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DIGITALLY VERIFIED RECORD

PROPOSED RESIDENTIAL BUILDING

AT VILANKURICHI VILLAGE

CONSULTANT ARCHITECTS & STRUCTURAL ENGINEERS

SRI MAHI ASSOCIATES

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STRUCTURAL DESIGN REPORT OF PROPOSED RESIDENTIAL BUILDING AT VILANKURICHI VILLAGE, COIMBATORE

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STRUCTURAL DESIGN REPORT OF PROPOSED RESIDENTIAL BUILDING AT VILANKURICHI VILLAGE, COIMBATORE

A. INTRODUCTION

The Proposed building is a **RESDENTIAL BUILDING** at **VILANKURICHI.**

- The Project Architects and the structural engineering services is provided by
- **M/s .MS ASSOCIATES, Coimbatore.**

The proposed Residential building at vilankurichi consists of a unit of G +1.

A.1 STATUTORY REQUIREMENTS:

The design of structural and other building services will comply with the following requirements:

- National Building Code
- The Building Regulations Act
- The Environmental Protection Act in liaison with the Environmental Agency.
- Fire prevention and detection in compliance with the local Fire Regulation.
- Any other applicable laws as advised by the client.
- Bureau of Indian Standard Codes.

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B. DESIGN STANDARDS:

Specific applicable codes and standards will be identified and adopted in the design philosophies as appropriate to the structural elements. The latest editions of the Codes and Standards will be used in designs. All design work shall be based on Indian Standards and Codes with latest revision, with amendments if any, as on date.

CODES USED:

IS: 875:1987 Code of Practice for design loads (other than earthquake) for Buildings and structure (part 1, 2, 3, 4&5).

IS: 1911 Schedule of unit weights of building materials.

Foundations:

IS: 1904 Code of Practice for design and construction of foundations in soils general requirement.

RCC:

IS: 456 Code of Practice for plain and reinforced concrete
IS: 5525 Recommendation for detailing of reinforced concrete works.
IS: 1893(part4) 2016 Criteria for earthquake resistant design of structures (Industrial structures including stack – like structures).
IS: 13920 Ductile Detailing of reinforced concrete structures subjected to seismic forces.

Structural Steel:

IS:800 Code of Practice for general construction in steel.

Miscellaneous:

IS:3067 Code of Practice for general design details and preparatory works for damp proofing and water proofing of buildings.
SP:16 Design Aids for reinforced concrete to IS456-1978.

SOFT WARE USED FOR ANALYSIS AND DESIGN:

STADD.Pro. V8i

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C. DESIGN DATA

C.1. LOADS

C.1.1. DEAD LOADS

Dead load shall include weight of all structural and Architectural components. Self weight of the materials shall be calculated on

Materials	Unit weight kN/m3
Steel	78.50
Plain Concrete	24.00
Reinforced Concrete	25.00
Brickwork	19.00
Solid Block work	18.00
Cement plaster	21.00
Floor finish	20.00
Soil	18.00
Water	10.00

C.1.2. LIVE LOADS

The superimposed loads shall be calculated in accordance with IS: 875(Part-2) based on Occupancy Classification. For multiple occupancies of use in the building shall be referred with the other appropriate comparable occupancy classification as per Table.1 of IS 875(Part-2)-1987. Some of the live loads as

As mentioned in the technical specifications are reproduced in this section.

1. Residential building : 2.0 kN / Sqm
2. Terraces (Weathering course) : 1.5kN / Sqm

C.1.4. SEISMIC FORCES

The Proposed residential building comes under Seismic zone III as per IS 1893-2016 (Part 1) (Fifth Revision on and has the following factors to be considered for design:

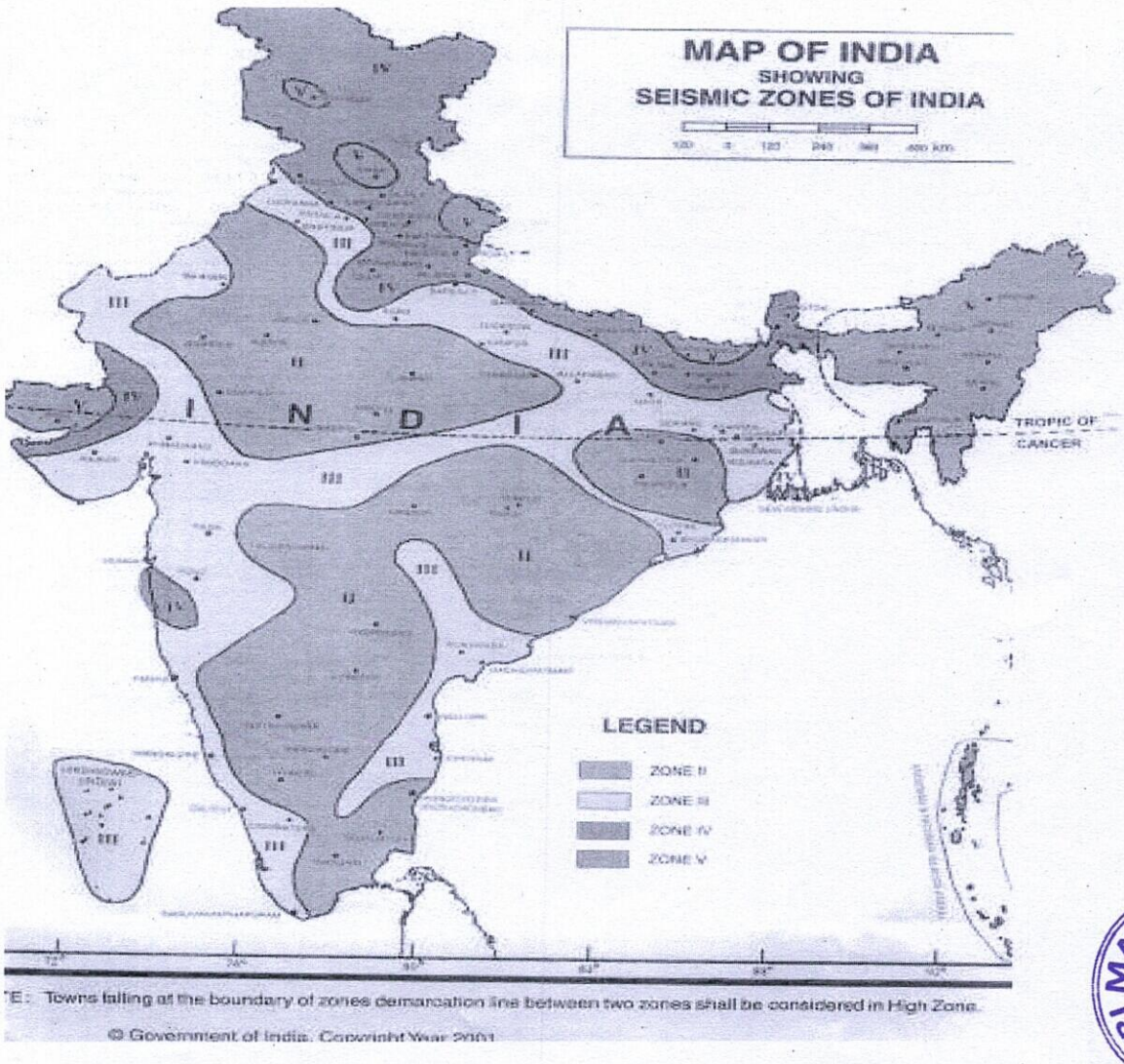
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Seismic Zone factor, Z	**III (Moderate)** As per Table 1893 –I Annex – E
	: 0.16 (As per Table 2-IS: 1893-2002)
I -Importance factor	: 1.5
Response reduction Factor	: 5 (SMRF)



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ENVIRONMENTAL CONDITIONS, CORROSION AND FIRE PROTECTION FOR CONCRETE AND STRUCTURAL STEEL

Case (i):

- Environment : Severe for all structures other than Liquid retaining structure
- Exposure conditions : Concrete exposed to coastal environment.
- Fire protection : Thickness of the structural elements as per Cl.21.0 of IS456:2000

Fire Resistance h	*Minimum Beam Width* b	*Rib Width of Slabs* b_w	*Minimum Thickness of Floors* D	*Column Dimension (b or D)*			*Minimum Wall Thickness*		
				Fully Exposed	50% Exposed	One Face Exposed	$p<0.4\%$	$0.4\% \le p \le 1\%$	$p>1\%$
	mm	mm	mm	mm	mm	mm	mm	mm	mm
0.5	200	125	75	150	125	130	150	100	100
1	200	125	95	200	160	120	150	120	100
1.5	200	125	110	250	200	140	175	140	100
2	200	125	125	300	200	160	–	160	100
3	240	150	150	400	300	200	–	200	150
4	280	175	170	450	350	240	–	240	180

NOTES

1 These minimum dimensions relate specifically to the covers given in Table 16A.

2 p is the percentage of steel reinforcement.

Minimum Dimensions of Reinforced Concrete Members for Fire Resistance as per clause 21of IS 456-2000

- Minimum grade of concrete : M20
- Nominal cover to reinforcement : Severe Exposure -Nominal cover should not be less than 40mm.

For 1 Hour Fire rating as per table 16A from IS 456

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Type of Structural element		Min. Cover to reinforcement
Beam		25 mm
Slabs		25 mm
Columns	≥ 200mm	40 mm
	≤ 200mm	25mm
Retaining wall		40 mm
Footing		50 mm

C.3. TEMPERATURE AND SHRINKAGE EFFECT

Horizontal floor displacement due to differential temperatures and shrinkage is of importance in long concrete buildings. It can be taken care of by either providing expansion joints at an appropriate spacing or designing structural members for the additional moments caused by the temperature and shrinkage effects.

