

Dr. ALEX JACOB

B.E., M.Tech (Str), Ph.D (Hon), Dip. Bdg.Sc (Aust), M.I.E (Aust), M.I.E (Ind)
CONSULTING ENGINEER

Old No.41/A, New No.70, Beach Road, Kalakshetra Colony,
Besant Nagar, Chennai - 600 090.

044 - 24910945

+91-98401 59550

alexjacobuc@gmail.com

www.unitedconsultants.in

18.09.2025

STABILITY CERTIFICATE

The detailed engineering and structure design of the Commercial Building "SUMMIT-1" comprising of Basement, Ground +10 floors to be constructed at T.S. Nos.1 Block No.5 Ward No 30, Ward AD at Uppilipalayam Village and T.S.Nos:18&22, Block No.9 Ward AC, at Sowripalayam Village, Trichy Main Road, Coimbatore South Taluk, Coimbatore District, has been done by us based on the report of geotechnical Investigation (soil test) done by Geo design India Pvt. Ltd., Report No. Ref: GEO-G-239-2023-24 Dated: 13.02.2024- 17.02.2024 and considering the functional requirement of the building;

2. It is certified that among other factors, the proposed building has been designed to resist earthquake. I have checked various parameters and found that the proposed building would be safe.

3. I further certify that:

- i. The minimum grade of concrete is **M25**
 - ii. The design and analysis have been done using the code of practice for plain and reinforced concrete as per IS 456, design loads as per IS Codes No **IS-875** and **IS - 1893** and design of earthquake resistant structure as per IS Code No **IS:1893**
4. The building will be **safe and sound** when used for the purpose for which it is designed.

For SREE SHARADHAAMBAL FOUNDATIONS

[Signature]

Partner

For SREE SHARADHAAMBAL FOUNDATIONS

[Signature]

Partner

(Dr.ALEX JACOB)

Dr. ALEX JACOB

B.E., M.Tech(Str), Ph.D(Hon),

M.I.E. (Aust), M.I.E. (Ind)

STRUCTURAL ENGINEER

70, BEACH ROAD, KALAKSHETRA COLONY,

Chennai - 600 090.

REG No. SE/GR-1/24/02/001

REG No. RSE100392025

Client: M/s. Sree Shardha Ambal Foundation (POA), Premier Hi-Tech Industries & Two Others (Owners)

Project: THE PROPOSED CONSTRUCTION OF HIGH RISE COMMERCIAL BUILDING CONSISTING OF BASEMENT FLOOR + GROUND FLOOR + 10 FLOORS AT T.S.No; 1, BLOCK No: 5, WARD No: AD-UPPILIPALAYAM VILLAGE, T.S.No: 22 & 18, BLOCK No: 9, WARD No: AC-SOWRIPALAYAM VILLAGE, TRIVHY MAIN ROAD, COIMBATORE CORPORATION, COIMBATORE DISTRICT

**Structural Consultant: M/s. UNITED CONSULTANTS
41/A, Beach road, Sea point apartments
Kalashetra colony, Besant nagar, Chennai-90**

Title: COMMERCIAL BUILDING

For SREE SHARADHA AMBAL FOUNDATIONS

[Signature]

Partner

For SREE SHARADHA AMBAL FOUNDATIONS

[Signature]

