DESIGN OF A G+2 RESIDENTIAL BUILDING

A REPORT

Of

Self Home Design

on

SDD Lab

By

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PROBLEM STATEMENT:

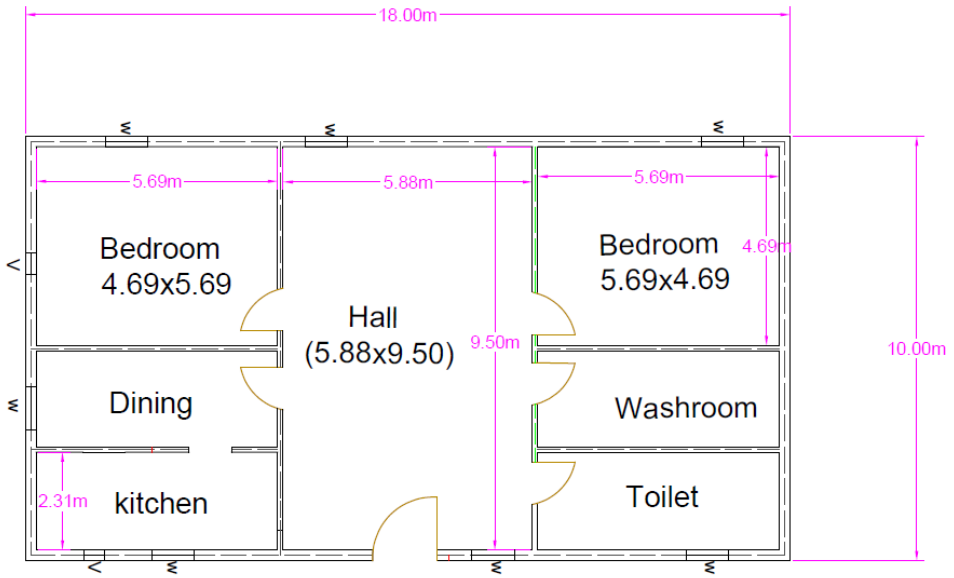
To fix a Building plan of a Residential Building –

- **Land area –** 200 m^2 s
- **Built up area –**180 – 200m^2 (187 m^2 provided by me)
- **Building Type –** Special Moment resisting Framed RCC structure with brick walls
- **Location of the Building –** Kolkata, West Bengal (hometown)
- **Terrain -** sloping rocky terrain of grey and pink granites.
- **Wind zone velocity**- 50 m/s (from IS 875 part 3 -1987)
- **Seismic zone** – III (from Is 1893 part 1)
- **Dimensions of various utilities considered-**
  MAIN DOOR – 1.5m x 2.1m
  ROOM DOORS – 1.1m x 2.1m, 1.0m x 2.1m, 0.9m x 2.1m, 0.8m x 2.1m
  WINDOWS – 1m x 1m
  VENTILATORS – 0.5m x 0.5m
- **Concrete Grade** – M30
- **P**.C.C. – 1:3:6 (M15)
- **Steel Grade** – Fe500
- **Externel walls** – 250mm
- **Internal walls** – 125mm

FUNCTIONAL PLAN:

Note:

All measurments are written in meters.
All dimensions are in meters.
Door dimension : 1mx2.1m.
all ventilaters :0.5mx0.5m.
all windows : 1mx1m.