C.4. TEMPERATURE LOADS

The effect of temperature will be considered wherever applicable in accordance with relevant Indian Codes. The coefficient for thermal expansion and contraction will be in accordance with IS: 456 and IS: 800 for concrete and steel respectively.

C.5. EXCEPTIONAL LOADS

- Loads due to the following catastrophic scenarios are not considered in the design.
- Exceptional loads due to terrorist attacks (Explosions)
- Accidental loads (Falling of aircraft on the building)
- Accidental hitting of vehicle on the façade
- Snow Load

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D. MATERIALS

Materials specified will conform to the latest edition of the relevant Indian Standard or other accepted standard. Specifications for materials will include sampling and testing as stipulated in the design standards. Detailed material specifications will be included in the Technical Specification.

D.1. CONCRETE

- All structural concrete shall have minimum cube crushing strength of M40 N/sq.mm at 28 days.
- Plain cement concrete shall have cube crushing strength of 10 N/sq.mm (M10) at 28 days.

CONCRETE ITEM	GRADE
Footings	M20
Columns	M20
Slab & Beams	M20

D.2. REINFORCEMENT STEEL

- All reinforcement shall confirm to IS: 1786 – 1985 having minimum yield strength of 500 N/sq.mm.

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E. STRUCTURAL CONCEPT

The proposed building is of the following structural concept

- RCC beam slab Frame system.
- Staircases are provided with mid-landing between the floors as per architectural layout.

E.1. STRUCTURAL CONFIGURATION

Framing system: RC Cast – in – situ monolithic structure consisting of

1. Columns and Beams.
2. Detailing is done pas per SP 34 & 13920 for all vertical and frame members

	DESCRIPTION	BUILDING SYSTEM
1	Column grids	Varies
2	Structural system	
	All floors	RCC beam Slab frame system
3.	Slab thickness	Varies
4.	Beams	Varies
5	Column size	Varies
6	No. of slabs	GROUND

E.2. STRUCTURAL ANALAYSIS AND DESIGN

General

1. All RCC structures shall be designed according to the limit state method as specified in IS 456 – 2000.
2. The structural analysis is carried out by finite element method using the commercially available **STADD.PRO** for the load combinations as per standards.
3. Forces and moments from the 3D analysis output for the worst combinations are used for the design of the structure.
4. The structure is analyzed for specific loads like dead load, live load, wind and seismic loads and for the load combinations as given in the relevant codes.
5. Design of structural steel members are made using Limit State method as per IS: 800 (2007) with relevant allowable stresses.

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E.3. DEFLECTION LIMITS:

For Reinforced concrete works:

Limiting values of deflection (Short and Long term) as per clause 35.3 of IS: 456-2000 is followed in the design.

Limiting value for short term deflection is considered as span/250 and for the long term deflection is considered as span/350 or 20mm whichever is less as per IS 456 – 2000.

As per IS1893 (Part1) :2002, Story drift in any storey due to minimum specified design seismic lateral force shall not exceed 0.004 times the storey height.

Lateral Sway due to wind load should not exceed H/500(H is the total height of structure).

E.4. CRACKING LIMITS:

Limiting values of crack width as per clause 35.3 of IS: 456-2000 is followed in the design. In general for slabs and beams, the crack width is limited to 0.3mm. For water retaining structures, the water retaining portion of the structure will be designed as uncracked section.

E.5. LOAD COMBINATIONS:

Load Combination	Limit State of Collapse`			Limit State of Serviceability		
	DL	LL	WL/EL/TL	DL	LL	WL/EL/TL
DL + LL	1.5	1.5	-	1	1	-
DL+WL	1.5 or 0.9*	-	1.5	1	-	1
DL+EL	1.5 or 0.9*	-	1.5	1	-	1
DL + TL	1.5	-	1.5	1	-	1
DL + LL + WL	1.2	1.2	1.2	1	.8	.8

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DL + LL+ EL	1.2	1.2	1.2	1	.8	.8
DL + LL + TL	1.2	1.2	1.2	1	1	1
DL + WL + TL	1.2	-	1.2	1	1	1
DL + EL + TL	1.2	-	1.2	1	-	1
DL +LL + EL + TL	1.2	1.2	1.2	1	1	1

The various loads are combined in accordance with the stipulations in IS: 875 (Part 5)-1987; whichever combination produces the most unfavorable effect in the building foundation or structural member concerned may be adopted.

***This value is to be considered when stability against overturning and stress reversal is critical.**

Where DL/LL/WL/EL denotes,

DL -Dead Load; LL -Live Load; WL -Wind Load; EL -Earthquake Load

Wind load and earthquake loads are considered for both x & y directions. Whenever imposed load is combined with earthquake load, the appropriate part of imposed load as specified in IS: 1893-2002 / Clause 7.3.1 of seismic code will be used both for evaluating earthquake effect and for combined load effects used in such combination.

GEO DESIGN:

Soil investigation is carried on by office building at Chennai. According to the report the safe bearing capacity of soil is taken as following.

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STAAD.Pro MODEL

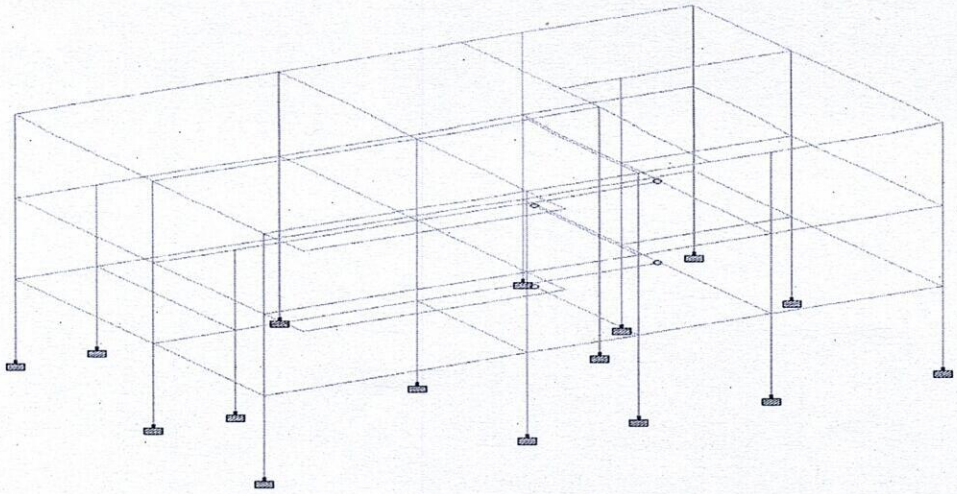
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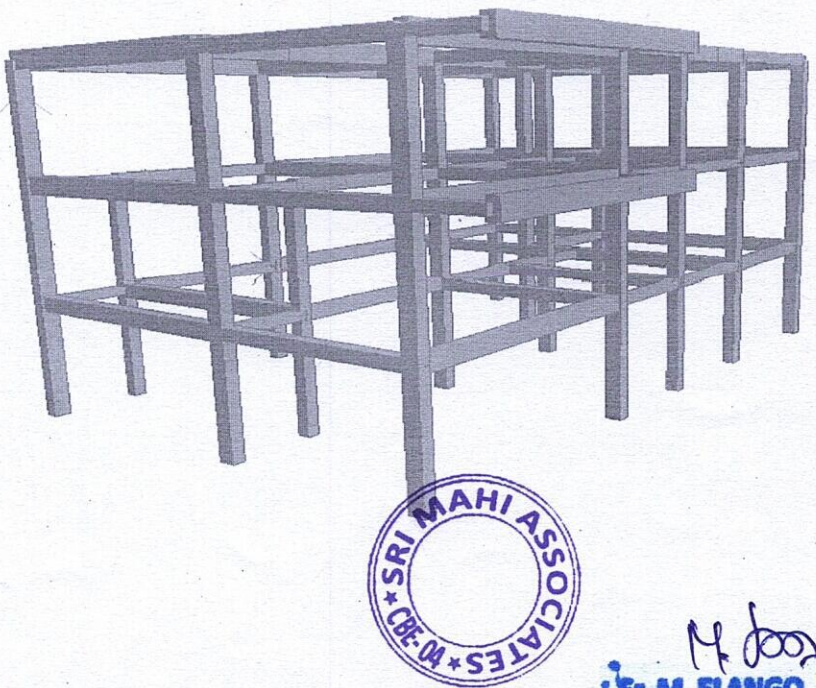
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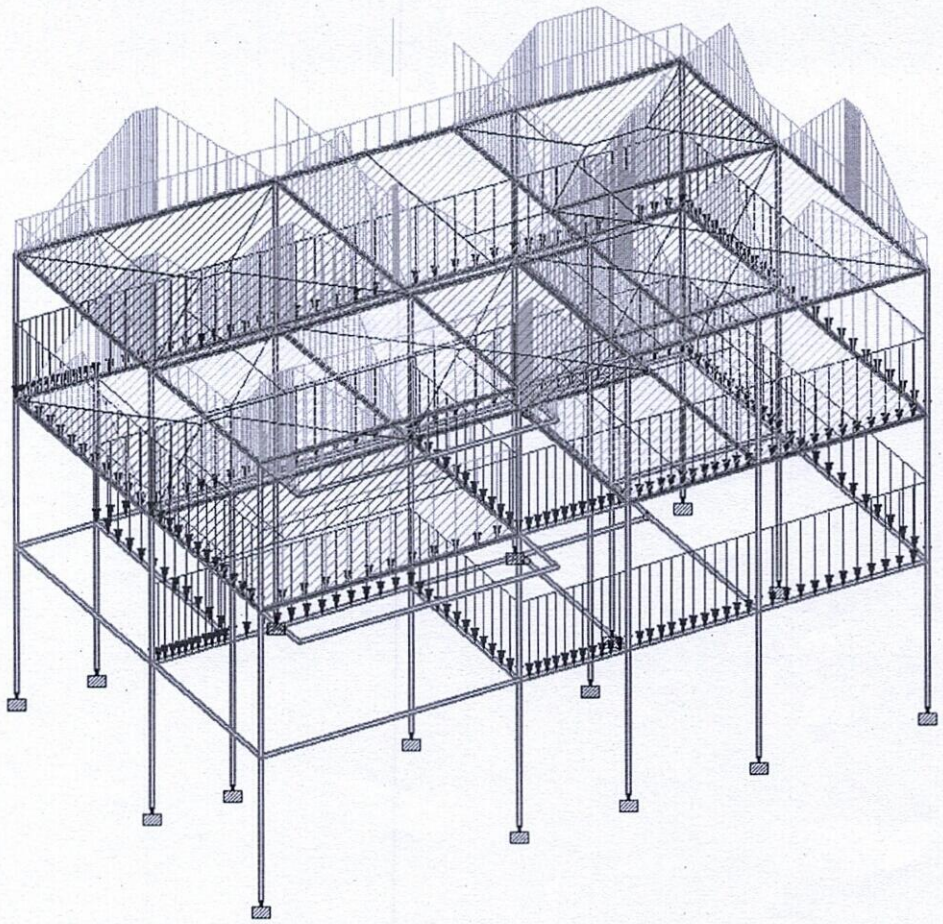
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s Materials Specifications Supports Loading Analysis Design



