Verified RealEstate™

Your trusted partner for buying, selling, and managing property, ensuring hassle-free service with 100% transparency.

3/350/2 Mettukuppam,
OMR Thoraipakkam,
Chennai, India

hello@verified.realestate
+91 9996 12 9996

Official Property Record

Digitally Verified Record - Powered by Verified RealEstate™

Structural Design Details

Of

The Proposed Construction of Commercial Building Project - MORAIS CITY MIB E BLOCK (Business Office Building) in SF.No: 201/1E1B, 204/2B, 205/1A2 Plot No: C-6 , (L.P(R)/NTDA NO: 1/2020), Morais City Extension -I, Keelakurichi Village & Panchayat, Tiruverumbur Panchayats Union & Taluk, Trichy District.

Structural Details Design by

TRICHY RG ENGINEERING EXCELLENCE PRIVATE LIMITED

No. 64, Nandavanam Street,
LIC Colony
Trichy – 620021
Phone – 0431-4024691

STRUCTURAL DESIGN STABILITY CERTIFICATE.

I hereby certify that the Proposed Construction of Commercial Building Project – Morais City MIB E Block (Business Office Building) in SF.No: 201/1E1B, 204/2B, 205/1A2, Plot No: C6 ., (L.P(R)/NTDA NO: 1/2020), Morais City Extension -I, Keelakurichi Village & Panchayat, Thiruverumbur Panchayat Union & Taluk, Trichy District. **The building will withstand against the Earthquake,(Seismic Zone II as per IS 1893 (Part I) 2002) loading stress parameters are within limits of National Building Code and Bureau of Indian standards code of practice for concrete and loading.** The building consists of Double Basement + stilt + four floors. For external and internal partition walls 200/100 thick A. A. C block work walls are used.

The R.C.C building frame of the structure is designed as per the Indian Standard code of practice for concrete and loading as follows:

1. IS: 456-2000 Code of Practice for Plain and Reinforced concrete

2. IS: 875-1987 Code of Practice for Design loads for Buildings and structures

3. IS: 1893-2002 Criteria for Earthquakes resistant design of structures Part-1 General Provisions and Buildings

4. IS: 4326-1993 Code of Practice for Earthquakes resistant design & Construction of Buildings.

5 .IS:13920-1993 Code of Practice for Ductile detailing of concrete structures subjected to seismic forces and

6. National Building code of India-2005.

It is further certified that the above structure will be constructed from foundation to roof, as per structural designs and detailing of reinforcements furnished in our drawings. The building will be **safe and Sound** as per the design.

R. GANESAN M.E., (Structres)
Structural Consultant
GSTRUDS
Structural Engineering
Consultancy Centre
No:64, Nandavanam Street,
Indra Nagar, L.I.C Colony,
Trichy - 620 021. Ph: 0431-4024691
Email: ganesan_struct@ rediffmail.com
LPA REG NO: SE/Gr/TLPA/MAY2019/029

DESIGN BASIS REPORT

For

The Proposed Construction of Commercial Building Project – Morais City MIB E Block (Business Office Building) in SF.No: 201/1E1B, 204/2B, 205/1A2, Plot No: C6 ., (L.P(R)/NTDA NO: 1/2020), Morais City Extension -I, Keelakurichi Village & Panchayat, Thiruverumbur Panchayat Union & Taluk, Trichy District.

TABLE OF CONTENTS

1.0 OBJECTIVE

The Proposed Construction of Commercial Building Project – Morais City MIB E Block (Business Office Building) in SF.No: 201/1E1B, 204/2B, 205/1A2, Plot No: C6 ., (L.P(R)/NTDA NO: 1/2020), Morais City Extension -I, Keelakurichi Village & Panchayat, Thiruverumbur Panchayat Union & Taluk, Trichy District.

The Building is designed for Double Basement + Stilt + Four floors. The structure is supported on column in turn resting on column footing Foundation. The Structural System comprises columns, beams, slabs and wall structure.

3-D Analysis of all the building structures will be carried out using STAAD PRO Software package and analysis results shall be used for designing the various elements.

2.0 DESIGN LOADS

2.1 Dead Loads

The Deadloads that are envisaged to act permanently are considered as per **IS:875 (Part 1) – 1987 – Dead loads.** Indian standard**" Code of Practice for Design Loads (other than earthquakes) for Buildings and Structures".**

1. Slab is assumed to be 125mm thick – 3.125 KN/m^2
2. Floor finish – 1.5KN/m^2
3. AAC Block masonry walls 200mm& 100mm thick are proposed to be used (location of walls per Architectural drawings) Unit weight is taken as 8 KN/m^3
4. Weathering course in Terrace finish –2 KN/m^2

2.2 Imposed Loads

The imposed loads that are envisaged to get permanently are considered as per **IS : 875 (part – 2) – 1987.** Indian standard **"Code of Practice for Design loads (other than earthquake) for Buildings and structures".**

1. Living = 4 KN/m^2
2. Staircase = 4 KN/m^2
3. Toilets = 2 KN/m^2
4. Terrace floors = 1.5 KN/m^2

2.3 Earthquake Load

The loading due to earthquake is assessed based on the provisions of **IS :1893-2016.** Structures with ductile detailing is considered as per **IS: 13920-2016.**

Madurai falls under Seismic Zone II

Zone factor **= 0.10**

Response reduction factor **= 3**

Importance factor **= 1.0**

Structure with ductile detailing is considered as per IS: 13920-2016

2.3 Load combinations

The various loads shall be combined in accordance with the stipulations in IS:875 (Part 5) – 1987. Whichever combinations produced the most unfavorable effect in the building, foundation or structural member concerned shall be adopted. The various load combinations considered in the analysis are as follows:

1. 1(DL + LL)
2. 1(DL + 0.8LL + 0.8 SQX + 1
3. 1(DL + 0.8LL + 0.8 SQX - 1
4. 1(DL + 0.8LL + 0.8 SQZ + 1
5. 1(DL + 0.8LL + 0.8 SQZ - 1
6. 1.0(DL + SQX + 1)
7. 1.0(DL + SQX - 1)
8. 1.0(DL + SQZ + 1)
9. 1.0(DL + SQZ - 1)
10. 1.5(DL + LL)
11. 1.5(DL + SQX + 1)
12. 1.5(DL + SQX - 1)
13. 1.5(DL + SQZ + 1)
14. 1.5(DL + SQZ – 1)
15. 1.2(DL + LL + SQX + 1)

16. 1.2(DL + LL + SQX – 1)
17. 1.2(DL + LL + SQZ + 1)
18. 1.2(DL + LL + SQZ – 1)
19. 0.9DL + 1.5SQX + 1
20. 0.9DL + 1.5SQX – 1
21. 0.9DL + 1.5SQZ + 1
22. 0.9DL + 1.5SQZ - 1

The above load combination will be considered and effect of worst combinations will be taken for design of various building elements.

3.0 ANALYSIS METHODS

The analysis of the structures is carried out using the STAAD PRO. The entire super structure is modeled using frame elements as appropriate. Beams and columns are modeled as frame elements. Appropriate loads and its combinations as per relevant IS code clauses, for most unfavorable effects are chosen for design. Various load cases considered in the analysis are briefed above.

4.0 DESIGN ASSUMPTION

4.1.1 The Base of the Foundation is assumed to be FIXED& PINNED.

4.1.2 All concrete elements shall be designed in accordance with IS 456:2000 Limit state design.

4.1.3 Appropriate loads and its combination as per relevant clauses, for the most unfavorable effects are chosen for design. (Refer Load Combination below).