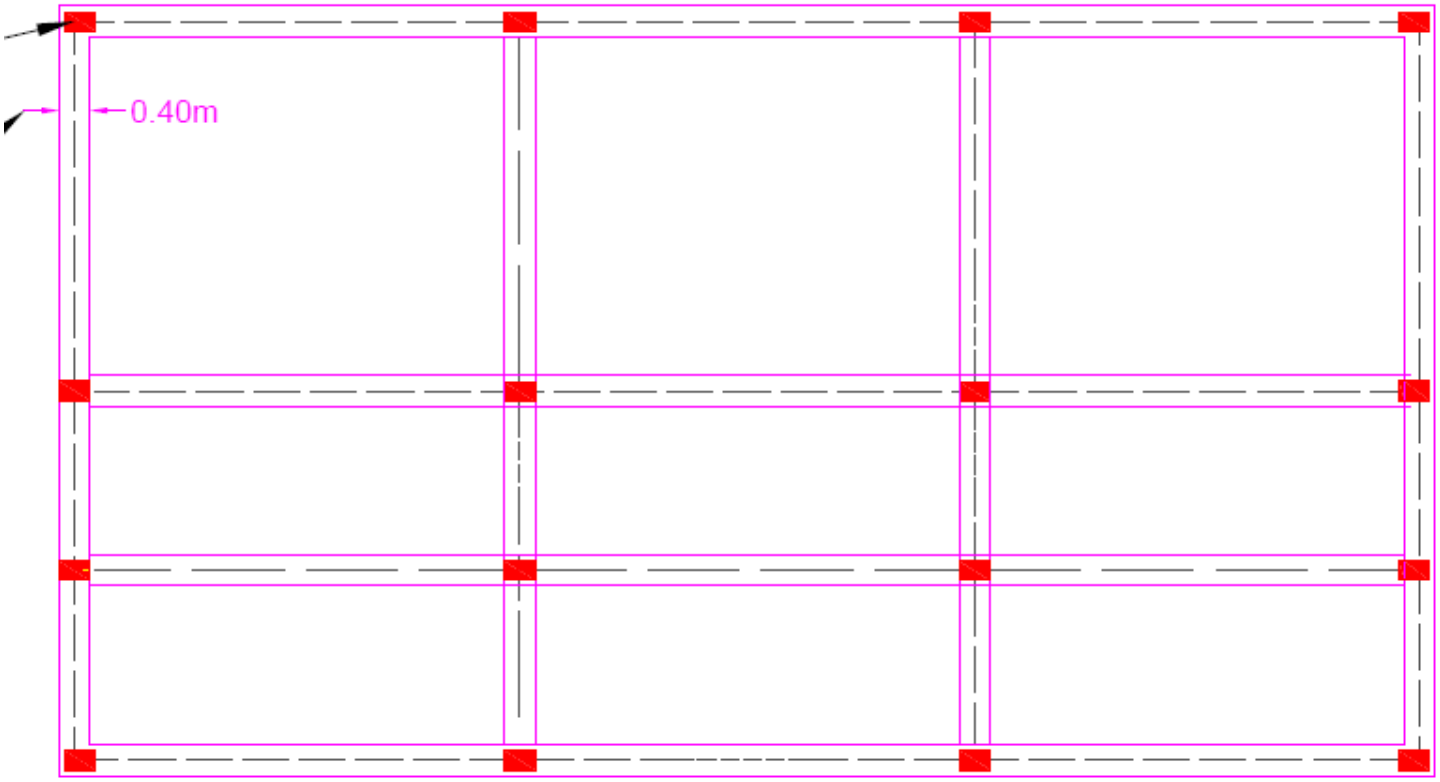


Plan layout

This is the functional plan for the residential building

The external walls are 250mm thick (full brick) and the internal walls are 125mm thick (half brick).

BEAM-COLUMN LAYOUT:

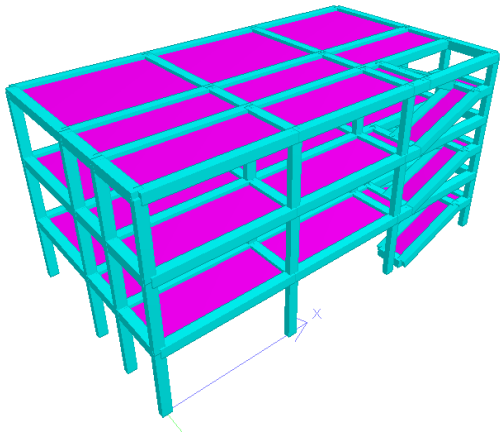


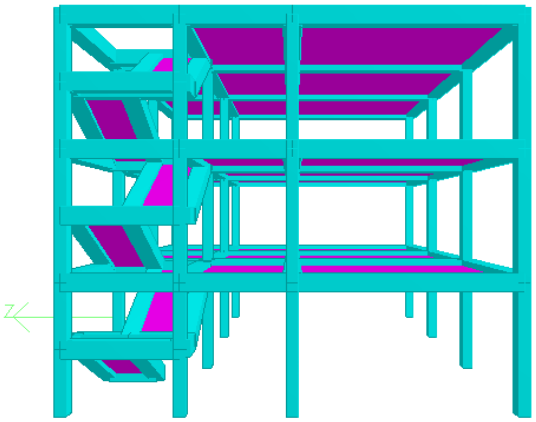
Beam layout

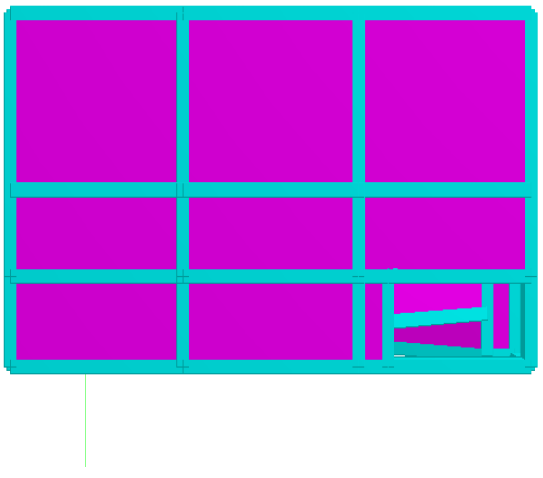
This is the BEAM-COLUMN grid layout

3-D MODEL OF THE STRUCTURE:

These are the various views of the 3D model of the building structure designed.