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I. LOAD CALCULATION

LOADS FROM CODE:

- Live Load as per – IS 875 – Part 2 – Page 29
- Earthquake Combination as per – IS 1893 – Part 1:2002, Clause 6.3.1.1
- Resdential building : 2.0kN / Sqm
- Terraces (Weathering course) : 1.5kN / Sqm

SLAB: (For slab thickness 150mm)

Self weight Slab	–	3.75 KN/m^2
Floor finish	–	2.0 KN/m^2
		5.75 KN/m^2

WALL LOAD: (230 mm THICK WALL)

Brick Work

Ground, &first Floor wall	-	0.23	x	2.44	x	19	=	10.66	kN/m
Head room Wall	-	0.23	x	2.0	x	19	=	5.33	kN/m
Parapet wall	-	0.23	x	1.0	x	19	=	4.3	kN/m

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STRUCTURAL DESIGN REPORT OF PROPOSED RESIDENTIAL BUILDING AT VILANKURICHI VILLAGE, COIMBATORE

STAAD INPUT

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STRUCTURAL DESIGN REPORT OF PROPOSED RESIDENTIAL BUILDING AT VILANKURICHI VILLAGE, COIMBATORE

STAAD SPACE
START JOB INFORMATION
ENGINEER DATE 10-Oct-23
END JOB INFORMATION
INPUT WIDTH 79
UNIT METER KN
JOINT COORDINATES
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FLOOR
_GFONEWAY 63 TO 65 69 70 72 73 75 78 TO 80 82 83 190 191 194 195
_GFTWOWAY 60 TO 62 64 TO 66 74 77 79 80 191 194

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_FFONEWA 153 155 TO 158 161 163 167 170 171 178 180 182 183
_FFTWO 151 152 154 TO 156 160 164 166 170 176 177 179 TO 184
END GROUP DEFINITION
DEFINE MATERIAL START
ISOTROPIC CONCRETE
E 2.17185e+07
POISSON 0.17
DENSITY 23.5616
ALPHA 1e-05
DAMP 0.05
TYPE CONCRETE
STRENGTH FCU 27579
END DEFINE MATERIAL
MEMBER PROPERTY AMERICAN
1 3 TO 6 8 TO 13 15 16 18 20 22 TO 24 28 30 33 34 36 42 44 TO 47 49 TO 54 -
56 57 61 63 65 69 73 75 78 79 82 131 133 TO 136 138 139 141 142 144 145 147 -
154 160 164 167 171 176 178 185 188 189 195 PRIS YD 0.3 ZD 0.23
2 7 14 17 21 26 27 55 60 64 71 72 128 129 143 162 168 172 184 187 191 TO 192 -
193 PRIS YD 0.23 ZD 0.23
19 25 29 31 35 37 62 66 77 157 158 163 181 182 186 194 PRIS YD 0.38 ZD 0.23
70 74 80 83 130 151 TO 153 155 156 161 165 166 170 177 179 180 183 -
190 PRIS YD 0.45 ZD 0.23
CONSTANTS
BETA 90 MEMB 5 6 8 9 11 TO 13 16 46 47 49 50 52 TO 54 57 128 135 136 138 139 -
141 142 145 147 168
MATERIAL CONCRETE ALL
SUPPORTS
17 TO 32 FIXED
MEMBER RELEASE
187 189 191 195 END MX MZ
LOAD 1 LOADTYPE Dead TITLE DL
SELFWEIGHT Y -1 LIST ALL
MEMBER LOAD
18 TO 22 26 TO 28 31 33 36 37 60 TO 63 70 TO 75 78 82 83 UNI GY -10.06
151 TO 154 162 TO 168 172 176 177 179 181 UNI GY -4.4
ONEWAY LOAD
_GFONEWAY ONE -5.75 GY
FLOOR LOAD
_GFTWOWAY FLOAD -5.75 GY
ONEWAY LOAD
_FFONEWA ONE -5.75 GY
FLOOR LOAD
_FFTWO FLOAD -5.75 GY
LOAD 2 LOADTYPE Live TITLE LL
ONEWAY LOAD
_GFONEWAY ONE -2 GY

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_GFTWOWAY ONE -2 GY
_FFONEWA ONE -1.5 GY
FLOOR LOAD
_FFTWO FLOAD -1.5 GY
LOAD COMB 3 1.0 (D.L+LL)
1 1.0 2 1.0
LOAD COMB 4 1.5 (D.L +LL)
1 1.5 2 1.5
PERFORM ANALYSIS
START CONCRETE DESIGN
CODE INDIAN
FC 20000 ALL
FYMAIN 500000 ALL
MAXMAIN 25 ALL
MAXSEC 12 ALL
MINMAIN 10 ALL
MINSEC 8 ALL
RATIO 3 MEMB 1 TO 16 42 44 TO 47 49 TO 57 131 133 TO 136 138 139 141 TO 145 - 147 185 192 193
DESIGN BEAM 17 TO 31 33 TO 37 60 TO 66 69 TO 75 77 TO 80 82 83 128 TO 130 - 151 TO 158 160 TO 168 170 TO 172 176 TO 184 186 TO 191 194 195
DESIGN COLUMN 1 TO 16 42 44 TO 47 49 TO 57 131 133 TO 136 138 139 141 TO 145 - 147 185 192 193
CONCRETE TAKE
END CONCRETE DESIGN
PERFORM ANALYSIS PRINT ALL
FINISH

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FOOTING

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STRUCTURAL DESIGN REPORT OF PROPOSED RESIDENTIAL BUILDING AT VILANKURICHI VILLAGE, COIMBATORE

Project	RESIDENTIAL BUILDING	Design by	Page
Client	NRI		
Design	DESIGN OF FOOTING	Checked	Job No
Consultant	SRI MAHI ASSOCIATES		

Given Data:

FOOTING ID = F3

Column / Pedestal size

	Breadth	= 230 mm		
	Depth	= 300 mm		
	Fck	=	20	N/mm2
	Fy	=	500	N/mm2
Load	P	=	38	T
Axial Load	Px	=	380	KN

Calculations:

Step 1:

Self wt of the footing	Self wt	= 38kN	
Total load	P	= 418kN	
Safe bearing Capacity of Soil	SBC	= 320kN/m2	

Step 2:

Area of the footing				
Total load / SBC		A	= 1.31m^2	14.0605
Equal spacing in both directions as ' x'		X req	= 439mm	
		X pro	= 935mm	
Size of Footing	Required	L	= 2.17m	
		B	= 2.10m	
	Provided	B	= 1.22m	4.00262
		L	= 1.52m	4.98688

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Net upward pressure p =225.41kN/m2

< SBC Hence safe

Step 3:

Bending Moment calculation:

for per m strip Mu (Long) = 147. 79kN.m

Depth required

d reqd = 462.81mm

D prov = 460mm

d eff = 390mm

Step 4:

Steel Ast calculation:

Ast req	= 926mm^2
Select bar dia	= 10mm
Spacing Required	= 85mm c/c
Spacing Provided	= 150mm c/c
Ast pro	= 523mm^2

Step 5:
Check For Shear:

1. one way shear:

From Critical Xn for One Way Shear

Vu	= 184.27KN
ζv	= 0.47N/mm2
pt	= 0.134%
ζc	= 0.274N/mm2

$\zeta v < \zeta c$

hence not sate

2. Two-way shear:

From Critical Xn for Two Way Shear

Vu	= 184.07KN
ζv	= 0.18N/mm2
ζc	= 1N/mm2

$\zeta c = k*0.28*\sqrt{fck}$

$\zeta v < \zeta c$

hence safe in Two-way shear

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SRI MAHI ASSOCIATES

STRUCTURAL DESIGN REPORT OF PROPOSED RESIDENTIAL BUILDING AT VILANKURICHI VILLAGE, COIMBATORE

COLUMN

SRI MAHI ASSOCIATES * CBE-641 004 *

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STRUCTURAL DESIGN REPORT OF PROPOSED RESIDENTIAL BUILDING AT VILANKURICHI VILLAGE, COIMBATORE

IS-456 LIMIT STATE DESIGN
COLUMN NO. 1 DESIGN RESULTS

M20 Fe500 (Main) Fe415 (Sec.)