5.0 FOUNDATION DESIGN

Type of foundation : Raftfoundation
Depth of foundation : 7.5 m below natural ground level

6.0 MATERIALS

The self-weight of the various elements are computed based on the unit weight of materials as given below:

S. no	Materials	Unit weight KN / m^3
1	Reinforced Cement Concrete	25
2	AAC Block / Brick WORK(for lift well& parapet)	8/20
3	Steel	78.50

Structural concrete shall be of grade M25 for all R.c.c work.
Steel reinforcement shall be of grade Fe 500 confirming to IS : 1786-2008.

7.0 NOMINAL COVER TO REINFORCEMENT

From Durability requirement, exposure condition is assumed as mild for structural elements above ground level and moderate for structural elements below ground level.

The clear cover to reinforcement to meet durability requirement shall be as follows:

Footing - 50mm

Column - 40mm

Beam- 32mm

Slab - 20mm

R. GANESAN M.E., (Structres)
Structural Consultant
GSTRUDS
Structural Engineering
Consultancy Centre
No:64, Nandavanam Street,
Indra Nagar, L.I.C Colony,
Trichy - 620 021. Ph: 0431-4024691
Email: ganesan _ struct@ rediffmail.com
LPA REG NO: SE/Gr/TLPA/MAY2019/029

Design of Isolated Footing with Moment

The values are Displayed in Blue color are the Input values

Support No = **COLUMN NO C15**

1 Design Forces From STAAD Load Case = 5

1. Axial Load on column	=	3800	KN
2. Bending moment along x-x, Mx	=	0	KN.m
3. Bending moment along y-y, My	=	0	KN.m

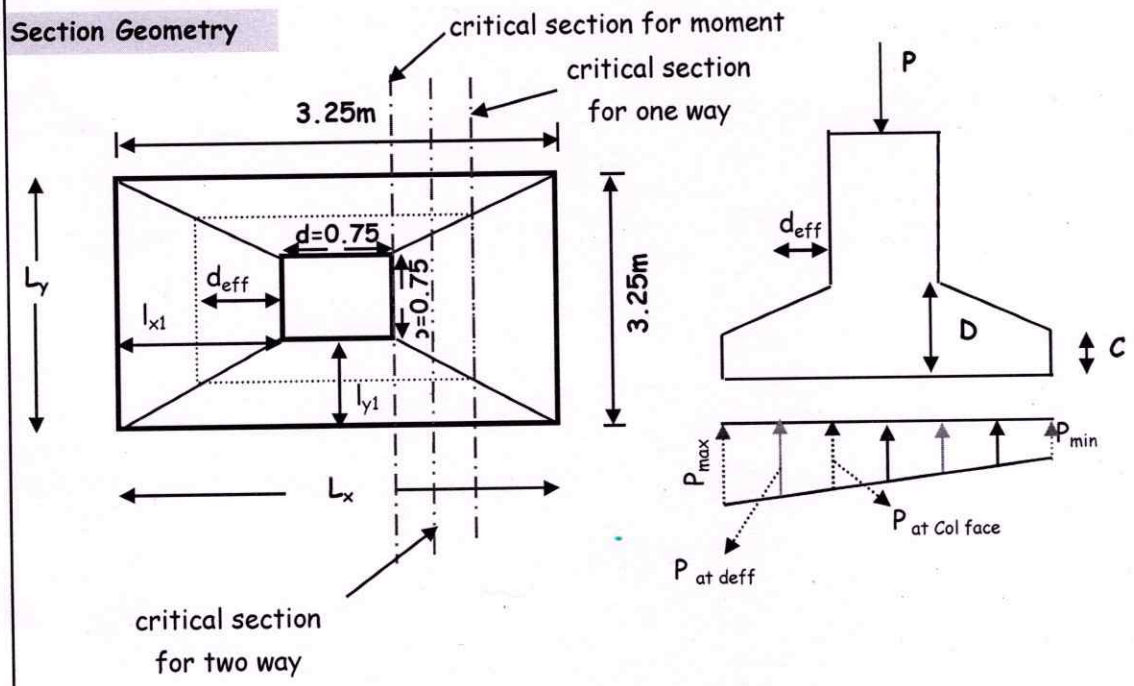
2 Design Datas

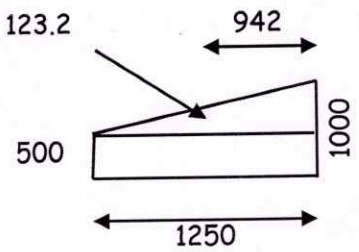
3. Compressive strength of Concrete, Fck	=	25	N/mm^2
4. Yield Strength of steel, Fy	=	500	N/mm^2
5.Diameter of Reinforcement, (x-direction)	=	16	mm
6.Diameter of Reinforcement, (y-direction)	=	16	mm
7. Clear cover to the reinforcement, C	=	50	mm
8. Safe bearing capacity of soil, SBC	=	400	KN/m^2
7 Type of Footing	=	Rectangular	
8 Size of pedastal/Column	=	b x d	
	=	0.75 x 0.75	m

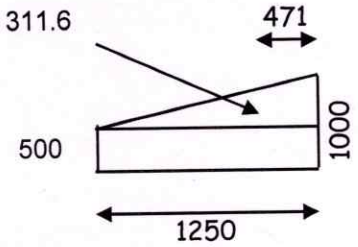
2 Assume trial size of footing

Area of footing	=	Total Load/SBC	
Self Wt. of footing			
(Assume 10% of column load	=	380	KN
Soil weight	=	0	KN
Total Load	=	4180	KN
Area of footing required	=	4180 / 400	
	=	10.45	m^2
Size Required	B =	**3.2**	m
	L =	**3.2**	m
Size Provided	B =	3.25	m
	L =	3.25	m
Area of Footing Provided	=	**10.563**	m^2
		10.5625 > 10.45	
		O.K	

3 Section Geometry







l_{x1} = $(L_x - d)/2$
= (3.25 - 0.75)/2
= **1.25** m

l_{y1} = $(L_y - d)/2$
= (3.25 - 0.75)/2
= **1.25** m

Assume Overall depth of footing, D	=	1000 mm
Depth at free end, C	=	500 mm
d_{eff} at critical moment section	=	942 mm
d_{eff} at critical one way shear section	=	565.2 mm
d_{eff} at critical two way shear section	=	753.6 mm

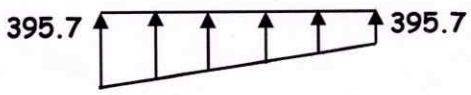
4 Check for Soil Pressure

A) Along X direction

Eccentricity, e_{xx} = (M_{xx}/P)

= 0 / 4180

= 0 m



$L_x/6$ = 0.542 m

0.542>0

$e_{xx} < L_x/6$

Maximum Pressure, Pmax = P/A(1+6e/B)

= 4180/10.5625(1 + 6 x (0+0/3.25)

= **395.7** KN/m^2

395.7<400

Safe

Minimum Pressure, Pmin = P/A(1-6e/B)

= 4180/10.5625(1 - 6 x (0+0)/3.25)

= **395.7** KN/m^2

= 395.7<400

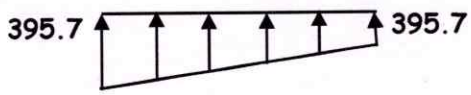
Safe

B) Along Y direction

Eccentricity, e_{yy} = (M_{yy}/P)

= 0 / 4180

= 0 m



$L_x/6$ = 0.542 m

0.542>0

$e_{xx} < L_y/6$

Maximum Pressure, Pmax = (P/A(1+6e/B)

= 4180/10.5625(1 + 6 x (0+0)/3.25)

= **395.7** KN/m^2

395.7<400

Safe

Minimum Pressure, Pmin = P/A(1-6e/B)

= 4180/10.5625(1 - 6 x (0+0)/3.25)

= **395.7** KN/m^2

= 395.7<400

Safe

5 Bending moment calculations

S.No	Direction	Pmax(net)	Pmin(net)	P at face of the column	Moment, KN/m
1	x	359.72	359.72	359.72	421.545
2	y	359.72	359.72	359.72	421.545