CALCULATION OF LOADS ON THE STRUCTURE:

1. Dead Load:

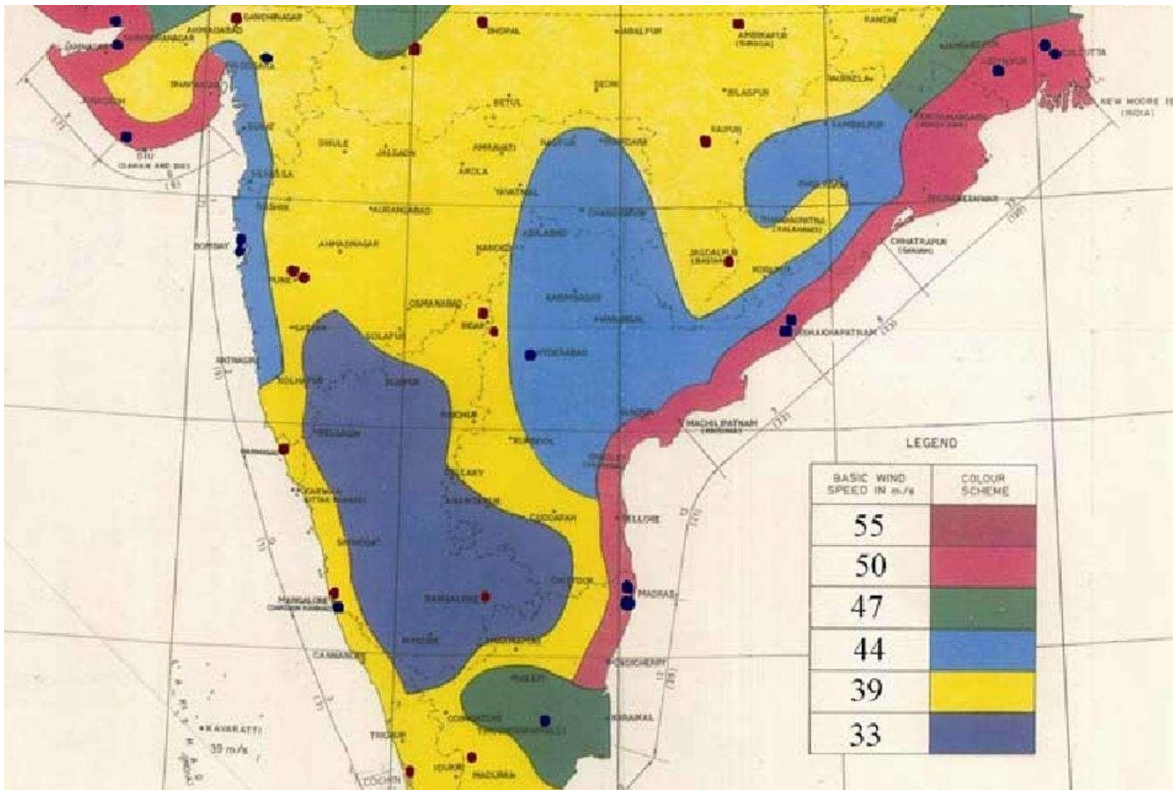
- **Dead load of the slab =** 0.125 x 25 = 3.125kN/m^2
- **Floor load =** 1kN/m^2
- **Self-weight intensity of beam (400mm*400mm) =** 0.4*0.4*25 = 4kN/m
- **Self-weight of column (300mm*400mm) =** 0.3*0.4*3*25 = 9kN
  (unit weight of concrete = 25kN/m^3)

2. Live Load:

- **Assumed live load =** 2.5kN/m^2 (since, on accessible roof)

3. Wind Load: (All design considerations are based on **IS 875 (Part 3): 2015**)

Basic Wind Speed (V_b)= 50 m/s (considering the structure located in Kolkata)



Map for Basic wind speed in m/s (based on 50 year return period)
(from IS875 part 3)

Design wind speed (V_z) = V_b x K_1 x K_2 x K_3 x K_4

V_z = Design wind speed at height z, in m/s;

K_1 = Probability factor;

K_2 = Terrain roughness and height factor;

K_3 = Topography factor

K_4 = Importance factor for the cyclonic region

K_1 = 1, K_2 = 0.8, K_3 = 1, K_4 = 1 (Based on various tables in IS 875(Part 3) 1987for height of the building < 10m)

Design wind speed (V_z) = 50 x 1 x 0.8 x 1 x 1 = **40m/s**

Up to building height of 10m we consider that there is no variation in the windspeed**.**

Basic wind pressure (P_z) = 0.6 $(V_z)^2$

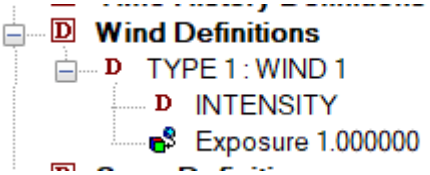
= 0.6 x $(50)^2$

Intensity(I) on staad pro= 9.6KN/m^2 and height is 10m.

