstX/AstY)	= 1.00
ReinForcement Placing (on two sides or on four sides)	= 2
Minimum steel Percentage	= 0.80
Maximum steel Percentage	= 4.00
Minimum spacing between main bars	= 25 mm
Maximum spacing between main bars	= 300 mm

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Minimum spacing between Stirrups	= 150 mm
Diameters of selected bars	= 12 mm , 16 mm , 20 mm , 25 mm , 32 mm .

Slab Data: Use Bent-up bars for steel detailing.

Material Properties :

RCC Grade	= M20
Main Steel Grade	= Fe415
Distribution Steel Grade	= Fe415

Slab Parameters :

Effective Cover	= 25 mm
Minimum spacing between Main bars	= 75 mm
Maximum spacing between Main bars	= 200 mm
Minimum spacing between Dist.bars	= 75 mm
Maximum spacing between Dist.bars	= 300 mm
Maximum Main/Dist. bar Diameter	= 32 mm
Minimum Main bar Diameter	= 8 mm
Minimum Dist.bar Diameter	= 8 mm
Maximum Dimension to be used for Trapizoidal Slab	= Average of two parellel sides
Maximum Dimension to be used for General Slab	= Maximum of two parellel sides

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Beam Data:

Shear Design Data :

Minimun Stirrup Dia	= 8 mm
Stirrup Legs	= 2
Minimum Stirrups Spacing	= 100 mm
Stirrups Steel Grade Name	= Fe500

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Effect of Concrete in shear considered

Beam Covers :

Tension Cover = 33 mm

Compression Cover = 33 mm

Side Cover = 25 mm

Beam sections are designed as Doubly Reinforced Section

Main Bars Detailing Straight + Curtailed

Detailing provision As per IS 13920 is followed

End Moments are calcultaed at c/c distance of the beam span for design

Torsion Moments are considered in beam design

Anchor bar Dia	= 8 mm
Main Steel Grade	= Fe500
No. of division of the beam	= 10
Max. Aggregate size –	= 20

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Annexure – XIV

[See rule 51 (3)]

Form 1

Structural Design Basis Report

(1) This report to accompany the application for Building Developments

Part1	General Data		
S.No.	Description	Information	Notes
1.	Site Address		
2	Name of Owner		
3	Name of Registered Developer along with the Registration Number		
4	Name of Registered Architect/Engineer along with the Registration Number		
5	Name of Registered Structural engineer along with the Registration Number	**SE/-I2024/4/0037**	
6	Use of the building	**RESIDENTIAL**	
7	Number of stories above ground level (including storeys to be added later, if any)	**STILT+5FLOORS**	
8	Number of basements below ground level	**NIL**	
9	Type of structure Load bearing walls R.C.C. frame R.C.C. frame and Shear Walls Steel frame	**RC FRAME**	
10	Soil data Type of soil Design safe bearing capacity	**INDIVIDUAL ISOLATED FOOTING 250KN/SQ.M**	IS:1893 C1.6.3.5.2 IS: 1904 IS: 1892 IS: 2131 IS: 2720

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11	Dead loads (unit weight adopted) • Earth: **18KN/CUM** • Water: **10KN/CUM** • Brick masonry:**19.2KN/CUM** • Plain cement concrete **24KN/CUM** • Reinforced cement concrete:**25 KN/CUM** • Floor finish **50KG/SQM** • Other fill materials		IS: 875 Part 1
12	Imposed (live) loads Floor loads Roof loads	**4KN/SQM** **1.5KN/SQM**	IS: 875 Part 2

13	Cyclone/Wind • Speed • Design pressure intensity	**N/A**	IS: 875 Part 3
14	Seismic zone	**III**	IS: 1893 (2002)
15	Importance factor	**1**	IS:1893(2002) Table 6
16	Seismic zone factor (Z)	**0.16**	IS:1893 Table 2
17	Response reduction factor		IS:1893 Table 7
18	Fundamental natural period – approx.	**0.29SEC**	IS:1893 C1.7.6
19	Design horizontal acceleration spectrum value (A_h)		IS: 1893 C1.6.4.2
20	♥ Expansion/Separation Joints	**N/A**	
21	Building is regular/irregular	**REGULAR**	IS 1893

♥ Enclose detailed drawings drawn to scale for each floor

♦ In case terrace garden is provided, indicate additional fill load and live load along with the detailed drawings drawn to scale

Part 2	**Load bearing masonry buildings**		
Sl.No.	**Description**	**Information**	**Notes**
1	Building category	**N/A**	IS: 4326 C1.7 Read with IS:1893

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			Zone II III IV V Bldg. Ordinary B C D E Important C D E E
2	Basement Provided	**N/A**	
3	Number of floors including Ground Floor (all floors including stepped floors in hill slopes)	**N/A**	
4	Type of wall masonry	**N/A**	
5	Type and mix of Mortar	**N/A**	IS: 4326 C1.8.1.2
6	Re: size and position of openings (See note No.[i]) • Minimum distance (b5) • Ratio $(b_1+b_2+b_3)/l_1$ or $(b_6+b_7)/l_2$ • Minimum pier width between consequent opening (b_4) • Vertical distance (h_3) • Ratio of wall height to thickness 4 Ratio of wall length between cross wall to thickness	**N/A**	IS: 4326 Table 4, Fig.7
7	Horizontal seismic band • at plinth level **N/A** • at window sill level **N/A** • at lintel level **N/A** • at ceiling level **N/A**	P IP NA } } } } } } } } } } } }	(see note No.2) IS:4326 C1 8.4.6 IS: 4326 C1 8.3 IS: 4326 C1 8.4.2 IS: 4326 C1 8.4.3 IS: 4326 C1 8.4.3

	• at eave level of sloping roof **N/A** • at top of gable walls **N/A** • at top of ridge walls **N/A**	} } } } } } } } }	IS: 4326 C1 8.4.3 IS: 4326 C1 8.4.4

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8	Vertical reinforcing bar **N/A** at corners and T junction of walls at jambs of doors and window openings **N/A**	} } } } } }	IS: 4326 C1 8.4.8. IS: 4326 C1 8.4.9
9	Integration of prefab roofing/flooring elements through reinforced concrete screed. **N/A**	} } }	IS:4326 C1 9.1.4
10	Horizontal bracings in pitched truss in horizontal plane at the level of ties in the slopes of pitched roofs **N/A**	} } } } } }	

Notes: (i) Information in Item 6 should be given on separate A4 sheets for all walls with large number of openings

(ii) IP indicated "Information Provided"

IP indicates "Information to be provided" NA indicates "Not Applicable"

Tick mark one box

Part 3	**Reinforced concrete framed buildings**		
Sl. No.	**Description**	**Information**	**Notes**
1	Type of building • Regular frames • Regular frames with Shear Walls • Irregular frames • Irregular frames with Shear Walls • Soft storey	**REGULAR FRAMES**	IS: 1893 C1 7.1
2	Number of basements	**NIL**	
3	Number of floors including ground floor	**S+5**	

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4	Horizontal floor system • Beams and slabs • Waffles • Ribbed floor • Flat slab with drops • Flat plate without drops	**BEAM AND SLAB**	
5	Soil data • Type of soil • Recommended type of foundation -Independent footings -Raft -Piles • Recommended bearing capacity of soil	**MEDIUM SOIL WITH ISOLATED FOOTING**	IS: 1498

	• Recommended type, length, diameter and load capacity of piles • Depth of water table • Chemical analysis of ground water • Chemical analysis of soil		
6	Foundations Depth below ground level Type Independent Interconnected Raft Piles	**INDIVIDUAL ISOLATED FOOTING**	

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7	System of interconnecting foundations Plinth beams Foundation beams	**PLINTH BEAM**	IS: 1893 C1 7.12.1
8	Grades if concrete used in different parts of building	**M25 FOR COLUMNS& M20 FOR REST**	
9	Method of analysis used	**FEM**	
10	Computer software used	**SCADDS NUCLEUS 2022 VERSION**	
11	Torsion included	**INCLUDED**	IS: 1893 C1 7.9
12	Base shear a. Based on approximate fundamental period b. Based on dynamic analysis c. Ratio of a/b	**BASED ON APPROXIMATE FUNDAMENTAL PERIOD**	IS: 1893 Cl. 7.5.3
13	Distribution of seismic forces along the height of the building.	**REFER SESIMIC JUSTIFICATION**	IS:1893 Cl.7.7 (Provide sketch)
14	The Column of soft ground storey specially designed.	**YES**	IS: 1893 Cl.7.10
15	Clear minimum cover provided in • **Footing 50MM** • **Column 40MM** • **Beams 25MM** • **Slabs 20MM** • **Walls**		IS: 456 Cl. 26.4

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16	Ductile detailing of RC frame • Type of reinforcement used **Fe 500D** • Minimum dimension of beams **230MM** • Minimum dimension of columns **230MM** • Minimum percentage of reinforcement of beams at any cross section **0.20%** • Maximum percentage of reinforcement at any section of beam **4%** • Spacing of transverse reinforcement in 2-d length of beams near the ends **100MM** • Ratio of capacity of beams in shear to capacity of beams in flexure **<1** • Maximum percentage of reinforcement in column **4%**		IS: 456 Cl. 5.6 IS: 13920 Cl.6.1 IS: 13920 Cl.7.1.2 IS: 456 Cl.26.5.1(a) IS: 13920 Cl.6.2.1 IS: 456 Cl.26.5.1.1(b) IS: 13920 Cl.6.2.2 IS: 13920 Cl.6.3.5 IS: 456 Cl.26.5.3.1 IS: 13920 Cl. 7.4
	• Confining stirrups near ends of columns and in beam-column joints Diameter **8mm** Spacing **100MM** • Ratio of shear capacity of columns to maximum seismic shear in the storey. **<1**		
17	Does the features require clearance by SDRP Example: High rise building Prefab building Building in hazard prone areas	**N/A**	

Foundation

i. In case raft foundation has been adopted, indicate K value used for analysis of the raft.

ii. Incase pile foundations have been used, give full particulars of the piles.

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type, dia, length, capacity

iii. In case of high water table, indicate system of countering water pressure, and indicate the existing water table, and that assumed to design foundations.

Idealization for Earthquake analysis

i. In case of composite system of shear walls and rigid frames, give distribution of base shear in the two systems on the basis of analysis, and that used for design of each system

ii. Indicate the idealization of frames and shear walls adopted in the analysis with the help of sketches.

iii. Submit framing plans of each floor

iv. In case of basements, indicate the system used to contain earth pressures.

Part 4	**Buildings in structural steel**		
1	Adopted method of design	o Simple o Semi-rigid o Rigid	IS:800 Cl 3.4.4 IS:800 Cl.3.4.5 IS:800 Cl.3.5.6
2	Design based on	o Elastic analysis o Plastic analysis	IS: 800 Section-9 SP;6 (6)
3	Floor construction	o Composite o Non composite o Boarded	
4	Roof construction	o Composite o Non composite o Metal o Any other	
5	Horizontal force resisting system adopted	Frames Braced frames Frames & shear walls	Note: Seismic force As per IS:1893 Would depend on system
6	Slenderness ratios maintained	Members defined in Table 3.1, IS:800	IS 800; Cl.3.7
7	Member deflection	Beams, Rafters	IS:800 Cl.3.13

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	limited to	Crane Girders, Purlins Top of columns	
8	Structural members	o Encased in concrete Not encased	IS: 800 Section-10
9	Proposed material	o General weld-able o High strength o Cold formed o Tubular	IS: 2062 IS: 8500 IS: 801, 811 IS: 806
10.	Minimum metal thickness Specified for corrosion protection	o Hot rolled sections o Cold formed sections o Tubes	IS: 800, Cl.3.8 Cl.3.8.1 to Cl.3.8.4 Cl.3.8.5
11	Structural connections	o Rivets o CT Bolts o S H F G Bolts o Black Bolts o Welding field Shop (Specify welding type proposed) Composite	IS: 800, Section-8 IS: 1929, 2155, 1149 IS 6639, 1367 IS 3757, 4000 IS: 1363, 1367 IS: 816, 814,1395, 7280, 3613, 6419, 6560, 813, 9595
12	Minimum Fire rating proposed, with method	o Rating..... hours o Method proposed. -In tumescent painting -Spraying -Quilting -Fire retardant boarding	IS: 1641, 1642, 1643

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STABILITY CALCULATIONS FOR `AVITTAM NAYANMAR 'THE PROPOSED CONSTRUCTION OF GROUP DEVELOPMENT WITH TWO BLOCKS BLOCK-1 STILT FLOOR+5 FLOORS (HEIGHT 18.3 M)RESIDENTIAL BUILDING WITH 65 DWELLING BLOCK-2-STILT+5 FLOORS (HEIGHT 18.3M) RESIDENTIAL BUILDING WITH 50 DWELLING UNITS.TOATALLY 115 DWELLING UNITS FOR AFFORDABLE HOUSING AT DARKAST ROAD(KISHKINDAMAIN ROAD),KANNADAPALAYAM,WEST TAMBARAM,CHENNAI-600045 COMPRISED IN OLD S.NO.268/2,268/3,&268/4&T.S NOS106/1,107/2,107/3,108/2,&108/3,BLOCK NO.21,WARD NO. C OF TAMBARAM VILLAGE,TAMBARAM VILLAGE,TAMBATAM TALUKWITH IN THE LIMITS OF TAMBARAM MUNICIPAL CORPORATION

SCADDS/RC-Footing Designer 2022 [Release: 4.01.3010]

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SCADDS/Nucleus 2022: RC-Footing Designer
Limit State Design of Wall Footings for
Axial Load & Uniaxial Bending,
Isolated Flat/Sloped Rectangular/Circular Footings
with or without Pedestals
for Axial Load, Uniaxial & Biaxial Bending,
Combined Rectangular/Trapezoidal Footings
with or without Pedestals
for Axial Load & Uniaxial Bending
in accordance with IS:456-2000 and IS:6403-1981

Introduction:-

This Report contains the detailed solution for the given Reinforced Concrete Footing Design problem.

The given Footing is considered for flexural design and the output contains the following portions:

1. Footing Input Data
2. Flexural Design Output for Footing
3. Flexural Design Output for Pedestal, if provided
4. One Way Shear Check Output
5. Two Way Shear Check Output
6. Development Length / Bond Design Output

While detailed design will be carried out for Flexure and Bond, only checks for stresses are made for Shear.

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Global Material Data			
Concrete Clear Cover	=	50	mm.
Char. Comp. Strength of Concrete	=	25	N/sq.mm.
Yield Strength of Main Steel	=	500	N/sq.mm.
Main Rod Size-1	=	10	mm.
Main Rod Size-2	=	12	mm.
Yield Strength of Distribution Steel	=	500	N/sq.mm.
Distbn. Rod Size-1	=	10	mm.
Distbn. Rod Size-2	=	12	mm.
Yield Strength of Dowel/Pedestal Steel	=	500	N/sq.mm.
Dowel/Pedestal Rod Size-1	=	12	mm.
Dowel/Pedestal Rod Size-2	=	16	mm.
Factor of Safety for Load	=	1	
Partial Safety Factor for Concrete	=	1.5	
Partial Safety Factor for Steel	=	1.15	
Max. Strain in Concrete	=	0.0035	mm./mm.
Max. Strain in Steel	=	0.0055	mm./mm.
Young's Modulus of Concrete	=	25000	N/sq.mm.
Young's Modulus of Steel	=	200000	N/sq.mm.

Bond / Development Length Output			
Char. Comp. Strength of Concrete	=	25	N/sq.mm.
Yield Stress of Main Steel	=	500	N/sq.mm.
Yield Stress of Secondary Steel	=	500	N/sq.mm.
Yield Stress of Dowel/Pedestal Steel	=	500	N/sq.mm.

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As Per IS:456-2000, Clause 26.2.1.1,

Design Bond Stress for Main Rods	=	2.24	N/sq.mm.
Design Bond Stress for Secondary Rods	=	2.24	N/sq.mm.
Design Bond Stress for Dowel/Pedestal Rods	=	2.24	N/sq.mm.

Rods in Tension:-

Main Rod Diameter-1	=	10	mm.
Corresponding Development Length	=	485.491	mm.
Main Rod Diameter-2	=	12	mm.
Corresponding Development Length	=	582.589	mm.
Secondary Rod Diameter-1	=	10	mm.
Corresponding Development Length	=	485.491	mm.
Secondary Rod Diameter-2	=	12	mm.
Corresponding Development Length	=	582.589	mm.

Rods in Compression:-

Dowel/Pedestal Rod Diameter-1	=	12	mm.
Corresponding Development Length	=	582.589	mm.
Dowel/Pedestal Rod Diameter-2	=	16	mm.
Corresponding Development Length	=	776.786	mm.

F02 : Global Input Data (LC No. : 9)

The footing is to be designed as an Isolated Footing.

Width of Column 200 mm.

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Length of Column	=	450	mm.
Footing Shape	=	Rectangular	
Initial Depth at the Face of Wall/Column	=	300	mm.
Initial Depth at the End	=	150	mm.
The footing is subjected to Axial Load & Biaxial Bending.			
Working Axial Load	=	549.808	KN.
Working Moment about ZZ-axis	=	2.881	KN m.
Working Moment about XX-axis	=	0.92	KN m.
Safe Bearing Capacity of Soil	=	250	KN/sq.m.
Factor of Safety for Safe Bearing Capacity	=	1.5	

F02 : Flexure Output (LC No. : 9)

Working Axial Load on Footing	=	549.808	KN.
Factored Axial Load on Footing	=	549.808	KN.
Percentage Factor for Self Weight of Footing	=	10	%
Factored Self Weight of Footing	=	54.981	KN.
Total Factored Axial Load on Footing	=	604.789	KN.
Working Moment about ZZ-axis	=	2.881	KN m.
Factored Moment about ZZ-axis	=	2.881	KN m.
Working Moment about XX-axis	=	0.92	KN m.
Factored Moment about XX-axis	=	0.92	KN m.
Ultimate Bearing Capacity of Soil	=	375	KN/sq.m.
From Vertical Load and Bending considerations, Area of Footing Required	=	1.658	sq.m.

Equal Projections were intially assumed from the Column to arrive at the Footing Size.

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Width of Footing Required	=	1.169	m.
Length of Footing Required	=	1.419	m.

Width of Footing Provided	=	1.175	m.
Length of Footing Provided	=	1.425	m.
Actual Bearing Area Provided	=	1.674	sq.m.
Max. Bearing Pressure at the Base	=	371.254	KN/sq.m.
Min. Bearing Pressure at the Base	=	351.152	KN/sq.m.

Bending about ZZ-axis:-

Load Eccentricity lies within the limit causing total
Hence, the Footing Base about ZZ-axis will be in touch with

Net Bearing Pressure at the Base - Right End	=	338.418	KN/sq.m.
Net Bearing Pressure at the Base - Left End	=	323.927	KN/sq.m.
Net Bearing Pressure at the Column Face	=	333.46	KN/sq.m.
Net Bearing Pressure - 'd' from Face	=	336.958	KN/sq.m.

As Per IS:456-2000, Clause 34.2.3,
the critical section for Bending Moment is at the Face of the Column.

Projection of Footing from Critical Section	=	487.5	mm.
Design Bending Moment	=	47.02	KN m.

Modified Depth of Footing at the Face of Wall	=	400	mm.
Modified Depth of Footing at the End	=	250	mm.

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Effective Depth Required	=	195.56	mm.
Effective Depth Provided	=	344	mm.
Hence			
Percentage of Steel Required	=	0.079	%
As Per IS:456-2000, Clause the required percentage of Steel is less than the to be provided. Hence, Minimum Steel is			
Percentage of Main Steel Provided	=	0.12	%
Area of Steel Provided	=	485.04	sq.mm.
Dia. of Rod-1 in Central Band	=	10	mm.
Required Spacing of Rods	=	190.261	mm.
Max. Spacing allowed (Rounded off)	=	175	mm.
Dia. of Rod-2 in Central Band	=	12	mm.