6 Check for depth (Moment consideratin)

$Mu.lim = (0.36 \times Fck \times (xu.max/d) \times (1-0.42(xu.max/d)) \times bd^2$

$xu.max/d = 0.46$

$Mu.lim = 3.34\ bd^2$

$d,reqd = (Mu.lim/Qb)^{1/2}$

$= (421545000/(3.34 \times 1000))^{1/2}$

$= 355.26$ mm

355.26 < 942

O.K

7 Calculation of Reinforcement

S. N	Direction	Mu/bd^2	pt from SP16	pt, min	pt,provided	Ast, mm^2
1	x	0.48	0.113	0.12	0.120	1130.4
2	y	0.48	0.113	0.12	0.120	1130.4

pt = 100Ast/bd

Ast = (pt/100)xbd

8 Spacing of reinforcement

Spacing, mm		Spacing provided, mm	Ast provided, mm^2
Reqd	Minimum		
177	300	125	1607.68
177	300	125	1607.68

pt.max, Provided = 0.1707 %

Spacing = (ast x 1000)/Ast

where,
ast= C/s area of bar
Ast=Area of reinforcement provided

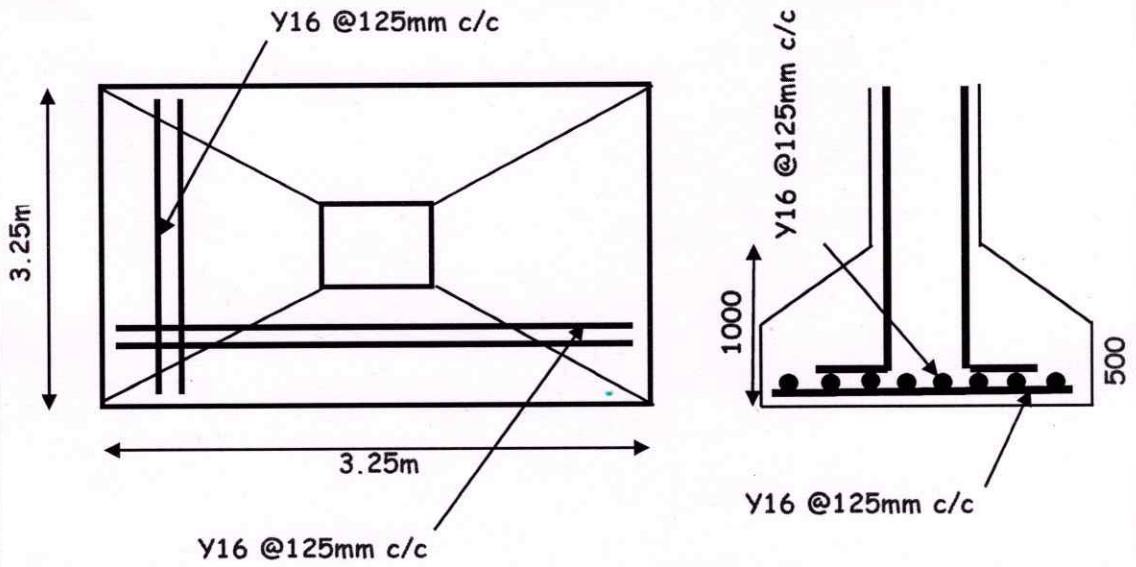
9 Check for one way shear

S.No	Direction	Pmax(net)	Pmin(net)	P at critical 1way shear Xn	Shear, KN
1	x	359.72	359.72	359.72	166.185
2	y	359.72	359.72	359.72	166.185

Nominal Shear stress, tv = Vu/bd

		=	166185/1000 x 565.2
		=	0.29 N/mm^2
	pt.max, Provided	=	0.1707 %
	Allowable shear stress, tc (for pt,max)	=	0.3082 N/mm^2
			tv < tc
			O.K
10	**Check for two way Shear**		
	Punching Shear,Vu	=	Net upward pressure x (A_F - A_c)
		=	5396.445 KN
	Punching Shear stress,	=	Vu/perimeter at critical section*d_{eff}
		=	1.0581 N/mm^2
	Allowable Stress	=	0.25(fck)$^{1/2}$
		=	1.25 N/mm^2
			O.K
11	**Check for bearing stress**		
	Actual bearing stress,	=	5700 KN
	Limiting bearing stress @ Column - footing		
	interface, fbr,max	=	0.45 fck (A1/A2)$^{1/2}$
	A1	=	902500 mm^2
	(A1/A2)$^{1/2}$	=	1
	fbr,max	=	11.25 N/mm^2
	Limiting bearing stress @ Column - footing		
	interface, fbr,max	=	0.45 fck (A1/A2)$^{1/2}$
	A1	=	10562500 mm^2
	A2	=	902500 mm^2
	(A1/A2)$^{1/2}$	=	2
	fbr,max	=	22.5 N/mm^2
	Limiting Bearing resistance, Fbr	=	10153 KN
			10153.125>5700
		=	O.K
	0	=	0
	0	=	0
	0	=	0 Ø
11	**Reinforcement Details**		

Direction	Reinforcement
X	Y16 @125mm c/c
Y	Y16 @125mm c/c



R. GANESAN M.E., (Structres)
Structural Consultant
GSTRUDS
Structural Engineering
Consultancy Centre
No:64, Nandavanam Street,
Indra Nagar, L.I.C Colony,
Trichy - 620 021. Ph: 0431-4024691
Email: ganesan _ struct@ rediffmail.com
LPA REG NO: SE/Gr/TLPA/MAY2019/029

Design of column with Biaxial Moment

Column No = **C15 (up to stilt roof)**

1 Design Forces From STAAD Load Case = C10

1. Axial Load on column	=	4390	KN
2. Bending moment along x-x, Mux	=	138	KN.m
3. Bending moment along y-y, Muy	=	58	KN.m

2 Design Datas

1. Compressive strength of Concrete, Fck	=	25	N/mm^2
2. Yield Strength of steel, Fy	=	500	N/mm^2
3.Diameter of Longitudinal Reinforcement,	=	32	mm
4.Diameter of lateral Reinforcement,	=	10	mm
5. Clear cover to the reinforcement, C	=	32	mm
6. Type of column	=	Rectangular	
7. Size of Column	=	b x d	
	=	750 x 750	mm
8. Unsupported Length of Column along x-x,L_x	=	3.66	m
9. Unsupported Length of Column along y-y,Ly	=	3.66	m
10. Effective length factor,	=	1	
11. Effective Length of Column, along x-x, L_x	=	3.66	m
12. Effective Length of Column, along y-y, Ly	=	3.66	m

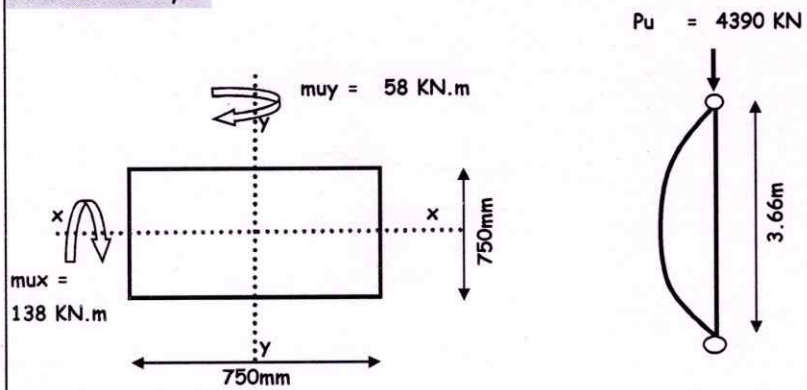
2 Check for leff/D

Effective length,lex/Lateral dimensions = L_{ex} / D
= 4.88
= 4.88< 12
= Short Column