Exposure= 1

Intensity vs. Height

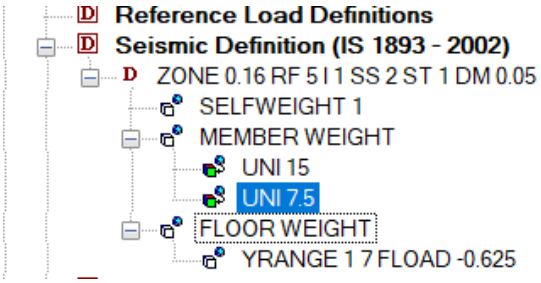
	Int (kN/m²)	Height (m)
1	0.960	10.000
2		



4. Seismic Load:

-

Zone-3



LL=2.5 kN/m^2

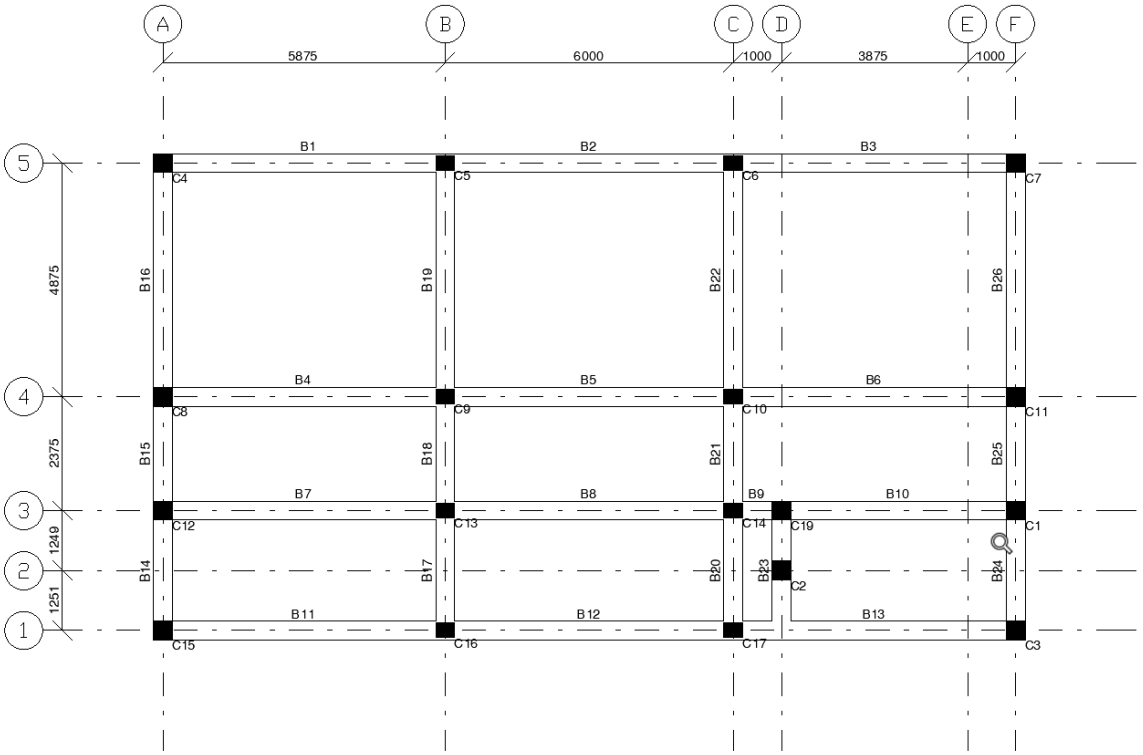
Floor weight is 25% of LL Taken so 0.25 x 2.5 = 0.625 kN/m^2