LENGTH: 2984.0 mm CROSS SECTION: 230.0 mm X 300.0 mm COVER: 40.0 mm

** GUIDING LOAD CASE: 4 SHORT(Z) /BRACED LONG(Y)

REQD. STEEL AREA : 191.24 Sq.mm.
REQD. CONCRETE AREA: 23904.92 Sq.mm.
MAIN REINFORCEMENT : Provide 4 - 12 dia. (0.66%, 452.39 Sq.mm.)
(Equally distributed)
TIE REINFORCEMENT : Provide 8 mm dia. rectangular ties @ 190 mm c/c

SECTION CAPACITY BASED ON REINFORCEMENT REQUIRED (KNS-MET)

Puz : 690.99 Muz1 : 26.77 Muy1 : 19.80

INTERACTION RATIO: 0.48 (as per Cl. 39.6, IS456:2000)

SECTION CAPACITY BASED ON REINFORCEMENT PROVIDED (KNS-MET)

WORST LOAD CASE: 4
Puz : 786.57 Muz : 39.95 Muy : 27.82 IR: 0.34

IS-456 LIMIT STATE DESIGN
COLUMN NO. 2 DESIGN RESULTS

M20 Fe500 (Main) Fe415 (Sec.)

LENGTH: 2984.0 mm CROSS SECTION: 230.0 mm X 230.0 mm COVER: 40.0 mm

** GUIDING LOAD CASE: 4 BRACED LONG COLUMN

REQD. STEEL AREA : 176.76 Sq.mm.
REQD. CONCRETE AREA: 52723.25 Sq.mm.
MAIN REINFORCEMENT : Provide 4 - 12 dia. (0.86%, 452.39 Sq.mm.)
(Equally distributed)
TIE REINFORCEMENT : Provide 8 mm dia. rectangular ties @ 190 mm c/c

SECTION CAPACITY BASED ON REINFORCEMENT REQUIRED (KNS-MET)

SRI MAHI ASSOCIATES * CBE-04 *

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Puz : 540.79 Muz1 : 16.16 Muy1 : 16.16

INTERACTION RATIO: 0.89 (as per Cl. 39.6, IS456:2000)

SECTION CAPACITY BASED ON REINFORCEMENT PROVIDED (KNS-MET)

WORST LOAD CASE: 4
Puz : 641.67 Muz : 23.97 Muy : 23.97 IR: 0.60

IS-456 LIMIT STATE DESIGN
COLUMN NO. 3 DESIGN RESULTS

M20 Fe500 (Main) Fe415 (Sec.)

LENGTH: 2984.0 mm CROSS SECTION: 230.0 mm X 300.0 mm COVER: 40.0 mm

** GUIDING LOAD CASE: 4 SHORT(Z) /BRACED LONG(Y)

REQD. STEEL AREA : 455.76 Sq.mm.
REQD. CONCRETE AREA: 68544.25 Sq.mm.
MAIN REINFORCEMENT : Provide 4 - 16 dia. (1.17%, 804.25 Sq.mm.)
(Equally distributed)
TIE REINFORCEMENT : Provide 8 mm dia. rectangular ties @ 230 mm c/c

SECTION CAPACITY BASED ON REINFORCEMENT REQUIRED (KNS-MET)

Puz : 787.81 Muz1 : 26.46 Muy1 : 19.32

INTERACTION RATIO: 0.86 (as per Cl. 39.6, IS456:2000)

SECTION CAPACITY BASED ON REINFORCEMENT PROVIDED (KNS-MET)

WORST LOAD CASE: 4
Puz : 915.35 Muz : 40.57 Muy : 28.04 IR: 0.62

IS-456 LIMIT STATE DESIGN
COLUMN NO. 4 DESIGN RESULTS

M20 Fe500 (Main) Fe415 (Sec.)

LENGTH: 2984.0 mm CROSS SECTION: 230.0 mm X 300.0 mm COVER: 40.0 mm

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** GUIDING LOAD CASE: 4 SHORT(Z) /BRACED LONG(Y)
REQD. STEEL AREA : 354.03 Sq.mm.
REQD. CONCRETE AREA: 44254.13 Sq.mm.
MAIN REINFORCEMENT : Provide 4 - 12 dia. (0.66%, 452.39 Sq.mm.)
(Equally distributed)
TIE REINFORCEMENT : Provide 8 mm dia. rectangular ties @ 190 mm c/c

SECTION CAPACITY BASED ON REINFORCEMENT REQUIRED (KNS-MET)

Puz : 750.58 Muz1 : 29.15 Muy1 : 21.30

INTERACTION RATIO: 0.63 (as per Cl. 39.6, IS456:2000)

SECTION CAPACITY BASED ON REINFORCEMENT PROVIDED (KNS-MET)

WORST LOAD CASE: 4
Puz : 786.57 Muz : 35.07 Muy : 24.88 IR: 0.61
STAAD SPACE -- PAGE NO. 77

IS-456 LIMIT STATE DESIGN
COLUMN NO. 5 DESIGN RESULTS

M20 Fe500 (Main) Fe415 (Sec.)

LENGTH: 2984.0 mm CROSS SECTION: 230.0 mm X 300.0 mm COVER: 40.0 mm

** GUIDING LOAD CASE: 4 SHORT(Z) /BRACED LONG(Y)

REQD. STEEL AREA : 191.21 Sq.mm.
REQD. CONCRETE AREA: 23901.56 Sq.mm.
MAIN REINFORCEMENT : Provide 4 - 12 dia. (0.66%, 452.39 Sq.mm.)
(Equally distributed)
TIE REINFORCEMENT : Provide 8 mm dia. rectangular ties @ 190 mm c/c

SECTION CAPACITY BASED ON REINFORCEMENT REQUIRED (KNS-MET)

Puz : 690.98 Muz1 : 26.77 Muy1 : 19.79

INTERACTION RATIO: 0.50 (as per Cl. 39.6, IS456:2000)

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SECTION CAPACITY BASED ON REINFORCEMENT PROVIDED (KNS-MET)

WORST LOAD CASE: 4
Puz : 786.57 Muz : 39.95 Muy : 27.82 IR: 0.43

IS-456 LIMIT STATE DESIGN
COLUMN NO. 6 DESIGN RESULTS

M20 Fe500 (Main) Fe415 (Sec.)

LENGTH: 2984.0 mm CROSS SECTION: 230.0 mm X 300.0 mm COVER: 40.0 mm

** GUIDING LOAD CASE: 4 SHORT(Z) /BRACED LONG(Y)

REQD. STEEL AREA : 302.51 Sq.mm.
REQD. CONCRETE AREA: 37813.27 Sq.mm.
MAIN REINFORCEMENT : Provide 4 - 12 dia. (0.66%, 452.39 Sq.mm.)
(Equally distributed)
TIE REINFORCEMENT : Provide 8 mm dia. rectangular ties @ 190 mm c/c

SECTION CAPACITY BASED ON REINFORCEMENT REQUIRED (KNS-MET)

Puz : 731.72 Muz1 : 29.52 Muy1 : 21.58

INTERACTION RATIO: 0.56 (as per Cl. 39.6, IS456:2000)

SECTION CAPACITY BASED ON REINFORCEMENT PROVIDED (KNS-MET)

WORST LOAD CASE: 4
Puz : 786.57 Muz : 37.46 Muy : 26.38 IR: 0.54

IS-456 LIMIT STATE DESIGN
COLUMN NO. 7 DESIGN RESULTS

M20 Fe500 (Main) Fe415 (Sec.)

LENGTH: 2984.0 mm CROSS SECTION: 230.0 mm X 230.0 mm COVER: 40.0 mm

** GUIDING LOAD CASE: 4 BRACED LONG COLUMN

REQD. STEEL AREA : 217.68 Sq.mm.
REQD. CONCRETE AREA: 52682.33 Sq.mm.

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MAIN REINFORCEMENT : Provide 4 - 12 dia. (0.86%, 452.39 Sq.mm.)
(Equally distributed)
TIE REINFORCEMENT : Provide 8 mm dia. rectangular ties @ 190 mm c/c

SECTION CAPACITY BASED ON REINFORCEMENT REQUIRED (KNS-MET)

Puz : 555.77 Muz1 : 16.54 Muy1 : 16.54

INTERACTION RATIO: 0.86 (as per Cl. 39.6, IS456:2000)

SECTION CAPACITY BASED ON REINFORCEMENT PROVIDED (KNS-MET)

WORST LOAD CASE: 4
Puz : 641.67 Muz : 22.99 Muy : 22.99 IR: 0.60

IS-456 LIMIT STATE DESIGN
COLUMN NO. 8 DESIGN RESULTS

M20 Fe500 (Main) Fe415 (Sec.)