As per clause 25.1.2.2, IS:456:2000

Effective length,ley/Lateral dimensions = L_{ex} / b
= 4.88
= 4.88< 12
= Short Column

3 Section Geometry



4 Check for Minimum Eccentricity

As per Clause 25.4, IS:456:2000

Applied eccentricties

ex = Mux/Pu
= 138/4390
= 31.435 mm

ey = Muy/Pu
= 58/4390
= 13.212 mm

Minimum eccenticity

e_{xx} = (lex/500)+(D/30)
= (3660/500) + (750/30)
= 32.32 mm or 20 mm
= 32.32 mm

e_{yy} = (ley/500)+(D/30)
= (3660/500) + (750/30)
= 32.32 mm or 20 mm
= 32.32 mm

5 **Moment due to Eccentricity**

m_{uex} = Pu x e_{xx}
= (4390x32.32)/1000
= 141.88 KN.m

m_{uey} = Pu x e_{yy}
= (4390x32.32)/1000
= 141.88 KN.m

6 **Design Moment**

mux = Mux or muex
= **141.88** KN.m

muy = Mux or muey
= **141.88** KN.m

7 **Calculation of Longitudinal reinforcement**

Assume percentage of reinforcement = 2.2 %
Asc, required = 2.2/100x 750x750
= 12375 mm^2
No of bars = 16 Nos
Asc, Provided = 12861 mm^2
pt, provided = 2.286 %

Moment Capacity Along x Direction

(Pu/fck b D) = (4390000/25 x 750 x 750)
= 0.31
p/fck = 2.286/25
= 0.09

d'/D = 32/750
= 0.04

From interaction chart, SP16

$Mux1/fck\ b\ D^2$ = 0.16

Mux1 = 0.16 x 750x750x750x25

= 1687.5 KN.m

Moment Capacity Along y Direction

(Pu/fck b D) = (4390000/25 x 750 x 750)

= 0.31

p/fck = 2.286/25

= 0.0914

b'/D = 32/750

= 0.04

From interaction chart, SP16

$Muy1/fck\ b\ D^2$ = 0.16

Muy1 = 0.16 x 750x750x750x25

= 1687.5 KN.m

8 Check for Moment Capcity

$(Mux/Mux1)^{an} + (Muy/Muy1)^{an} < 1$

Puz = (0.45 fck.Ac) +(0.75 fy -0.45fck)Asc

Ac = 562500 mm^2

Puz = 11006.314 KN

Pu/Puz = 0.399

an = 1.3317

For Pu/Puz =0.2 to 0.8
an varies from 1.0 to 2.0

$(Mux/Mux1)^{an} + (Muy/Muy1)^{an}$ = 0.074

0.074< 1

O.K

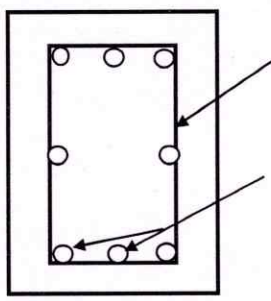
9 Calculation of Lateral Reinforcement

Spacing of ties

1. Least Lateral Dimensions of column = 750 mm
2. Sixteen times the least dia of Longi bar = 512 mm
3. 300mm = 300 mm

Adopt Spacing = **300 mm**

10 Details



No of bars = 16 Nos

R. GANESAN M.E., (Structres)
Structural Consultant
GSTRUDS
Structural Engineering
Consultancy Centre
No:64, Nandavanam Street,
Indra Nagar, L.I.C Colony,
Trichy - 620 021. Ph: 0431-4024691
Email: ganesan _ struct@ rediffmail.com
LPA REG NO: SE/Gr/TLPA/MAY2019/029

Design of column with Biaxial Moment

Column No = **C15 (Stilt roof ro Third floor roof)**

1 Design Forces From STAAD Load Case = C5

1. Axial Load on column	=	2580	KN
2. Bending moment along x-x, Mux	=	89	KN.m
3. Bending moment along y-y, Muy	=	62	KN.m

2 Design Datas

1. Compressive strength of Concrete, Fck	=	25	N/mm^2
2. Yield Strength of steel, Fy	=	500	N/mm^2
3.Diameter of Longitudinal Reinforcement,	=	32	mm
4.Diameter of lateral Reinforcement,	=	8	mm
5. Clear cover to the reinforcement, C	=	32	mm
6. Type of column	=	Rectangular	
7. Size of Column	=	b x d	
	=	750 x 750	mm
8. Unsupported Length of Column along x-x,L_x	=	3.66	m
9. Unsupported Length of Column along y-y,Ly	=	3.66	m
10. Effective length factor,	=	1	
11. Effective Length of Column, along x-x, L_x	=	3.66	m
12. Effective Length of Column, along y-y, Ly	=	3.66	m

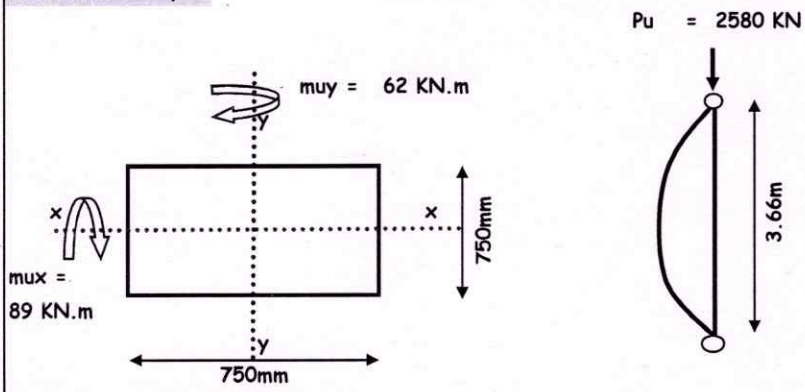
2 Check for leff/D

Effective length,lex/Lateral dimensions = L_{ex} / D
= 4.88
= 4.88< 12
= Short Column

As per clause 25.1.2.2, IS:456:2000

Effective length,ley/Lateral dimensions = L_{ex} / b
= 4.88
= 4.88< 12
= Short Column

3 Section Geometry



4 Check for Minimum Eccentricity

As per Clause 25.4, IS:456:2000

Applied eccentricties

ex = Mux/Pu
= 89/2580
= 34.496 mm

ey = Muy/Pu
= 62/2580
= 24.031 mm

Minimum eccenticity

e_{xx} = (lex/500)+(D/30)
= (3660/500) + (750/30)
= 32.32 mm or 20 mm
= 32.32 mm

e_{yy} = (ley/500)+(D/30)
= (3660/500) + (750/30)
= 32.32 mm or 20 mm
= 32.32 mm

5 **Moment due to Eccentricity**

m_{uex} = Pu x e_{xx}
= (2580x32.32)/1000
= 83.39 KN.m

m_{uey} = Pu x e_{yy}
= (2580x32.32)/1000
= 83.39 KN.m

6 **Design Moment**

mux = Mux or muex
= **89** KN.m

muy = Mux or muey
= **83.39** KN.m

7 **Calculation of Longitudinal reinforcement**

Assume percentage of reinforcement = 1.6 %
Asc, required = 1.6/100x 750x750
= 9000 mm^2
No of bars = 12 Nos
Asc, Provided = 9646 mm^2
pt, provided = 1.715 %

Moment Capacity Along x Direction

(Pu/fck b D) = (2580000/25 x 750 x 750)
= 0.18

p/fck = 1.715/25
= 0.07

d'/D = 32/750
= 0.04

From interaction chart, SP16

$Mux1/fck\ b\ D^2$ = 0.16

Mux1 = 0.16 x 750x750x750x25

= 1687.5 KN.m

Moment Capacity Along y Direction

(Pu/fck b D) = (2580000/25 x 750 x 750)