Required Spacing of Rods	=	273.976	mm.
Max. Spacing allowed (Rounded off)	=	250	mm.
Bending about XX-axis:-			
Load Eccentricity lies within the limit causing total Hence, the Footing Base about XX-axis will be in			
Net Bearing Pressure at the Base - Right End	=	338.418	KN/sq.m.
Net Bearing Pressure at the Base - Left End	=	332.806	KN/sq.m.
Net Bearing Pressure at the Column Face	=	336.089	KN/sq.m.
Net Bearing Pressure - 'd' from Face	=	337.732	KN/sq.m.

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As Per IS:456-2000, Clause 34.2.3,
the critical section for Bending Moment is at the Face of the Column.

Projection of Footing from Critical Section	=	487.5	mm.
Design Bending Moment	=	57.173	KN m.
Modified Depth of Footing at the Face of Wall	=	400	mm.
Modified Depth of Footing at the End	=	250	mm.
Effective Depth Required	=	166.56	mm.
Effective Depth Provided	=	332	mm.

Hence SAFE.

Percentage of Steel Required	=	0.085	%

As Per IS:456-2000, Clause 26.5.2.1,
the required percentage of Steel is less than the to be provided. Hence, Minimum Steel is provided.

Percentage of Main Steel Provided	=	0.12	%
Area of Steel Provided	=	567.72	sq.mm.
Dia. of Rod-1 in Central Band	=	10	mm.
Required Spacing of Rods	=	197.138	mm.
Max. Spacing allowed (Rounded off)	=	200	mm.
Dia. of Rod-2 in Central Band	=	12	mm.
Required Spacing of Rods	=	283.879	mm.
Max. Spacing allowed (Rounded off)	=	250	mm.

Note (1):- The required Spacing of Main Rods will be 300 mm. or 3d (300 mm. or 5d for Dist. Rods) If the required spacing exceeds this limit, the least value

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will be automatically provided. This is done in IS:456-2000 Clause 26.3.3.

Note (2):- The required minimum area of reinforcement as per IS:456-2000, Clause 34.5.2, if the Footing 1000 mm. This minimum area is 360.0 sq.mm. for each

Note (3):- The assumed Depth of Footing will be so that a SAFE design is arrived at from both flexure as considerations.

Note (4):- Spacing of Rods are also controlled by Value, User-defined Minimum and Maximum Spacing

F02 : Dowel Bars Output (LC No. : 9)

Factored Axial Load on Column	=	549.808	KN.
Char. Comp. Strength of Concrete	=	25	N/sq.mm.
Yield Stress of Pedestal Steel	=	500	N/sq.mm.
Width of Column Section	=	200	mm.
Depth of Column Section	=	450	mm.
Area of Column Section	=	90000	sq.mm.
Width of Footing	=	1.175	m.
Length of Footing	=	1.425	m.
Area of Footing	=	1.674	sq.m.
As Per IS:456-2000, Clause 34.4,			
Basic Permissible Bearing Stress	=	11.25	N/sq.mm.
Max. Bearing Stress based on Area Ratio	=	22.5	N/sq.mm.

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Actual Bearing Stress	=	6.109	N/sq.mm.

As Per IS:456-2000, Clause 34.4.3,
Reinforcement is NOT required. However, Minimum

Percentage of Steel Required	=	0.5	%
Area of Steel Provided	=	450	sq.mm.
Dowel Rod Size-1	=	12	mm.
No. of Rods to be Provided	=	4	Nos.
Corresponding Steel Area	=	452.389	sq.mm.
Dowel Rod Size-2	=	16	mm.
No. of Rods to be Provided	=	3	Nos.
Corresponding Steel Area	=	603.186	sq.mm.

Note :- Calculation for Dowel Rods is only optionally
However, Dowel Rods may not be required in all cases.

F02 : One Way Shear Output (LC No. : 9)

As Per IS:456-2000, Clause 34.2.4,
the critical section for Shear Force is at a distance equal
the Effective Depth of the Footing, from the Face of the

Design Shear Force about Length	=	56.938	KN.
Modified Depth of Footing at the Face of Wall	=	400	mm.
Modified Depth of Footing at the End	=	250	mm.
Depth of Footing at Critical Section	=	238.154	mm.
Projection of Footing from Critical Section	=	143.5	mm.

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As Per IS:456-2000, Clause 40.1, Actual Shear Stress	=	0.203	N/sq.mm.
As Per IS:456-2000, Table 19, Design Shear Strength of Concrete	=	0.273	N/sq.mm.
As Per IS:456-2000, Table 20, Max. Permissible Shear Stress	=	3.124	N/sq.mm.
The section is SAFE in Shear, about ZZ-axis.			
Design Shear Force about Width	=	69.132	KN.
Depth of Footing at Critical Section	=	226.154	mm.
Projection of Footing from Critical Section	=	143.5	mm.
As Per IS:456-2000, Clause 40.1, Actual Shear Stress	=	0.215	N/sq.mm.
As Per IS:456-2000, Table 19, Design Shear Strength of Concrete	=	0.261	N/sq.mm.
As Per IS:456-2000, Table 20, Max. Permissible Shear Stress	=	3.124	N/sq.mm.
The section is SAFE in Shear, about XX-axis.			

F02 : Punching Shear Output (LC No. : 9)

As Per IS:456-2000, Clause 34.2.4,
the critical section for Shear Force is at a distance equal the Half the Effective Depth of the Footing, from the

the Column.

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Length of Footing at Critical Section	=	0.782	m.
Width of Footing at Critical Section	=	0.532	m.
Ratio of Width to Length at Critical Section	=	0.68	
Modified Depth of Footing at the Face of Wall	=	400	mm.
Modified Depth of Footing at the End	=	250	mm.
Depth of Footing at Critical Section	=	285.077	mm.
Design Shear Force	=	407.975	KN.
As Per IS:456-2000, Clause 31.6.2.1, Actual Shear Stress	=	0.545	N/sq.mm.
As Per IS:456-2000, Clause 31.6.3.1, Coefficient, ks	=	1	
Max. Permissible Shear Stress	=	1.25	N/sq.mm.

The section is SAFE in Shear.

F02 : Global Input Data (LC No. : 10)

The footing is to be designed as an Isolated Footing.

Width of Column	=	200	mm.
Length of Column	=	450	mm.
Footing Shape	=	Rectangular	
Initial Depth at the Face of Wall/Column	=	300	mm.
Initial Depth at the End	=	150	mm.

The footing is subjected to Axial Load & Biaxial

Working Axial Load	=	397.742	KN.
Working Moment about ZZ-axis	=	45.682	KN m.

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STABILITY CALCULATIONS FOR `AVITTAM NAYANMAR 'THE PROPOSED CONSTRUCTION OF GROUP DEVELOPMENT WITH TWO BLOCKS BLOCK-1 STILT FLOOR+5 FLOORS (HEIGHT 18.3 M)RESIDENTIAL BUILDING WITH 65 DWELLING BLOCK-2-STILT+5 FLOORS (HEIGHT 18.3M) RESIDENTIAL BUILDING WITH 50 DWELLING UNITS.TOATALLY 115 DWELLING UNITS FOR AFFORDABLE HOUSING AT DARKAST ROAD(KISHKINDAMAIN ROAD),KANNADAPALAYAM,WEST TAMBARAM,CHENNAI-600045 COMPRISED IN OLD S.NO.268/2,268/3,&268/4&T.S NOS106/1,107/2,107/3,108/2,&108/3,BLOCK NO.21,WARD NO. C OF TAMBARAM VILLAGE,TAMBARAM VILLAGE,TAMBATAM TALUKWITH IN THE LIMITS OF TAMBARAM MUNICIPAL CORPORATION

Working Moment about XX-axis	=	0.16	KN m.
Safe Bearing Capacity of Soil	=	250	KN/sq.m.
Factor of Safety for Safe Bearing Capacity	=	1.5	

F02 : Flexure Output (LC No. : 10)

Working Axial Load on Footing	=	397.742	KN.
Factored Axial Load on Footing	=	397.742	KN.
Percentage Factor for Self Weight of Footing	=	10	%
Factored Self Weight of Footing	=	39.774	KN.
Total Factored Axial Load on Footing	=	437.516	KN.
Working Moment about ZZ-axis	=	45.682	KN m.
Factored Moment about ZZ-axis	=	45.682	KN m.
Working Moment about XX-axis	=	0.16	KN m.
Factored Moment about XX-axis	=	0.16	KN m.
Ultimate Bearing Capacity of Soil	=	375	KN/sq.m.
From Vertical Load and Bending considerations, Area of Footing Required	=	1.681	sq.m.
Equal Projections were intially assumed from the to arrive at the Footing Size.			
Width of Footing Required	=	1.178	m.
Length of Footing Required	=	1.428	m.
Width of Footing Provided	=	1.2	m.
Length of Footing Provided	=	1.45	m.

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Actual Bearing Area Provided	=	1.74	sq.m.
Max. Bearing Pressure at the Base	=	360.544	KN/sq.m.
Min. Bearing Pressure at the Base	=	142.348	KN/sq.m.

Bending about ZZ-axis:-

Load Eccentricity lies within the limit causing total
Hence, the Footing Base about ZZ-axis will be in touch

Net Bearing Pressure at the Base - Right End	=	337.686	KN/sq.m.
Net Bearing Pressure at the Base - Left End	=	120.409	KN/sq.m.
Net Bearing Pressure at the Column Face	=	262.763	KN/sq.m.
Net Bearing Pressure - 'd' from Face	=	314.31	KN/sq.m.

As Per IS:456-2000, Clause 34.2.3,
the critical section for Bending Moment is at the Face of the Column.

Projection of Footing from Critical Section	=	500	mm.
Design Bending Moment	=	46.907	KN m.
Modified Depth of Footing at the Face of Wall	=	400	mm.
Modified Depth of Footing at the End	=	250	mm.

Effective Depth Required	=	194.184	mm.
Effective Depth Provided	=	344	mm.

Hence SAFE.

Percentage of Steel Required = 0.077 %

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As Per IS:456-2000, Clause 26.5.2.1,
the required percentage of Steel is less than the
to be provided. Hence, Minimum Steel is provided.

Percentage of Main Steel Provided	=	0.12	%
Area of Steel Provided	=	495.36	sq.mm.
Dia. of Rod-1 in Central Band	=	10	mm.
Required Spacing of Rods	=	190.261	mm.
Max. Spacing allowed (Rounded off)	=	175	mm.
Dia. of Rod-2 in Central Band	=	12	mm.
Required Spacing of Rods	=	273.976	mm.
Max. Spacing allowed (Rounded off)	=	250	mm.

Bending about XX-axis:-

Load Eccentricity lies within the limit causing total
Hence, the Footing Base about XX-axis will be in touch

Net Bearing Pressure at the Base - Right End	=	337.686	KN/sq.m.
Net Bearing Pressure at the Base - Left End	=	336.766	KN/sq.m.
Net Bearing Pressure at the Column Face	=	337.302	KN/sq.m.
Net Bearing Pressure - 'd' from Face	=	337.566	KN/sq.m.

As Per IS:456-2000, Clause 34.2.3,
the critical section for Bending Moment is at the Face
of the Column.

Projection of Footing from Critical Section	=	500	mm.
Design Bending Moment	=	61.182	KN m.
Modified Depth of Footing at the Face of Wall	=	400	mm.
Modified Depth of Footing at the End	=	250	mm.
Effective Depth Required	=	171.7	mm.
Effective Depth Provided	=	332	mm.

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Hence SAFE.

Percentage of Steel Required	=	0.09	%
As Per IS:456-2000, Clause 26.5.2.1, the required percentage of Steel is less than the to be provided. Hence, Minimum Steel is provided.			
Percentage of Main Steel Provided	=	0.12	%
Area of Steel Provided	=	577.68	sq.mm.
Dia. of Rod-1 in Central Band	=	10	mm.
Required Spacing of Rods	=	197.138	mm.
Max. Spacing allowed (Rounded off)	=	200	mm.
Dia. of Rod-2 in Central Band	=	12	mm.
Required Spacing of Rods	=	283.879	mm.
Max. Spacing allowed (Rounded off)	=	250	mm.

Note (1):- The required Spacing of Main Rods will be 300 mm. or 3d (300 mm. or 5d for Dist. Rods) If the required spacing exceeds this limit, the least will be automatically provided. This is done in IS:456-2000 Clause 26.3.3.

Note (2):- The required minimum area of reinforcement as per IS:456-2000, Clause 34.5.2, if the Footing 1000 mm. This minimum area is 360.0 sq.mm. for each

Note (3):- The assumed Depth of Footing will be so that a SAFE design is arrived at from both flexure as considerations.

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Note (4):- Spacing of Rods are also controlled by Value, User-defined Minimum and Maximum Spacing

F02 : Dowel Bars Output (LC No. : 10)

Factored Axial Load on Column	=	397.742	KN.
Char. Comp. Strength of Concrete	=	25	N/sq.mm.
Yield Stress of Pedestal Steel	=	500	N/sq.mm.
Width of Column Section	=	200	mm.
Depth of Column Section	=	450	mm.
Area of Column Section	=	90000	sq.mm.
Width of Footing	=	1.2	m.
Length of Footing	=	1.45	m.
Area of Footing	=	1.74	sq.m.

As Per IS:456-2000, Clause 34.4,

Basic Permissible Bearing Stress	=	11.25	N/sq.mm.
Max. Bearing Stress based on Area Ratio	=	22.5	N/sq.mm.
Actual Bearing Stress	=	4.419	N/sq.mm.

As Per IS:456-2000, Clause 34.4.3,
Reinforcement is NOT required. However, Minimum

Percentage of Steel Required	=	0.5	%
Area of Steel Provided	=	450	sq.mm.
Dowel Rod Size-1	=	12	mm.
No. of Rods to be Provided	=	4	Nos.
Corresponding Steel Area	=	452.389	sq.mm.
Dowel Rod Size-2		16	mm.

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No. of Rods to be Provided	=	3	Nos.
Corresponding Steel Area	=	603.186	sq.mm.

Note :- Calculation for Dowel Rods is only optionally
However, Dowel Rods may not be required in all

F02 : One Way Shear Output (LC No. : 10)

As Per IS:456-2000, Clause 34.2.4,
the critical section for Shear Force is at a distance
the Effective Depth of the Footing, from the Face of

Design Shear Force about Length	=	61.027	KN.
Modified Depth of Footing at the Face of Wall	=	400	mm.
Modified Depth of Footing at the End	=	250	mm.
Depth of Footing at Critical Section	=	240.8	mm.
Projection of Footing from Critical Section	=	156	mm.

As Per IS:456-2000, Clause 40.1,

Actual Shear Stress	=	0.211	N/sq.mm.

As Per IS:456-2000, Table 19,

Design Shear Strength of Concrete	=	0.273	N/sq.mm.

As Per IS:456-2000, Table 20,

Max. Permissible Shear Stress	=	3.124	N/sq.mm.

The section is SAFE in Shear, about ZZ-axis.

Design Shear Force about Width	=	76.371	KN.
Depth of Footing at Critical Section	=	228.8	mm.

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Projection of Footing from Critical Section	=	156	mm.
As Per IS:456-2000, Clause 40.1, Actual Shear Stress	=	0.23	N/sq.mm.
As Per IS:456-2000, Table 19, Design Shear Strength of Concrete	=	0.261	N/sq.mm.
As Per IS:456-2000, Table 20, Max. Permissible Shear Stress	=	3.124	N/sq.mm.

The section is SAFE in Shear, about XX-axis.

F02 : Punching Shear Output (LC No. : 10)

As Per IS:456-2000, Clause 34.2.4,
the critical section for Shear Force is at a distance the Half the Effective Depth of the Footing, from the the Column.

Length of Footing at Critical Section	=	0.782	m.
Width of Footing at Critical Section	=	0.532	m.
Ratio of Width to Length at Critical Section	=	0.68	
Modified Depth of Footing at the Face of Wall	=	400	mm.
Modified Depth of Footing at the End	=	250	mm.
Depth of Footing at Critical Section	=	286.4	mm.
Design Shear Force	=	299.007	KN.
As Per IS:456-2000, Clause 31.6.2.1, Actual Shear Stress	=	0.397	N/sq.mm.
As Per IS:456-2000, Clause 31.6.3.1, Coefficient, ks	=	1	
Max. Permissible Shear Stress	=	1.25	N/sq.mm.

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The section is SAFE in Shear.

F02 : Global Input Data (LC No. : 11)

The footing is to be designed as an Isolated Footing.

Width of Column	=	200	mm.
Length of Column	=	450	mm.

Footing Shape	=	Rectangular	
Initial Depth at the Face of Wall/Column	=	300	mm.
Initial Depth at the End	=	150	mm.

The footing is subjected to Axial Load & Biaxial

Working Axial Load	=	481.951	KN.
Working Moment about ZZ-axis	=	50.292	KN m.
Working Moment about XX-axis	=	1.312	KN m.
Safe Bearing Capacity of Soil	=	250	KN/sq.m.
Factor of Safety for Safe Bearing Capacity	=	1.5	

F02 : Flexure Output (LC No. : 11)

Working Axial Load on Footing	=	481.951	KN.
Factored Axial Load on Footing	=	481.951	KN.
Percentage Factor for Self Weight of Footing	=	10	%
Factored Self Weight of Footing	=	48.195	KN.
Total Factored Axial Load on Footing	=	530.146	KN.

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Working Moment about ZZ-axis	=	50.292	KN m.
Factored Moment about ZZ-axis	=	50.292	KN m.
Working Moment about XX-axis	=	1.312	KN m.
Factored Moment about XX-axis	=	1.312	KN m.
Ultimate Bearing Capacity of Soil	=	375	KN/sq.m.
From Vertical Load and Bending considerations, Area of Footing Required	=	1.956	sq.m.
Equal Projections were intially assumed from the to arrive at the Footing Size.			
Width of Footing Required	=	1.279	m.
Length of Footing Required	=	1.529	m.
Width of Footing Provided	=	1.3	m.
Length of Footing Provided	=	1.55	m.
Actual Bearing Area Provided	=	2.015	sq.m.
Max. Bearing Pressure at the Base	=	362.721	KN/sq.m.
Min. Bearing Pressure at the Base	=	163.479	KN/sq.m.

Bending about ZZ-axis:-

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Load Eccentricity lies within the limit causing total Hence, the Footing Base about ZZ-axis will be in			
Net Bearing Pressure at the Base - Right End	=	338.802	KN/sq.m.
Net Bearing Pressure at the Base - Left End	=	145.571	KN/sq.m.
Net Bearing Pressure at the Column Face	=	270.236	KN/sq.m.

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Net Bearing Pressure - 'd' from Face	=	316.238	KN/sq.m.

As Per IS:456-2000, Clause 34.2.3,
the critical section for Bending Moment is at the Face of the Column.

Projection of Footing from Critical Section	=	550	mm.
Design Bending Moment	=	62.123	KN m.
Modified Depth of Footing at the Face of Wall	=	425	mm.
Modified Depth of Footing at the End	=	275	mm.
Effective Depth Required	=	218.447	mm.
Effective Depth Provided	=	369	mm.

Hence SAFE.

Percentage of Steel Required	=	0.082	%

As Per IS:456-2000, Clause 26.5.2.1,
the required percentage of Steel is less than the to be provided. Hence, Minimum Steel is provided.

Percentage of Main Steel Provided	=	0.12	%
Area of Steel Provided	=	575.64	sq.mm.
Dia. of Rod-1 in Central Band	=	10	mm.
Required Spacing of Rods	=	177.371	mm.
Max. Spacing allowed (Rounded off)	=	175	mm.
Dia. of Rod-2 in Central Band	=	12	mm.
Required Spacing of Rods	=	255.414	mm.
Max. Spacing allowed (Rounded off)	=	250	mm.

Bending about XX-axis:-

Load Eccentricity lies within the limit causing total
Hence, the Footing Base about XX-axis will be in

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Net Bearing Pressure at the Base - Right End	=	338.802	KN/sq.m.
Net Bearing Pressure at the Base - Left End	=	332.792	KN/sq.m.

Net Bearing Pressure at the Column Face	=	336.26	KN/sq.m.
Net Bearing Pressure - 'd' from Face	=	337.966	KN/sq.m.

As Per IS:456-2000, Clause
the critical section for Bending Moment is at the of the Column.