LENGTH: 2984.0 mm CROSS SECTION: 230.0 mm X 300.0 mm COVER: 40.0 mm

** GUIDING LOAD CASE: 4 SHORT(Z) /BRACED LONG(Y)

REQD. STEEL AREA : 546.33 Sq.mm.
REQD. CONCRETE AREA: 68453.68 Sq.mm.
MAIN REINFORCEMENT : Provide 4 - 16 dia. (1.17%, 804.25 Sq.mm.)
(Equally distributed)
TIE REINFORCEMENT : Provide 8 mm dia. rectangular ties @ 230 mm c/c

SECTION CAPACITY BASED ON REINFORCEMENT REQUIRED (KNS-MET)

Puz : 820.96 Muz1 : 26.19 Muy1 : 19.02

INTERACTION RATIO: 0.97 (as per Cl. 39.6, IS456:2000)

SECTION CAPACITY BASED ON REINFORCEMENT PROVIDED (KNS-MET)

WORST LOAD CASE: 4
Puz : 915.35 Muz : 37.60 Muy : 26.12 IR: 0.72

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STRUCTURAL DESIGN REPORT OF PROPOSED RESIDENTIAL BUILDING AT VILANKURICHI VILLAGE, COIMBATORE

IS-456 LIMIT STATE DESIGN
COLUMN NO. 9 DESIGN RESULTS

M20 Fe500 (Main) Fe415 (Sec.)

LENGTH: 2984.0 mm CROSS SECTION: 230.0 mm X 300.0 mm COVER: 40.0 mm

** GUIDING LOAD CASE: 4 SHORT(Z) /BRACED LONG(Y)

_ STAAD SPACE -- PAGE NO. 80

REQD. STEEL AREA : 378.16 Sq.mm.
REQD. CONCRETE AREA: 47269.83 Sq.mm.
MAIN REINFORCEMENT : Provide 4 - 12 dia. (0.66%, 452.39 Sq.mm.)
(Equally distributed)
TIE REINFORCEMENT : Provide 8 mm dia. rectangular ties @ 190 mm c/c

SECTION CAPACITY BASED ON REINFORCEMENT REQUIRED (KNS-MET)

Puz : 759.41 Muz1 : 28.75 Muy1 : 20.99

INTERACTION RATIO: 0.67 (as per Cl. 39.6, IS456:2000)

SECTION CAPACITY BASED ON REINFORCEMENT PROVIDED (KNS-MET)

WORST LOAD CASE: 4
Puz : 786.57 Muz : 33.77 Muy : 24.05 IR: 0.66

IS-456 LIMIT STATE DESIGN
COLUMN NO. 10 DESIGN RESULTS

M20 Fe500 (Main) Fe415 (Sec.)

LENGTH: 2984.0 mm CROSS SECTION: 230.0 mm X 300.0 mm COVER: 40.0 mm

** GUIDING LOAD CASE: 4 SHORT(Z) /BRACED LONG(Y)

REQD. STEEL AREA : 283.88 Sq.mm.
REQD. CONCRETE AREA: 35484.63 Sq.mm.
MAIN REINFORCEMENT : Provide 4 - 12 dia. (0.66%, 452.39 Sq.mm.)
(Equally distributed)
TIE REINFORCEMENT : Provide 8 mm dia. rectangular ties @ 190 mm c/c

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SECTION CAPACITY BASED ON REINFORCEMENT REQUIRED (KNS-MET)

Puz : 724.90 Muz1 : 29.48 Muy1 : 21.55

INTERACTION RATIO: 0.55 (as per Cl. 39.6, IS456:2000)

SECTION CAPACITY BASED ON REINFORCEMENT PROVIDED (KNS-MET)

WORST LOAD CASE: 4
Puz : 786.57 Muz : 38.24 Muy : 26.82 IR: 0.51
STAAD SPACE -- PAGE NO. 81

IS-456 LIMIT STATE DESIGN
COLUMN NO. 11 DESIGN RESULTS

M20 Fe500 (Main) Fe415 (Sec.)

LENGTH: 2984.0 mm CROSS SECTION: 230.0 mm X 300.0 mm COVER: 40.0 mm

** GUIDING LOAD CASE: 4 SHORT(Z) /BRACED LONG(Y)

REQD. STEEL AREA : 249.85 Sq.mm.
REQD. CONCRETE AREA: 31230.85 Sq.mm.
MAIN REINFORCEMENT : Provide 4 - 12 dia. (0.66%, 452.39 Sq.mm.)
(Equally distributed)
TIE REINFORCEMENT : Provide 8 mm dia. rectangular ties @ 190 mm c/c

SECTION CAPACITY BASED ON REINFORCEMENT REQUIRED (KNS-MET)

Puz : 712.44 Muz1 : 29.14 Muy1 : 21.31

INTERACTION RATIO: 0.52 (as per Cl. 39.6, IS456:2000)

SECTION CAPACITY BASED ON REINFORCEMENT PROVIDED (KNS-MET)

WORST LOAD CASE: 4
Puz : 786.57 Muz : 39.57 Muy : 27.50 IR: 0.48

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STRUCTURAL DESIGN REPORT OF PROPOSED RESIDENTIAL BUILDING AT VILANKURICHI VILLAGE, COIMBATORE

IS-456 LIMIT STATE DESIGN
COLUMN NO. 12 DESIGN RESULTS

M20 Fe500 (Main) Fe415 (Sec.)

LENGTH: 2984.0 mm CROSS SECTION: 230.0 mm X 300.0 mm COVER: 40.0 mm

** GUIDING LOAD CASE: 4 SHORT(Z) /BRACED LONG(Y)

REQD. STEEL AREA : 274.29 Sq.mm.
REQD. CONCRETE AREA: 34285.98 Sq.mm.
MAIN REINFORCEMENT : Provide 4 - 12 dia. (0.66%, 452.39 Sq.mm.)
(Equally distributed)
TIE REINFORCEMENT : Provide 8 mm dia. rectangular ties @ 190 mm c/c

SECTION CAPACITY BASED ON REINFORCEMENT REQUIRED (KNS-MET)

Puz : 721.39 Muz1 : 29.41 Muy1 : 21.51

INTERACTION RATIO: 0.54 (as per Cl. 39.6, IS456:2000)

SECTION CAPACITY BASED ON REINFORCEMENT PROVIDED (KNS-MET)

WORST LOAD CASE: 4
Puz : 786.57 Muz : 38.62 Muy : 27.02 IR: 0.50

IS-456 LIMIT STATE DESIGN
COLUMN NO. 13 DESIGN RESULTS

M20 Fe500 (Main) Fe415 (Sec.)

LENGTH: 2984.0 mm CROSS SECTION: 230.0 mm X 300.0 mm COVER: 40.0 mm

** GUIDING LOAD CASE: 4 SHORT(Z) /BRACED LONG(Y)

REQD. STEEL AREA : 347.15 Sq.mm.
REQD. CONCRETE AREA: 43393.66 Sq.mm.
MAIN REINFORCEMENT : Provide 4 - 12 dia. (0.66%, 452.39 Sq.mm.)
(Equally distributed)
TIE REINFORCEMENT : Provide 8 mm dia. rectangular ties @ 190 mm c/c

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SECTION CAPACITY BASED ON REINFORCEMENT REQUIRED (KNS-MET)

Puz : 748.06 Muz1 : 29.24 Muy1 : 21.37

INTERACTION RATIO: 0.69 (as per Cl. 39.6, IS456:2000)

SECTION CAPACITY BASED ON REINFORCEMENT PROVIDED (KNS-MET)

WORST LOAD CASE: 4
Puz : 786.57 Muz : 35.42 Muy : 25.10 IR: 0.67
STAAD SPACE -- PAGE NO. 83

IS-456 LIMIT STATE DESIGN
COLUMN NO. 14 DESIGN RESULTS

M20 Fe500 (Main) Fe415 (Sec.)

LENGTH: 2984.0 mm CROSS SECTION: 230.0 mm X 230.0 mm COVER: 40.0 mm

** GUIDING LOAD CASE: 4 BRACED LONG COLUMN

REQD. STEEL AREA : 167.45 Sq.mm.
REQD. CONCRETE AREA: 52732.55 Sq.mm.
MAIN REINFORCEMENT : Provide 4 - 12 dia. (0.86%, 452.39 Sq.mm.)
(Equally distributed)
TIE REINFORCEMENT : Provide 8 mm dia. rectangular ties @ 190 mm c/c

SECTION CAPACITY BASED ON REINFORCEMENT REQUIRED (KNS-MET)

Puz : 537.39 Muz1 : 15.94 Muy1 : 15.94

INTERACTION RATIO: 0.76 (as per Cl. 39.6, IS456:2000)

SECTION CAPACITY BASED ON REINFORCEMENT PROVIDED (KNS-MET)

WORST LOAD CASE: 4
Puz : 641.67 Muz : 24.19 Muy : 24.19 IR: 0.51

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STRUCTURAL DESIGN REPORT OF PROPOSED RESIDENTIAL BUILDING AT VILANKURICHI VILLAGE, COIMBATORE

IS-456 LIMIT STATE DESIGN
COLUMN NO. 15 DESIGN RESULTS

M20 Fe500 (Main) Fe415 (Sec.)