BEAM DESIGN:-

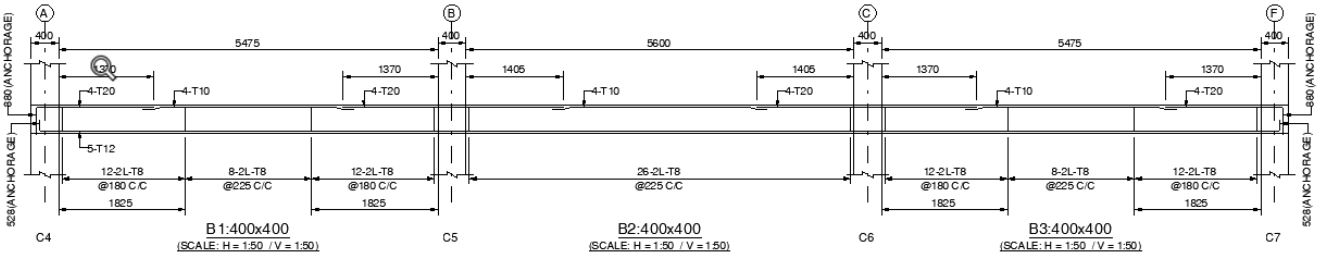
Design

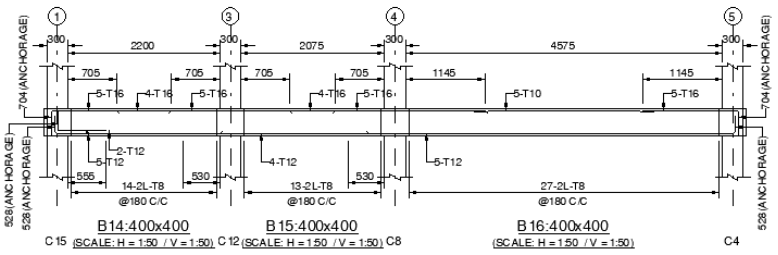
GRP	Beam	Type	Size mm	Material	Bottom Left	Bottom Mid	Bottom Right	Top Left	Top Mid	Top Right	Shear Left	Shear Mid	Shear Right	SFR	Diagonal
G1	B1	Reg	400 x 400	M30:Fe500	5-T12	5-T12	5-T12	4-T20	4-T10	4-T20	2L-T8 @ 180	2L-T8 @ 225	2L-T8 @ 180	-	-
	B2	Reg	400 x 400	M30:Fe500	5-T12	5-T12	5-T12	4-T20	4-T10	4-T20	2L-T8 @ 225	2L-T8 @ 225	2L-T8 @ 225	-	-
	B3	Reg	400 x 400	M30:Fe500	5-T12	5-T12	5-T12	4-T20	4-T10	4-T20	2L-T8 @ 180	2L-T8 @ 225	2L-T8 @ 180	-	-
G2	B4	Reg	400 x 400	M30:Fe500	5-T12	5-T12	5-T12	5-T16	5-T10	5-T16	2L-T8 @ 180	2L-T8 @ 225	2L-T8 @ 180	-	-
	B5	Reg	400 x 400	M30:Fe500	5-T12	5-T12	5-T12	5-T16	5-T10	5-T16	2L-T8 @ 225	2L-T8 @ 225	2L-T8 @ 225	-	-
	B6	Reg	400 x 400	M30:Fe500	5-T12	5-T12	5-T12	5-T16	5-T10	5-T16	2L-T8 @ 180	2L-T8 @ 225	2L-T8 @ 180	-	-
G3	B7	Reg	400 x 400	M30:Fe500	4-T12	4-T12	4-T12	3-T20	3-T20	3-T20	2L-T8 @ 180	2L-T8 @ 225	2L-T8 @ 180	-	-
	B8	Reg	400 x 400	M30:Fe500	5-T10	5-T10	5-T10	3-T20	3-T20	3-T25	2L-T8 @ 180	2L-T8 @ 225	2L-T8 @ 180	-	-
	B9	Reg	400 x 400	M30:Fe500	4-T12	4-T12	4-T12	3-T25	3-T20	3-T20	2L-T10 @ 115	2L-T10 @ 115	2L-T10 @ 110	-	-
	B10	Reg	400 x 400	M30:Fe500	5-T10	5-T10	5-T10	3-T20	3-T20	3-T20	2L-T8 @ 225	2L-T8 @ 225	2L-T8 @ 225	-	-
G4	B11	Reg	400 x 400	M30:Fe500	4-T12	4-T12	4-T12	3-T20	3-T20	3-T25	2L-T8 @ 225	2L-T8 @ 225	2L-T8 @ 180	-	-
	B12	Reg	400 x 400	M30:Fe500	4-T12	4-T12	4-T12	3-T25	3-T20	3-T25	2L-T8 @ 180	2L-T8 @ 225	2L-T8 @ 180	-	-
	B13	Reg	400 x 400	M30:Fe500	4-T12	4-T12	4-T12	3-T25	3-T20	3-T20	2L-T8 @ 85	2L-T8 @ 180	2L-T8 @ 180	-	-
G5	B14	Reg	400 x 400	M30:Fe500	5-T12 2-T12	5-T12	5-T12	5-T16	4-T16	5-T16	2L-T8 @ 180	2L-T8 @ 180	2L-T8 @ 180	-	-
	B15	Reg	400 x 400	M30:Fe500	4-T12	4-T12	4-T12	5-T16	4-T16	5-T16	2L-T8 @ 180	2L-T8 @ 180	2L-T8 @ 180	-	-
	B16	Reg	400 x 400	M30:Fe500	5-T12	5-T12	5-T12	5-T16	5-T10	5-T16	2L-T8 @ 180	2L-T8 @ 180	2L-T8 @ 180	-	-
G6	B17	Reg	400 x 400	M30:Fe500	5-T12	5-T12	5-T12	4-T16	4-T12	4-T12	2L-T8 @ 180	2L-T8 @ 180	2L-T8 @ 180	-	-
	B18	Reg	400 x 400	M30:Fe500	4-T12	4-T12	4-T12	4-T12	4-T12	4-T16	2L-T8 @ 180	2L-T8 @ 225	2L-T8 @ 225	-	-
	B19	Reg	400 x 400	M30:Fe500	4-T12	4-T12	4-T12	4-T16	4-T10	4-T16	2L-T8 @ 180	2L-T8 @ 225	2L-T8 @ 180	-	-
G7	B20	Reg	400 x 400	M30:Fe500	4-T12	4-T12	4-T12	4-T16	4-T12	4-T12	2L-T8 @ 180	2L-T8 @ 180	2L-T8 @ 180	-	-
	B21	Reg	400 x 400	M30:Fe500	4-T12	4-T12	4-T12	4-T12	4-T12	4-T16	2L-T8 @ 180	2L-T8 @ 225	2L-T8 @ 225	-	-
	B22	Reg	400 x 400	M30:Fe500	4-T12	4-T12	4-T12	4-T16	4-T10	4-T16	2L-T8 @ 180	2L-T8 @ 225	2L-T8 @ 180	-	-
G9	B24	Reg	400 x 400	M30:Fe500	5-T12 2-T12	5-T12	5-T12	5-T16	4-T16	5-T16	2L-T8 @ 180	2L-T8 @ 180	2L-T8 @ 180	-	-
	B25	Reg	400 x 400	M30:Fe500	5-T12	5-T12	5-T12	5-T16	4-T16	5-T16	2L-T8 @ 180	2L-T8 @ 180	2L-T8 @ 180	-	-
	B26	Reg	400 x 400	M30:Fe500	4-T12	4-T12	4-T12	5-T16	5-T10	5-T16	2L-T8 @ 180	2L-T8 @ 180	2L-T8 @ 180	-	-