Projection of Footing from Critical Section	=	550	mm.
Design Bending Moment	=	79.229	KN m.
Modified Depth of Footing at the Face of Wall	=	425	mm.
Modified Depth of Footing at the End	=	275	mm.
Effective Depth Required	=	192.719	mm.
Effective Depth Provided	=	357	mm.

Hence SAFE.

Percentage of Steel Required	=	0.094	%

As Per IS:456-2000, Clause 26.5.2.1,
the required percentage of Steel is less than the to be provided. Hence, Minimum Steel is provided.

Percentage of Main Steel Provided	=	0.12	%
Area of Steel Provided	=	664.02	sq.mm.
Dia. of Rod-1 in Central Band	=	10	mm.
Required Spacing of Rods	=	183.333	mm

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STABILITY CALCULATIONS FOR `AVITTAM NAYANMAR 'THE PROPOSED CONSTRUCTION OF GROUP DEVELOPMENT WITH TWO BLOCKS BLOCK-1 STILT FLOOR+5 FLOORS (HEIGHT 18.3 M)RESIDENTIAL BUILDING WITH 65 DWELLING BLOCK-2-STILT+5 FLOORS (HEIGHT 18.3M) RESIDENTIAL BUILDING WITH 50 DWELLING UNITS.TOATALLY 115 DWELLING UNITS FOR AFFORDABLE HOUSING AT DARKAST ROAD(KISHKINDAMAIN ROAD),KANNADAPALAYAM,WEST TAMBARAM,CHENNAI-600045 COMPRISED IN OLD S.NO.268/2,268/3,&268/4&T.S NOS106/1,107/2,107/3,108/2,&108/3,BLOCK NO.21,WARD NO. C OF TAMBARAM VILLAGE,TAMBARAM VILLAGE,TAMBATAM TALUKWITH IN THE LIMITS OF TAMBARAM MUNICIPAL CORPORATION

Max. Spacing allowed (Rounded off)	=	175	mm.
Dia. of Rod-2 in Central Band	=	12	mm.
Required Spacing of Rods	=	263.999	mm.
Max. Spacing allowed (Rounded off)	=	250	mm.

Note (1):- The required Spacing of Main Rods will be 300 mm. or 3d (300 mm. or 5d for Dist. Rods) If the required spacing exceeds this limit, the least will be automatically provided. This is done in IS:456-2000 Clause 26.3.3.

Note (2):- The required minimum area of as per IS:456-2000, Clause 34.5.2, if the Footing 1000 mm. This minimum area is 360.0 sq.mm. for

Note (3):- The assumed Depth of Footing will be so that a SAFE design is arrived at from both flexure considerations.

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Note (4):- Spacing of Rods are also controlled by Value, User-defined Minimum and Maximum

F02 : Dowel Bars Output (LC No. : 11)

Factored Axial Load on Column	=	481.951	KN.
Char. Comp. Strength of Concrete	=	25	N/sq.mm.
Yield Stress of Pedestal Steel	=	500	N/sq.mm.
Width of Column Section	=	200	mm.
Depth of Column Section	=	450	mm.
Area of Column Section	=	90000	sq.mm.

STABILITY CALCULATIONS FOR `AVITTAM NAYANMAR 'THE PROPOSED CONSTRUCTION OF GROUP DEVELOPMENT WITH TWO BLOCKS BLOCK-1 STILT FLOOR+5 FLOORS (HEIGHT 18.3 M)RESIDENTIAL BUILDING WITH 65 DWELLING BLOCK-2-STILT+5 FLOORS (HEIGHT 18.3M) RESIDENTIAL BUILDING WITH 50 DWELLING UNITS.TOATALLY 115 DWELLING UNITS FOR AFFORDABLE HOUSING AT DARKAST ROAD(KISHKINDAMAIN ROAD),KANNADAPALAYAM,WEST TAMBARAM,CHENNAI-600045 COMPRISED IN OLD S.NO.268/2,268/3,&268/4&T.S NOS106/1,107/2,107/3,108/2,&108/3,BLOCK NO.21,WARD NO. C OF TAMBARAM VILLAGE,TAMBARAM VILLAGE,TAMBATAM TALUKWITH IN THE LIMITS OF TAMBARAM MUNICIPAL CORPORATION

Width of Footing	=	1.3	m.
Length of Footing	=	1.55	m.
Area of Footing	=	2.015	sq.m.
As Per IS:456-2000, Clause 34.4,			
Basic Permissible Bearing Stress	=	11.25	N/sq.mm.
Max. Bearing Stress based on Area Ratio	=	22.5	N/sq.mm.
Actual Bearing Stress	=	5.355	N/sq.mm.
As Per IS:456-2000, Clause 34.4.3,			
Reinforcement is NOT required. However, Minimum			
Percentage of Steel Required	=	0.5	%
Area of Steel Provided	=	450	sq.mm.
Dowel Rod Size-1	=	12	mm.
No. of Rods to be Provided	=	4	Nos.
Corresponding Steel Area	=	452.389	sq.mm.
Dowel Rod Size-2	=	16	mm.
No. of Rods to be Provided	=	3	Nos.
Corresponding Steel Area	=	603.186	sq.mm.

Note :- Calculation for Dowel Rods is only optionally
However, Dowel Rods may not be required in all

F02 : One Way Shear Output (LC No. : 11)

As Per IS:456-2000, Clause 34.2.4,
the critical section for Shear Force is at a distance
the Effective Depth of the Footing, from the Face of

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STABILITY CALCULATIONS FOR `AVITTAM NAYANMAR 'THE PROPOSED CONSTRUCTION OF GROUP DEVELOPMENT WITH TWO BLOCKS BLOCK-1 STILT FLOOR+5 FLOORS (HEIGHT 18.3 M)RESIDENTIAL BUILDING WITH 65 DWELLING BLOCK-2-STILT+5 FLOORS (HEIGHT 18.3M) RESIDENTIAL BUILDING WITH 50 DWELLING UNITS.TOATALLY 115 DWELLING UNITS FOR AFFORDABLE HOUSING AT DARKAST ROAD(KISHKINDAMAIN ROAD),KANNADAPALAYAM,WEST TAMBARAM,CHENNAI-600045 COMPRISED IN OLD S.NO.268/2,268/3,&268/4&T.S NOS106/1,107/2,107/3,108/2,&108/3,BLOCK NO.21,WARD NO. C OF TAMBARAM VILLAGE,TAMBARAM VILLAGE,TAMBATAM TALUKWITH IN THE LIMITS OF TAMBARAM MUNICIPAL CORPORATION

Design Shear Force about Length	=	77.066	KN.
Modified Depth of Footing at the Face of Wall	=	425	mm.
Modified Depth of Footing at the End	=	275	mm.
Depth of Footing at Critical Section	=	268.364	mm.
Projection of Footing from Critical Section	=	181	mm.
As Per IS:456-2000, Clause 40.1, Actual Shear Stress	=	0.221	N/sq.mm.
As Per IS:456-2000, Table 19, Design Shear Strength of Concrete	=	0.265	N/sq.mm.
As Per IS:456-2000, Table 20, Max. Permissible Shear Stress	=	3.124	N/sq.mm.

The section is SAFE in Shear, about ZZ-axis.

Design Shear Force about Width	=	94.934	KN.
Depth of Footing at Critical Section	=	256.364	mm.
Projection of Footing from Critical Section	=	181	mm.
As Per IS:456-2000, Clause 40.1, Actual Shear Stress	=	0.239	N/sq.mm.
As Per IS:456-2000, Table 19, Design Shear Strength of Concrete	=	0.269	N/sq.mm.
As Per IS:456-2000, Table 20, Max. Permissible Shear Stress	=	3.124	N/sq.mm.

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The section is SAFE in Shear, about XX-axis.

F02 : Punching Shear Output (LC No. : 11)

As Per IS:456-2000, Clause 34.2.4,
the critical section for Shear Force is at a distance the Half the Effective Depth of the Footing, from the the Column.

Length of Footing at Critical Section	=	0.807	m.
Width of Footing at Critical Section	=	0.557	m.
Ratio of Width to Length at Critical Section	=	0.69	
Modified Depth of Footing at the Face of Wall	=	425	mm.
Modified Depth of Footing at the End	=	275	mm.
Depth of Footing at Critical Section	=	312.682	mm.
Design Shear Force	=	370.49	KN.
As Per IS:456-2000, Clause 31.6.2.1, Actual Shear Stress	=	0.434	N/sq.mm.
As Per IS:456-2000, Clause 31.6.3.1, Coefficient, ks	=	1	
Max. Permissible Shear Stress	=	1.25	N/sq.mm.

The section is SAFE in Shear.

F02 : Global Input Data (LC No. : 12)

The footing is to be designed as an Isolated Footing.

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Width of Column	=	200	mm.
Length of Column	=	450	mm.
Footing Shape	=	Rectangular	
Initial Depth at the Face of Wall/Column	=	300	mm.
Initial Depth at the End	=	150	mm.
The footing is subjected to Axial Load & Biaxial			
Working Axial Load	=	366.447	KN.
Working Moment about ZZ-axis	=	8.03	KN m.
Working Moment about XX-axis	=	19.396	KN m.
Safe Bearing Capacity of Soil	=	250	KN/sq.m.
Factor of Safety for Safe Bearing Capacity	=	1.5	

F02 : Flexure Output (LC No. : 12)

Working Axial Load on Footing	=	366.447	KN.
Factored Axial Load on Footing	=	366.447	KN.
Percentage Factor for Self Weight of Footing	=	10	%
Factored Self Weight of Footing	=	36.645	KN.
Total Factored Axial Load on Footing	=	403.092	KN.
Working Moment about ZZ-axis	=	8.03	KN m.
Factored Moment about ZZ-axis	=	8.03	KN m.
Working Moment about XX-axis	=	19.396	KN m.
Factored Moment about XX-axis	=	19.396	KN m.

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Ultimate Bearing Capacity of Soil	=	375	KN/sq.m.
From Vertical Load and Bending considerations, Area of Footing Required	=	1.456	sq.m.
Equal Projections were intially assumed from the to arrive at the Footing Size.			
Width of Footing Required	=	1.088	m.
Length of Footing Required	=	1.338	m.
Width of Footing Provided	=	1.1	m.
Length of Footing Provided	=	1.35	m.
Actual Bearing Area Provided	=	1.485	sq.m.
Max. Bearing Pressure at the Base	=	366.718	KN/sq.m.
Min. Bearing Pressure at the Base	=	176.167	KN/sq.m.

Bending about ZZ-axis:-

Load Eccentricity lies within the limit causing total Hence, the Footing Base about ZZ-axis will be in touch			
Net Bearing Pressure at the Base - Right End	=	342.042	KN/sq.m.
Net Bearing Pressure at the Base - Left End	=	293.976	KN/sq.m.
Net Bearing Pressure at the Column Face	=	326.02	KN/sq.m.
Net Bearing Pressure - 'd' from Face	=	337.377	KN/sq.m.
As Per IS:456-2000, Clause 34.2.3, the critical section for Bending Moment is at the Face of the Column.			
Projection of Footing from Critical Section	=	450	mm.
Design Bending Moment	=	37.5	KN m.
Modified Depth of Footing at the Face of Wall	=	375	mm.
Modified Depth of Footing at the End	=	225	mm.

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Effective Depth Required	=	177.812	mm.
Effective Depth Provided	=	319	mm.

Hence SAFE.

Percentage of Steel Required	=	0.078	%

As Per IS:456-2000, Clause 26.5.2.1,
the required percentage of Steel is less than the

to be provided. Hence, Minimum Steel is provided.

Percentage of Main Steel Provided	=	0.12	%
Area of Steel Provided	=	421.08	sq.mm.
Dia. of Rod-1 in Central Band	=	10	mm.
Required Spacing of Rods	=	205.172	mm.
Max. Spacing allowed (Rounded off)	=	200	mm.
Dia. of Rod-2 in Central Band	=	12	mm.
Required Spacing of Rods	=	295.448	mm.
Max. Spacing allowed (Rounded off)	=	250	mm.

Bending about XX-axis:-

Load Eccentricity lies within the limit causing total
Hence, the Footing Base about XX-axis will be in touch

Net Bearing Pressure at the Base - Right End	=	342.042	KN/sq.m.
Net Bearing Pressure at the Base - Left End	=	199.556	KN/sq.m.
Net Bearing Pressure at the Column Face	=	283.752	KN/sq.m.
Net Bearing Pressure - 'd' from Face	=	325.073	KN/sq.m.

As Per IS:456-2000, Clause 34.2.3,
the critical section for Bending Moment is at the Face of the Column.

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Projection of Footing from Critical Section	=	450	mm.
Design Bending Moment	=	44.097	KN m.
Modified Depth of Footing at the Face of Wall	=	375	mm.
Modified Depth of Footing at the End	=	225	mm.
Effective Depth Required	=	147.844	mm.
Effective Depth Provided	=	307	mm.

Hence SAFE.

Percentage of Steel Required	=	0.081	%

As Per IS:456-2000, Clause 26.5.2.1,
the required percentage of Steel is less than the
to be provided. Hence, Minimum Steel is provided.

Percentage of Main Steel Provided	=	0.12	%
Area of Steel Provided	=	497.34	sq.mm.

Dia. of Rod-1 in Central Band	=	10	mm.
Required Spacing of Rods	=	213.192	mm.
Max. Spacing allowed (Rounded off)	=	200	mm.
Dia. of Rod-2 in Central Band	=	12	mm.
Required Spacing of Rods	=	306.996	mm.
Max. Spacing allowed (Rounded off)	=	250	mm.

Note (1):- The required Spacing of Main Rods will be 300 mm. or 3d (300 mm. or 5d for Dist. Rods) If the required spacing exceeds this limit, the least value will be automatically provided. This is done in IS:456-2000 Clause 26.3.3.

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Note (2):- The required minimum area of reinforcement as per IS:456-2000, Clause 34.5.2, if the Footing 1000 mm. This minimum area is 360.0 sq.mm. for each

Note (3):- The assumed Depth of Footing will be so that a SAFE design is arrived at from both flexure as considerations.

Note (4):- Spacing of Rods are also controlled by Value, User-defined Minimum and Maximum Spacing

F02 : Dowel Bars Output (LC No. : 12)

Factored Axial Load on Column	=	366.447	KN.
Char. Comp. Strength of Concrete	=	25	N/sq.mm.
Yield Stress of Pedestal Steel	=	500	N/sq.mm.
Width of Column Section	=	200	mm.
Depth of Column Section	=	450	mm.
Area of Column Section	=	90000	sq.mm.
Width of Footing	=	1.1	m.
Length of Footing	=	1.35	m.
Area of Footing	=	1.485	sq.m.
As Per IS:456-2000, Clause 34.4,			
Basic Permissible Bearing Stress	=	11.25	N/sq.mm.
Max. Bearing Stress based on Area Ratio	=	22.5	N/sq.mm.
Actual Bearing Stress	=	4.072	N/sq.mm.

As Per IS:456-2000, Clause 34.4.3,
Reinforcement is NOT required. However, Minimum

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Percentage of Steel Required	=	0.5	%
Area of Steel Provided	=	450	sq.mm.
Dowel Rod Size-1	=	12	mm.
No. of Rods to be Provided	=	4	Nos.
Corresponding Steel Area	=	452.389	sq.mm.
Dowel Rod Size-2	=	16	mm.
No. of Rods to be Provided	=	3	Nos.
Corresponding Steel Area	=	603.186	sq.mm.

Note :- Calculation for Dowel Rods is only optionally
However, Dowel Rods may not be required in all cases.

F02 : One Way Shear Output (LC No. : 12)

As Per IS:456-2000, Clause 34.2.4,
the critical section for Shear Force is at a distance equal the Effective Depth of the Footing, from the Face of the

Design Shear Force about Length	=	48.952	KN.
Modified Depth of Footing at the Face of Wall	=	375	mm.
Modified Depth of Footing at the End	=	225	mm.
Depth of Footing at Critical Section	=	212.667	mm.
Projection of Footing from Critical Section	=	131	mm.

As Per IS:456-2000, Clause 40.1,
Actual Shear Stress = 0.209 N/sq.mm.

As Per IS:456-2000, Table 19,
Design Shear Strength of Concrete = 0.266 N/sq.mm.

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As Per IS:456-2000, Table 20, Max. Permissible Shear Stress	=	3.124	N/sq.mm.
The section is SAFE in Shear, about ZZ-axis.			
Design Shear Force about Width	=	58.99	KN.
Depth of Footing at Critical Section	=	200.667	mm.
Projection of Footing from Critical Section	=	131	mm.
As Per IS:456-2000, Clause 40.1, Actual Shear Stress	=	0.218	N/sq.mm.
As Per IS:456-2000, Table 19, Design Shear Strength of Concrete	=	0.271	N/sq.mm.

As Per IS:456-2000, Table 20, Max. Permissible Shear Stress	=	3.124	N/sq.mm.
The section is SAFE in Shear, about XX-axis.			

F02 : Punching Shear Output (LC No. : 12)

As Per IS:456-2000, Clause 34.2.4,
the critical section for Shear Force is at a distance the Half the Effective Depth of the Footing, from the the Column.

Length of Footing at Critical Section	=	0.757	m.
Width of Footing at Critical Section	=	0.507	m.
Ratio of Width to Length at Critical Section	=	0.67	

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STABILITY CALCULATIONS FOR `AVITTAM NAYANMAR 'THE PROPOSED CONSTRUCTION OF GROUP DEVELOPMENT WITH TWO BLOCKS BLOCK-1 STILT FLOOR+5 FLOORS (HEIGHT 18.3 M)RESIDENTIAL BUILDING WITH 65 DWELLING BLOCK-2-STILT+5 FLOORS (HEIGHT 18.3M) RESIDENTIAL BUILDING WITH 50 DWELLING UNITS.TOATALLY 115 DWELLING UNITS FOR AFFORDABLE HOUSING AT DARKAST ROAD(KISHKINDAMAIN ROAD),KANNADAPALAYAM,WEST TAMBARAM,CHENNAI-600045 COMPRISED IN OLD S.NO.268/2,268/3,&268/4&T.S NOS106/1,107/2,107/3,108/2,&108/3,BLOCK NO.21,WARD NO. C OF TAMBARAM VILLAGE,TAMBARAM VILLAGE,TAMBATAM TALUKWITH IN THE LIMITS OF TAMBARAM MUNICIPAL CORPORATION

Modified Depth of Footing at the Face of Wall	=	375	mm.
Modified Depth of Footing at the End	=	225	mm.
Depth of Footing at Critical Section	=	259.833	mm.
Design Shear Force	=	267.96	KN.
As Per IS:456-2000, Clause 31.6.2.1, Actual Shear Stress	=	0.408	N/sq.mm.
As Per IS:456-2000, Clause 31.6.3.1, Coefficient, ks	=	1	
Max. Permissible Shear Stress	=	1.25	N/sq.mm.

The section is SAFE in Shear.

F02 : Global Input Data (LC No. : 13)

The footing is to be designed as an Isolated Footing.

Width of Column	=	200	mm.
Length of Column	=	450	mm.
Footing Shape	=	Rectangular	
Initial Depth at the Face of Wall/Column	=	300	mm.
Initial Depth at the End	=	150	mm.

The footing is subjected to Axial Load & Biaxial

Working Axial Load	=	513.246	KN.
Working Moment about ZZ-axis	=	3.42	KN m.

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Working Moment about XX-axis	=	20.868	KN m.
Safe Bearing Capacity of Soil	=	250	KN/sq.m.
Factor of Safety for Safe Bearing Capacity	=	1.5	

F02 : Flexure Output (LC No. : 13)

Working Axial Load on Footing	=	513.246	KN.
Factored Axial Load on Footing	=	513.246	KN.
Percentage Factor for Self Weight of Footing	=	10	%
Factored Self Weight of Footing	=	51.325	KN.
Total Factored Axial Load on Footing	=	564.57	KN.
Working Moment about ZZ-axis	=	3.42	KN m.
Factored Moment about ZZ-axis	=	3.42	KN m.
Working Moment about XX-axis	=	20.868	KN m.
Factored Moment about XX-axis	=	20.868	KN m.
Ultimate Bearing Capacity of Soil	=	375	KN/sq.m.
From Vertical Load and Bending considerations, Area of Footing Required	=	1.815	sq.m.
Equal Projections were intially assumed from the to arrive at the Footing Size.			
Width of Footing Required	=	1.228	m.
Length of Footing Required	=	1.478	m.
Width of Footing Provided	=	1.25	m.
Length of Footing Provided	=	1.5	m.
Actual Bearing Area Provided	=	1.875	sq.m.
Max. Bearing Pressure at the Base	=	361.822	KN/sq.m.
Min. Bearing Pressure at the Base	=	240.386	KN/sq.m.