LENGTH: 2984.0 mm CROSS SECTION: 230.0 mm X 300.0 mm COVER: 40.0 mm

** GUIDING LOAD CASE: 4 SHORT(Z) /BRACED LONG(Y)

REQD. STEEL AREA : 289.95 Sq.mm.
REQD. CONCRETE AREA: 36243.59 Sq.mm.
MAIN REINFORCEMENT : Provide 4 - 12 dia. (0.66%, 452.39 Sq.mm.)
(Equally distributed)
TIE REINFORCEMENT : Provide 8 mm dia. rectangular ties @ 190 mm c/c

SECTION CAPACITY BASED ON REINFORCEMENT REQUIRED (KNS-MET)

Puz : 727.12 Muz1 : 29.50 Muy1 : 21.57

INTERACTION RATIO: 0.55 (as per Cl. 39.6, IS456:2000)

SECTION CAPACITY BASED ON REINFORCEMENT PROVIDED (KNS-MET)

WORST LOAD CASE: 4
Puz : 786.57 Muz : 37.99 Muy : 26.69 IR: 0.52

IS-456 LIMIT STATE DESIGN
COLUMN NO. 16 DESIGN RESULTS

M20 Fe500 (Main) Fe415 (Sec.)

LENGTH: 2984.0 mm CROSS SECTION: 230.0 mm X 300.0 mm COVER: 40.0 mm

** GUIDING LOAD CASE: 4 SHORT(Z) /BRACED LONG(Y)

REQD. STEEL AREA : 278.77 Sq.mm.
REQD. CONCRETE AREA: 34846.55 Sq.mm.
MAIN REINFORCEMENT : Provide 4 - 12 dia. (0.66%, 452.39 Sq.mm.)
(Equally distributed)
TIE REINFORCEMENT : Provide 8 mm dia. rectangular ties @ 190 mm c/c

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SECTION CAPACITY BASED ON REINFORCEMENT REQUIRED (KNS-MET)

Puz : 723.03 Muz1 : 29.45 Muy1 : 21.53

INTERACTION RATIO: 0.65 (as per Cl. 39.6, IS456:2000)

SECTION CAPACITY BASED ON REINFORCEMENT PROVIDED (KNS-MET)

WORST LOAD CASE: 4
Puz : 786.57 Muz : 38.44 Muy : 26.93 IR: 0.60
STAAD SPACE -- PAGE NO. 85

IS-456 LIMIT STATE DESIGN
COLUMN NO. 42 DESIGN RESULTS

M20 Fe500 (Main) Fe415 (Sec.)

LENGTH: 3000.0 mm CROSS SECTION: 230.0 mm X 300.0 mm COVER: 40.0 mm

** GUIDING LOAD CASE: 4 SHORT(Z) /BRACED LONG(Y)

REQD. STEEL AREA : 179.78 Sq.mm.
REQD. CONCRETE AREA: 22472.28 Sq.mm.
MAIN REINFORCEMENT : Provide 4 - 12 dia. (0.66%, 452.39 Sq.mm.)
(Equally distributed)
TIE REINFORCEMENT : Provide 8 mm dia. rectangular ties @ 190 mm c/c

SECTION CAPACITY BASED ON REINFORCEMENT REQUIRED (KNS-MET)

Puz : 686.80 Muz1 : 25.98 Muy1 : 19.25

INTERACTION RATIO: 0.76 (as per Cl. 39.6, IS456:2000)

SECTION CAPACITY BASED ON REINFORCEMENT PROVIDED (KNS-MET)

WORST LOAD CASE: 4
Puz : 786.57 Muz : 39.46 Muy : 27.60 IR: 0.60

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STRUCTURAL DESIGN REPORT OF PROPOSED RESIDENTIAL BUILDING AT VILANKURICHI VILLAGE, COIMBATORE

BEAMS

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STRUCTURAL DESIGN REPORT OF PROPOSED RESIDENTIAL BUILDING AT VILANKURICHI VILLAGE, COIMBATORE

IS 456 - 2000 BEAM DESIGN RESULTS
IS-456 LIMIT STATE DESIGN
BEAMNO. 17 DESIGN RESULTS

M20 Fe500 (Main) Fe415 (Sec.)

LENGTH: 1630.0 mm SIZE: 230.0 mm X 230.0 mm COVER: 30.0 mm

SUMMARY OF REINF. AREA (Sq.mm)

SECTION	0.0 mm	407.5 mm	815.0 mm	1222.5 mm	1630.0 mm
TOP REINF.	76.25 (Sq. mm)	76.25 (Sq. mm)	76.25 (Sq. mm)	76.25 (Sq. mm)	96.70 (Sq. mm)
BOTTOM REINF.	76.25 (Sq. mm)	76.25 (Sq. mm)	76.25 (Sq. mm)	76.25 (Sq. mm)	76.25 (Sq. mm)

SUMMARY OF PROVIDED REINF. AREA

SECTION	0.0 mm	407.5 mm	815.0 mm	1222.5 mm	1630.0 mm
TOP REINF.	3-10d 1 layer(s)	3-10d 1 layer(s)	3-10d 1 layer(s)	3-10d 1 layer(s)	3-10d 1 layer(s)
BOTTOM REINF.	3-10d 1 layer(s)	3-10d 1 layer(s)	3-10d 1 layer(s)	3-10d 1 layer(s)	3-10d 1 layer(s)
SHEAR REINF.	2 legged 8d @ 85 mm c/c	2 legged 8d @ 85 mm c/c	2 legged 8d @ 85 mm c/c	2 legged 8d @ 85 mm c/c	2 legged 8d @ 85 mm c/c

SHEAR DESIGN RESULTS AT DISTANCE d (EFFECTIVE DEPTH) FROM FACE OF THE SUPPORT

SHEAR DESIGN RESULTS AT 345.0 mm AWAY FROM START SUPPORT
VY = -2.63 MX = -2.70 LD= 4
Provide 2 Legged 8d @ 85 mm c/c

SHEAR DESIGN RESULTS AT 310.0 mm AWAY FROM END SUPPORT
VY = -4.48 MX = -2.70 LD= 4
Provide 2 Legged 8d @ 85 mm c/c

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STRUCTURAL DESIGN REPORT OF PROPOSED RESIDENTIAL BUILDING AT VILANKURICHI VILLAGE, COIMBATORE

IS 456 - 2000 B E A M D E S I G N R E S U L T S
IS-456 L I M I T S T A T E D E S I G N
B E A M N O. 18 D E S I G N R E S U L T S

M20 Fe500 (Main) Fe415 (Sec.)

LENGTH: 3660.0 mm SIZE: 230.0 mm X 300.0 mm COVER: 30.0 mm

SUMMARY OF REINF. AREA (Sq.mm)

SECTION	0.0 mm	915.0 mm	1830.0 mm	2745.0 mm	3660.0 mm
TOP REINF.	181.83 (Sq. mm)	103.62 (Sq. mm)	0.00 (Sq. mm)	103.62 (Sq. mm)	246.90 (Sq. mm)
BOTTOM REINF.	0.00 (Sq. mm)	103.62 (Sq. mm)	129.40 (Sq. mm)	103.62 (Sq. mm)	103.62 (Sq. mm)

SUMMARY OF PROVIDED REINF. AREA

SECTION	0.0 mm	915.0 mm	1830.0 mm	2745.0 mm	3660.0 mm
TOP REINF.	3-10d 1 layer(s)	3-10d 1 layer(s)	2-10d 1 layer(s)	3-10d 1 layer(s)	4-10d 1 layer(s)
BOTTOM REINF.	2-10d 1 layer(s)	3-10d 1 layer(s)	3-10d 1 layer(s)	3-10d 1 layer(s)	3-10d 1 layer(s)
SHEAR REINF.	2 legged 8d @ 105 mm c/c	2 legged 8d @ 105 mm c/c	2 legged 8d @ 105 mm c/c	2 legged 8d @ 105 mm c/c	2 legged 8d @ 105 mm c/c

SHEAR DESIGN RESULTS AT DISTANCE d (EFFECTIVE DEPTH) FROM FACE OF THE SUPPORT

SHEAR DESIGN RESULTS AT 380.0 mm AWAY FROM START SUPPORT
VY = 23.82 MX = 2.67 LD= 4
Provide 2 Legged 8d @ 105 mm c/c

SHEAR DESIGN RESULTS AT 415.0 mm AWAY FROM END SUPPORT
VY = -26.58 MX = 2.67 LD= 4
Provide 2 Legged 8d @ 105 mm c/c

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STRUCTURAL DESIGN REPORT OF PROPOSED RESIDENTIAL BUILDING AT VILANKURICHI VILLAGE, COIMBATORE

IS 456 - 2000 B E A M D E S I G N R E S U L T S
IS-456 L I M I T S T A T E D E S I G N
B E A M N O. 19 D E S I G N R E S U L T S

M20 Fe500 (Main) Fe415 (Sec.)