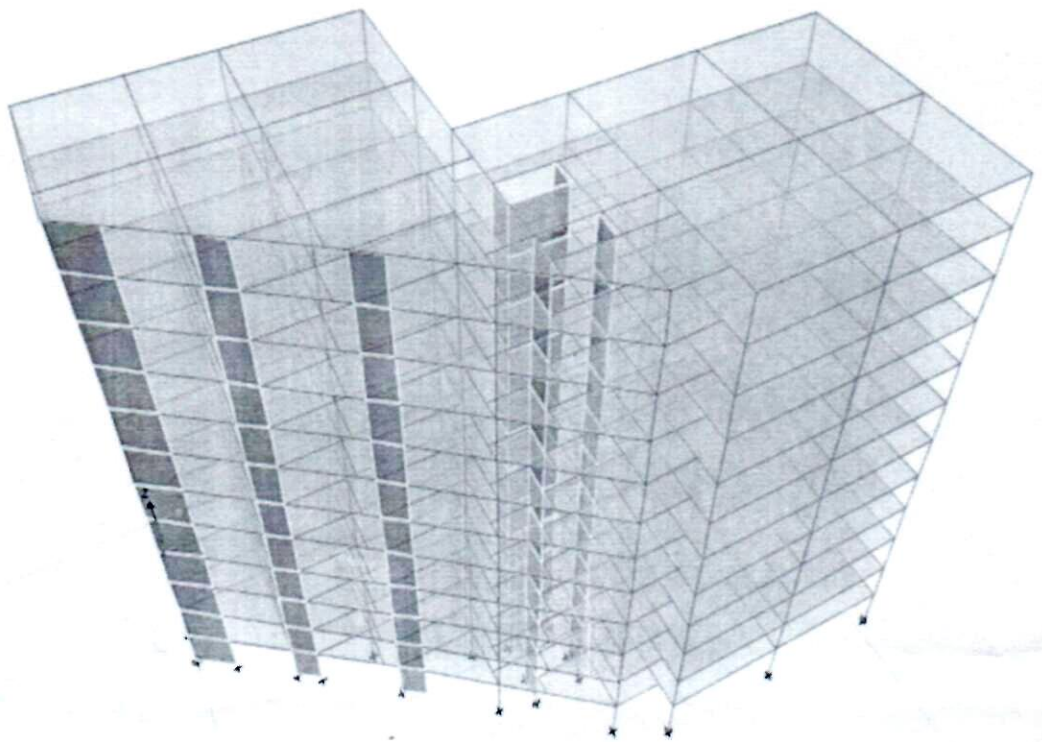
Partner

[Signature]

Dr. ALEX JACOB
B.E., M.Tech(Str), Ph.D(Hon),
M.I.E. (Aust), M.I.E. (Ind)
STRUCTURAL ENGINEER
70, BEACH ROAD, KALAKSHETRA COLONY,
Chennai - 600 090.
REG No. SE/GR-1/24/02/001
REG No. RSE100392025

BUILDING DESCRIPTION

- The Proposed Construction of commercial building Extended Single Basement + Ground Floor + 10 Floors.
- Height of Building above ground level is 34.93m. (From Ground floor to Terrace floor)
- Basement floor used for Parking and the remaining upper floors used for Commercial purpose.
- The structure comprises of RC Shear wall, column, Beam & Slab.
- Raft foundation provided as per soil test report.



For SREE SHARADHAAMBAL FOUNDATIONS

S. V. Anand

Partner

3D VIEW

Dr. Alex Jacob
Dr. ALEX JACOB
B.E., M.Tech(Str), Ph.D(Hon),
M.I.E. (Aust), M.I.E. (Ind)
STRUCTURAL ENGINEER
70, BEACH ROAD, KALAKSHETRA COLONY,
Chennai - 600 090.
REG No. SE/GR-1/24/02/001
REG No. RSE100392025

For SREE SHARADHAAMBAL FOUNDATIONS

11/17

Partner

GRADE OF CONCRETE & STEEL

- | | | |
|--|---|-----|
| • Raft foundation | : | M35 |
| • Columns | : | M40 |
| • RC Wall | : | M25 |
| • Beams | : | M25 |
| • Slabs | : | M25 |
| • Staircase | : | M25 |
| • Reinforcement of Grade Fe-500 is used for RCC design | | |

LOADS

- | |
|--|
| • Following Codes are used for designing members. |
| • IS 875 : 1987 (Part 1) Dead loads |
| • IS 875 : 1987 (Part 2) Live loads |
| • IS 875 : 2015 (Part 3) Wind loads |
| • IS 1893 : 2016 (Part 1) Earthquake loads |
| • IS 13920 : 2016 Ductile Design and Detailing of Reinforced concrete Structures |

For SREE SHARADHAAMBAL FOUNDATIONS

SV. Anand

Partner

For SREE SHARADHAAMBAL FOUNDATIONS

SV. Anand

Partner

Dr. Alex Jacob
Dr. ALEX JACOB
B.E., M.Tech(Str), Ph.D(Hon),
M.I.E. (Aust), M.I.E. (Ind)
STRUCTURAL ENGINEER
70, BEACH ROAD, KALAKSHETRA COLONY,
Chennai - 600 090.
REG No. SE/GR-I/24/02/001
REG No. RSE100392025

SUPER STRUCTURE DATA

Number of floors - Single Basement + Ground + 10 upper floors Height of each

Floors - 3.11 m

Total height of Building - 34.93 m, excluding Headroom & LMR

WALL PROPERTIES

- Lift RC wall thickness - 0.2m
- Modelling Type - Shell Thin

SLAB PROPERTIES

- Basement floors RC slab thickness - 0.45/0.2/0.15/0.12m
- Typical Floor RC slab thickness - 0.45/0.2/0.15/0.12m
- Modelling Type - Shell Thin

DEAD & LIVE LOADS

DEAD LOADS

- This comprises of self-weight of various structural elements indicated below:
- Self-weight of RC wall, column, Beam, slab and staircase.
- Floor and Roof finishes.
- Self-weight of the modelled elements is calculated by ETABS through SELF WEIGHT command.