Bending about ZZ-axis:-

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Load Eccentricity lies within the limit causing total
Hence, the Footing Base about ZZ-axis will be in

Net Bearing Pressure at the Base - Right End	=	334.449	KN/sq.m.
Net Bearing Pressure at the Base - Left End	=	319.857	KN/sq.m.
Net Bearing Pressure at the Column Face	=	329.341	KN/sq.m.
Net Bearing Pressure - 'd' from Face	=	332.688	KN/sq.m.

As Per IS:456-2000, Clause 34.2.3,
the critical section for Bending Moment is at the Face of the Column.

Projection of Footing from Critical Section	=	525	mm.
Design Bending Moment	=	57.321	KN m.
Modified Depth of Footing at the Face of Wall	=	400	mm.
Modified Depth of Footing at the End	=	250	mm.
Effective Depth Required	=	212.206	mm.
Effective Depth Provided	=	344	mm.

Hence SAFE.

Percentage of Steel Required	=	0.091	%

As Per IS:456-2000, Clause 26.5.2.1,
the required percentage of Steel is less than the to be provided. Hence, Minimum Steel is provided.

Percentage of Main Steel Provided	=	0.12	%

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Area of Steel Provided	=	516	sq.mm.
Dia. of Rod-1 in Central Band	=	10	mm.
Required Spacing of Rods	=	190.261	mm.
Max. Spacing allowed (Rounded off)	=	175	mm.
Dia. of Rod-2 in Central Band	=	12	mm.
Required Spacing of Rods	=	273.976	mm.
Max. Spacing allowed (Rounded off)	=	250	mm.

Bending about XX-axis:-

Load Eccentricity lies within the limit causing total
Hence, the Footing Base about XX-axis will be in

Net Bearing Pressure at the Base - Right End	=	334.449	KN/sq.m.
Net Bearing Pressure at the Base - Left End	=	227.605	KN/sq.m.
Net Bearing Pressure at the Column Face	=	289.574	KN/sq.m.
Net Bearing Pressure - 'd' from Face	=	318.978	KN/sq.m.

As Per IS:456-2000, Clause 34.2.3,
the critical section for Bending Moment is at the Face of the Column.

Projection of Footing from Critical Section	=	525	mm.

Design Bending Moment	=	66.045	KN m.
Modified Depth of Footing at the Face of Wall	=	400	mm.
Modified Depth of Footing at the End	=	250	mm.
Effective Depth Required	=	177.161	mm.
Effective Depth Provided	=	332	mm.

Hence SAFE.

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Percentage of Steel Required	=	0.094	%
As Per IS:456-2000, Clause 26.5.2.1, the required percentage of Steel is less than the to be provided. Hence, Minimum Steel is provided.			
Percentage of Main Steel Provided	=	0.12	%
Area of Steel Provided	=	597.6	sq.mm.
Dia. of Rod-1 in Central Band	=	10	mm.
Required Spacing of Rods	=	197.138	mm.
Max. Spacing allowed (Rounded off)	=	200	mm.
Dia. of Rod-2 in Central Band	=	12	mm.
Required Spacing of Rods	=	283.879	mm.
Max. Spacing allowed (Rounded off)	=	250	mm.

Note (1):- The required Spacing of Main Rods will be 300 mm. or 3d (300 mm. or 5d for Dist. Rods) If the required spacing exceeds this limit, the least will be automatically provided. This is done in IS:456-2000 Clause 26.3.3.

Note (2):- The required minimum area of as per IS:456-2000, Clause 34.5.2, if the Footing 1000 mm. This minimum area is 360.0 sq.mm. for

Note (3):- The assumed Depth of Footing will be so that a SAFE design is arrived at from both considerations.

Note (4):- Spacing of Rods are also controlled by Value, User-defined Minimum and Maximum

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F02 : Dowel Bars Output (LC No. : 13)

Factored Axial Load on Column	=	513.246	KN.
Char. Comp. Strength of Concrete	=	25	N/sq.mm.

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Yield Stress of Pedestal Steel	=	500	N/sq.mm.
Width of Column Section	=	200	mm.
Depth of Column Section	=	450	mm.
Area of Column Section	=	90000	sq.mm.
Width of Footing	=	1.25	m.
Length of Footing	=	1.5	m.
Area of Footing	=	1.875	sq.m.
As Per IS:456-2000, Clause			
Basic Permissible Bearing Stress	=	11.25	N/sq.mm.
Max. Bearing Stress based on Area Ratio	=	22.5	N/sq.mm.
Actual Bearing Stress	=	5.703	N/sq.mm.
As Per IS:456-2000, Clause 34.4.3,			
Reinforcement is NOT required. However,			
Percentage of Steel Required	=	0.5	%
Area of Steel Provided	=	450	sq.mm.
Dowel Rod Size-1	=	12	mm.
No. of Rods to be Provided	=	4	Nos.
Corresponding Steel Area	=	452.389	sq.mm.
Dowel Rod Size-2	=	16	mm.
No. of Rods to be Provided	=	3	Nos.
Corresponding Steel Area	=	603.186	sq.mm.

Note :- Calculation for Dowel Rods is only optionally
However, Dowel Rods may not be required in all

F02 : One Way Shear Output (LC No. : 13)

As Per IS:456-2000, Clause 34.2.4,

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the critical section for Shear Force is at a distance
the Effective Depth of the Footing, from the Face of

Design Shear Force about Length	=	75.47	KN.
Modified Depth of Footing at the Face of Wall	=	400	mm.
Modified Depth of Footing at the End	=	250	mm.
Depth of Footing at Critical Section	=	245.714	mm.
Projection of Footing from Critical Section	=	181	mm.

As Per IS:456-2000, Clause 40.1,

Actual Shear Stress	=	0.246	N/sq.mm.

As Per IS:456-2000, Table 19,

Design Shear Strength of Concrete	=	0.273	N/sq.mm.

As Per IS:456-2000, Table 20,

Max. Permissible Shear Stress	=	3.124	N/sq.mm.

The section is SAFE in Shear, about ZZ-axis.

Design Shear Force about Width	=	88.703	KN.
Depth of Footing at Critical Section	=	233.714	mm.
Projection of Footing from Critical Section	=	181	mm.

As Per IS:456-2000, Clause 40.1,

Actual Shear Stress	=	0.253	N/sq.mm.

As Per IS:456-2000, Table 19,

Design Shear Strength of Concrete	=	0.261	N/sq.mm.

As Per IS:456-2000, Table 20,

Max. Permissible Shear Stress	=	3.124	N/sq.mm.

The section is SAFE in Shear, about XX-axis.

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F02 : Punching Shear Output (LC No. : 13)

As Per IS:456-2000, Clause 34.2.4,
the critical section for Shear Force is at a distance the Half the Effective Depth of the Footing, from the the Column.

Length of Footing at Critical Section	=	0.782	m.
Width of Footing at Critical Section	=	0.532	m.
Ratio of Width to Length at Critical Section	=	0.68	
Modified Depth of Footing at the Face of Wall	=	400	mm.
Modified Depth of Footing at the End	=	250	mm.
Depth of Footing at Critical Section	=	288.857	mm.
Design Shear Force	=	395.011	KN.

As Per IS:456-2000, Clause 31.6.2.1,

Actual Shear Stress	=	0.52	N/sq.mm.

As Per IS:456-2000, Clause 31.6.3.1,

Coefficient, ks	=	1	
Max. Permissible Shear Stress	=	1.25	N/sq.mm.

The section is SAFE in Shear.

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SCADDS/RC-Column Designer 2022 [Release: 4.01.3010]

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SCADDS/Nucleus 2022: RC-Column Designer
Limit State Design of Braced/Unbraced Short/Long
Rectangular/Circular Cracked/Uncracked Column Sections
Subjected to Axial Load/Uni-axial & Bi-axial Bending
as per IS:456-2000 upto Amendment 5 (Reaffirmed 2021)

Introduction:-

This Report contains the detailed solution for the Reinforced Concrete Column Design problem.

The given Column Section is considered for Design and the output contains the following

1. Global Input Data
2. Development Length Output
3. Slenderness & Eccentricity Output
4. Flexural Design Output
5. Tie Design Output

While detailed design will be carried out for design for Axial Tension and Shear is not

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Global Material Data			
Concrete Clear Cover	=	40	mm.
Char. Comp. Strength of Concrete	=	30	N/sq.mm.

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Yield Strength of Main Steel	=	500	N/sq.mm.
Main Rod Size-1	=	16	mm.
Main Rod Size-2	=	20	mm.
Yield Strength of Tie Steel	=	500	N/sq.mm.
Tie Rod Size-1	=	8	mm.
Tie Rod Size-2	=	10	mm.
Factor of Safety for Load	=	1	
Partial Safety Factor for Concrete	=	1.5	
Partial Safety Factor for Steel	=	1.15	
Max. Strain in Concrete	=	0.0035	mm./mm.
Max. Strain in Steel	=	0.0055	mm./mm.
Young's Modulus of Concrete	=	27386.128	N/sq.mm.
Young's Modulus of Steel	=	200000	N/sq.mm.

Bond / Development Length Output

Char. Comp. Strength of Concrete	=	30	N/sq.mm.
Yield Stress of Main Steel	=	500	N/sq.mm.
As Per IS:456-2000, Clause			
Design Bond Stress for Main Rods	=	3	N/sq.mm.
Rods in Compression:-			
Main Rod Diameter-1	=	16	mm.
Corresponding Development Length	=	580	mm.
Main Rod Diameter-2	=	20	mm.
Corresponding Development Length	=	725	mm.

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C1 : Global Input Data (LC No. : 9)			
Column Section	=	Rectangular	
Width of Column	=	200	mm.
Depth of Column	=	450	mm.
The Effective Lengths about ZZ and YY axes based on actual framing conditions from the 3D			
Effective Length Coeff. about ZZ axis	=	0.755	
Effective Length Coeff. about YY axis	=	0.739	
Unsupported Length-ZZ of Column	=	1.55	m.
Unsupported Length-YY of Column	=	1.55	m.
Effective Length-ZZ of Column	=	1.17	m.
Effective Length-YY of Column	=	1.145	m.
Working Axial Load on Column	=	1021.562	KN.
Working Moment about ZZ-axis at Top	=	-0.082	KN m.
Working Moment about YY-axis at Top	=	-1.181	KN m.
Working Moment about ZZ-axis at Bottom	=	4.561	KN m.
Working Moment about YY-axis at Bottom	=	-1.412	KN m.

C1 : Slenderness & Eccentricity Output (LC No. : 9)			
Effective Length-ZZ of Column	=	1.17	m.
Effective Length-YY of Column	=	1.145	m.
Slenderness Ratio about ZZ-axis	=	5.727	
The Column is Short about the ZZ-axis.			

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STABILITY CALCULATIONS FOR `AVITTAM NAYANMAR 'THE PROPOSED CONSTRUCTION OF GROUP DEVELOPMENT WITH TWO BLOCKS BLOCK-1 STILT FLOOR+5 FLOORS (HEIGHT 18.3 M)RESIDENTIAL BUILDING WITH 65 DWELLING BLOCK-2-STILT+5 FLOORS (HEIGHT 18.3M) RESIDENTIAL BUILDING WITH 50 DWELLING UNITS.TOATALLY 115 DWELLING UNITS FOR AFFORDABLE HOUSING AT DARKAST ROAD(KISHKINDAMAIN ROAD),KANNADAPALAYAM,WEST TAMBARAM,CHENNAI-600045 COMPRISED IN OLD S.NO.268/2,268/3,&268/4&T.S NOS106/1,107/2,107/3,108/2,&108/3,BLOCK NO.21,WARD NO. C OF TAMBARAM VILLAGE,TAMBARAM VILLAGE,TAMBATAM TALUKWITH IN THE LIMITS OF TAMBARAM MUNICIPAL CORPORATION

Slenderness Ratio about YY-axis	=	2.599	
The Column is Short about the YY-axis.			
As Per IS:456-2000, 25.4,			
Minimum Eccentricity	=	20	mm.
Lo/500 + b/30	=	9.767	mm.
Lo/500 + D/30	=	18.1	mm.
Actual Minimum Eccentricity about ZZ	=	20	mm.
Actual Minimum Eccentricity about YY	=	20	mm.
As Per IS:456-2000, 39.3,			
0.05 times D (Limiting Value about ZZ)	=	22.5	mm.
0.05 times b (Limiting Value about YY)	=	10	mm.
Actual Eccentricity about ZZ due to Moment-ZZ	=	4.464	mm.

Actual Eccentricity about YY due to Moment-YY	=	1.383	mm.
Design Eccentricity about ZZ due to Moment-ZZ	=	20	mm.
Design Eccentricity about YY due to Moment-YY	=	20	mm.
As Per IS:456-2000, 39.3,			
Design Eccentricity about ZZ is not more than the			
Hence, the Column carries only Axial Load about			
Design Eccentricity about YY is more than the			
Hence, the Column has Axial Load & Bending			
Revised Design Bending Moment about YY	=	20.431	KN m.

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C1 : Flexural Design Output (LC No. : 9)

Axial Load on Column	=	1021.562	KN.
Factored Axial Load	=	1021.562	KN.

STABILITY CALCULATIONS FOR `AVITTAM NAYANMAR 'THE PROPOSED CONSTRUCTION OF GROUP DEVELOPMENT WITH TWO BLOCKS BLOCK-1 STILT FLOOR+5 FLOORS (HEIGHT 18.3 M)RESIDENTIAL BUILDING WITH 65 DWELLING BLOCK-2-STILT+5 FLOORS (HEIGHT 18.3M) RESIDENTIAL BUILDING WITH 50 DWELLING UNITS.TOATALLY 115 DWELLING UNITS FOR AFFORDABLE HOUSING AT DARKAST ROAD(KISHKINDAMAIN ROAD),KANNADAPALAYAM,WEST TAMBARAM,CHENNAI-600045 COMPRISED IN OLD S.NO.268/2,268/3,&268/4&T.S NOS106/1,107/2,107/3,108/2,&108/3,BLOCK NO.21,WARD NO. C OF TAMBARAM VILLAGE,TAMBARAM VILLAGE,TAMBATAM TALUKWITH IN THE LIMITS OF TAMBARAM MUNICIPAL CORPORATION

Revised Design Moment about YY axis	=	20.431	KN m.
The Column is subjected to Axial Load & Uni-axial			
Main Reinforcement is provided along all the			
Characteristic Comp. Strength of Concrete	=	30	N/sq.mm.
Yield Stress of Main Steel	=	500	N/sq.mm.
Min. Percentage of Reinforcement Required	=	0.8	%
Max. Percentage of Reinforcement Allowed	=	4	%
Percentage of Reinforcement Required	=	0.335	%
As Per IS:456-2000, the required percentage of Reinforcement is less the Minimum value to be provided. Therefore, Reinforcement will be provided.			
Depth of Neutral Axis	=	429.75	mm.
Width of Column	=	200	mm.
Depth of Column	=	450	mm.
Gross Sectional Area	=	90000	sq.mm.
Percentage of Reinforcement to be Provided	=	0.8	%
Area of Longitudinal Reinforcement Required	=	720	sq.mm.
Main Rod Size-1	=	16	mm.
No. of Rods Required	=	3.581	Nos.
No. of Rods Provided	=	4	Nos.
Corresponding Steel Area	=	804.248	sq.mm.

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STABILITY CALCULATIONS FOR `AVITTAM NAYANMAR 'THE PROPOSED CONSTRUCTION OF GROUP DEVELOPMENT WITH TWO BLOCKS BLOCK-1 STILT FLOOR+5 FLOORS (HEIGHT 18.3 M)RESIDENTIAL BUILDING WITH 65 DWELLING BLOCK-2-STILT+5 FLOORS (HEIGHT 18.3M) RESIDENTIAL BUILDING WITH 50 DWELLING UNITS.TOATALLY 115 DWELLING UNITS FOR AFFORDABLE HOUSING AT DARKAST ROAD(KISHKINDAMAIN ROAD),KANNADAPALAYAM,WEST TAMBARAM,CHENNAI-600045 COMPRISED IN OLD S.NO.268/2,268/3,&268/4&T.S NOS106/1,107/2,107/3,108/2,&108/3,BLOCK NO.21,WARD NO. C OF TAMBARAM VILLAGE,TAMBARAM VILLAGE,TAMBATAM TALUKWITH IN THE LIMITS OF TAMBARAM MUNICIPAL CORPORATION

Main Rod Size-2	=	20	mm.
No. of Rods Required	=	2.292	Nos.
No. of Rods Provided	=	4	Nos.
Corresponding Steel Area	=	1256.637	sq.mm.

Note:- Please note that the minimum number of will be always FOUR for Rectangular Columns Columns, as per IS:456-2000 Clause 26.5.3.1.(c)

C1 : Tie Pitch Output (LC No. : 9)

Tie Rod Size-1	=	8	mm.
Tie Rod Size-2	=	10	mm.
Main Rod Size-1	=	16	mm.
As Per IS:456-2000,			
Least Lateral Dimension	=	200	mm.
16 times dia. of Main Rod	=	256	mm.
Maximum allowable value as per Code	=	300	mm.
Minimum of the above values for 16# Rods	=	200	mm.
Main Rod Size-2	=	20	mm.
As Per IS:456-2000,			
Least Lateral Dimension	=	200	mm.
16 times dia. of Main Rod	=	320	mm.
Maximum allowable value as per Code	=	300	mm.
Minimum of the above values for 20# Rods	=	200	mm.

Spacing of Rods are also controlled by Value, User-defined Minimum and Maximum

C1 : Global Input Data (LC No. : 10)

Column Section	=	Rectangular	
Width of Column	=	200	mm.

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Depth of Column	=	450	mm.
The Effective Lengths about ZZ and YY axes were based on actual framing conditions from the 3D			
Effective Length Coeff. about ZZ axis	=	0.755	
Effective Length Coeff. about YY axis	=	0.739	
Unsupported Length-ZZ of Column	=	1.55	m.
Unsupported Length-YY of Column	=	1.55	m.

Effective Length-ZZ of Column	=	1.17	m.
Effective Length-YY of Column	=	1.145	m.
Working Axial Load on Column	=	715.057	KN.
Working Moment about ZZ-axis at Top	=	41.792	KN m.
Working Moment about YY-axis at Top	=	2.574	KN m.
Working Moment about ZZ-axis at Bottom	=	4.818	KN m.
Working Moment about YY-axis at Bottom	=	2.015	KN m.

C1 : Slenderness & Eccentricity Output (LC No. : 10)

Effective Length-ZZ of Column	=	1.17	m.
Effective Length-YY of Column	=	1.145	m.
Slenderness Ratio about ZZ-axis	=	5.727	
The Column is Short about the ZZ-axis.			
Slenderness Ratio about YY-axis	=	2.599	
The Column is Short about the YY-axis.			
As Per IS:456-2000, 25.4,			
Minimum Eccentricity	=	20	mm.
Lo/500 + b/30	=	9.767	mm.
Lo/500 + D/30	=	18.	mm.

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Actual Minimum Eccentricity about ZZ	=	20	mm.
Actual Minimum Eccentricity about YY	=	20	mm.
As Per IS:456-2000, 39.3,			
0.05 times D (Limiting Value about ZZ)	=	22.5	mm.
0.05 times b (Limiting Value about YY)	=	10	mm.
Actual Eccentricity about ZZ due to Moment-ZZ	=	58.446	mm.
Actual Eccentricity about YY due to Moment-YY	=	3.6	mm.
Design Eccentricity about ZZ due to Moment-ZZ	=	58.446	mm.
Design Eccentricity about YY due to Moment-YY	=	20	mm.
As Per IS:456-2000, 39.3,			
Design Eccentricity about ZZ is more than the			
Hence, the Column has Axial Load & Bending			
Revised Design Bending Moment about ZZ	=	41.792	KN m.
Design Eccentricity about YY is more than the			
Hence, the Column has Axial Load & Bending			
Revised Design Bending Moment about YY	=	14.301	KN m.