LENGTH: 4900.0 mm SIZE: 230.0 mm X 380.0 mm COVER: 30.0 mm

SUMMARY OF REINF. AREA (Sq.mm)

SECTION	0.0 mm	1225.0 mm	2450.0 mm	3675.0 mm	4900.0 mm
TOP REINF.	251.63 (Sq. mm)	134.90 (Sq. mm)	134.90 (Sq. mm)	134.90 (Sq. mm)	254.31 (Sq. mm)
BOTTOM REINF.	134.90 (Sq. mm)	134.90 (Sq. mm)	146.96 (Sq. mm)	134.90 (Sq. mm)	0.00 (Sq. mm)

SUMMARY OF PROVIDED REINF. AREA

SECTION	0.0 mm	1225.0 mm	2450.0 mm	3675.0 mm	4900.0 mm
TOP REINF.	4-10d 1 layer(s)	3-10d 1 layer(s)	3-10d 1 layer(s)	3-10d 1 layer(s)	4-10d 1 layer(s)
BOTTOM REINF.	3-10d 1 layer(s)	3-10d 1 layer(s)	3-10d 1 layer(s)	3-10d 1 layer(s)	2-10d 1 layer(s)
SHEAR REINF.	2 legged 8d @ 125 mm c/c	2 legged 8d @ 125 mm c/c	2 legged 8d @ 125 mm c/c	2 legged 8d @ 125 mm c/c	2 legged 8d @ 125 mm c/c

SHEAR DESIGN RESULTS AT DISTANCE d (EFFECTIVE DEPTH) FROM FACE OF THE SUPPORT

SHEAR DESIGN RESULTS AT 495.0 mm AWAY FROM START SUPPORT
VY = 35.56 MX = -0.44 LD= 4
Provide 2 Legged 8d @ 125 mm c/c

SHEAR DESIGN RESULTS AT 495.0 mm AWAY FROM END SUPPORT
VY = -35.70 MX = -0.44 LD= 4
Provide 2 Legged 8d @ 125 mm c/c

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STRUCTURAL DESIGN REPORT OF PROPOSED RESIDENTIAL BUILDING AT VILANKURICHI VILLAGE, COIMBATORE

IS 456 - 2000 B E A M D E S I G N R E S U L T S
IS-456 L I M I T S T A T E D E S I G N
B E A M N O. 20 D E S I G N R E S U L T S

M20 Fe500 (Main) Fe415 (Sec.)

LENGTH: 3430.0 mm SIZE: 230.0 mm X 300.0 mm COVER: 30.0 mm

SUMMARY OF REINF. AREA (Sq.mm)

SECTION	0.0 mm	857.5 mm	1715.0 mm	2572.5 mm	3430.0 mm
TOP REINF.	214.51 (Sq. mm)	103.62 (Sq. mm)	0.00 (Sq. mm)	103.62 (Sq. mm)	109.46 (Sq. mm)
BOTTOM REINF.	103.62 (Sq. mm)	103.62 (Sq. mm)	103.62 (Sq. mm)	103.62 (Sq. mm)	0.00 (Sq. mm)

SUMMARY OF PROVIDED REINF. AREA

SECTION	0.0 mm	857.5 mm	1715.0 mm	2572.5 mm	3430.0 mm
TOP REINF.	2-12d 1 layer(s)	2-12d 1 layer(s)	2-12d 1 layer(s)	2-12d 1 layer(s)	2-12d 1 layer(s)
BOTTOM REINF.	3-10d 1 layer(s)	3-10d 1 layer(s)	3-10d 1 layer(s)	3-10d 1 layer(s)	2-10d 1 layer(s)
SHEAR REINF.	2 legged 8d @ 105 mm c/c	2 legged 8d @ 105 mm c/c	2 legged 8d @ 105 mm c/c	2 legged 8d @ 105 mm c/c	2 legged 8d @ 105 mm c/c

SHEAR DESIGN RESULTS AT DISTANCE d (EFFECTIVE DEPTH) FROM FACE OF THE SUPPORT

SHEAR DESIGN RESULTS AT 414.0 mm AWAY FROM START SUPPORT
VY = 25.92 MX = -0.53 LD= 4
Provide 2 Legged 8d @ 105 mm c/c

SHEAR DESIGN RESULTS AT 379.0 mm AWAY FROM END SUPPORT
VY = -20.44 MX = -0.53 LD= 4
Provide 2 Legged 8d @ 105 mm c/c

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STRUCTURAL DESIGN REPORT OF PROPOSED RESIDENTIAL BUILDING AT VILANKURICHI VILLAGE, COIMBATORE

IS 456 - 2000 B E A M D E S I G N R E S U L T S
IS-456 L I M I T S T A T E D E S I G N
B E A M N O. 21 D E S I G N R E S U L T S

M20 Fe500 (Main) Fe415 (Sec.)

LENGTH: 1630.0 mm SIZE: 230.0 mm X 230.0 mm COVER: 30.0 mm

SUMMARY OF REINF. AREA (Sq.mm)

SECTION	0.0 mm	407.5 mm	815.0 mm	1222.5 mm	1630.0 mm
TOP REINF.	76.25 (Sq. mm)	76.25 (Sq. mm)	76.25 (Sq. mm)	76.25 (Sq. mm)	163.74 (Sq. mm)
BOTTOM REINF.	76.25 (Sq. mm)	76.25 (Sq. mm)	76.25 (Sq. mm)	76.25 (Sq. mm)	76.25 (Sq. mm)

SUMMARY OF PROVIDED REINF. AREA

SECTION	0.0 mm	407.5 mm	815.0 mm	1222.5 mm	1630.0 mm
TOP REINF.	2-12d 1 layer(s)	2-12d 1 layer(s)	2-12d 1 layer(s)	2-12d 1 layer(s)	2-12d 1 layer(s)
BOTTOM REINF.	3-10d 1 layer(s)	3-10d 1 layer(s)	3-10d 1 layer(s)	3-10d 1 layer(s)	3-10d 1 layer(s)
SHEAR REINF.	2 legged 8d @ 85 mm c/c	2 legged 8d @ 85 mm c/c	2 legged 8d @ 85 mm c/c	2 legged 8d @ 85 mm c/c	2 legged 8d @ 85 mm c/c

SHEAR DESIGN RESULTS AT DISTANCE d (EFFECTIVE DEPTH) FROM FACE OF THE SUPPORT

SHEAR DESIGN RESULTS AT 309.0 mm AWAY FROM START SUPPORT
VY = 3.11 MX = 2.89 LD= 4
Provide 2 Legged 8d @ 85 mm c/c

SHEAR DESIGN RESULTS AT 309.0 mm AWAY FROM END SUPPORT
VY = -14.19 MX = 2.89 LD= 4
Provide 2 Legged 8d @ 85 mm c/c

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STRUCTURAL DESIGN REPORT OF PROPOSED RESIDENTIAL BUILDING AT VILANKURICHI VILLAGE, COIMBATORE

IS 456 - 2000 B E A M D E S I G N R E S U L T S
IS-456 L I M I T S T A T E D E S I G N
B E A M N O. 22 D E S I G N R E S U L T S

M20 Fe500 (Main) Fe415 (Sec.)

LENGTH: 3660.0 mm SIZE: 230.0 mm X 300.0 mm COVER: 30.0 mm

SUMMARY OF REINF. AREA (Sq.mm)

SECTION	0.0 mm	915.0 mm	1830.0 mm	2745.0 mm	3660.0 mm
TOP REINF.	228.15 (Sq. mm)	103.62 (Sq. mm)	103.62 (Sq. mm)	0.00 (Sq. mm)	175.68 (Sq. mm)
BOTTOM REINF.	0.00 (Sq. mm)	103.62 (Sq. mm)	149.71 (Sq. mm)	103.62 (Sq. mm)	103.62 (Sq. mm)

SUMMARY OF PROVIDED REINF. AREA

SECTION	0.0 mm	915.0 mm	1830.0 mm	2745.0 mm	3660.0 mm
TOP REINF.	3-10d 1 layer(s)	3-10d 1 layer(s)	3-10d 1 layer(s)	2-10d 1 layer(s)	3-10d 1 layer(s)
BOTTOM REINF.	2-10d 1 layer(s)	3-10d 1 layer(s)	3-10d 1 layer(s)	3-10d 1 layer(s)	3-10d 1 layer(s)
SHEAR REINF.	2 legged 8d @ 105 mm c/c	2 legged 8d @ 105 mm c/c	2 legged 8d @ 105 mm c/c	2 legged 8d @ 105 mm c/c	2 legged 8d @ 105 mm c/c

SHEAR DESIGN RESULTS AT DISTANCE d (EFFECTIVE DEPTH) FROM FACE OF THE SUPPORT

SHEAR DESIGN RESULTS AT 380.0 mm AWAY FROM START SUPPORT
VY = 26.88 MX = -3.00 LD= 4
Provide 2 Legged 8d @ 105 mm c/c

SHEAR DESIGN RESULTS AT 380.0 mm AWAY FROM END SUPPORT
VY = -24.13 MX = -3.00 LD= 4
Provide 2 Legged 8d @ 105 mm c/c

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STRUCTURAL DESIGN REPORT OF PROPOSED RESIDENTIAL BUILDING AT VILANKURICHI VILLAGE, COIMBATORE

IS 456 - 2000 B E A M D E S I G N R E S U L T S
IS-456 L I M I T S T A T E D E S I G N
B E A M NO. 23 D E S I G N R E S U L T S

M20 Fe500 (Main) Fe415 (Sec.)