LIVE LOADS

These loads are considered for the analysis in addition to dead loads as follows,

- | | |
|-----------------------------|--|
| • Bath/Shower & Toilet | = 2.0 kN/m ² |
| • commercial floor area | = 5.0 kN/m ² |
| • Activity room | = 5.0 kN/m ² |
| • Cafeteria | = 5.0 kN/m ² |
| • Lobby, Balcony, Staircase | = 4.0 kN/m ² |
| • AHU & Electrical Rooms | = 5.0kN/m ² or as per actuals |

For SREE SHARADHAAMBAL FOUNDATIONS

SV. Anandulu

Partner

For SREE SHARADHAAMBAL FOUNDATIONS

Partner

Dr
Dr. ALEX JACOB
B.E., M.Tech(Str), Ph.D(Hon),
M.I.E. (Aust), M.I.E. (Ind)
STRUCTURAL ENGINEER
70, BEACH ROAD, KALAKSHETRA COLONY,
Chennai - 600 090.
REG No. SE/GR-I/24/02/001
REG No. RSE100392025

- Ramp, Parking = 5.0 kN/m²
- Lift Machine rooms = 10.0 kN/m² or as per actuals
- Live Load on Roof = 2 kN/m²

SEISMIC INPUT

- Height of the Building, H = 34.9 m
- Seismic Zone = III
- Seismic Zone Factor, Z = 0.16
- Importance Factor, I = 1.2
- Response Reduction Factor, R = 3
- Percentage Damping = 5%
- Soil Type = III
- Avg. response acc. coeff. Sa/g = As per IS: 1893: 2016

Indian IS 1893:2016 Seismic Loading

Direction and Eccentricity ☒ X Dir ☐ Y Dir ☒ X Dir + Eccentricity ☐ Y Dir + Eccentricity ☒ X Dir - Eccentricity ☐ Y Dir - Eccentricity Ecc. Ratio (All Diaph.) 0.05 Overwrite Eccentricities Overwrite...		Seismic Coefficients Seismic Zone Factor, Z ☒ Per Code 0.16 ☐ User Defined Site Type III Importance Factor, I 1.2	
Story Range Top Story Story 12 Bottom Story Base		Time Period ☐ Approximate ☐ Program Calculated ☒ User Defined 1.157 sec	
Factors Response Reduction, R 3		OK Cancel	

For SREE SHARADHAAMBAL FOUNDATIONS

SV. Anand...

Partner

For SREE SHARADHAAMBAL FOUNDATIONS

SV. Anand...

Partner

JA
Dr. ALEX JACOB
 B.E., M.Tech(Str), Ph.D(Hon),
 M.I.E. (Aust), M.I.E. (Ind)
 STRUCTURAL ENGINEER
 70, BEACH ROAD, KALAKSHETRA COLONY,
 Chennai - 600 090.
 REG No. SE/GR-I/24/02/001
 REG No. RSE100392025

WIND LOAD INPUT

The building located in Coimbatore region and the wind parameters are considered as per IS 875 part: 3

- Wind Speed = 39 m/s
- Terrain Category = 2
- Importance factor = 1
- Risk Coefficient, K1 = 1
- Topography, K3 = 1
- Importance factor for Cyclonic Region, k4 = 1

E Wind Load Pattern - Indian IS 875:2015

Exposure and Pressure Coefficients

☒ Exposure from Extents of Diaphragms
☐ Exposure from Shell Objects

Wind Exposure Parameters

Wind Directions and Exposure Widths

Windward Coefficient, Cp

Leeward Coefficient, Cp

Wind Coefficients

Wind Speed, Vb (m/s)

Terrain Category

Importance Factor

Risk Coefficient (k1 Factor)

Topography (k3 Factor)

Exposure Height

Top Story

Bottom Story

☐ Include Parapet
Parapet Height

For SREE SHARADHA AMBAL FOUNDATIONS

V. Arun Kumar

Partner

For SREE SHARADHA AMBAL FOUNDATIONS

~ ~ ~

Partner

Dr. Alex Jacob

Dr. ALEX JACOB
B.E., M.Tech(Str), Ph.D(Hon),
M.I.E. (Aust), M.I.E. (Ind)
STRUCTURAL ENGINEER
70, BEACH ROAD, KALAKSHETRA COLONY,
Chennai - 600 090.
REG No. SE/GR-I/24/02/001
REG No. RSE100392025

MASS SOURCE

Mass Source Name

MS1

Mass Source

☐ Element Self Mass

☐ Additional Mass

☒ Specified Load Patterns

☐ Adjust Diaphragm Lateral Mass to Move Mass Centroid by:

This Ratio of Diaphragm Width in X Direction

This Ratio of Diaphragm Width in Y Direction

Mass Multipliers for Load Patterns

Load Pattern	Multiplier
Live	0.5
Dead	1

Add

Modify

Delete

Mass Options

☒ Include Lateral Mass

☐ Include Vertical Mass

☒ Lump Lateral Mass at Story Levels

OK

Cancel

DYNAMIC ANALYSIS

- Height of the Building, H = 34.9 m
- Seismic Zone = III
- Seismic Zone Factor, Z = 0.16
- Importance Factor, I = 1.2
- Response Reduction Factor, R = 3
- Percentage Damping = 5%
- Soil Type = III

Response Spectrum Function Definition - IS 1893:2016

Function Name

RS 1

Function Damping Ratio

0.05

Parameters

Seismic Zone

III

Seismic Zone Factor, Z

0.16

Importance Factor, I

1.2

Soil Type

III

Response Reduction Factor, R

3

Defined Function

Period	Acceleration
0	0.032
0.1	0.08
0.67	0.08
0.8	0.0668
1	0.0534
1.2	0.0445
1.4	0.0382
1.6	0.0334
1.8	0.0297

Convert to User Defined

Function Graph

Plot Options

☒ Linear X - Linear Y

☐ Linear X - Log Y

☐ Log X - Linear Y

☐ Log X - Log Y

OK

Cancel

For SREE SHARADHA AMBAL FOUNDATIONS

Dr. Alex Jacob

Partner

For SREE SHARADHA AMBAL FOUNDATIONS

Dr. Alex Jacob

Partner

Dr. Alex Jacob

Dr. ALEX JACOB
B.E., M.Tech(Str), Ph.D(Hon),
M.I.E. (Aust), M.I.E. (Ind)
STRUCTURAL ENGINEER
70, BEACH ROAD, KALAKSHETRA COLONY,
Chennai - 600 090.
REG No. SE/GR-1/24/02/001
REG No. RSE100392025

LOAD COMBINATIONS

Load combinations as per IS 1893:2016

1.5(DL+LL)	0.9DL+1.5WLX
1.2(DL+LL+EQX)	0.9DL-1.5WLX
1.2(DL+LL-EQX)	0.9DL+1.5WLY
1.2(DL+LL+EQY)	0.9DL-1.5WLY
1.2(DL+LL-EQY)	0.9DL+1.5RSX
1.2(DL+LL+WLX)	0.9DL-1.5RSX
1.2(DL+LL-WLX)	0.9DL+1.5RSY
1.2(DL+LL+WLY)	0.9DL-1.5RSY
1.2(DL+LL-WLY)	1.5(DL+EQX)
1.2(DL+LL+RSX)	1.5(DL-EQX)
1.2(DL+LL-RSX)	1.5(DL+EQY)
1.2(DL+LL+RSY)	1.5(DL-EQY)
1.2(DL+LL-RSY)	1.5(DL+WLX)
0.9DL+1.5EQX	1.5(DL-WLX)
0.9DL-1.5EQX	1.5(DL+WLY)
0.9DL+1.5EQY	1.5(DL-WLY)
0.9DL-1.5EQY	1.5(DL+RSX)
	1.5(DL-RSX)
	1.5(DL+RSY)
	1.5(DL-RSY)

MAXIMUM DISPLACEMENT

ALLOWABLE MAXIMUM DISPLACEMENT = 139.6 mm for wind & 69.8mm for seismic

- EQ-X = 34 mm
- EQ-Y = 29.5 mm
- RS-X = 40.7 mm
- RS-Y = 34.4 mm

For SREE SHARADHAAMBAL FOUNDATIONS

[Signature]

Partner

For SREE SHARADHAAMBAL FOUNDATIONS

[Signature]

Partner

ON

Dr. ALEX JACOB
B.E., M.Tech(Str), Ph.D(Hon),
M.I.E. (Aust), M.I.E. (Ind)
STRUCTURAL ENGINEER
70, BEACH ROAD, KALAKSHETRA COLONY,
Chennai - 600 090.
REG No. SE/GR-I/24/02/001
REG No. RSE100392025