= 0.18

p/fck = 1.715/25

= 0.0686

b'/D = 32/750

= 0.04

From interaction chart, SP16

$Muy1/fck\ b\ D^2$ = 0.16

Muy1 = 0.16 x 750x750x750x25

= 1687.5 KN.m

8 Check for Moment Capcity

$(Mux/Mux1)^{an} + (Muy/Muy1)^{an} < 1$

Puz = (0.45 fck.Ac) +(0.75 fy -0.45fck)Asc

Ac = 562500 mm^2

Puz = 9836.8575 KN

Pu/Puz = 0.262

an = 1.1033

For Pu/Puz =0.2 to 0.8
an varies from 1.0 to 2.0

$(Mux/Mux1)^{an} + (Muy/Muy1)^{an}$ = 0.075

0.075< 1

O.K

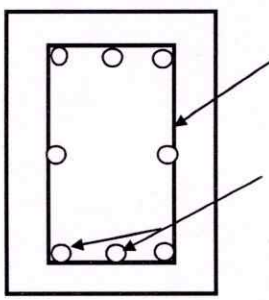
9 Calculation of Lateral Reinforcement

Spacing of ties

1. Least Lateral Dimensions of column = 750 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 = **16** Nos

R. GANESAN M.E., (Structres)
Structural Consultant
GSTRUDS
Structural Engineering
Consultancy Centre
No:64, Nandavanam Street,
Indra Nagar, L.I.C Colony,
Trichy - 620 021. Ph: 0431-4024691
Email: ganesan _ struct@ rediffmail.com
LPA REG NO: SE/Gr/TLPA/MAY2019/029

Design of column with Biaxial Moment

Column No = **C45(third floor roof to terrace)**

1 Design Forces From STAAD Load Case = C5

1. Axial Load on column	=	780	KN
2. Bending moment along x-x, Mux	=	54	KN.m
3. Bending moment along y-y, Muy	=	26	KN.m

2 Design Datas

1. Compressive strength of Concrete, Fck	=	25	N/mm^2
2. Yield Strength of steel, Fy	=	500	N/mm^2
3.Diameter of Longitudinal Reinforcement,	=	16	mm
4.Diameter of lateral Reinforcement,	=	8	mm
5. Clear cover to the reinforcement, C	=	32	mm
6. Type of column	=	Rectangular	
7. Size of Column	=	b x d	
	=	230 x 600	mm
8. Unsupported Length of Column along x-x,L_x	=	3	m
9. Unsupported Length of Column along y-y,Ly	=	3	m
10. Effective length factor,	=	1	
11. Effective Length of Column, along x-x, L_x	=	3	m
12. Effective Length of Column, along y-y, Ly	=	3	m

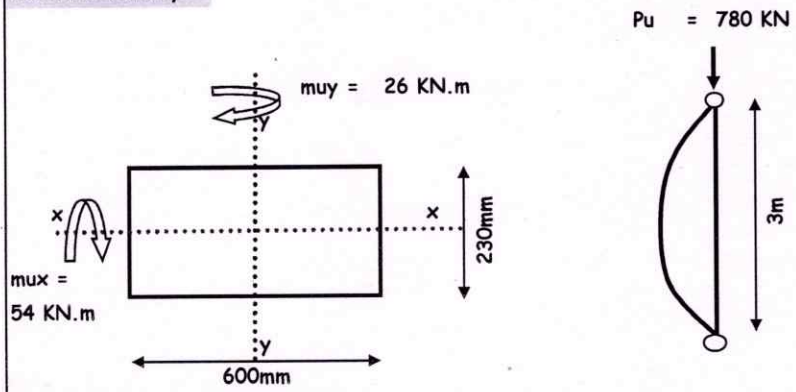
2 Check for leff/D

Effective length,lex/Lateral dimensions = L_{ex} / D
= 13.04
= 13.04>12
= Long Column

As per clause 25.1.2.2, IS:456:2000

Effective length,ley/Lateral dimensions = L_{ex} / b
= 5
= 5< 12
= Short Column

3 Section Geometry



4 Check for Minimum Eccentricity

As per Clause 25.4, IS:456:2000

Applied eccentricties

ex = Mux/Pu
= 54/780
= 69.231 mm

ey = Muy/Pu
= 26/780
= 33.333 mm

Minimum eccenticity

e_{xx} = (lex/500)+(D/30)
= (3000/500) + (600/30)
= 26 mm or 20 mm
= 26 mm

e_{yy} = (ley/500)+(D/30)
= (3000/500) + (230/30)
= 13.667 mm or 20 mm
= 20 mm

5 **Moment due to Eccentricity**

m_{uex} = Pu x e_{xx}
= (780x26)/1000
= 20.28 KN.m

m_{uey} = Pu x e_{yy}
= (780x13.67)/1000
= 10.66 KN.m

6 **Design Moment**

mux = Mux or muex
= 54 KN.m

muy = Mux or muey
= 26 KN.m

7 **Calculation of Longitudinal reinforcement**

Assume percentage of reinforcement = 1.2 %
Asc, required = 1.2/100x 230x600
= 1656 mm^2
No of bars = 9 Nos
Asc, Provided = 1809 mm^2
pt, provided = 1.311 %

Moment Capacity Along x Direction

(Pu/fck b D) = (780000/25 x 230 x 600)
= 0.23
p/fck = 1.311/25
= 0.05

d'/D = 32/600
= 0.05

From interaction chart, SP16

$Mux1/fck\ b\ D^2$ = 0.11

Mux1 = 0.11 x 230x230x600x25

= 227.7 KN.m

Moment Capacity Along y Direction

(Pu/fck b D) = (780000/25 x 230 x 600)

= 0.23

p/fck = 1.311/25

= 0.0524

b'/D = 32/230

= 0.14

From interaction chart, SP16

$Muy1/fck\ b\ D^2$ = 0.1

Muy1 = 0.1 x 230x230x600x25

= 207 KN.m

8 Check for Moment Capcity

$(Mux/Mux1)^{an} + (Muy/Muy1)^{an} < 1$

Puz = (0.45 fck.Ac) +(0.75 fy -0.45fck)Asc

Ac = 138000 mm^2

Puz = 2210.5238 KN

Pu/Puz = 0.353

an = 1.255

For Pu/Puz =0.2 to 0.8
an varies from 1.0 to 2.0

$(Mux/Mux1)^{an} + (Muy/Muy1)^{an}$ = 0.238

0.238< 1

O.K

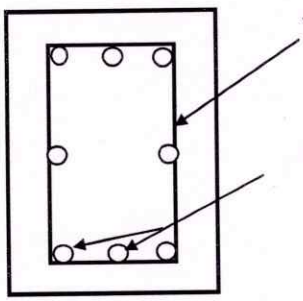
9 Calculation of Lateral Reinforcement

Spacing of ties

1. Least Lateral Dimensions of column = 230 mm
2. Sixteen times the least dia of Longi bar = 256 mm
3. 300mm = 300 mm

Adopt Spacing = 200 mm

10 Details



No of bars = 8 Nos

R. GANESAN M.E., (Structres)
Structural Consultant
GSTRUDS
Structural Engineering
Consultancy Centre
No:64, Nandavanam Street,
Indra Nagar, L.I.C Colony,
Trichy - 620 021. Ph: 0431-4024691
Email: ganesan _ struct@ rediffmail.com
LPA REG NO: SE/Gr/TLPA/MAY2019/029

Design of Beam BB1

Size of Beam	- 340mm x 750mm
Concrete grade	- M25
Characteristic strength of reinforcement	- 500N/mm^2
Clear cover	- 32 mm,
Effective depth = 750-32-25/2 = 702	- 702 mm
Dia of rod used	- 25 mm