C1 : Flexural Design Output (LC No. : 10)

Axial Load on Column	=	715.057	KN.
Factored Axial Load	=	715.057	KN.
Revised Design Moment about ZZ axis	=	41.792	KN m.
Revised Design Moment about YY axis	=	14.301	KN m.
The Column is subjected to Axial Load & Bi-axial			

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Main Reinforcement is provided along all the

Characteristic Comp. Strength of Concrete	=	30	N/sq.mm.
Yield Stress of Main Steel	=	500	N/sq.mm.
Min. Percentage of Reinforcement Required	=	0.8	%
Max. Percentage of Reinforcement Allowed	=	4	%
Percentage of Reinforcement Required	=	0.001	%

As Per IS:456-2000,
the required percentage of Reinforcement is less the Minimum value to be provided. Therefore, Reinforcement will be provided.

Depth of Neutral Axis about ZZ-axis	=	330.75	mm.
Depth of Neutral Axis about YY-axis	=	330.75	mm.
Ultimate Axial Load, Puz	=	1215.325	KN.
Ratio of Pu/Puz	=	0.588	
Value of Coefficient, Alpha-n	=	1.647	
Ultimate Moment Capacity about ZZ-axis	=	62.476	KN m.
Ultimate Moment Capacity about YY-axis	=	27.76	KN m.
Ratio of Actual to Ultimate Moment, Mux/Mux1	=	0.669	
Ratio of Actual to Ultimate Moment, Muy/Muy1	=	0.515	
Sum of above Ratios, applied with Alpha-n	=	0.851	
Width of Column	=	200	mm.
Depth of Column	=	450	mm.
Gross Sectional Area	=	90000	sq.mm.
Percentage of Reinforcement to be Provided	=	0.8	%
Area of Longitudinal Reinforcement Required	=	720	sq.mm.
Main Rod Size-1	=	16	mm.

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No. of Rods Required	=	3.581	Nos.
No. of Rods Provided	=	4	Nos.
Corresponding Steel Area	=	804.248	sq.mm.

Main Rod Size-2	=	20	mm.
No. of Rods Required	=	2.292	Nos.
No. of Rods Provided	=	4	Nos.
Corresponding Steel Area	=	1256.637	sq.mm.

Note:- Please note that the minimum number of will be always FOUR for Rectangular Columns Columns, as per IS:456-2000 Clause 26.5.3.1.(c)

C1 : Tie Pitch Output (LC No. : 10)

Tie Rod Size-1	=	8	mm.
Tie Rod Size-2	=	10	mm.
Main Rod Size-1	=	16	mm.
As Per IS:456-2000,			
Least Lateral Dimension	=	200	mm.
16 times dia. of Main Rod	=	256	mm.
Maximum allowable value as per Code	=	300	mm.
Minimum of the above values for 16# Rods	=	200	mm.
Main Rod Size-2	=	20	mm.
As Per IS:456-2000,			
Least Lateral Dimension	=	200	mm.
16 times dia. of Main Rod	=	320	mm.
Maximum allowable value as per Code	=	300	mm.
Minimum of the above values for 20# Rods	=	200	mm.

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Spacing of Rods are also controlled by
Value, User-defined Minimum and Maximum

C1 : Global Input Data (LC No. : 11)

Column Section	=	Rectangular	
Width of Column	=	200	mm.
Depth of Column	=	450	mm.
The Effective Lengths about ZZ and YY axes were based on actual framing conditions from the 3D			
Effective Length Coeff. about ZZ axis	=	0.755	
Effective Length Coeff. about YY axis	=	0.739	
Unsupported Length-ZZ of Column	=	1.55	m.
Unsupported Length-YY of Column	=	1.55	m.

Effective Length-ZZ of Column	=	1.17	m.
Effective Length-YY of Column	=	1.145	m.
Working Axial Load on Column	=	919.441	KN.
Working Moment about ZZ-axis at Top	=	-41.924	KN m.
Working Moment about YY-axis at Top	=	-4.465	KN m.
Working Moment about ZZ-axis at Bottom	=	2.479	KN m.
Working Moment about YY-axis at Bottom	=	-4.275	KN m.

C1 : Slenderness & Eccentricity Output (LC No. : 11)

Effective Length-ZZ of Column	=	1.17	m.
Effective Length-YY of Column	=	1.145	m.
Slenderness Ratio about ZZ-axis	=	5.727	

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The Column is Short about the ZZ-axis.			
Slenderness Ratio about YY-axis	=	2.599	
The Column is Short about the YY-axis.			
As Per IS:456-2000, 25.4,			
Minimum Eccentricity	=	20	mm.
Lo/500 + b/30	=	9.767	mm.
Lo/500 + D/30	=	18.1	mm.
Actual Minimum Eccentricity about ZZ	=	20	mm.
Actual Minimum Eccentricity about YY	=	20	mm.
As Per IS:456-2000, 39.3,			
0.05 times D (Limiting Value about ZZ)	=	22.5	mm.
0.05 times b (Limiting Value about YY)	=	10	mm.
Actual Eccentricity about ZZ due to Moment-ZZ	=	45.597	mm.
Actual Eccentricity about YY due to Moment-YY	=	4.856	mm.
Design Eccentricity about ZZ due to Moment-ZZ	=	45.597	mm.
Design Eccentricity about YY due to Moment-YY	=	20	mm.
As Per IS:456-2000, 39.3,			
Design Eccentricity about ZZ is more than the			
Hence, the Column has Axial Load & Bending			
Revised Design Bending Moment about ZZ	=	41.924	KN m.
Design Eccentricity about YY is more than the			
Hence, the Column has Axial Load & Bending			
Revised Design Bending Moment about YY	=	18.389	KN m.

C1 : Flexural Design Output (LC No. : 11)

Axial Load on Column	=	919.441	KN.

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Factored Axial Load	=	919.441	KN.
Revised Design Moment about ZZ axis	=	41.924	KN m.
Revised Design Moment about YY axis	=	18.389	KN m.
The Column is subjected to Axial Load & Bi-axial			
Main Reinforcement is provided along all the			
Characteristic Comp. Strength of Concrete	=	30	N/sq.mm.
Yield Stress of Main Steel	=	500	N/sq.mm.
Min. Percentage of Reinforcement Required	=	0.8	%
Max. Percentage of Reinforcement Allowed	=	4	%
Percentage of Reinforcement Required	=	0.421	%
As Per IS:456-2000, the required percentage of Reinforcement is less the Minimum value to be provided. Therefore, Reinforcement will be provided.			
Depth of Neutral Axis about ZZ-axis	=	386.55	mm.
Depth of Neutral Axis about YY-axis	=	385.65	mm.
Ultimate Axial Load, Puz	=	1351.972	KN.
Ratio of Pu/Puz	=	0.68	
Value of Coefficient, Alpha-n	=	1.8	
Ultimate Moment Capacity about ZZ-axis	=	63.577	KN m.
Ultimate Moment Capacity about YY-axis	=	26.413	KN m.
Ratio of Actual to Ultimate Moment, Mux/Mux1	=	0.659	
Ratio of Actual to Ultimate Moment, Muy/Muy1	=	0.696	

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STABILITY CALCULATIONS FOR `AVITTAM NAYANMAR 'THE PROPOSED CONSTRUCTION OF GROUP DEVELOPMENT WITH TWO BLOCKS BLOCK-1 STILT FLOOR+5 FLOORS (HEIGHT 18.3 M)RESIDENTIAL BUILDING WITH 65 DWELLING BLOCK-2-STILT+5 FLOORS (HEIGHT 18.3M) RESIDENTIAL BUILDING WITH 50 DWELLING UNITS.TOATALLY 115 DWELLING UNITS FOR AFFORDABLE HOUSING AT DARKAST ROAD(KISHKINDAMAIN ROAD),KANNADAPALAYAM,WEST TAMBARAM,CHENNAI-600045 COMPRISED IN OLD S.NO.268/2,268/3,&268/4&T.S NOS106/1,107/2,107/3,108/2,&108/3,BLOCK NO.21,WARD NO. C OF TAMBARAM VILLAGE,TAMBARAM VILLAGE,TAMBATAM TALUKWITH IN THE LIMITS OF TAMBARAM MUNICIPAL CORPORATION

Sum of above Ratios, applied with Alpha-n	=	0.994	
Width of Column	=	200	mm.
Depth of Column	=	450	mm.
Gross Sectional Area	=	90000	sq.mm.
Percentage of Reinforcement to be Provided	=	0.8	%
Area of Longitudinal Reinforcement Required	=	720	sq.mm.
Main Rod Size-1	=	16	mm.
No. of Rods Required	=	3.581	Nos.
No. of Rods Provided	=	4	Nos.
Corresponding Steel Area	=	804.248	sq.mm.

Main Rod Size-2	=	20	mm.
No. of Rods Required	=	2.292	Nos.
No. of Rods Provided	=	4	Nos.
Corresponding Steel Area	=	1256.637	sq.mm.

Note:- Please note that the minimum number of will be always FOUR for Rectangular Columns Columns, as per IS:456-2000 Clause 26.5.3.1.(c)

C1 : Tie Pitch Output (LC No. : 11)

Tie Rod Size-1	=	8	mm.
Tie Rod Size-2	=	10	mm.
Main Rod Size-1	=	16	mm.
As Per IS:456-2000,			
Least Lateral Dimension	=	200	mm.

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16 times dia. of Main Rod	=	256	mm.
Maximum allowable value as per Code	=	300	mm.
Minimum of the above values for 16# Rods	=	200	mm.
Main Rod Size-2	=	20	mm.
As Per IS:456-2000,			
Least Lateral Dimension	=	200	mm.
16 times dia. of Main Rod	=	320	mm.
Maximum allowable value as per Code	=	300	mm.
Minimum of the above values for 20# Rods	=	200	mm.
Spacing of Rods are also controlled by Value, User-defined Minimum and Maximum			

C1 : Global Input Data (LC No. : 12)

Column Section	=	Rectangular	
Width of Column	=	200	mm.
Depth of Column	=	450	mm.
The Effective Lengths about ZZ and YY axes were based on actual framing conditions from the 3D			
Effective Length Coeff. about ZZ axis	=	0.755	
Effective Length Coeff. about YY axis	=	0.739	
Unsupported Length-ZZ of Column	=	1.55	m.
Unsupported Length-YY of Column	=	1.55	m.
Effective Length-ZZ of Column	=	1.17	m.
Effective Length-YY of Column	=	1.145	m.

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Working Axial Load on Column	=	1006.844	KN.
Working Moment about ZZ-axis at Top	=	0.259	KN m.
Working Moment about YY-axis at Top	=	44.031	KN m.
Working Moment about ZZ-axis at Bottom	=	4.948	KN m.
Working Moment about YY-axis at Bottom	=	40.061	KN m.

C1 : Slenderness & Eccentricity Output (LC No. : 12)

Effective Length-ZZ of Column	=	1.17	m.
Effective Length-YY of Column	=	1.145	m.
Slenderness Ratio about ZZ-axis	=	5.727	
The Column is Short about the ZZ-axis.			
Slenderness Ratio about YY-axis	=	2.599	
The Column is Short about the YY-axis.			
As Per IS:456-2000, 25.4,			
Minimum Eccentricity	=	20	mm.
Lo/500 + b/30	=	9.767	mm.
Lo/500 + D/30	=	18.1	mm.
Actual Minimum Eccentricity about ZZ	=	20	mm.
Actual Minimum Eccentricity about YY	=	20	mm.
As Per IS:456-2000, 39.3,			
0.05 times D (Limiting Value about ZZ)	=	22.5	mm.
0.05 times b (Limiting Value about YY)	=	10	mm.
Actual Eccentricity about ZZ due to Moment-ZZ	=	4.915	mm.
Actual Eccentricity about YY due to Moment-YY	=	43.731	mm.
Design Eccentricity about ZZ due to Moment-ZZ	=	20	mm.
Design Eccentricity about YY due to Moment-YY	=	43.731	mm.

As Per IS:456-2000, 39.3,

Design Eccentricity about ZZ is not more than the

Hence, the Column carries only Axial Load about

Design Eccentricity about YY is more than the

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Hence, the Column has Axial Load & Bending

Revised Design Bending Moment about YY	=	44.031	KN m.

C1 : Flexural Design Output (LC No. : 12)

Axial Load on Column	=	1006.844	KN.
Factored Axial Load	=	1006.844	KN.
Revised Design Moment about YY axis	=	44.031	KN m.

The Column is subjected to Axial Load & Uni-axial

Main Reinforcement is provided along all the

Characteristic Comp. Strength of Concrete	=	30	N/sq.mm.
Yield Stress of Main Steel	=	500	N/sq.mm.
Min. Percentage of Reinforcement Required	=	0.8	%
Max. Percentage of Reinforcement Allowed	=	4	%
Depth of Neutral Axis	=	309.6	mm.
Width of Column	=	200	mm.
Depth of Column	=	450	mm.
Gross Sectional Area	=	90000	sq.mm.
Percentage of Reinforcement to be Provided	=	2.255	%
Area of Longitudinal Reinforcement Required	=	2029.127	sq.mm.
Main Rod Size-1	=	16	mm.
No. of Rods Required	=	10.092	Nos.
No. of Rods Provided	=	10	Nos.

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Corresponding Steel Area	=	2010.619	sq.mm.
Main Rod Size-2	=	20	mm.
No. of Rods Required	=	6.459	Nos.
No. of Rods Provided	=	7	Nos.
Corresponding Steel Area	=	2199.115	sq.mm.

Note:- Please note that the minimum number of will be always FOUR for Rectangular Columns Columns, as per IS:456-2000 Clause 26.5.3.1.(c)

C1 : Tie Pitch Output (LC No. : 12)

Tie Rod Size-1	=	8	mm.
Tie Rod Size-2	=	10	mm.
Main Rod Size-1	=	16	mm.
As Per IS:456-2000,			
Least Lateral Dimension	=	200	mm.
16 times dia. of Main Rod	=	256	mm.
Maximum allowable value as per Code	=	300	mm.
Minimum of the above values for 16# Rods	=	200	mm.
Main Rod Size-2	=	20	mm.
As Per IS:456-2000,			
Least Lateral Dimension	=	200	mm.
16 times dia. of Main Rod	=	320	mm.
Maximum allowable value as per Code	=	300	mm.
Minimum of the above values for 20# Rods	=	200	mm.

Spacing of Rods are also controlled by

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Value, User-defined Minimum and Maximum

C1 : Global Input Data (LC No. : 13)

Column Section	=	Rectangular	
Width of Column	=	200	mm.
Depth of Column	=	450	mm.
The Effective Lengths about ZZ and YY axes were based on actual framing conditions from the 3D			
Effective Length Coeff. about ZZ axis	=	0.755	
Effective Length Coeff. about YY axis	=	0.739	
Unsupported Length-ZZ of Column	=	1.55	m.
Unsupported Length-YY of Column	=	1.55	m.
Effective Length-ZZ of Column	=	1.17	m.
Effective Length-YY of Column	=	1.145	m.
Working Axial Load on Column	=	627.655	KN.
Working Moment about ZZ-axis at Top	=	-0.391	KN m.
Working Moment about YY-axis at Top	=	-45.921	KN m.
Working Moment about ZZ-axis at Bottom	=	2.349	KN m.
Working Moment about YY-axis at Bottom	=	-42.321	KN m.

C1 : Slenderness & Eccentricity Output (LC No. : 13)

Effective Length-ZZ of Column	=	1.17	m.
Effective Length-YY of Column	=	1.145	m.
Slenderness Ratio about ZZ-axis	=	5.727	
The Column is Short about the ZZ-axis.			
Slenderness Ratio about YY-axis	=	2.599	
The Column is Short about the YY-axis.			
As Per IS:456-2000, 25.4,			
Minimum Eccentricity	=	20	mm.
Lo/500 + b/30	=	9.767	mm.

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Lo/500 + D/30	=	18.1	mm.
Actual Minimum Eccentricity about ZZ	=	20	mm.

Actual Minimum Eccentricity about YY	=	20	mm.
As Per IS:456-2000, 39.3,			
0.05 times D (Limiting Value about ZZ)	=	22.5	mm.
0.05 times b (Limiting Value about YY)	=	10	mm.
Actual Eccentricity about ZZ due to Moment-ZZ	=	3.742	mm.
Actual Eccentricity about YY due to Moment-YY	=	73.163	mm.
Design Eccentricity about ZZ due to Moment-ZZ	=	20	mm.
Design Eccentricity about YY due to Moment-YY	=	73.163	mm.

As Per IS:456-2000, 39.3,
Design Eccentricity about ZZ is not more than the
Hence, the Column carries only Axial Load about

Design Eccentricity about YY is more than the
Hence, the Column has Axial Load & Bending

Revised Design Bending Moment about YY	=	45.921	KN m.

C1 : Flexural Design Output (LC No. : 13)

Axial Load on Column	=	627.655	KN.
Factored Axial Load	=	627.655	KN.
Revised Design Moment about YY axis	=	45.921	KN m.

The Column is subjected to Axial Load & Uni-axial

Main Reinforcement is provided along all the

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Characteristic Comp. Strength of Concrete	=	30	N/sq.mm.
Yield Stress of Main Steel	=	500	N/sq.mm.
Min. Percentage of Reinforcement Required	=	0.8	%
Max. Percentage of Reinforcement Allowed	=	4	%
Depth of Neutral Axis	=	4.5	mm.
Width of Column	=	200	mm.
Depth of Column	=	450	mm.
Gross Sectional Area	=	90000	sq.mm.
Percentage of Reinforcement to be Provided	=	0.8	%
Area of Longitudinal Reinforcement Required	=	720	sq.mm.
Main Rod Size-1	=	16	mm.
No. of Rods Required	=	3.581	Nos.
No. of Rods Provided	=	4	Nos.

Corresponding Steel Area	=	804.248	sq.mm.
Main Rod Size-2	=	20	mm.
No. of Rods Required	=	2.292	Nos.
No. of Rods Provided	=	4	Nos.
Corresponding Steel Area	=	1256.637	sq.mm.

Note:- Please note that the minimum number of will be always FOUR for Rectangular Columns Columns, as per IS:456-2000 Clause 26.5.3.1.(c)

C1 : Tie Pitch Output (LC No. : 13)

Tie Rod Size-1	=	8	mm.
Tie Rod Size-2			

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Main Rod Size-1	=	16	mm.
As Per IS:456-2000,			
Least Lateral Dimension	=	200	mm.
16 times dia. of Main Rod	=	256	mm.
Maximum allowable value as per Code	=	300	mm.
Minimum of the above values for 16# Rods	=	200	mm.
Main Rod Size-2	=	20	mm.
As Per IS:456-2000,			
Least Lateral Dimension	=	200	mm.
16 times dia. of Main Rod	=	320	mm.
Maximum allowable value as per Code	=	300	mm.
Minimum of the above values for 20# Rods	=	200	mm.

Spacing of Rods are also controlled by Value, User-defined Minimum and Maximum

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SCADDS/RC-Beam Desiqner 2022 [Release: 4.01.3010]

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SCADDS/Nucleus 2022: RC-Beam Designer
Limit State Design of Singly/Doubly Reinforced
Rectangular/Tee/Ell Beam Sections
subjected to Moment/Torsion/Shear
as per IS:456-2000 upto Amendment 5 (Reaffirmed 2021)

Introduction:-

This Report contains the detailed solution for the Reinforced Concrete Beam Design problem.

The given Beam Section is considered for flexural design and the output contains the following

1. Global Input Data
2. Development Length Output
3. Flexural Design Output
4. Shear Design Output
5. Side Face Steel Output
6. Deflection Check Output
7. Slender Beam Check Output
8. Deep Beam Check Output

While detailed design will be carried out for and Side Face Steel, only checks are made for

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Global Material Data

Concrete Clear Cover	=	25	mm.