MAXIMUM STOREY DRIFT

ALLOWABLE STOREY DRIFT = 0.004*H

- EQ-X = 0.0012
- EQ-Y = 0.0011
- RS-X = 0.0014
- RS-Y = 0.0010

STOREY SHEAR

- EQ-X = 4824 kN
- EQ-Y = 4801 Kn
- RS-X = 6275 kN
- RS-Y = 5999 kN

MODEL MASS PARTICIPATING RATIOS

Modal Participating Mass Ratios

File Edit Format-Filter-Sort Select Options

Units: As Noted Hidden Columns: No Sort: None

Filter: None

Modal Participating Mass Ratios

Case	Mode	Period sec	UX	UY	UZ	SumUX	SumUY	SumUZ	RX	RY	RZ	SumRX	SumRY	SumRZ
Modal	1	1.688	0.5154	0.1983	0	0.5154	0.1983	0	0.0753	0.184	0.0264	0.0753	0.184	0.0264
Modal	2	1.513	0.0307	0.2505	0	0.5482	0.4488	0	0.1029	0.0091	0.4476	0.1781	0.193	0.4741
Modal	3	1.026	0.1847	0.2657	0	0.7309	0.7145	0	0.1152	0.0833	0.2538	0.2933	0.2764	0.7279
Modal	4	0.481	0.091	0.0218	0	0.8219	0.7364	0	0.0665	0.2971	0.0102	0.3598	0.5734	0.7381
Modal	5	0.416	0.0002	0.062	0	0.8221	0.7984	0	0.1603	0.0013	0.0733	0.5201	0.5748	0.8115
Modal	6	0.269	0.044	0.0657	0	0.8661	0.8641	0	0.144	0.0956	0.0586	0.6642	0.6704	0.8701
Modal	7	0.234	0.0401	0.0068	0	0.9062	0.8709	0	0.013	0.075	0.006	0.6771	0.7454	0.8761
Modal	8	0.201	3.025E-05	0.0262	0	0.9063	0.8971	0	0.0505	4.693E-05	0.0282	0.7277	0.7454	0.9043
Modal	9	0.176	1.427E-05	8.497E-07	0	0.9063	0.8971	0	2.761E-06	1.465E-05	0.0001	0.7277	0.7455	0.9044
Modal	10	0.157	0.0003	0.0001	0	0.9066	0.8971	0	0.0001	0.0007	0.0014	0.7278	0.7481	0.9057
Modal	11	0.141	0.0196	0.0051	0	0.9261	-0.9022	0	0.0134	0.0561	0.0045	0.7412	0.8022	0.9102
Modal	12	0.135	0.0153	0.0195	0	0.9414	0.9217	0	0.0401	0.0331	0.0138	0.7812	0.8353	0.924

For SREE SHARADHAAMBAL FOUNDATIONS

[Signature]

Partner

For SREE SHARADHAAMBAL FOUNDATIONS

[Signature]

Partner

[Signature]
Dr. ALEX JACOB
B.E., M.Tech(Str), Ph.D(Hon),
M.I.E. (Aust), M.I.E. (Ind)
STRUCTURAL ENGINEER
70, BEACH ROAD, KALAKSHETRA COLONY,
Chennai - 600 090.
REG No. SE/GR-I/24/02/001
REG No. RSE100392025

Design of column with Biaxial Moment

SHORT COLUMN

The values are Displayed in Blue color are the Input value

Column No = C1, STAAD - 17
Design Forces From STAAD

Load Case = 100

1. Axial Load on column = 25300 KN
2. Bending moment along x-x, Mux = 861 KN.m Load Case = 1
3. Bending moment along y-y, Muy = 600 KN.m Load Case = 1

Design Datas

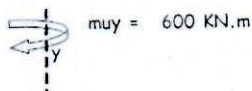
1. Compressive strength of Concrete, Fck = 40 N/mm²
2. Yield Strength of steel, Fy = 500 N/mm²
3. Diameter of Longitudinal Reinforcement, = 32 mm
4. Diameter of lateral Reinforcement, = 8 mm
5. Clear cover to the reinforcement, C = 40 mm
6. Type of column = Rectangular
7. Size of Column = b x d
= 900 x 900 mm
8. Unsupported Length of Column along x-x, Lx = 3.2 m
9. Unsupported Length of Column along y-y, Ly = 3.2 m
10. Effective length factor, = 0.65
11. Effective Length of Column, along x-x, Lx = 2.08 m
12. Effective Length of Column, along y-y, Ly = 2.08 m

Check for leff/D

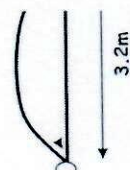
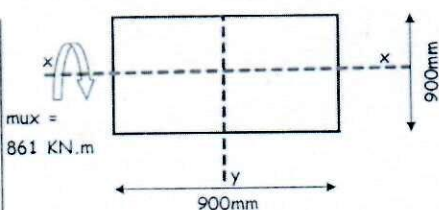
- Effective length, leff/Lateral dimensions = L_{ux} / D
= 2.31
= 2.31 x 12
= Short Column

- Effective length, leff/Lateral dimensions = L_{ux} / b
= 2.31
= 2.31 x 12
= Short Column

Section Geometry



Pu = 25300 KN



4 Check for Minimum Eccentricity

Applied eccentricities

$$e_x = M_{ux}/P_u = 861/25300 = 34.032 \text{ mm}$$

$$e_y = M_{uy}/P_u = 600/25300 = 23.715 \text{ mm}$$

Minimum eccentricity

$$e_{xx} = (l_{ex}/500) + (D/30) = (2080/500) + (900/30) = 34.16 \text{ mm or } 20 \text{ mm}$$

$$e_{yy} = (l_{ey}/500) + (D/30) = (2080/500) + (900/30) = 34.16 \text{ mm or } 20 \text{ mm}$$