From staadd out put result

Factored Shear force maximum	- 374 kN
Factored Sagging moment Mu_z	- 491 knm
Factored Hogging moment Mu_z	- 793 knm

Reinforcement is at bottom:

$$M_u/bd^2 \text{ (sagging)} = = \frac{491 \times 10^6}{340 \times (702)^2} = 2.93 \text{ N/mm}^2$$

Using design aids, for M25, Fe 500, Table 3,

$P_t = 0.811\%$

$$A_t = \frac{0.811x340x702}{100} = 1935 \text{ mm}^2$$

Provide 4Y25 = 1964 mm^2 > 1935 mm^2

Hence Safe

R. GANESAN M.E., (Structres)
Structural Consultant
GSTRUDS
Structural Engineering
Consultancy Centre
No:64, Nandavanam Street,
Indra Nagar, L.I.C Colony,
Trichy - 620 021. Ph: 0431-4024691
Email: ganesan _ struct@ rediffmail.com
LPA REG NO: SE/Gr/TLPA/MAY2019/029

From interaction chart, SP16

$Mux1/fck\ b\ D^2$ = 0.11

Mux1 = 0.11 x 230x230x600x25

= 227.7 KN.m

Moment Capacity Along y Direction

(Pu/fck b D) = (780000/25 x 230 x 600)

= 0.23

p/fck = 1.311/25

= 0.0524

b'/D = 32/230

= 0.14

From interaction chart, SP16

$Muy1/fck\ b\ D^2$ = 0.1

Muy1 = 0.1 x 230x230x600x25

= 207 KN.m

8 Check for Moment Capcity

$(Mux/Mux1)^{an} + (Muy/Muy1)^{an} < 1$

Puz = (0.45 fck.Ac) +(0.75 fy -0.45fck)Asc

Ac = 138000 mm^2

Puz = 2210.5238 KN

Pu/Puz = 0.353

an = 1.255

For Pu/Puz =0.2 to 0.8
an varies from 1.0 to 2.0

$(Mux/Mux1)^{an} + (Muy/Muy1)^{an}$ = 0.238

0.238< 1

O.K

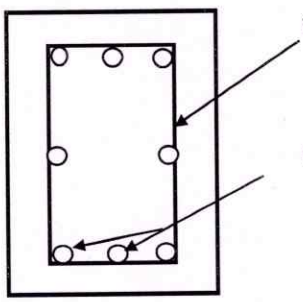
9 Calculation of Lateral Reinforcement

Spacing of ties

1. Least Lateral Dimensions of column = 230 mm
2. Sixteen times the least dia of Longi bar = 256 mm
3. 300mm = 300 mm

Adopt Spacing = 200 mm

10 Details



No of bars = 8 Nos

R. GANESAN M.E., (Structres)
Structural Consultant
ESTRUDS
Structural Engineering
Consultancy Centre
No:64, Nandavanam Street,
Indra Nagar, L.I.C Colony,
Trichy - 620 021. Ph: 0431-4024691
Email: ganesan _ struct@ rediffmail.com
LPA REG NO: SE/Gr/TLPA/MAY2019/029

Reinforcement at support section:

M_u/bd^2 (Hogging) = $\frac{793 \times 10^6}{340x(702)^2}$ = 4.73 N/mm^2

Using design aids, for M25, Fe 500, Table 3,

P_t = 1.321 % P_c = 0.409 %

$A_t = \frac{1.321x340x702}{100}$ = 3153 mm^2 , $A_c = \frac{409x340x702}{100}$ = 976 mm^2

Provide,

Ast : 7Y25 = 3437mm^2 > 3153 mm^2

Asc : 4Y25 = 1963mm^2 > 976 mm^2

Hence Safe.

Design for Shear:

T_v Max = $\frac{Vu}{bd} = \frac{374x1000}{340x702}$ = 1.57 N/mm^2

Ast provided 1030 mm^2

$P_t = \frac{1964x100}{340x702}$ =0.82 %

Refer table, 61 of SP16, for M25 grade Concrete

T_c = 0.59 N/mm^2

So, shear taken by stirrups ,

$\frac{(Tv-Tc)Xbd}{1000} = \frac{(1.57-0.59)X340X702}{1000}$ = 233.9KN

Shear force per CM depth of beam = $\frac{233.9}{70.2}$ = 3.33 KN/cm depth of beam

Refer table No. 62,

Provide 2 legged Y10 @150mm C/C

Size of beam (340 x 750)mm
Span reinforcement (Bottom) – 4Y25
Support reinforcement (Top) – 7Y25
Stirrups – Y10 @ 150mm C/C

R. GANESAN M.E., (Structres)
Structural Consultant
GSTRUDS
Structural Engineering
Consultancy Centre
No:64, Nandavanam Street,
Indra Nagar, L.I.C Colony,
Trichy - 620 021. Ph: 0431-4024691
Email: ganesan _ struct@ rediffmail.com
LPA REG NO: SE/Gr/TLPA/MAY2019/029

Design of slab

Four Edges Discontinuous

Fck	25	N/mm^2
Fy	500	N/mm^2
Dia of bar (Lx Direction)	12	mm
Dia of bar (Ly Direction)	10	mm
Clear cover	15	mm
Clear span Lx	5780	mm
Clear span Ly	7370	mm
Width of Beam	300	mm
Slab tk	175	mm
Floor Finish	45	mm
Weathering Coarse	5	mm
LIVE LOAD	4	KN/m2
Length of slab (lx)	5934	mm
Length of slab (ly)	7519	mm
Dead Load	5.33	KN/m2
LIVE LOAD	4	KN/m2
FD D.L	7.995	KN/m2
FD L.L	6	KN/m2
ly/lx	1.2751	IT IS TWO WAY SLAB

Bending Moment Coeffecient for Rectangular Panels Supported on Four Sides with Provision for Torsion at Corners (IS 456-2000 Table 26)

	short span		**long span**	
	(-ve Mx)	(+ve Mx	(-ve My)	
	0	0.0907	0	(+ve My) 0.055781

support moment	Mx	0	KN.m
	My	0	KN.m
span moment	Mx	44.692	KN.m
	My	27.489	KN.m
Xu max/d		0.46	
Q		3.3402	
d rquired		115.67	The depth provide is suffcient
Effective depth shorter span		154	
Effective depth longer span		143	
Ast (+ ve Shorter span)		738.27	mm^2
Ast (+ ve Longerer span)		473.48	mm^2
Ast (- ve Shorter span)		0	mm^2
Ast (- ve Longerer span)		0	mm^2
Min Ast		210	mm^2