Beam layout-plan

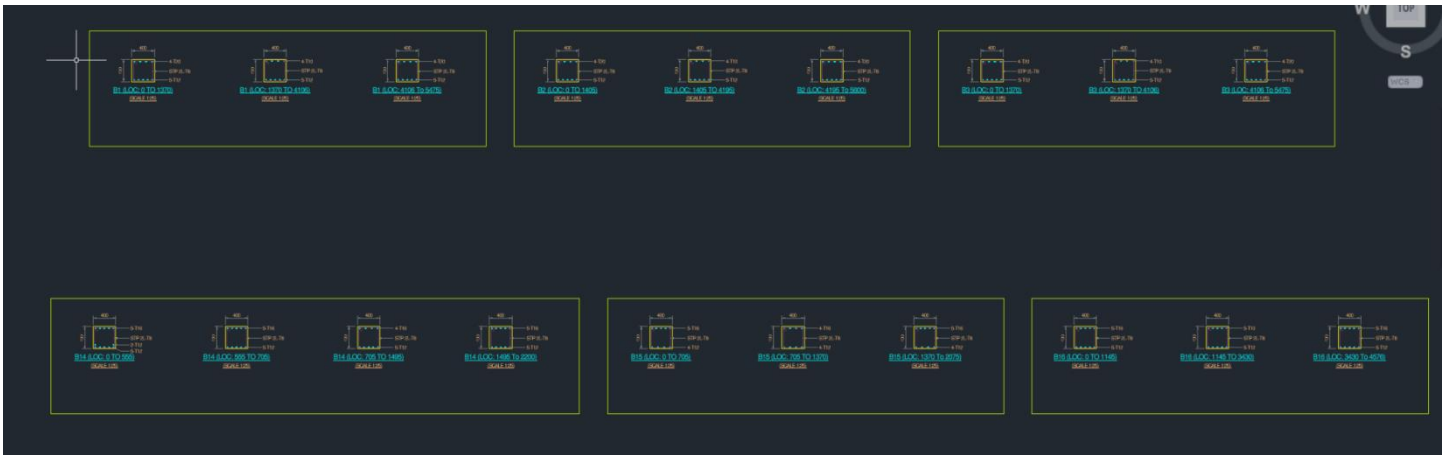


Beam elevation:-





Beam cross section



BEAM DESIGN SUMMARY

Project Name	:	Unassigned
Client Name	:	Unassigned
Engineer Name	:	Unassigned
Design File	:	D:\report\beam rcdc.rcdx
Analysis File	:	D:\staadpro\22CE02010_report.std
Analysis Last Modified	:	2/18/2025 7:20:31 PM
Level Designed	:	3 m