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Char. Comp. Strength of Concrete	=	25	N/sq.mm.
Yield Strength of Main Steel	=	500	N/sq.mm.
Main Rod Size-1	=	12	mm.
Main Rod Size-2	=	16	mm.
Yield Strength of Tie Steel	=	500	N/sq.mm.
Stirrup Rod Size-1	=	8	mm.
Stirrup Rod Size-2	=	10	mm.
Factor of Safety for Load	=	1	
Partial Safety Factor for Concrete	=	1.5	
Partial Safety Factor for Steel	=	1.15	
Max. Strain in Concrete	=	0.0035	mm./mm.
Max. Strain in Steel	=	0.0055	mm./mm.
Young's Modulus of Concrete	=	25000	N/sq.mm.
Young's Modulus of Steel	=	200000	N/sq.mm.

Bond / Development Length Output

Char. Comp. Strength of Concrete	=	25	N/sq.mm.
Yield Stress of Main Steel	=	500	N/sq.mm.
As Per IS:456-2000, Clause 26.2.1.1,			
Design Bond Stress for Main Rods	=	2.24	N/sq.mm.
Rods in Tension:-			
Main Rod Diameter-1	=	12	mm.
Corresponding Development Length	=	582.589	mm.
Main Rod Diameter-2	=	16	mm.
Corresponding Development Length	=	776.786	mm.

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STABILITY CALCULATIONS FOR `AVITTAM NAYANMAR 'THE PROPOSED CONSTRUCTION OF GROUP DEVELOPMENT WITH TWO BLOCKS BLOCK-1 STILT FLOOR+5 FLOORS (HEIGHT 18.3 M)RESIDENTIAL BUILDING WITH 65 DWELLING BLOCK-2-STILT+5 FLOORS (HEIGHT 18.3M) RESIDENTIAL BUILDING WITH 50 DWELLING UNITS.TOATALLY 115 DWELLING UNITS FOR AFFORDABLE HOUSING AT DARKAST ROAD(KISHKINDAMAIN ROAD),KANNADAPALAYAM,WEST TAMBARAM,CHENNAI-600045 COMPRISED IN OLD S.NO.268/2,268/3,&268/4&T.S NOS106/1,107/2,107/3,108/2,&108/3,BLOCK NO.21,WARD NO. C OF TAMBARAM VILLAGE,TAMBARAM VILLAGE,TAMBATAM TALUKWITH IN THE LIMITS OF TAMBARAM MUNICIPAL CORPORATION.

Rods in Compression:-

Main Rod Diameter-1	=	12	mm.
Corresponding Development Length	=	466.071	mm.
Main Rod Diameter-2	=	16	mm.
Corresponding Development Length	=	621.429	mm.

B29 : Global Input Data

Effective Span	=	3.15	m.
Section Type	=	Rectangular	
Width of Web	=	200	mm.
Overall Depth	=	450	mm.
Effective Cover at Top	=	55	mm.
Effective Cover at Bottom	=	55	mm.
Number of Stirrup Legs	=	2	Nos.
Max. Bending Moment at End-1	=	74.17	KN m.
Min. Bending Moment at End-1	=	-70.898	KN m.
Max. Bending Moment at End-2	=	52.217	KN m.
Min. Bending Moment at End-2	=	-50.538	KN m.
Max. Bending Moment at Middle	=	38.346	KN m.
Min. Bending Moment at Middle	=	-40.636	KN m.
Max. Shear Force at Left	=	43.76	KN.

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Max. Shear Force at Right	=	43.254	KN.
Max. Torsional Moment	=	0	KN m.
Torsion, as per Analysis Results, is partially			
Ignore Torsion Limit	=	10	%
If Torsion is less than the above % of the Max. it will be ignored. Otherwise, the Beam is			

B29 : End-1 Max - Flexure Output

Bending Moment	=	74.17	KN m.
Factored Moment	=	74.17	KN m.
Overall Depth of Section	=	450	mm.
Bottom Effective Cover	=	55	mm.
Effective Depth	=	395	mm.
Maximum N.A. Ratio	=	0.456	
Total Limiting Moment	=	103.788	KN m.

Total Design Moment	=	74.17	KN m.
Depth of Neutral Axis	=	119.301	mm.
Tensile Reinforcement Required	=	0.625	%
Compression Reinforcement is NOT Necessary.			
As Per IS:456-2000, Clause 26.5.1.1.a, Min. Tensile Reinforcement Percentage	=	0.17	%

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As Per IS:456-2000, Clause 26.5.1.1.b,			
Max. Reinforcement Percentage	=	4	%
Area of Tensile Reinforcement	=	493.659	sq.mm.
Main Rod Size-1	=	12	mm.
No. of Rods Required	=	4.365	Nos.
No. of Rods Provided	=	5	Nos.
Corresponding Steel Area	=	565.487	sq.mm.
Main Rod Size-2	=	16	mm.
No. of Rods Required	=	2.455	Nos.
No. of Rods Provided	=	3	Nos.
Corresponding Steel Area	=	603.186	sq.mm.
Compression Steel is NOT required. However, 2 are provided, irrespective of the size, for holding			
Main Rod Size-1	=	12	mm.
No. of Rods Provided	=	2	Nos.
Corresponding Steel Area	=	226.195	sq.mm.
Compression Steel is NOT required. However, 2 are provided, irrespective of the size, for holding			
Main Rod Size-2	=	16	mm.
No. of Rods Provided	=	2	Nos.
Corresponding Steel Area	=	402.124	sq.mm.
Note:- Please note that the minimum number of should be always TWO, even if the number of ONE or less. This is to be done during detailing.			

B29 : End-1 Max - Shear Output

Shear Force	=	43.76	KN.
Factored Shear	=	43.76	KN.
As Per IS:456-2000, Clause 40.1,			
Actual Shear Stress	=	0.554	N/sq.mm.

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As Per IS:456-2000, Table 19,			
Design Shear Strength of Concrete	=	0.564	N/sq.mm.
As Per IS:456-2000, Table 20,			
Max. Permissible Shear Stress	=	3.124	N/sq.mm.
Minimum Shear Reinforcement is provided.			
Stirrup Steel Yield Strength	=	500	N/sq.mm.
No. of Stirrup Legs	=	2	Nos.
Stirrup Rod Diameter-1	=	8	mm.
Spacing of Stirrups Required	=	300	mm.
Stirrup Rod Diameter-2	=	10	mm.
Spacing of Stirrups Required	=	300	mm.

As per IS:456-2000 Clause 26.5.1.5, if the stirrup exceeds 0.75d or 300 mm., whichever is less, the value will be provided as the Spacing of Stirrups.

B29 : End-1 Min - Flexure Output

Bending Moment	=	70.898	KN m.
Factored Moment	=	70.898	KN m.
Overall Depth of Section	=	450	mm.
Bottom Effective Cover	=	55	mm.
Effective Depth	=	395	mm.
Maximum N.A. Ratio	=	0.456	
Total Limiting Moment	=	108.788	KN m.

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Total Design Moment	=	70.898	KN m.
Depth of Neutral Axis	=	113.207	mm.
Tensile Reinforcement Required	=	0.593	%
Compression Reinforcement is NOT Necessary.			
As Per IS:456-2000, Clause 26.5.1.1.a, Min. Tensile Reinforcement Percentage	=	0.17	%
As Per IS:456-2000, Clause 26.5.1.1.b, Max. Reinforcement Percentage	=	4	%
Area of Tensile Reinforcement	=	468.441	sq.mm.
Main Rod Size-1	=	12	mm.

No. of Rods Required	=	4.142	Nos.
No. of Rods Provided	=	4	Nos.
Corresponding Steel Area	=	452.389	sq.mm.
Main Rod Size-2	=	16	mm.
No. of Rods Required	=	2.33	Nos.
No. of Rods Provided	=	3	Nos.
Corresponding Steel Area	=	603.186	sq.mm.
Compression Steel is NOT required. However, 2 are provided, irrespective of the size, for holding			
Main Rod Size-1	=	12	mm.
No. of Rods Provided	=	2	Nos.
Corresponding Steel Area	=	226.195	sq.mm.
Compression Steel is NOT required. However, 2			

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are provided, irrespective of the size, for holding

Main Rod Size-2	=	16	mm.
No. of Rods Provided	=	2	Nos.
Corresponding Steel Area	=	402.124	sq.mm.

Note:- Please note that the minimum number of should be always TWO, even if the number of ONE or less. This is to be done during detailing.

B29 : End-1 Min - Shear Output

Shear Force	=	43.76	KN.
Factored Shear	=	43.76	KN.
As Per IS:456-2000, Clause 40.1,			
Actual Shear Stress	=	0.554	N/sq.mm.
As Per IS:456-2000, Table 19,			
Design Shear Strength of Concrete	=	0.517	N/sq.mm.
As Per IS:456-2000, Table 20,			
Max. Permissible Shear Stress	=	3.124	N/sq.mm.
Stirrups have to be Designed for Shear.			
Shear for which Stirrups are Provided	=	2.954	KN.
Stirrup Steel Yield Strength	=	500	N/sq.mm.
No. of Stirrup Legs	=	2	Nos.
Stirrup Rod Diameter-1	=	8	mm.
Spacing of Stirrups Required	=	300	mm.
Stirrup Rod Diameter-2	=	10	mm.

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Spacing of Stirrups Required	=	300	mm.
As per IS:456-2000 Clause 26.5.1.5, if the stirrup exceeds 0.75d or 300 mm., whichever is less, the value will be provided as the Spacing of Stirrups.			

B29 : End-2 Max - Flexure Output

Bending Moment	=	52.217	KN m.
Factored Moment	=	52.217	KN m.
Overall Depth of Section	=	450	mm.
Bottom Effective Cover	=	55	mm.
Effective Depth	=	395	mm.
Maximum N.A. Ratio	=	0.456	
Total Limiting Moment	=	103.788	KN m.
Total Design Moment	=	52.217	KN m.
Depth of Neutral Axis	=	80.215	mm.
Tensile Reinforcement Required	=	0.42	%
Compression Reinforcement is NOT Necessary.			
As Per IS:456-2000, Clause 26.5.1.1.a, Min. Tensile Reinforcement Percentage	=	0.17	%
As Per IS:456-2000, Clause 26.5.1.1.b, Max. Reinforcement Percentage	=	4	%
Area of Tensile Reinforcement	=	331.923	sq.mm.
Main Rod Size-1	=	12	mm.
No. of Rods Required	=	2.935	Nos.
No. of Rods Provided	=	3	Nos.
Corresponding Steel Area	=	339.292	sq.mm.

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Main Rod Size-2	=	16	mm.
No. of Rods Required	=	1.651	Nos.
No. of Rods Provided	=	2	Nos.
Corresponding Steel Area	=	402.124	sq.mm.

Compression Steel is NOT required. However, 2 are provided, irrespective of the size, for holding

Main Rod Size-1	=	12	mm.
No. of Rods Provided	=	2	Nos.
Corresponding Steel Area	=	226.195	sq.mm.

Compression Steel is NOT required. However, 2 are provided, irrespective of the size, for holding

Main Rod Size-2	=	16	mm.
No. of Rods Provided	=	2	Nos.
Corresponding Steel Area	=	402.124	sq.mm.

Note:- Please note that the minimum number of should be always TWO, even if the number of ONE or less. This is to be done during detailing.

B29 : End-2 Max - Shear Output

Shear Force	=	43.254	KN.
Factored Shear	=	43.254	KN.
As Per IS:456-2000, Clause 40.1,			
Actual Shear Stress	=	0.548	N/sq.mm.
As Per IS:456-2000, Table 19,			
Design Shear Strength of Concrete	=	0.459	N/sq.mm.
As Per IS:456-2000, Table 20,			

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Max. Permissible Shear Stress	=	3.124	N/sq.mm.
Stirrups have to be Designed for Shear.			
Shear for which Stirrups are Provided	=	6.979	KN.
Stirrup Steel Yield Strength	=	500	N/sq.mm.
No. of Stirrup Legs	=	2	Nos.
Stirrup Rod Diameter-1	=	8	mm.
Spacing of Stirrups Required	=	300	mm.
Stirrup Rod Diameter-2	=	10	mm.
Spacing of Stirrups Required	=	300	mm.

As per IS:456-2000 Clause 26.5.1.5, if the stirrup exceeds 0.75d or 300 mm., whichever is less, the value will be provided as the Spacing of Stirrups.

B29 : End-2 Min - Flexure Output

Bending Moment	=	50.538	KN m.
Factored Moment	=	50.538	KN m.
Overall Depth of Section	=	450	mm.
Bottom Effective Cover	=	55	mm.
Effective Depth	=	395	mm.

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Maximum N.A. Ratio	=	0.456	
Total Limiting Moment	=	103.788	KN m.
Total Design Moment	=	50.538	KN m.

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Depth of Neutral Axis	=	77.383	mm.
Tensile Reinforcement Required	=	0.405	%
Compression Reinforcement is NOT Necessary.			
As Per IS:456-2000, Clause 26.5.1.1.a, Min. Tensile Reinforcement Percentage	=	0.17	%
As Per IS:456-2000, Clause 26.5.1.1.b, Max. Reinforcement Percentage	=	4	%
Area of Tensile Reinforcement	=	320.204	sq.mm.
Main Rod Size-1	=	12	mm.
No. of Rods Required	=	2.831	Nos.
No. of Rods Provided	=	3	Nos.
Corresponding Steel Area	=	339.292	sq.mm.
Main Rod Size-2	=	16	mm.
No. of Rods Required	=	1.593	Nos.
No. of Rods Provided	=	2	Nos.
Corresponding Steel Area	=	402.124	sq.mm.
Compression Steel is NOT required. However, 2 are provided, irrespective of the size, for holding			
Main Rod Size-1	=	12	mm.
No. of Rods Provided	=	2	Nos.
Corresponding Steel Area	=	226.195	sq.mm.
Compression Steel is NOT required. However, 2 are provided, irrespective of the size, for holding			
Main Rod Size-2	=	16	mm.
No. of Rods Provided	=	2	Nos.
Corresponding Steel Area	=	402.124	sq.mm.

Note:- Please note that the minimum number of should be always TWO, even if the number of ONE or less. This is to be done during detailing.

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B29 : End-2 Min - Shear Output			
Shear Force	=	43.254	KN.

Factored Shear	=	43.254	KN.
As Per IS:456-2000, Clause 40.1, Actual Shear Stress	=	0.548	N/sq.mm.
As Per IS:456-2000, Table 19, Design Shear Strength of Concrete	=	0.459	N/sq.mm.
As Per IS:456-2000, Table 20, Max. Permissible Shear Stress	=	3.124	N/sq.mm.
Stirrups have to be Designed for Shear.			
Shear for which Stirrups are Provided	=	6.979	KN.
Stirrup Steel Yield Strength	=	500	N/sq.mm.
No. of Stirrup Legs	=	2	Nos.
Stirrup Rod Diameter-1	=	8	mm.
Spacing of Stirrups Required	=	300	mm.
Stirrup Rod Diameter-2	=	10	mm.
Spacing of Stirrups Required	=	300	mm.
As per IS:456-2000 Clause 26.5.1.5, if the stirrup exceeds 0.75d or 300 mm., whichever is less, the value will be provided as the Spacing of Stirrups.			

B29 : Mid. Max - Flexure Output			
Bending Moment	=	40.636	KN.m.

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STABILITY CALCULATIONS FOR `AVITTAM NAYANMAR 'THE PROPOSED CONSTRUCTION OF GROUP DEVELOPMENT WITH TWO BLOCKS BLOCK-1 STILT FLOOR+5 FLOORS (HEIGHT 18.3 M)RESIDENTIAL BUILDING WITH 65 DWELLING BLOCK-2-STILT+5 FLOORS (HEIGHT 18.3M) RESIDENTIAL BUILDING WITH 50 DWELLING UNITS.TOATALLY 115 DWELLING UNITS FOR AFFORDABLE HOUSING AT DARKAST ROAD(KISHKINDAMAIN ROAD),KANNADAPALAYAM,WEST TAMBARAM,CHENNAI-600045 COMPRISED IN OLD S.NO.268/2,268/3,&268/4&T.S NOS106/1,107/2,107/3,108/2,&108/3,BLOCK NO.21,WARD NO. C OF TAMBARAM VILLAGE,TAMBARAM VILLAGE,TAMBATAM TALUKWITH IN THE LIMITS OF TAMBARAM MUNICIPAL CORPORATION.

Factored Moment	=	40.636	KN m.
Overall Depth of Section	=	450	mm.
Bottom Effective Cover	=	55	mm.
Effective Depth	=	395	mm.
Maximum N.A. Ratio	=	0.456	
Total Limiting Moment	=	103.788	KN m.
Total Design Moment	=	40.636	KN m.
Depth of Neutral Axis	=	61.079	mm.
Tensile Reinforcement Required	=	0.32	%
Compression Reinforcement is NOT Necessary.			
As Per IS:456-2000, Clause 26.5.1.1.a,			
Min. Tensile Reinforcement Percentage	=	0.17	%

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As Per IS:456-2000, Clause 26.5.1.1.b,			
Max. Reinforcement Percentage	=	4	%
Area of Tensile Reinforcement	=	252.742	sq.mm.
Main Rod Size-1	=	12	mm.
No. of Rods Required	=	2.235	Nos.
No. of Rods Provided	=	3	Nos.
Corresponding Steel Area	=	339.292	sq.mm.
Main Rod Size-2	=	16	mm.
No. of Rods Required	=	1.257	Nos.
No. of Rods Provided	=	2	Nos.

STABILITY CALCULATIONS FOR `AVITTAM NAYANMAR 'THE PROPOSED CONSTRUCTION OF GROUP DEVELOPMENT WITH TWO BLOCKS BLOCK-1 STILT FLOOR+5 FLOORS (HEIGHT 18.3 M)RESIDENTIAL BUILDING WITH 65 DWELLING BLOCK-2-STILT+5 FLOORS (HEIGHT 18.3M) RESIDENTIAL BUILDING WITH 50 DWELLING UNITS.TOATALLY 115 DWELLING UNITS FOR AFFORDABLE HOUSING AT DARKAST ROAD(KISHKINDAMAIN ROAD),KANNADAPALAYAM,WEST TAMBARAM,CHENNAI-600045 COMPRISED IN OLD S.NO.268/2,268/3,&268/4&T.S NOS106/1,107/2,107/3,108/2,&108/3,BLOCK NO.21,WARD NO. C OF TAMBARAM VILLAGE,TAMBARAM VILLAGE,TAMBATAM TALUKWITH IN THE LIMITS OF TAMBARAM MUNICIPAL CORPORATION.

Corresponding Steel Area	=	402.124	sq.mm.
Compression Steel is NOT required. However, 2 are provided, irrespective of the size, for holding			
Main Rod Size-1	=	12	mm.
No. of Rods Provided	=	2	Nos.
Corresponding Steel Area	=	226.195	sq.mm.
Compression Steel is NOT required. However, 2 are provided, irrespective of the size, for holding			
Main Rod Size-2	=	16	mm.
No. of Rods Provided	=	2	Nos.
Corresponding Steel Area	=	402.124	sq.mm.
Note:- Please note that the minimum number of should be always TWO, even if the number of ONE or less. This is to be done during detailing.			

B29 : Mid. Max - Shear Output

Shear Force	=	41.536	KN.
Factored Shear	=	41.536	KN.
As Per IS:456-2000, Clause 40.1,			
Actual Shear Stress	=	0.526	N/sq.mm.
As Per IS:456-2000, Table 19,			
Design Shear Strength of Concrete	=	0.459	N/sq.mm.
As Per IS:456-2000, Table 20,			
Max. Permissible Shear Stress	=	3.124	N/sq.mm.
Stirrups have to be Designed for Shear.			
Shear for which Stirrups are Provided	=	5.26	KN.

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Stirrup Steel Yield Strength	=	500	N/sq.mm.
No. of Stirrup Legs	=	2	Nos.
Stirrup Rod Diameter-1	=	8	mm.
Spacing of Stirrups Required	=	300	mm.
Stirrup Rod Diameter-2	=	10	mm.
Spacing of Stirrups Required	=	300	mm.

As per IS:456-2000 Clause 26.5.1.5, if the stirrup exceeds 0.75d or 300 mm., whichever is less, the value will be provided as the Spacing of Stirrups.