SPAN REINFORCEMENT

TO PROVIDE 12 mm DIA OF BAR @153 mm SPACING IN 5780 mm DIRECTION

TO PROVIDE 10 mm DIA OF BAR @166 mm SPACING IN 7370 mm DIRECTION

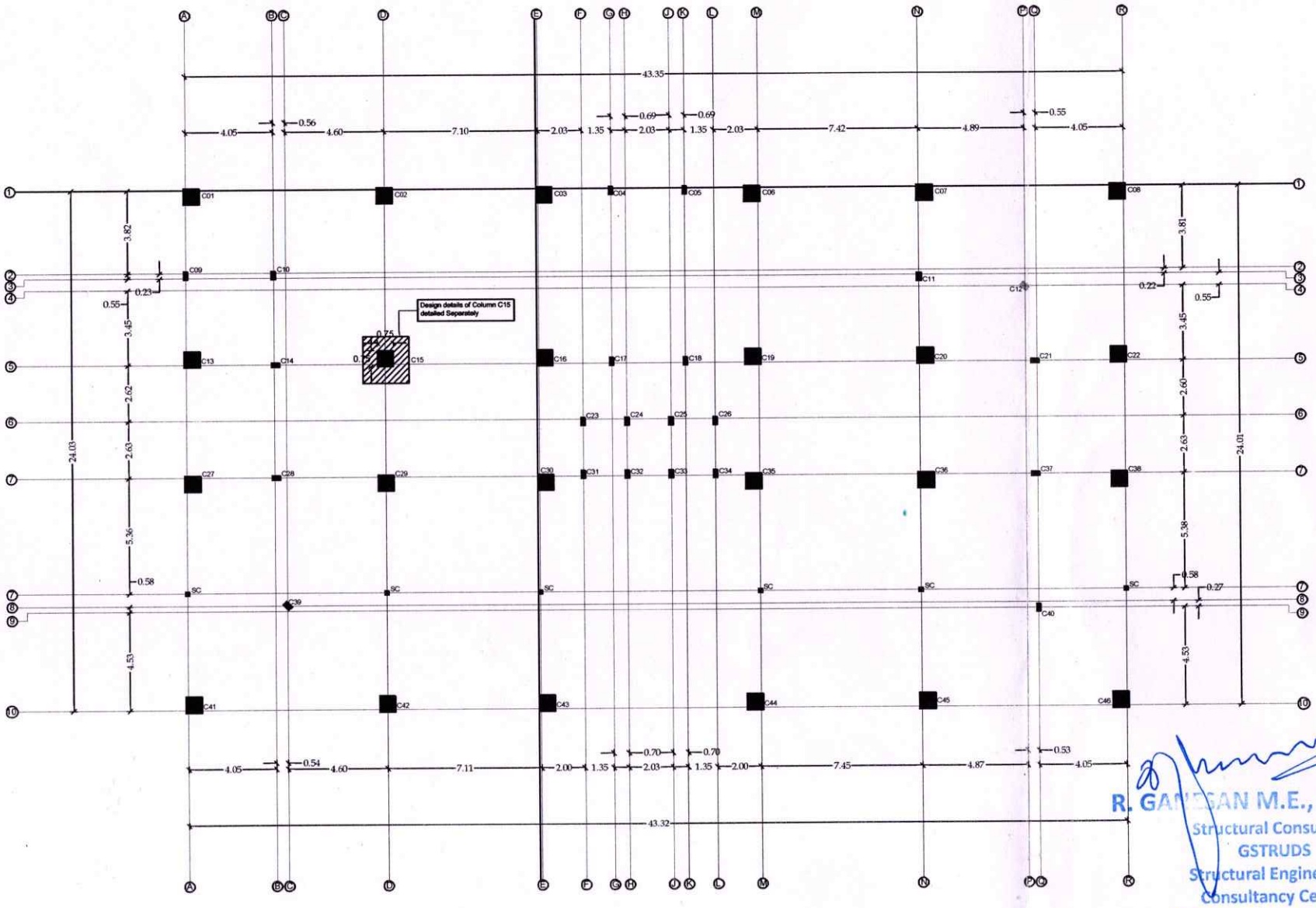
SUPPORT REINFORCEMENT

.

.

R. GANESAN M.E., (Structres)
Structural Consultant
GSTRUDS
Structural Engineering
Consultancy Centre
No:64, Nandavanam Street,
Indra Nagar, L.I.C Colony,
Trichy - 620 021. Ph: 0431-4024691
Email: ganesan _ struct@ rediffmail.com
LPA REG NO: SE/Gr/TLPA/MAY2019/029

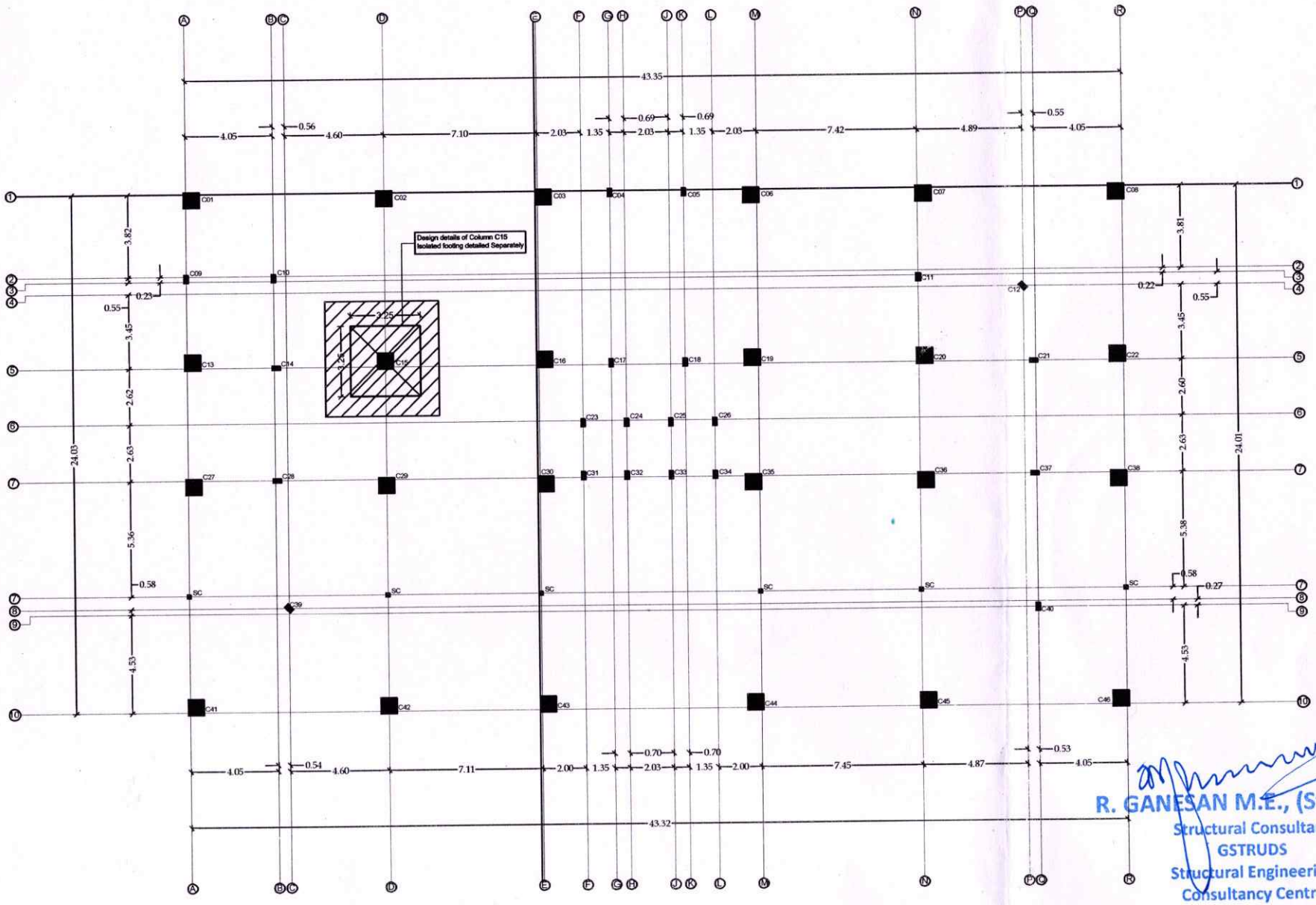
Column & Grid Layout



- Regular Column
- Column to be terminated at Basement Floor - 1
- Column to be terminated at Basement Floor - 2
- Stub Column

R. GANESAN M.E., (Structres)
Structural Consultant
GSTRUDS
Structural Engineering
Consultancy Centre
No:64, Nandavanam Street,
Indra Nagar, L.I.C Colony,
Trichy - 620 021. Ph: 0431-4024691
Email: ganesan_struct@rediffmail.com
LPA REG NO: SE/Gr/TLPA/MAY2019/029