Beam No		:	**B1**	
Group No		:	**G1**	
Analysis Reference(Member)	3 m	:	63	
Breadth		:	400	mm
Depth		:	400	mm
Concrete Grade		:	M30	N/sqmm
Grade Of Steel (Main)		:	Fe500	N/sqmm
Grade Of Steel (Shear)		:	Fe500	N/sqmm
Top/Bottom Clear Cover		:	25	mm
Side Clear Cover		:	25	mm
Design Code		:	IS 456 : 2000 + IS 13920 : 2016	
Beam Type		:	Regular Beam	

Flexure Design

	Beam Bottom			Beam Top		
	Left	**Mid**	**Right**	**Left**	**Mid**	**Right**
Mud (kNm)	28.44	72.99	14.22	133.39	11.52	150.04
PtClc (%)	0.2	0.376	0.2	0.734	0.2	0.844
AstCalc (sqmm)	276	519.05	276	1013.49	276	1164.32
Ast Prv (sqmm)	565.5	565.5	565.5	1256.64	314.16	1256.64
Reinforcement	5-T12	5-T12	5-T12	4-T20	4-T10	4-T20

Shear Design

	Left	**Mid**	**Right**
Vut (kN)	120.26	57.26	123.24
Asv Torsion (sqmm/m)	427.4	209.64	415.14
Asv Reqd (sqmm/m)	443.15	443.15	443.15
Asv Prv (sqmm/m)	558.56	446.84	558.56
Reinforcement	2L-T8 @ 180	2L-T8 @ 225	2L-T8 @ 180

SFR : -

Beam No	:	**B2**
Group No	:	**G1**

Analysis Reference(Member)	3 m	:	64	
Breadth		:	400	mm
Depth		:	400	mm
Concrete Grade		:	M30	N/sqmm
Grade Of Steel (Main)		:	Fe500	N/sqmm
Grade Of Steel (Shear)		:	Fe500	N/sqmm
Top/Bottom Clear Cover		:	25	mm
Side Clear Cover		:	25	mm
Design Code		:	IS 456 : 2000 + IS 13920 : 2016	
Beam Type		:	Regular Beam	

Flexure Design

	Beam Bottom			Beam Top		
	Left	**Mid**	**Right**	**Left**	**Mid**	**Right**
Mud (kNm)	10.33	68.22	11.03	145.1	10.25	143.18
PtClc (%)	0.2	0.35	0.2	0.811	0.2	0.798
AstCalc (sqmm)	276	482.91	276	1118.73	276	1101.27
Ast Prv (sqmm)	565.5	565.5	565.5	1256.64	314.16	1256.64
Reinforcement	5-T12	5-T12	5-T12	4-T20	4-T10	4-T20

Shear Design

	Left	**Mid**	**Right**
Vut (kN)	121.56	53.1	120.74
Asv Torsion (sqmm/m)	-	185.36	-
Asv Reqd (sqmm/m)	443.15	443.15	443.15
Asv Prv (sqmm/m)	446.84	446.84	446.84
Reinforcement	2L-T8 @ 225	2L-T8 @ 225	2L-T8 @ 225

SFR : -

Beam No		**:**	**B3**	
Group No		**:**	**G1**	
Analysis Reference(Member)	3 m	:	65	
Breadth		:	400	mm
Depth		:	400	mm
Concrete Grade		:	M30	N/sqmm
Grade Of Steel (Main)		:	Fe500	N/sqmm
Grade Of Steel (Shear)		:	Fe500	N/sqmm
Top/Bottom Clear Cover		:	25	mm
Side Clear Cover		:	25	mm
Design Code		:	IS 456 : 2000 + IS 13920 : 2016	
Beam Type		:	Regular Beam	

Flexure Design

	Beam Bottom			Beam Top		
	Left	**Mid**	**Right**	**Left**	**Mid**	**Right**
Mud (kNm)	13.23	73.25	29.43	152.08	12	130.97
PtClc (%)	0.2	0.378	0.2	0.857	0.2	0.719
AstCalc (sqmm)	276	521.07	276	1183.29	276	992.15
Ast Prv (sqmm)	565.5	565.5	565.5	1256.64	314.16	1256.64
Reinforcement	5-T12	5-T12	5-T12	4-T20	4-T10	4-T20

Shear Design

	Left	**Mid**	**Right**
Vut (kN)	124.54	62.07	118.95
Asv Torsion (sqmm/m)	420.32	214.49	421.28
Asv Reqd (sqmm/m)	443.15	443.15	443.15
Asv Prv (sqmm/m)	558.56	446.84	558.56
Reinforcement	2L-T8 @ 180	2L-T8 @ 225	2L-T8 @ 180

SFR : -

Beam No		**:**	**B4**	
Group No		**:**	**G2**	
Analysis Reference(Member)	3 m	:	51	
Breadth		:	400	mm
Depth		:	400	mm
Concrete Grade		:	M30	N/sqmm
Grade Of Steel (Main)		:	Fe500	N/sqmm
Grade Of Steel (Shear)		:	Fe500	N/sqmm
Top/Bottom Clear Cover		:	25	mm
Side Clear Cover		:	25	mm
Design Code		:	IS 456 : 2000 + IS 13920 : 2016	
Beam Type		:	Regular Beam	