B29 : Mid. Min - Flexure Output

Bending Moment	=	38.346	KN m.
Factored Moment	=	38.346	KN m.
Overall Depth of Section	=	450	mm.
Bottom Effective Cover	=	55	mm.
Effective Depth	=	395	mm.
Maximum N.A. Ratio	=	0.456	
Total Limiting Moment	=	103.788	KN m.
Total Design Moment	=	38.346	KN m.
Depth of Neutral Axis	=	57.399	mm.
Tensile Reinforcement Required	=	0.301	%

Compression Reinforcement is NOT Necessary.

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As Per IS:456-2000, Clause 26.5.1.1.a,			
Min. Tensile Reinforcement Percentage	=	0.17	%
As Per IS:456-2000, Clause 26.5.1.1.b,			
Max. Reinforcement Percentage	=	4	%
Area of Tensile Reinforcement	=	237.514	sq.mm.
Main Rod Size-1	=	12	mm.
No. of Rods Required	=	2.1	Nos.
No. of Rods Provided	=	2	Nos.
Corresponding Steel Area	=	226.195	sq.mm.
Main Rod Size-2	=	16	mm.
No. of Rods Required	=	1.181	Nos.
No. of Rods Provided	=	1	Nos.
Corresponding Steel Area	=	201.062	sq.mm.

Compression Steel is NOT required. However, 2 are provided, irrespective of the size, for holding

Main Rod Size-1	=	12	mm.
No. of Rods Provided	=	2	Nos.
Corresponding Steel Area	=	226.195	sq.mm.

Compression Steel is NOT required. However, 2 are provided, irrespective of the size, for holding

Main Rod Size-2	=	16	mm.
No. of Rods Provided	=	2	Nos.
Corresponding Steel Area	=	402.124	sq.mm.

Note:- Please note that the minimum number of should be always TWO, even if the number of ONE or less. This is to be done during detailing.

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B29 : Mid. Min - Shear Output			
Shear Force	=	41.536	KN.
Factored Shear	=	41.536	KN.
As Per IS:456-2000, Clause 40.1,			
Actual Shear Stress	=	0.526	N/sq.mm.
As Per IS:456-2000, Table 19,			
Design Shear Strength of Concrete	=	0.387	N/sq.mm.
As Per IS:456-2000, Table 20,			
Max. Permissible Shear Stress	=	3.124	N/sq.mm.
Stirrups have to be Designed for Shear.			
Shear for which Stirrups are Provided	=	10.978	KN.
Stirrup Steel Yield Strength	=	500	N/sq.mm.
No. of Stirrup Legs	=	2	Nos.
Stirrup Rod Diameter-1	=	8	mm.
Spacing of Stirrups Required	=	300	mm.
Stirrup Rod Diameter-2	=	10	mm.
Spacing of Stirrups Required	=	300	mm.
As per IS:456-2000 Clause 26.5.1.5, if the stirrup exceeds 0.75d or 300 mm., whichever is less, the value will be provided as the Spacing of Stirrups.			

B29 : Side Face Steel Output			
Overall Depth of Section	=	450	mm.

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As Per IS:456-2000, Clauses 26.5.1.3, 26.5.1.7,
Side Face Reinforcement is NOT Required.

B29 : Deflection Check Output

Type of Beam	=	Ends	Fixed or Continuous
Effective Span of Beam	=	3.15	m.
Effective Depth of Beam	=	395	mm.
Actual Span to Depth Ratio	=	7.975	
As Per IS:456-2000, Clause 23.2.1.a, Factor Alpha	=	26	
As Per IS:456-2000, Clause 23.2.1.b, Factor Zigma	=	1	
As Per IS:456-2000, Clause 23.2.1.c, Factor Gamma	=	1.221	
As Per IS:456-2000, Clause 23.2.1.d, Factor Delta	=	1	
As Per IS:456-2000, Clause 23.2.1.e, Factor Lamda	=	1	
Allowable Span to Depth Ratio	=	31.733	

Deflection Requirements are O.K.

B29 : Deep Beam Check Output

Effective Span of Beam	=	3.15	m.
Overall Depth	=	450	mm.
Effective Span to Depth Ratio	=	7	
Minimum Value for the above	=	2.5	

As Per IS:456-2000, Clause 29.1,
this Beam is NOT a Deep Beam.

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B29 : Slender Beam Check Output

Clear Distance between Lateral Restraints	=	3.15	m.
Allowable Value for the above	=	12	m.

As Per IS:456-2000, Clause 23.3,
this Beam is NOT a Slender Beam.

Note :-

Actually, the clear distance between lateral taken as against the effective span. But, the taken for simplifying the calculations. In fact, it's to consider the effective span rather than the clear

B28 : Global Input Data

Effective Span	=	3.25	m.
Section Type	=	Rectangular	
Width of Web	=	200	mm.
Overall Depth	=	450	mm.
Effective Cover at Top	=	55	mm.
Effective Cover at Bottom	=	55	mm.

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Number of Stirrup Legs	=	2	Nos.
Max. Bending Moment at End-1	=	50.076	KN m.
Min. Bending Moment at End-1	=	-51.434	KN m.
Max. Bending Moment at End-2	=	76.923	KN m.
Min. Bending Moment at End-2	=	-68.4	KN m.
Max. Bending Moment at Middle	=	39.96	KN m.
Min. Bending Moment at Middle	=	-39.541	KN m.
Max. Shear Force at Left	=	40.757	KN.
Max. Shear Force at Right	=	43.797	KN.
Max. Torsional Moment	=	0	KN m.
Torsion, as per Analysis Results, is partially			
Ignore Torsion Limit	=	10	%
If Torsion is less than the above % of the Max. it will be ignored. Otherwise, the Beam is			

B28 : End-1 Max - Flexure Output

Bending Moment	=	51.434	KN m.
Factored Moment	=	51.434	KN m.
Overall Depth of Section	=	450	mm.
Bottom Effective Cover	=	55	mm.
Effective Depth	=	395	mm.
Maximum N.A. Ratio	=	0.456	
Total Limiting Moment	=	103.788	KN m.

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Total Design Moment	=	51.434	KN m.
Depth of Neutral Axis	=	78.892	mm.
Tensile Reinforcement Required	=	0.413	%
Compression Reinforcement is NOT Necessary.			
As Per IS:456-2000, Clause Min. Tensile Reinforcement Percentage	=	0.17	%
As Per IS:456-2000, Clause Max. Reinforcement Percentage	=	4	%
Area of Tensile Reinforcement	=	326.448	sq.mm.
Main Rod Size-1	=	12	mm.
No. of Rods Required	=	2.886	Nos.
No. of Rods Provided	=	3	Nos.
Corresponding Steel Area	=	339.292	sq.mm.
Main Rod Size-2	=	16	mm.
No. of Rods Required	=	1.624	Nos.
No. of Rods Provided	=	2	Nos.
Corresponding Steel Area	=	402.124	sq.mm.
Compression Steel is NOT required. However, 2 are provided, irrespective of the size, for holding			
Main Rod Size-1	=	12	mm.
No. of Rods Provided	=	2	Nos.
Corresponding Steel Area	=	226.195	sq.mm.
Compression Steel is NOT required. However, 2 are provided, irrespective of the size, for holding			

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Main Rod Size-2	=	16	mm.
No. of Rods Provided	=	2	Nos.
Corresponding Steel Area	=	402.124	sq.mm.

Note:- Please note that the minimum number of should be always TWO, even if the number of ONE or less. This is to be done during detailing.

B28 : End-1 Max - Shear Output

Shear Force	=	40.757	KN.
Factored Shear	=	40.757	KN.
As Per IS:456-2000, Clause 40.1,			
Actual Shear Stress	=	0.516	N/sq.mm.
As Per IS:456-2000, Table 19,			
Design Shear Strength of Concrete	=	0.459	N/sq.mm.
As Per IS:456-2000, Table 20,			
Max. Permissible Shear Stress	=	3.124	N/sq.mm.
Stirrups have to be Designed for Shear.			
Shear for which Stirrups are Provided	=	4.481	KN.
Stirrup Steel Yield Strength	=	500	N/sq.mm.
No. of Stirrup Legs	=	2	Nos.
Stirrup Rod Diameter-1	=	8	mm.
Spacing of Stirrups Required	=	300	mm.
Stirrup Rod Diameter-2	=	10	mm.
Spacing of Stirrups Required	=	300	mm.

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As per IS:456-2000 Clause 26.5.1.5, if the stirrup exceeds 0.75d or 300 mm., whichever is less, the value will be provided as the Spacing of Stirrups.

B28 : End-1 Min - Flexure Output

Bending Moment	=	50.076	KN m.
Factored Moment	=	50.076	KN m.
Overall Depth of Section	=	450	mm.
Bottom Effective Cover	=	55	mm.
Effective Depth	=	395	mm.
Maximum N.A. Ratio	=	0.456	
Total Limiting Moment	=	103.788	KN m.
Total Design Moment	=	50.076	KN m.
Depth of Neutral Axis	=	76.607	mm.
Tensile Reinforcement Required	=	0.401	%
Compression Reinforcement is NOT Necessary.			
As Per IS:456-2000, Clause Min. Tensile Reinforcement Percentage	=	0.17	%
As Per IS:456-2000, Clause Max. Reinforcement Percentage	=	4	%
Area of Tensile Reinforcement	=	316.994	sq.mm.

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STABILITY CALCULATIONS FOR `AVITTAM NAYANMAR 'THE PROPOSED CONSTRUCTION OF GROUP DEVELOPMENT WITH TWO BLOCKS BLOCK-1 STILT FLOOR+5 FLOORS (HEIGHT 18.3 M)RESIDENTIAL BUILDING WITH 65 DWELLING BLOCK-2-STILT+5 FLOORS (HEIGHT 18.3M) RESIDENTIAL BUILDING WITH 50 DWELLING UNITS.TOATALLY 115 DWELLING UNITS FOR AFFORDABLE HOUSING AT DARKAST ROAD(KISHKINDAMAIN ROAD),KANNADAPALAYAM,WEST TAMBARAM,CHENNAI-600045 COMPRISED IN OLD S.NO.268/2,268/3,&268/4&T.S NOS106/1,107/2,107/3,108/2,&108/3,BLOCK NO.21,WARD NO. C OF TAMBARAM VILLAGE,TAMBARAM VILLAGE,TAMBATAM TALUKWITH IN THE LIMITS OF TAMBARAM MUNICIPAL CORPORATION.

Main Rod Size-1	=	12	mm.
No. of Rods Required	=	2.803	Nos.
No. of Rods Provided	=	3	Nos.
Corresponding Steel Area	=	339.292	sq.mm.
Main Rod Size-2	=	16	mm.
No. of Rods Required	=	1.577	Nos.
No. of Rods Provided	=	2	Nos.
Corresponding Steel Area	=	402.124	sq.mm.
Compression Steel is NOT required. However, 2 are provided, irrespective of the size, for holding			
Main Rod Size-1	=	12	mm.
No. of Rods Provided	=	2	Nos.
Corresponding Steel Area	=	226.195	sq.mm.
Compression Steel is NOT required. However, 2 are provided, irrespective of the size, for holding			
Main Rod Size-2	=	16	mm.
No. of Rods Provided	=	2	Nos.
Corresponding Steel Area	=	402.124	sq.mm.
Note:- Please note that the minimum number of should be always TWO, even if the number of ONE or less. This is to be done during detailing.			

B28 : End-1 Min - Shear Output

Shear Force	=	40.757	KN.
Factored Shear	=	40.757	KN.
As Per IS:456-2000, Clause 40.1,			
Actual Shear Stress	=	0.516	N/sq.mm.
As Per IS:456-2000, Table 19,			
Design Shear Strength of Concrete	=	0.459	N/sq.mm.
As Per IS:456-2000, Table 20,			
Max. Permissible Shear Stress	=	3.124	N/sq.mm.

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STABILITY CALCULATIONS FOR `AVITTAM NAYANMAR 'THE PROPOSED CONSTRUCTION OF GROUP DEVELOPMENT WITH TWO BLOCKS BLOCK-1 STILT FLOOR+5 FLOORS (HEIGHT 18.3 M)RESIDENTIAL BUILDING WITH 65 DWELLING BLOCK-2-STILT+5 FLOORS (HEIGHT 18.3M) RESIDENTIAL BUILDING WITH 50 DWELLING UNITS.TOATALLY 115 DWELLING UNITS FOR AFFORDABLE HOUSING AT DARKAST ROAD(KISHKINDAMAIN ROAD),KANNADAPALAYAM,WEST TAMBARAM,CHENNAI-600045 COMPRISED IN OLD S.NO.268/2,268/3,&268/4&T.S NOS106/1,107/2,107/3,108/2,&108/3,BLOCK NO.21,WARD NO. C OF TAMBARAM VILLAGE,TAMBARAM VILLAGE,TAMBATAM TALUKWITH IN THE LIMITS OF TAMBARAM MUNICIPAL CORPORATION.

Stirrups have to be Designed for Shear.

Shear for which Stirrups are Provided	=	4.481	KN.
Stirrup Steel Yield Strength	=	500	N/sq.mm.
No. of Stirrup Legs	=	2	Nos.
Stirrup Rod Diameter-1	=	8	mm.
Spacing of Stirrups Required	=	300	mm.

Stirrup Rod Diameter-2	=	10	mm.
Spacing of Stirrups Required	=	300	mm.

As per IS:456-2000 Clause 26.5.1.5, if the stirrup exceeds 0.75d or 300 mm., whichever is less, the value will be provided as the Spacing of Stirrups.

B28 : End-2 Max - Flexure Output

Bending Moment	=	76.923	KN m.
Factored Moment	=	76.923	KN m.
Overall Depth of Section	=	450	mm.
Bottom Effective Cover	=	55	mm.
Effective Depth	=	395	mm.
Maximum N.A. Ratio	=	0.456	
Total Limiting Moment	=	103.788	KN m.
Total Design Moment	=	76.923	KN m.
Depth of Neutral Axis	=	124.514	mm.

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STABILITY CALCULATIONS FOR `AVITTAM NAYANMAR 'THE PROPOSED CONSTRUCTION OF GROUP DEVELOPMENT WITH TWO BLOCKS BLOCK-1 STILT FLOOR+5 FLOORS (HEIGHT 18.3 M)RESIDENTIAL BUILDING WITH 65 DWELLING BLOCK-2-STILT+5 FLOORS (HEIGHT 18.3M) RESIDENTIAL BUILDING WITH 50 DWELLING UNITS.TOATALLY 115 DWELLING UNITS FOR AFFORDABLE HOUSING AT DARKAST ROAD(KISHKINDAMAIN ROAD),KANNADAPALAYAM,WEST TAMBARAM,CHENNAI-600045 COMPRISED IN OLD S.NO.268/2,268/3,&268/4&T.S NOS106/1,107/2,107/3,108/2,&108/3,BLOCK NO.21,WARD NO. C OF TAMBARAM VILLAGE,TAMBARAM VILLAGE,TAMBATAM TALUKWITH IN THE LIMITS OF TAMBARAM MUNICIPAL CORPORATION.

Tensile Reinforcement Required	=	0.652	%
Compression Reinforcement is NOT Necessary.			
As Per IS:456-2000, Clause			
Min. Tensile Reinforcement Percentage	=	0.17	%
As Per IS:456-2000, Clause			
Max. Reinforcement Percentage	=	4	%
Area of Tensile Reinforcement	=	515.218	sq.mm.
Main Rod Size-1	=	12	mm.
No. of Rods Required	=	4.556	Nos.
No. of Rods Provided	=	5	Nos.
Corresponding Steel Area	=	565.487	sq.mm.
Main Rod Size-2	=	16	mm.
No. of Rods Required	=	2.562	Nos.
No. of Rods Provided	=	3	Nos.
Corresponding Steel Area	=	603.186	sq.mm.
Compression Steel is NOT required. However, 2 are provided, irrespective of the size, for holding			
Main Rod Size-1	=	12	mm.

No. of Rods Provided	=	2	Nos.
Corresponding Steel Area	=	226.195	sq.mm.
Compression Steel is NOT required. However, 2 are provided, irrespective of the size, for holding			
Main Rod Size-2	=	16	mm.
No. of Rods Provided	=	2	Nos.

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STABILITY CALCULATIONS FOR `AVITTAM NAYANMAR 'THE PROPOSED CONSTRUCTION OF GROUP DEVELOPMENT WITH TWO BLOCKS BLOCK-1 STILT FLOOR+5 FLOORS (HEIGHT 18.3 M)RESIDENTIAL BUILDING WITH 65 DWELLING BLOCK-2-STILT+5 FLOORS (HEIGHT 18.3M) RESIDENTIAL BUILDING WITH 50 DWELLING UNITS.TOATALLY 115 DWELLING UNITS FOR AFFORDABLE HOUSING AT DARKAST ROAD(KISHKINDAMAIN ROAD),KANNADAPALAYAM,WEST TAMBARAM,CHENNAI-600045 COMPRISED IN OLD S.NO.268/2,268/3,&268/4&T.S NOS106/1,107/2,107/3,108/2,&108/3,BLOCK NO.21,WARD NO. C OF TAMBARAM VILLAGE,TAMBARAM VILLAGE,TAMBATAM TALUKWITH IN THE LIMITS OF TAMBARAM MUNICIPAL CORPORATION.

Corresponding Steel Area	=	402.124	sq.mm.

Note:- Please note that the minimum number of should be always TWO, even if the number of ONE or less. This is to be done during detailing.

B28 : End-2 Max - Shear Output

Shear Force	=	43.797	KN.
Factored Shear	=	43.797	KN.
As Per IS:456-2000, Clause 40.1,			
Actual Shear Stress	=	0.554	N/sq.mm.
As Per IS:456-2000, Table 19,			
Design Shear Strength of Concrete	=	0.564	N/sq.mm.
As Per IS:456-2000, Table 20,			
Max. Permissible Shear Stress	=	3.124	N/sq.mm.
Minimum Shear Reinforcement is provided.			
Stirrup Steel Yield Strength	=	500	N/sq.mm.
No. of Stirrup Legs	=	2	Nos.
Stirrup Rod Diameter-1	=	8	mm.
Spacing of Stirrups Required	=	300	mm.
Stirrup Rod Diameter-2	=	10	mm.
Spacing of Stirrups Required	=	300	mm.

As per IS:456-2000 Clause 26.5.1.5, if the stirrup exceeds 0.75d or 300 mm., whichever is less, the value will be provided as the Spacing of Stirrups.

B28 : End-2 Min - Flexure Output

Bending Moment	=	68.4	KN m.
Factored Moment	=	68.4	KN m.
Overall Depth of Section	=	450	mm.

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Bottom Effective Cover	=	55	mm.
Effective Depth	=	395	mm.

Maximum N.A. Ratio	=	0.456	
Total Limiting Moment	=	103.788	KN m.
Total Design Moment	=	68.4	KN m.
Depth of Neutral Axis	=	108.624	mm.
Tensile Reinforcement Required	=	0.569	%

Compression Reinforcement is NOT Necessary.

As Per IS:456-2000, Clause Min. Tensile Reinforcement Percentage	=	0.17	%
As Per IS:456-2000, Clause Max. Reinforcement Percentage	=	4	%
Area of Tensile Reinforcement	=	449.478	sq.mm.
Main Rod Size-1	=	12	mm.
No. of Rods Required	=	3.974	Nos.
No. of Rods Provided	=	4	Nos.
Corresponding Steel Area	=	452.389	sq.mm.
Main Rod Size-2	=	16	mm.
No. of Rods Required	=	2.236	Nos.
No. of Rods Provided	=	3	Nos.
Corresponding Steel Area	=	603.186	sq.mm.

Compression Steel is NOT required. However 2

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are provided, irrespective of the size, for holding

Main Rod Size-1	=	12	mm.
No. of Rods Provided	=	2	Nos.
Corresponding Steel Area	=	226.195	sq.mm.

Compression Steel is NOT required. However, 2 are provided, irrespective of the size, for holding

Main Rod Size-2	=	16	mm.
No. of Rods Provided	=	2	Nos.
Corresponding Steel Area	=	402.124	sq.mm.

Note:- Please note that the minimum number of should be always TWO, even if the number of ONE or less. This is to be done during detailing.

B28 : End-2 Min - Shear Output

Shear Force	=	43.797	KN.