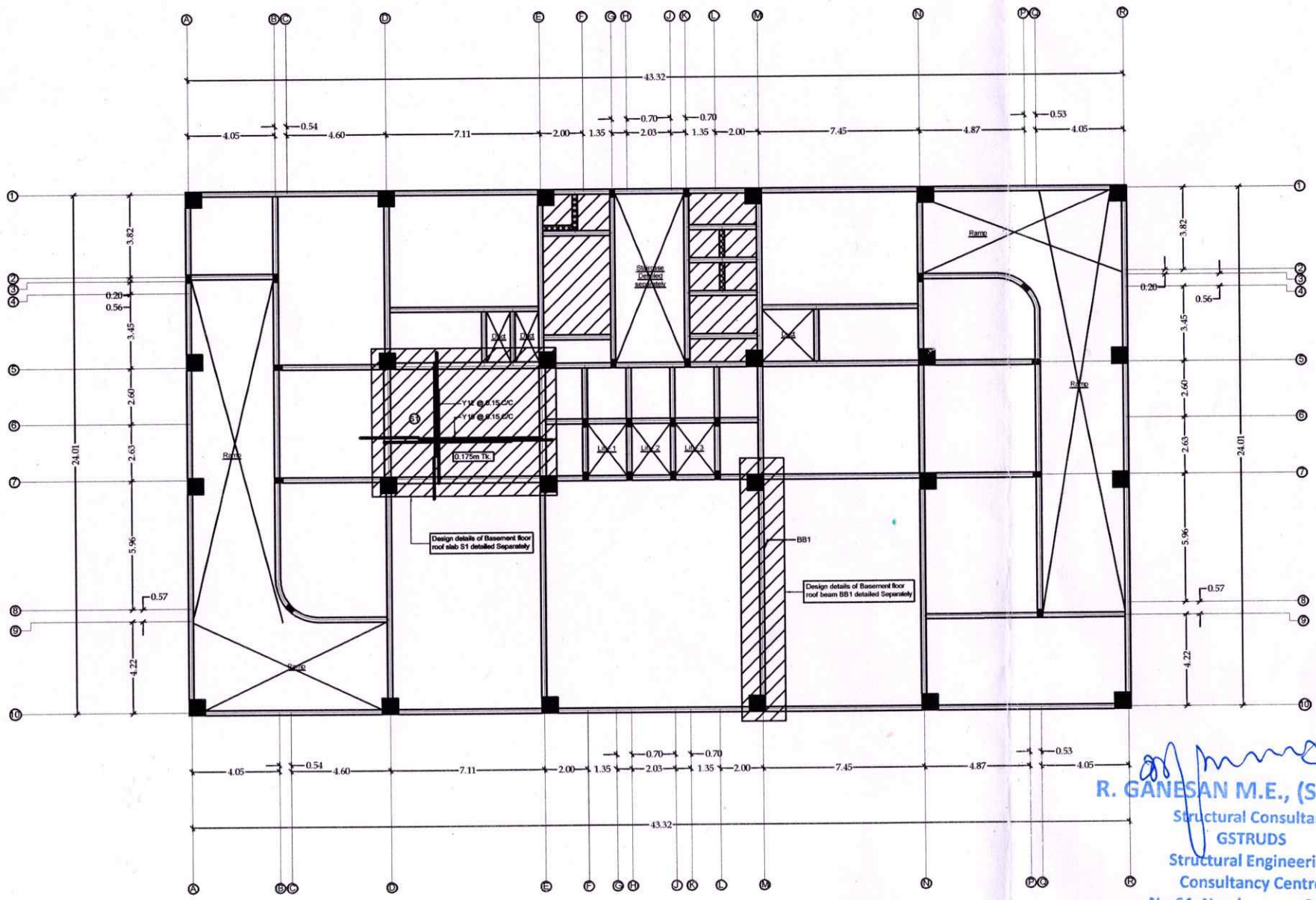
Foundation Layout



R. GANESAN M.E., (Structres)
Structural Consultant
GSTRUDS
Structural Engineering
Consultancy Centre
No:64, Nandavanam Street,
Indra Nagar, L.I.C Colony,
Trichy - 620 021. Ph: 0431-4024691
Email: ganesan _ struct@ rediffmail.com
LPA REG NO: SE/Gr/TLPA/MAY2019/029

- Regular Column
- Column to be terminated at Basement Floor - 1
- Column to be terminated at Basement Floor - 2
- Stub Column

Basement Floor - 2 Roof Beam Layout.



R. GANESAN M.E., (Structres)
Structural Consultant
GSTRUDS
Structural Engineering
Consultancy Centre
No:64, Nandavanam Street,
Indra Nagar, L.I.C Colony,
Trichy - 620 021. Ph: 0431-4024691
Email: ganesan _ struct@ rediffmail.com
LPA REG NO: SE/Gr/TLPA/MAY2019/029

- Regular Column	- Column to be terminated at Basement Floor - 1	- Column to be terminated at Basement Floor - 2	- Stub Column	- Sunken by beam bottom

DIRECTORATE OF TOWN AND COUNTRY PLANNING

(Government of Tamil Nadu)
(807 Anna Salai, Chennai 600 002)

TIRUCHIRAPPALLI LOCAL PLANNING AUTHORITY

(Kajamalai Main road, Kajamalai, Tiruchy 620 023)

PROFESSIONAL REGISTRATION CERTIFICATE

This is to certify that Thiru **R.GANESAN** has enrolled as **STRUCTURAL ENGINEER GRADE-I** with this office who has the qualification of **M.E., in Structural Engineering** and experience in the relevant field for 29 years.

He has been given the Registration No.**SE/Gr.I/TLPA/May2019/029** on **08.05.2019.**

He shall be required to comply with the duties and responsibilities prescribed by the Government of Tamil Nadu in Part V, "Registration of Professionals", Tamil Nadu Combined Development and Building Rules 2019, approved vide G.O (Ms) No.18 MAWS (MA1) Department dated 4.2.2019.

This Registration is valid up to 07.05.2024

09 MAY 2019

Member Secretary,
Tiruchirappalli Local Planning Authority,
Tiruchirappalli

our services doesn't just end there

Buying & Selling Services

Property Buying Assistance, Property Selling Support, Market Price Analysis, Owner Outreach and Negotiation.

Legal & Documentation Services

Certified EC, Patta, legal opinions, property verification, due diligence, litigation solutions, and legal heir certificates.

Property Development & Approvals

Building plan approvals, construction, layout and sub-division approvals, zone conversion, and occupancy certification.

NRI & Investment Services

Escrow Services, Rentals, Litigation Solutions, Property Valuation and Property Management

Compliance & Special Services

Demolition, Vaasthu checks, regularization of unauthorized buildings, and office space solutions.

empowering your real estate decisions with smart tools

Property Valuation & Cost Estimation

Guideline Value, Apartment Composite Value, Stamp Duty & Registration Fees Calculator, Building Value Calculator, Capital Gains Calculator, Area Unit Converter, Length Unit Converter

Ownership, Compliance & Legal Verification

Encumbrance Certificate (EC) Search, Find Your SRO, Temple Property Check, WAQF Property Check, View Patta/Chitta, View FMB, Patta Analyzer, EC Analyzer

Zoning & Land Use Analysis

Land Use Zone Finder, CRZ Zone Check, Aquifer Zone Check, CBA Check, EWS Check, Road Width Check, Proposed Road Widening Check, FSI Calculator

Property Documentation & Workflow Tools

Forms & Templates, Document Generator, Document Translation, Dictionary

Vastu & Property Management Tools

Home Vastu Shastra, Plot Vastu Shastra, Property Management

Verified RealEstate™

We're honored to be part of your real estate journey

3/350/2 Mettukuppam,
OMR Thoraipakkam,
Chennai, India

hello@verified.realestate
+91 9996 12 9996
www.verified.realestate