5 Moment due to Eccentricity

$$m_{ux} = P_u \times e_{xx} = (25300 \times 34.16)/1000 = 864.25 \text{ KN.m}$$

$$m_{uy} = P_u \times e_{yy} = (25300 \times 34.16)/1000 = 864.25 \text{ KN.m}$$

6 Design Moment

$$m_{ux} = M_{ux} \text{ or } m_{ux} = 864.25 \text{ KN.m}$$

$$m_{uy} = M_{uy} \text{ or } m_{uy} = 864.25 \text{ KN.m}$$

For SREE SHARADHAAMBAL FOUNDATIONS

Dr. Alex Jacob

Partner

For SREE SHARADHAAMBAL FOUNDATIONS

Dr. Alex Jacob

Partner

Dr. Alex Jacob
B.E., M.Tech(Str), Ph.D(Hon),
M.I.E. (Aust), M.I.E. (Ind)
STRUCTURAL ENGINEER
70, BEACH ROAD, KALAKSHETRA COLONY,
Chennai - 600 090.
REG No. SE/GR-I/24/02/001
REG No. RSE100392025

7 Calculation of Longitudinal reinforcement

$$\begin{aligned} \text{Assume percentage of reinforcement} &= 4.7 \% \\ \text{Asc, required} &= 4.7/100 \times 900 \times 900 \\ &= 38070 \text{ mm}^2 \\ \text{No of bars} &= 48 \text{ Nos} \\ \text{Asc, Provided} &= 38584 \text{ mm}^2 \\ \text{pt, provided} &= 4.763 \% \end{aligned}$$

Moment Capacity Along x Direction

$$\begin{aligned} (P_u/fck b D) &= (25300000/40 \times 900 \times 900) \\ &= 0.78 \end{aligned}$$

$$\begin{aligned} p/fck &= 4.763/40 \\ &= 0.12 \end{aligned}$$

$$\begin{aligned} d'/D &= 40/900 \\ &= 0.04 \end{aligned}$$

From interaction chart, SP16 [chart 48]

$$\begin{aligned} M_{ux1}/fck b D^2 &= 0.1 \\ M_{ux1} &= 0.1 \times 900 \times 900 \times 900 \times 40 \\ &= 2916 \text{ KN.m} \end{aligned}$$

Moment Capacity Along y Direction

$$\begin{aligned} (P_u/fck b D) &= (25300000/40 \times 900 \times 900) \\ &= 0.78 \end{aligned}$$

$$\begin{aligned} p/fck &= 4.763/40 \\ &= 0.1191 \end{aligned}$$

$$\begin{aligned} b'/D &= 40/900 \\ &= 0.04 \end{aligned}$$

From interaction chart, SP16 [chart 50]

$$\begin{aligned} M_{uy1}/fck b D^2 &= 0.09 \\ M_{uy1} &= 0.09 \times 900 \times 900 \times 900 \times 40 \\ &= 2624.4 \text{ KN.m} \end{aligned}$$

8 Check for Moment Capacity

$$(M_{ux}/M_{ux1})^m + (M_{uy}/M_{uy1})^n < 1$$

$$P_{uz} = (0.45 fck A_c) + (0.75 f_y - 0.45 fck) A_{sc}$$

For SREE SHARADHAAMBAL FOUNDATIONS

[Signature]

Partner

For SREE SHARADHAAMBAL FOUNDATIONS

[Signature]

Partner

[Signature]
Dr. ALEX JACOB
 B.E., M.Tech(Str), Ph.D(Hon),
 M.I.E. (Aust), M.I.E. (Ind)
 STRUCTURAL ENGINEER
 70, BEACH ROAD, KALAKSHETRA COLONY,
 Chennai - 600 090.
 REG No. SE/GR-I/24/02/001
 REG No. RSE100392025

Ac = 810000 mm²
Puz = 28354.488 KN
Pu/Puz = 0.892
an = 2

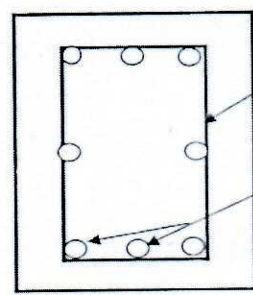
For
an vi

$(Mux/Mux1)^{an} + (Muy/Muy1)^{an} = 0.196$
 $0.196 < 1$
O.K

9 Calculation of Lateral Reinforcement

Spacing of ties
1. Least Lateral Dimensions of column = 900 mm
2. Sixteen times the least dia of Longi bar = 512 mm
3. 300mm = 300 mm
Adopt Spacing = 300 mm