Factored Shear	=	43.797	KN.
As Per IS:456-2000, Clause 40.1,			
Actual Shear Stress	=	0.554	N/sq.mm.
As Per IS:456-2000, Table 19,			
Design Shear Strength of Concrete	=	0.517	N/sq.mm.
As Per IS:456-2000, Table 20,			
Max. Permissible Shear Stress	=	3.124	N/sq.mm.

Stirrups have to be Designed for Shear.

Shear for which Stirrups are Provided	=	2.991	KN.

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Stirrup Steel Yield Strength	=	500	N/sq.mm.
No. of Stirrup Legs	=	2	Nos.
Stirrup Rod Diameter-1	=	8	mm.
Spacing of Stirrups Required	=	300	mm.
Stirrup Rod Diameter-2	=	10	mm.
Spacing of Stirrups Required	=	300	mm.

As per IS:456-2000 Clause 26.5.1.5, if the stirrup exceeds 0.75d or 300 mm., whichever is less, the value will be provided as the Spacing of Stirrups.

B28 : Mid. Max - Flexure Output

Bending Moment	=	39.96	KN m.
Factored Moment	=	39.96	KN m.
Overall Depth of Section	=	450	mm.
Bottom Effective Cover	=	55	mm.
Effective Depth	=	395	mm.
Maximum N.A. Ratio	=	0.456	
Total Limiting Moment	=	103.788	KN m.
Total Design Moment	=	39.96	KN m.
Depth of Neutral Axis	=	59.99	mm.
Tensile Reinforcement Required	=	0.314	%

Compression Reinforcement is NOT Necessary.

As Per IS:456-2000, Clause

Min. Tensile Reinforcement Percentage	=	0.17	%

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As Per IS:456-2000, Clause			
Max. Reinforcement Percentage	=	4	%
Area of Tensile Reinforcement	=	248.235	sq.mm.
Main Rod Size-1	=	12	mm.
No. of Rods Required	=	2.195	Nos.
No. of Rods Provided	=	2	Nos.
Corresponding Steel Area	=	226.195	sq.mm.
Main Rod Size-2	=	16	mm.
No. of Rods Required	=	1.235	Nos.
No. of Rods Provided	=	2	Nos.
Corresponding Steel Area	=	402.124	sq.mm.
Compression Steel is NOT required. However, 2 are provided, irrespective of the size, for holding			
Main Rod Size-1	=	12	mm.
No. of Rods Provided	=	2	Nos.
Corresponding Steel Area	=	226.195	sq.mm.
Compression Steel is NOT required. However, 2 are provided, irrespective of the size, for holding			
Main Rod Size-2	=	16	mm.
No. of Rods Provided	=	2	Nos.
Corresponding Steel Area	=	402.124	sq.mm.

Note:- Please note that the minimum number of should be always TWO, even if the number of ONE or less. This is to be done during detailing.

B28 : Mid. Max - Shear Output

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Shear Force	=	41.503	KN.
Factored Shear	=	41.503	KN.
As Per IS:456-2000, Clause 40.1,			
Actual Shear Stress	=	0.525	N/sq.mm.
As Per IS:456-2000, Table 19,			
Design Shear Strength of Concrete	=	0.387	N/sq.mm.
As Per IS:456-2000, Table 20,			
Max. Permissible Shear Stress	=	3.124	N/sq.mm.
Stirrups have to be Designed for Shear.			
Shear for which Stirrups are Provided	=	10.945	KN.

Stirrup Steel Yield Strength	=	500	N/sq.mm.
No. of Stirrup Legs	=	2	Nos.
Stirrup Rod Diameter-1	=	8	mm.
Spacing of Stirrups Required	=	300	mm.
Stirrup Rod Diameter-2	=	10	mm.
Spacing of Stirrups Required	=	300	mm.

As per IS:456-2000 Clause 26.5.1.5, if the stirrup exceeds 0.75d or 300 mm., whichever is less, the value will be provided as the Spacing of Stirrups.

B28 : Mid. Min - Flexure Output

Bending Moment	=	39.541	KN m.
Factored Moment	=	39.541	KN m.

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Overall Depth of Section	=	450	mm.
Bottom Effective Cover	=	55	mm.
Effective Depth	=	395	mm.
Maximum N.A. Ratio	=	0.456	
Total Limiting Moment	=	103.788	KN m.
Total Design Moment	=	39.541	KN m.
Depth of Neutral Axis	=	59.316	mm.
Tensile Reinforcement Required	=	0.311	%
Compression Reinforcement is NOT Necessary.			
As Per IS:456-2000, Clause			
Min. Tensile Reinforcement Percentage	=	0.17	%
As Per IS:456-2000, Clause			
Max. Reinforcement Percentage	=	4	%
Area of Tensile Reinforcement	=	245.448	sq.mm.
Main Rod Size-1	=	12	mm.
No. of Rods Required	=	2.17	Nos.
No. of Rods Provided	=	2	Nos.
Corresponding Steel Area	=	226.195	sq.mm.
Main Rod Size-2	=	16	mm.
No. of Rods Required	=	1.221	Nos.
No. of Rods Provided	=	2	Nos.
Corresponding Steel Area	=	402.124	sq.mm.

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Compression Steel is NOT required. However, 2 are provided, irrespective of the size, for holding			
Main Rod Size-1	=	12	mm.
No. of Rods Provided	=	2	Nos.
Corresponding Steel Area	=	226.195	sq.mm.
Compression Steel is NOT required. However, 2 are provided, irrespective of the size, for holding			
Main Rod Size-2	=	16	mm.
No. of Rods Provided	=	2	Nos.
Corresponding Steel Area	=	402.124	sq.mm.
Note:- Please note that the minimum number of should be always TWO, even if the number of ONE or less. This is to be done during detailing.			

B28 : Mid. Min - Shear Output

Shear Force	=	41.503	KN.
Factored Shear	=	41.503	KN.
As Per IS:456-2000, Clause 40.1,			
Actual Shear Stress	=	0.525	N/sq.mm.
As Per IS:456-2000, Table 19,			
Design Shear Strength of Concrete	=	0.387	N/sq.mm.
As Per IS:456-2000, Table 20,			
Max. Permissible Shear Stress	=	3.124	N/sq.mm.
Stirrups have to be Designed for Shear.			
Shear for which Stirrups are Provided	=	10.945	KN.
Stirrup Steel Yield Strength	=	500	N/sq.mm.
No. of Stirrup Legs	=	2	Nos.
Stirrup Rod Diameter-1	=	8	mm.
Spacing of Stirrups Required	=	300	mm.

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STABILITY CALCULATIONS FOR `AVITTAM NAYANMAR 'THE PROPOSED CONSTRUCTION OF GROUP DEVELOPMENT WITH TWO BLOCKS BLOCK-1 STILT FLOOR+5 FLOORS (HEIGHT 18.3 M)RESIDENTIAL BUILDING WITH 65 DWELLING BLOCK-2-STILT+5 FLOORS (HEIGHT 18.3M) RESIDENTIAL BUILDING WITH 50 DWELLING UNITS.TOATALLY 115 DWELLING UNITS FOR AFFORDABLE HOUSING AT DARKAST ROAD(KISHKINDAMAIN ROAD),KANNADAPALAYAM,WEST TAMBARAM,CHENNAI-600045 COMPRISED IN OLD S.NO.268/2,268/3,&268/4&T.S NOS106/1,107/2,107/3,108/2,&108/3,BLOCK NO.21,WARD NO. C OF TAMBARAM VILLAGE,TAMBARAM VILLAGE,TAMBATAM TALUKWITH IN THE LIMITS OF TAMBARAM MUNICIPAL CORPORATION.

Stirrup Rod Diameter-2	=	10	mm.
Spacing of Stirrups Required	=	300	mm.

As per IS:456-2000 Clause 26.5.1.5, if the stirrup exceeds 0.75d or 300 mm., whichever is less, the value will be provided as the Spacing of Stirrups.

B28 : Side Face Steel Output

Overall Depth of Section	=	450	mm.

As Per IS:456-2000, Clauses 26.5.1.3, 26.5.1.7,
Side Face Reinforcement is NOT Required.

B28 : Deflection Check Output

Type of Beam	=	Ends	Fixed or Continuous
Effective Span of Beam	=	3.25	m.
Effective Depth of Beam	=	395	mm.
Actual Span to Depth Ratio	=	8.228	
As Per IS:456-2000, Clause 23.2.1.a, Factor Alpha	=	26	
As Per IS:456-2000, Clause 23.2.1.b, Factor Zigma	=	1	
As Per IS:456-2000, Clause 23.2.1.c, Factor Gamma	=	1.221	
As Per IS:456-2000, Clause 23.2.1.d, Factor Delta	=	1	

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As Per IS:456-2000, Clause 23.2.1.e,

Factor Lamda	=	1
Allowable Span to Depth Ratio	=	31.733

Deflection Requirements are O.K.

B28 : Deep Beam Check Output

Effective Span of Beam	=	3.25	m.
Overall Depth	=	450	mm.
Effective Span to Depth Ratio	=	7.222	
Minimum Value for the above	=	2.5	

As Per IS:456-2000, Clause 29.1,
this Beam is NOT a Deep Beam.

B28 : Slender Beam Check Output

Clear Distance between Lateral Restraints	=	3.25	m.
Allowable Value for the above	=	12	m.

As Per IS:456-2000, Clause 23.3,
this Beam is NOT a Slender Beam.

Note :-

Actually, the clear distance between lateral taken as against the effective span. But, the taken for simplifying the calculations. In fact, it's to consider the effective span rather than the

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SCADDS/RC-Slab Designer 2022 [Release: 4.01.3010]

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SCADDS/Nucleus 2022: RC-Slab Designer
Limit State Design of R.C.C. One Way/Two Way
Rectangular/Square Slabs & Trapezoidal/Triangular Slabs
and Circular/Hexagonal/Octagonal Slabs
with Simple/Fixed/Continuous/Cantilever Supports
as per IS:456-2000 upto Amendment 5 (Reaffirmed 2021)
and IS:875-1987(Part-2)

INTRODUCTION

This Report contains detailed design solutions for

The R.C.C. Slabs are considered for Flexural Design,
the output contains the following portions:

1. Global Input Data
2. Flexural Design Output
3. Shear Check Output
4. Deflection Check Output
5. Development Length / Bond Design Output

While detailed design is carried out for Flexure,
only checks are made for items 3 and 4.

GLOBAL MATERIAL DATA

Concrete Clear Cover	=	20	mm.
Char. Comp. Strength of Concrete	=	25	N/sq.mm.

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Density of Concrete	=	24.517	KN/cu.m.
Yield Strength of Main Steel	=	550	N/sq.mm.
Main Rod Size-0	=	8	mm.
Main Rod Size-1	=	10	mm.
Yield Strength of Secondary Steel	=	550	N/sq.mm.
Secondary Rod Size-0	=	8	mm.
Secondary Rod Size-1	=	10	mm.
Yield Strength of Torsion Steel	=	550	N/sq.mm.
Torsion Rod Size-0	=	8	mm.
Torsion Rod Size-1	=	10	mm.

Factor of Safety for Load	=	1.5	
Partial Safety Factor for Concrete	=	1.5	
Partial Safety Factor for Steel	=	1.15	
Max. Strain in Concrete	=	0.0035	mm./mm.
Max. Strain in Steel	=	0.0055	mm./mm.
Young's Modulus of Concrete	=	22360.68	N/sq.mm.
Young's Modulus of Steel	=	200000	N/sq.mm.
Total Number of Slab Panels	=	1	

BOND / DEVELOPMENT LENGTH OUTPUT

Char. Comp. Strength of Concrete	=	25	N/sq.mm.
Yield Stress of Main Steel	=	550	N/sq.mm.
Yield Stress of Secondary Steel	=	550	N/sq.mm.

As Per IS:456-2000, Clause 26.2.1.1,

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Design Bond Stress for Main Rods	=	2.24	N/sq.mm.
Design Bond Stress for Secondary Rods	=	2.24	N/sq.mm.
Rods in Tension			
Main Rod Diameter-1	=	8	mm.
Corresponding Development Length	=	427.232	mm.
Main Rod Diameter-2	=	10	mm.
Corresponding Development Length	=	534.04	mm.
Secondary Rod Diameter-1	=	8	mm.
Corresponding Development Length	=	427.232	mm.
Secondary Rod Diameter-2	=	10	mm.
Corresponding Development Length	=	534.04	mm.

S01 - PANEL INPUT

Slab Number	=	S01	
Slab Shape	=	Rectangular	
Centre to Centre Short Span	=	1.6	m.
Centre to Centre Long Span	=	3.15	m.
Effective Short Span	=	1.4	m.

Support Type : Continuous Supports
It is a One way Slab.

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Initial Thickness of Slab	=	125	mm.
Type of Building is "Residential Building"			
Type of Floor is "All Rooms and Kitchens"			
Live Load	=	2	KN/sq.m.
Floor Finish Load	=	1	KN/sq.m.
Partition Load	=	NIL	
Miscellaneous Load	=	NIL	

S01 - FLEXURE OUTPUT

Slab Identification Number	=	**S01**	
Effective Short Span	=	1.4	m.
Effective Long Span	=	3.025	m.
Long Span to Short Span Ratio	=	2.161	
It is a One way Slab.			
Thickness of Slab Provided	=	**125**	**mm.**
Concrete Clear Cover	=	20	mm.
Density of Reinforced Concrete	=	24.517	KN/cu.m.
Dead Weight of Slab	=	**2.819**	**KN/sq.m.**
Loads on the Slab Panel			
Live Load	=	2	KN/sq.m.
Floor Finish Load	=	1	KN/sq.m.
Partition Load	=	NIL	
Miscellaneous Load	=	NIL	
Total Dead Load on Slab Panel	=	**3.819**	**KN/sq.m.**
Total Load on Slab Panel	=	**5.819**	**KN/sq.m.**
Safety Factor for Load	=	1.5	

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Total Factored Load on Slab Panel	=	**8.729**	**KN/sq.m.**
Effective Depth Required	=	23.667	mm.
Effective Depth Provided	=	90	mm.
Hence SAFE.			

Short Span Reinforcement over Centre Portion

Short Span Positive Moment	=	1.524	KN m.
Short Span Positive Steel	=	**108**	**sq.mm.**
Dia. of Rod-1 along Short Span	=	8	mm.
Required Spacing along Short Span (+)	=	465.421	mm.
Max. Spacing allowed (Rounded off) (+)	=	**275**	**mm.**
Dia. of Rod-2 along Short Span	=	10	mm.
Required Spacing along Short Span (+)	=	727.221	mm.
Max. Spacing allowed (Rounded off) (+)	=	**275**	**mm.**

Short Span Reinforcement over Support Portion

Short Span Negative Moment	=	1.776	KN m.
Short Span Negative Steel	=	**108**	**sq.mm.**
Dia. of Rod-1 along Short Span	=	8	mm.
Required Spacing along Short Span (-)	=	465.421	mm.
Max. Spacing allowed (Rounded off) (-)	=	**275**	**mm.**
Dia. of Rod-2 along Short Span	=	10	mm.
Required Spacing along Short Span (-)	=	727.221	mm.
Max. Spacing allowed (Rounded off) (-)	=	**275**	**mm.**

Distribution Reinforcement

Distribution Steel Percentage	=	0.12	%
Long Span Distribution Steel	=	**138**	**sq.mm.**
Spacing of Rod-1 along Long Span (+)	=	364.243	mm.
Max. Spacing allowed (Rounded off) (+)	=	**300**	**mm.**

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Spacing of Rod-2 along Long Span (+)	=	569.129	mm.
Max. Spacing allowed (Rounded off) (+)	=	**300**	**mm.**

Note:- The required Spacing of Main Rods will be compared 300 mm. (11.811") or 3d whichever is less. If the required this limit, the least value will be automatically provided. This is done in accordance with IS:456-2000 Clause 26.3.3.

Similarly, the required Spacing of Dist. Rods will be compared 300 mm. (11.811") or 5d whichever is less. If the required this limit, the least value will be automatically provided. This is done in accordance with IS:456-2000 Clause 26.3.3.

If the User has fixed Minimum and Maximum Spacing values practical considerations, those values will be used as and implemented in the Drawings and Quantity Calculations.

S01 - SHEAR CHECK

Effective Short Span	=	1.4	m.
Effective Long Span	=	3.025	m.
Total Factored Load per Unit Length	=	**8.729**	**KN/m.**
Shear Coeff. for Continuous Edge-X	=	0.6	
Corresponding Design Shear	=	7.333	KN.
Shear Coeff. for Discontinuous Edge-X	=	0	
Corresponding Design Shear	=	0	KN.
Shear Coeff. for Continuous Edge-Y	=	0.6	
Corresponding Design Shear	=	7.333	KN.
Shear Coeff. for Discontinuous Edge-Y	=	0	
Corresponding Design Shear	=	0	KN.

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Maximum Design Shear	=	**7.333**	**KN.**
As Per IS:456-2000, Clause 40.1, Actual Shear Stress	=	0.081	N/sq.mm.
As Per IS:456-2000, Clause 40.2.1.1 & Table 19, Design Shear Strength of Concrete	=	0.342	N/sq.mm.
As Per IS:456-2000, Table 20, Max. Permissible Shear Stress	=	3.124	N/sq.mm.

It can be seen that 0.081 < 0.342 and 0.081 < 3.124.
The Slab Panel is SAFE in Shear.

S01 - DEFLECTION CHECK

Effective Short Span	=	1.4	m.
Effective Depth of Slab	=	90	mm.
Actual Span to Depth Ratio	=	**15.556**	
As Per IS:456-2000, Clause 23.2.1.a, Factor Alpha	=	26	
As Per IS:456-2000, Clause 23.2.1.b, Factor Zigma	=	1	
As Per IS:456-2000, Clause 23.2.1.c, Factor Gamma	=	1.478	
Allowable Span to Depth Ratio	=	**38.424**	**> 15.556**

Deflection Requirements are O.K.

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THE LANDLENS SUITE

Eight ways to know a piece of land before you pay for it.

This report covers one part of the picture. These cover the rest, drawn from the same government records, for any property in Tamil Nadu.

LandLens One
Ask anything about a property and get an answer grounded in live government records, with the sources shown.
/landlens/one

Verify My Land
Every record check run on one property and returned as a single report.
/landlens/verify-my-land

Legal Opinion
An advocate's written opinion on the title, built on the records we pull for it.
/landlens

One Map
Every layer on one map: the parcel, its boundary, zoning, water bodies and what sits around it.
/landlens/one/map

PriceMap
What land actually changed hands for around this plot, taken from the registered deeds.
/landlens/pricemap

Build Scope
What you are allowed to build here: floor space, height, coverage and setbacks.
/landlens/build-scope

Property Tracker
Watch a property and hear about it when something new is registered against it.
/landlens/property-tracker

Deal Room
Run the transaction in one place: documents, stamping, signatures and the parties.
/landlens/deal-room

FREE TOOLS · NO ACCOUNT NEEDED

Twenty-four checks you can run yourself, at no cost.

Records and verification

The registers themselves, read for you.

- Encumbrance Certificate
- Patta and Chitta
- Field Measurement Sketch
- EC Analyzer
- Bank charge check
- Court case search
- Seller background check
- Approval check by survey

Value and duty

What it is worth and what it costs to register.

- Guideline value by street
- Guideline value by survey
- Stamp duty and registration fees
- Capital gains
- Floor space index
- Area unit converter

Zoning and land use

What the plan says can happen on this land.

- Land use zone finder
- CMDA land use check
- Coastal regulation zone
- Master plan check
- Water bodies finder
- Airport height clearance

Registers and directories

Who holds it, and which office keeps the record.

- Find your registering office
- Temple property check
- Waqf property check
- RERA register

Every free tool
/tools

Services we run for you
/services

The LandLens suite
/landlens/one

Verified RealEstate™

Every claim in this document traces back to a government record.

- Legal opinions, due diligence and title verification
- Building plan, layout and sub-division approvals
- Completion and occupancy certificates, regularisation
- Escrow, negotiation and NRI property management
- Land survey, soil testing, architecture and construction

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Prepared from the registers named on the page each finding sits on. Where a register could not be read, this document says so in its place rather than leaving the gap to be read as a clean result.