LENGTH: 2240.0 mm SIZE: 230.0 mm X 300.0 mm COVER: 30.0 mm

SUMMARY OF REINF. AREA (Sq.mm)

SECTION	0.0 mm	560.0 mm	1120.0 mm	1680.0 mm	2240.0 mm
TOP REINF.	103.62 (Sq. mm)	103.62 (Sq. mm)	103.62 (Sq. mm)	103.62 (Sq. mm)	103.62 (Sq. mm)
BOTTOM REINF.	103.62 (Sq. mm)	103.62 (Sq. mm)	103.62 (Sq. mm)	103.62 (Sq. mm)	103.62 (Sq. mm)

SUMMARY OF PROVIDED REINF. AREA

SECTION	0.0 mm	560.0 mm	1120.0 mm	1680.0 mm	2240.0 mm
TOP REINF.	3-10d 1 layer(s)	3-10d 1 layer(s)	3-10d 1 layer(s)	3-10d 1 layer(s)	3-10d 1 layer(s)
BOTTOM REINF.	3-10d 1 layer(s)	3-10d 1 layer(s)	3-10d 1 layer(s)	3-10d 1 layer(s)	3-10d 1 layer(s)
SHEAR REINF.	2 legged 8d @ 105 mm c/c	2 legged 8d @ 105 mm c/c	2 legged 8d @ 105 mm c/c	2 legged 8d @ 105 mm c/c	2 legged 8d @ 105 mm c/c

SHEAR DESIGN RESULTS AT DISTANCE d (EFFECTIVE DEPTH) FROM FACE OF THE SUPPORT

SHEAR DESIGN RESULTS AT 380.0 mm AWAY FROM START SUPPORT
VY = 5.35 MX = 0.82 LD= 4
Provide 2 Legged 8d @ 105 mm c/c

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STRUCTURAL DESIGN REPORT OF PROPOSED RESIDENTIAL BUILDING AT VILANKURICHI VILLAGE, COIMBATORE

IS 456 - 2000 BEAM DESIGN RESULTS
IS-456 LIMIT STATE DESIGN
BEAMNO. 24 DESIGN RESULTS

M20 Fe500 (Main) Fe415 (Sec.)

LENGTH: 3430.0 mm SIZE: 230.0 mm X 300.0 mm COVER: 30.0 mm

SUMMARY OF REINF. AREA (Sq.mm)

SECTION	0.0 mm	857.5 mm	1715.0 mm	2572.5 mm	3430.0 mm
TOP REINF.	103.62 (Sq. mm)	103.62 (Sq. mm)	103.62 (Sq. mm)	103.62 (Sq. mm)	103.62 (Sq. mm)
BOTTOM REINF.	103.62 (Sq. mm)	103.62 (Sq. mm)	103.62 (Sq. mm)	103.62 (Sq. mm)	103.62 (Sq. mm)

SUMMARY OF PROVIDED REINF. AREA

SECTION	0.0 mm	857.5 mm	1715.0 mm	2572.5 mm	3430.0 mm
TOP REINF.	3-10d 1 layer(s)	3-10d 1 layer(s)	3-10d 1 layer(s)	3-10d 1 layer(s)	3-10d 1 layer(s)
BOTTOM REINF.	3-10d 1 layer(s)	3-10d 1 layer(s)	3-10d 1 layer(s)	3-10d 1 layer(s)	3-10d 1 layer(s)
SHEAR REINF.	2 legged 8d @ 105 mm c/c	2 legged 8d @ 105 mm c/c	2 legged 8d @ 105 mm c/c	2 legged 8d @ 105 mm c/c	2 legged 8d @ 105 mm c/c

SHEAR DESIGN RESULTS AT DISTANCE d (EFFECTIVE DEPTH) FROM FACE OF THE SUPPORT

SHEAR DESIGN RESULTS AT 415.0 mm AWAY FROM START SUPPORT
VY = 4.07 MX = -0.65 LD= 4
Provide 2 Legged 8d @ 105 mm c/c

SHEAR DESIGN RESULTS AT 380.0 mm AWAY FROM END SUPPORT
VY = -2.38 MX = -0.65 LD= 4
Provide 2 Legged 8d @ 105 mm c/c

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STRUCTURAL DESIGN REPORT OF PROPOSED RESIDENTIAL BUILDING AT VILANKURICHI VILLAGE, COIMBATORE

IS 456 - 2000 B E A M D E S I G N R E S U L T S
IS-456 L I M I T S T A T E D E S I G N
B E A M N O. 25 D E S I G N R E S U L T S

M20 Fe500 (Main) Fe415 (Sec.)

LENGTH: 5290.0 mm SIZE: 230.0 mm X 380.0 mm COVER: 30.0 mm

SUMMARY OF REINF. AREA (Sq.mm)

SECTION	0.0 mm	1322.5 mm	2645.0 mm	3967.5 mm	5290.0 mm
TOP REINF.	134.90 (Sq. mm)	134.90 (Sq. mm)	134.90 (Sq. mm)	134.90 (Sq. mm)	134.90 (Sq. mm)
BOTTOM REINF.	0.00 (Sq. mm)	134.90 (Sq. mm)	134.90 (Sq. mm)	134.90 (Sq. mm)	0.00 (Sq. mm)

SUMMARY OF PROVIDED REINF. AREA

SECTION	0.0 mm	1322.5 mm	2645.0 mm	3967.5 mm	5290.0 mm
TOP REINF.	3-10d 1 layer(s)	3-10d 1 layer(s)	3-10d 1 layer(s)	3-10d 1 layer(s)	3-10d 1 layer(s)
BOTTOM REINF.	2-10d 1 layer(s)	3-10d 1 layer(s)	3-10d 1 layer(s)	3-10d 1 layer(s)	2-10d 1 layer(s)
SHEAR REINF.	2 legged 8d @ 125 mm c/c	2 legged 8d @ 125 mm c/c	2 legged 8d @ 125 mm c/c	2 legged 8d @ 125 mm c/c	2 legged 8d @ 125 mm c/c

SHEAR DESIGN RESULTS AT DISTANCE d (EFFECTIVE DEPTH) FROM FACE OF THE SUPPORT

SHEAR DESIGN RESULTS AT 460.0 mm AWAY FROM START SUPPORT
VY = 6.58 MX = 0.90 LD= 4
Provide 2 Legged 8d @ 125 mm c/c

SHEAR DESIGN RESULTS AT 460.0 mm AWAY FROM END SUPPORT
VY = -6.95 MX = 0.90 LD= 4
Provide 2 Legged 8d @ 125 mm c/c

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SLAB

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DESIGN OF TWOWAY SLAB

STEP 1: GIVEN DATA

Room size = 4.76m X 5.29m

Long span ly = 5.29m (5290mm)

Short span lx = 4.76m (4760mm)

IT IS TWO WAY SLAB

Live load (including water pressure)		- 2KN/m^2
Floor finish load		- 2KN/m^2
Grade of Concrete	fck	- 20N/mm^2
Grade of Steel	fy	- 500N/mm^2
Unit Weight of concrete	γ_c	- 25KN/m^3
Diameter of Main Reinforcement	d1	- 10mm
Diameter of distribution Reinforcement	d2	- 10mm

DEPTH OF SLAB

From IS 456:2000 pg.no 39

For Continuous slab

Span/ effective depth ratio	- 40	
eff depth (Span/40)	- 119.00mm	
Calculated eff depth	- 119.00mm	- 0.119 m
Over all Depth D	- 144.00mm	- 0.144 m
Provided Eff depth	**- 130.00**	**- 0.130 m**
Provided Over all Depth D	**- 150.00mm**	**- 0.150 m**

STEP 2: EFFECTIVE SPAN CALCULATIONS

From IS 456:2000

Effective span 1 = clear span+ eff depth

Effective span 2 = clear span+ (Bearing/2)

whichever is lesser from above

Effective span 1 = clear span+ eff depth = 4.89m

Effective span 2 = clear span+ (Bearing/2) = 4.99m

Adopt an Effective span l eff = 4.89m

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STEP 3: LOAD CALCULATIONS

DEAD LOAD CALCULATIONS

Self-weight of slab	= 3.75Kn/m
Floor finish load	= 2Kn/m
Live load	= 2Kn/m
Total load	= 7.75Kn/m
Factored load (1.5 x total load)	-= 11.63Kn/m

STEP 4: ULTIMATE DESIGN MOMENT AND SHEAR FORCES

Refer table 26 of IS: 456 code) page 91

Ly/Lx		1.11
αx	0.053	
αy	0.04	
Mux	$\alpha x*wu*L^2$	14. 73KN.m
Muy	$\alpha y*wu*L^2$	11. 12KN.m
Vux	$0.5*wu*L^2$	28. 42KN.m

STEP 5: CHECK FOR DEPTH

From IS 456:2000 Pg No 96 clause G.1.1 c

Mu lim=0.138* (fck b d^2)

Required depth = 101.48 mm

Provided depth = 130.00 mm

130.00 > 101.48

Provided depth sufficient

STEP 6: MAIN REINFORCEMENT CALCULATIONS

From IS 456:2000 Pg No 96 clause G.1.1 b

Mu = 0.87* fy*Ast*d((1-(Ast*fy)/(b*d*fck))

	Ast1	= 4924.92061 mm^2
	Ast2	= 275.079388 mm^2
Area of main reinforcement	Ast	= 275.079388 mm^2
spacing	s	= 285.372163 mm
Adopt Spacing y dir	s	= 125 mm

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CHECK WITH MINIMUM REINFORCEMENT

From IS 456:2000 Pg No 48 clause 26.5.2.1

Minimum reinforcement ((0.12 % * cross sectional area of slab)) = 180.00

Area of main reinforcement	Ast	= 180.00 275.079388 mm^2
Spacing	s	= 285.372163 mm
Adopt Spacing x dir	s	= 112.1305 mm
Ast Provided	s	= 700.077142 mm

STEP 9: CHECK FOR SHEAR STRESS

(i) NOMINAL SHEAR STRESS

$\tau_v = ((V/b*d))$ τ_v = 0.21863942 N/mm^2

(ii) PERMISSIBLE SHEAR STRESS

From IS 456:2000 Pg No 84 table 23

100 Ast/(b*d) = 0.53852088

For τ_c = 0.31 N/mm^2

IT IS SAFE AGAINST SHEAR

RESULT

REINFORCEMENT x dir - 10 mm @ 130 mm C/c

REINFORCEMENT y dir - 10 mm @ 130 mm C/c

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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
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Services we run for you
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The LandLens suite
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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.