10 Details



Y8@300mm c/c

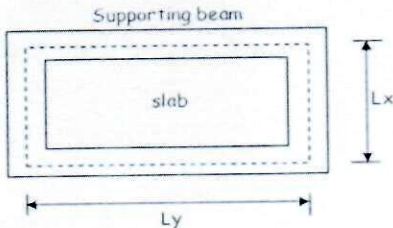
No of bars = 32mm 48 Nos

For SREE SHARADHA AMBAL FOUNDATIONS
[Signature]
Partner

[Signature]
Dr. ALEX JACOB
B.E., M.Tech(Str), Ph.D(Hon),
M.I.E. (Aust), M.I.E. (Ind)
STRUCTURAL ENGINEER
70, BEACH ROAD, KALAKSHETRA COLONY,
Chennai - 600 090.
REG No. SE/GR-1/24/02/001
REG No. RSE100392025

For SREE SHARADHA AMBAL FOUNDATIONS
[Signature]
Partner

SLAB DETAILS

Design of Two way Slab	The values are Displayed in Blue color are the Input values	References
1 Design Datas	 1. Eff. Shorter span between c/c support, L_x = 6.9 m 2. Eff. Longer span between c/c support, L_y = 7.1 m 3. Compressive strength of Concrete, F_{ck} = 25 N/mm² 4. Yield Strength of steel, F_y = 500 N/mm² 5. Diameter of Reinforcement, (Shorter span) = 12 mm 6. Diameter of Reinforcement, (Longer span) = 12 mm 7. Fire resistance in hours = 1.5 hrs 8. Nominal cover to the reinforcement, C = 20 mm	(Eff. Span, As per IS456:2000, clause 22.2 (b))
2 Assume trial depth of slab	Span/depth, ratio l/d (Basic value) = 26 Assume modification factor, M.F. = 1.5 depth of slab = (Span/B.V x M.F.) = (6.9 x 1000) / (26 x 1.5) = 176.92 mm Overall depth required, D = (d + cc + 1/2 dia of bars) = 176.92 + 20 + 12 / 2 = 202.92 mm = 230 mm Eff. Depth, d = 204 mm	(Nominal cover, As per IS456:2000, Table 16A, clauses 21.4 and 26.4.3 and Fig 1)
3 Load Calculations	Unit weight of Concrete = 25 KN/m³ Dead load of Slab = 5.75 KN/m² Floor finishes = 1.5 KN/m² Partitions = 0 KN/m² Extra loads due to filling, surki, etc., if any = 0 KN/m² Live Load = 5 KN/m² Total Load = 12.25 KN/m² Design Load = 18.375 KN/m²	
4 Calculation of Bending Moment	Edge condition of Slab = 9.9 Four Edges discontinuous L_y/L_x, ratio = 7.1 / 6.9 = 1.029 = The slab is Two way Slab	Edge conditions, As per IS456:2000, D-1.1 and 24.4.1

For SREE SHARADHAAMBAL FOUNDATIONS

[Signature]

Partner

For SREE SHARADHAAMBAL FOUNDATIONS

[Signature]

Partner

[Signature]

Dr. ALEX JACOB

B.E., M.Tech(Str), Ph.D(Hon),

M.I.E. (Aust), M.I.E. (Ind)

STRUCTURAL ENGINEER

70, BEACH ROAD, KALAKSHETRA COLONY,

Chennai - 600 090.

REG No. SE/GR-I/24/02/001

REG No. RSE100392025

Design of Two way Slab		The values are Displayed in Blue color are the Input values		References			
1 Design Datas							
S.No	Direction & Sign	Moment Co-efficients	Moment KN.m				
1	X - Negative	0	0	(alpha x * wu * lx ²)			
2	X - Positive	0.058	50.74	(alpha x * wu * lx ²)			
3	Y - Negative	0	0	(alpha y * wu * ly ²)			
4	Y - Positive	0.056	48.99	(alpha y * wu * ly ²)			
M _{max} = 50.74 KN/m							
5 Effective depth required							
$\mu_{u,lim} = (0.36 \times F_{ck} \times (x_{u,max}/d) \times (1 - 0.42(x_{u,max}/d)) \times b d^2$ $x_{u,max}/d = 0.46$ $\mu_{u,lim} = 3.34 b d^2$ $d_{reqd} = (\mu_{u,lim}/Q_b)^{1/2}$ $= (50740000 / (3.34 \times 1000))^{1/2}$ $= 123.25 \text{ mm}$ $123.25 < 204$ $O.K$							
6 Reinforcement Calculations							
S. N	Dn & Sign	Mu/bd ²	pt from SP16	pt, min	pt, provided	Ast, mm ²	
1	x -ve	0	0	0.12	0.12	244.8	$pt = 100Ast/bd$ $Ast = (pt/100) \times b d$ (Minimum reinforcement of slab shall be provide as per IS456:2000, clause 26.5.2.1)
2	x -ve	1.22	0.298	0.12	0.298	607.92	
3	y -ve	0	0	0.12	0.12	244.8	
4	y +ve	1.18	0.287	0.12	0.287	585.48	
7 Spacing of reinforcement							
Spacing, mm		Spacing provided, mm		Ast provided, mm ²			
Actual	Maximum						
461.76	300	150		753.6			
185.95	300	150		753.6			
461.76	300	150		753.6			
193.07	300	150		753.6			
$Spacing = (ast \times 1000)/Ast$ where, ast = C/s area of bar Ast = Area of reinforcement provided							
max distance of tension reinforcement bars 3d or 300mm which ever is less As per IS:456:2000, Clause 26.3.3.b							
8 Check for deflection							
close close $l_x/d, \text{ Actual} = 33.82$ $l/d, \text{ Max} = 8.5 \times M.F$ $pt, = 100Ast/bd$ $= 0.3694$ $fs = 0.58 \times f_{yx} (Ast \text{ required}/Ast \text{ provided})$ $fs = 233.94 \text{ N/mm}^2$ $\text{Modification Factor} = 1.41$ $l/d, \text{ Max} = 1.41 \times 26$ $= 36.66$ $36.66 < 33.82$ $O.K$							
From Fig 4, IS456:2000							

For SREE SHARADHA AMBAL FOUNDATIONS

[Signature]

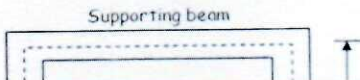
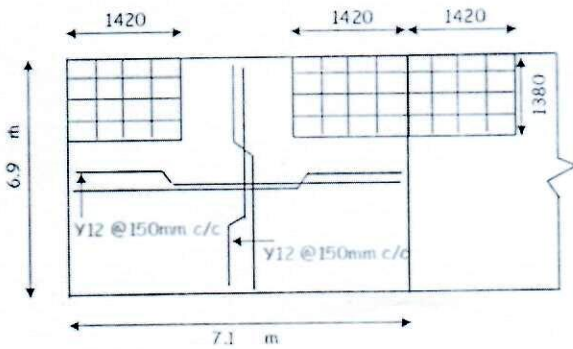
Partner

For SREE SHARADHA AMBAL FOUNDATIONS

[Signature]

Partner

[Signature]
Dr. ALEX JACOB
 B.E., M.Tech(Str), Ph.D(Hon),
 M.I.E. (Aust), M.I.E. (Ind)
 STRUCTURAL ENGINEER
 70, BEACH ROAD, KALAKSHETRA COLONY,
 Chennai - 600 090.
 REG No. SE/GR-I/24/02/001
 REG No. RSE100392025

Design of Two way Slab	The values are Displayed in Blue color are the Input values	References						
1 Design Datas								
9 Torsional Reinforcement	Size of torsional reinforcement mesh (lx/5 and ly/5) = 1380 x 1420 mm Ast required to resist the torsion = 3/4 times of mid-span Ast = 455.94 mm² dia of torsional reinforcement = 8 mm Spacing required = 110 mm Spacing Provided = 200 mm No of layers = 4 Nos (Each 2 top and bottom) NOTE: 1. Torsion reinforcement shall be provided at any corner where the slab is simply supported on both edges meeting at that corner 2. Torsion reinforcement equal to half that described above shall be provided at corner contained by edges over only one of which the slab is continuous 3. Torsion reinforcements need not be provided at any corner contained by edges over both of which the slab is continuous 9 Reinforcement Details <table border="1"> <thead> <tr> <th>Direction</th> <th>Reinforcement</th> </tr> </thead> <tbody> <tr> <td>X</td> <td>Y12 @150mm c/c</td> </tr> <tr> <td>Y</td> <td>Y12 @150mm c/c</td> </tr> </tbody> </table> 	Direction	Reinforcement	X	Y12 @150mm c/c	Y	Y12 @150mm c/c	As per IS456:2000, ANNEX D, clause D-1.8
Direction	Reinforcement							
X	Y12 @150mm c/c							
Y	Y12 @150mm c/c							

For SREE SHARADHAAMBAL FOUNDATIONS

[Signature]

Partner

For SREE SHARADHAAMBAL FOUNDATIONS

[Signature]

Partner

[Signature]
Dr. ALEX JACOB
 B.E., M.Tech(Str), Ph.D(Hon),
 M.I.E. (Aust), M.I.E. (Ind)
 STRUCTURAL ENGINEER
 70, BEACH ROAD, KALAKSHETRA COLONY,
 Chennai - 600 090.
 REG No. SE/GR-I/24/02/001
 REG No. RSE100392025