Flexure Design

	Beam Bottom			Beam Top		
	Left	**Mid**	**Right**	**Left**	**Mid**	**Right**
Mud (kNm)	19.56	70.84	7.68	105.47	6.52	123.99
PtClc (%)	0.2	0.364	0.2	0.562	0.2	0.675
AstCalc (sqmm)	276	502.74	276	775.87	276	931.54
Ast Prv (sqmm)	565.5	565.5	565.5	1005.3	392.7	1005.3
Reinforcement	5-T12	5-T12	5-T12	5-T16	5-T10	5-T16

Shear Design

	Left	**Mid**	**Right**

Vut (kN)	105	44.1	113.35
Asv Torsion (sqmm/m)	350.14	146.33	377.84
Asv Reqd (sqmm/m)	443.15	443.15	443.15
Asv Prv (sqmm/m)	558.56	446.84	558.56
Reinforcement	2L-T8 @ 180	2L-T8 @ 225	2L-T8 @ 180

SFR : -

Beam No		:	**B5**	
Group No		:	**G2**	
Analysis Reference(Member)	3 m	:	59	
Breadth		:	400	mm
Depth		:	400	mm
Concrete Grade		:	M30	N/sqmm
Grade Of Steel (Main)		:	Fe500	N/sqmm
Grade Of Steel (Shear)		:	Fe500	N/sqmm
Top/Bottom Clear Cover		:	25	mm
Side Clear Cover		:	25	mm
Design Code		:	IS 456 : 2000 + IS 13920 : 2016	
Beam Type		:	Regular Beam	

Flexure Design

	Beam Bottom			Beam Top		
	Left	**Mid**	**Right**	**Left**	**Mid**	**Right**
Mud (kNm)	3.94	65.79	3.46	126.08	5.57	123.95
PtClc (%)	0.2	0.337	0.2	0.688	0.2	0.675
AstCalc (sqmm)	276	464.61	276	949.57	276	931.16
Ast Prv (sqmm)	565.5	565.5	565.5	1005.3	392.7	1005.3
Reinforcement	5-T12	5-T12	5-T12	5-T16	5-T10	5-T16

Shear Design

	Left	**Mid**	**Right**
Vut (kN)	111.75	44.69	111.04
Asv Reqd (sqmm/m)	443.15	443.15	443.15
Asv Prv (sqmm/m)	446.84	446.84	446.84
Reinforcement	2L-T8 @ 225	2L-T8 @ 225	2L-T8 @ 225

SFR : -

Beam No		:	**B6**
Group No		:	**G2**
Analysis Reference(Member)	3 m	:	62

Breadth	:	400	mm
Depth	:	400	mm
Concrete Grade	:	M30	N/sqmm
Grade Of Steel (Main)	:	Fe500	N/sqmm
Grade Of Steel (Shear)	:	Fe500	N/sqmm
Top/Bottom Clear Cover	:	25	mm
Side Clear Cover	:	25	mm
Design Code	:	IS 456 : 2000 + IS 13920 : 2016	
Beam Type	:	Regular Beam	

Flexure Design

	Beam Bottom			Beam Top		
	Left	**Mid**	**Right**	**Left**	**Mid**	**Right**
Mud (kNm)	6.26	71.06	21.62	126.36	6.34	105.02
PtClc (%)	0.2	0.365	0.2	0.69	0.2	0.56
AstCalc (sqmm)	276	504.37	276	951.95	276	772.13
Ast Prv (sqmm)	565.5	565.5	565.5	1005.3	392.7	1005.3
Reinforcement	5-T12	5-T12	5-T12	5-T16	5-T10	5-T16

Shear Design

	Left	**Mid**	**Right**
Vut (kN)	114.58	53.68	104.65
Asv Torsion (sqmm/m)	383.2	178.98	350.27
Asv Reqd (sqmm/m)	443.15	443.15	443.15
Asv Prv (sqmm/m)	558.56	446.84	558.56
Reinforcement	2L-T8 @ 180	2L-T8 @ 225	2L-T8 @ 180

SFR : -

Beam No		:	**B7**	
Group No		:	**G3**	
Analysis Reference(Member)	3 m	:	54	
Breadth		:	400	mm
Depth		:	400	mm
Concrete Grade		:	M30	N/sqmm
Grade Of Steel (Main)		:	Fe500	N/sqmm
Grade Of Steel (Shear)		:	Fe500	N/sqmm
Top/Bottom Clear Cover		:	25	mm
Side Clear Cover		:	25	mm
Design Code		:	IS 456 : 2000 + IS 13920 : 2016	
Beam Type		:	Regular Beam	

Flexure Design

	Beam Bottom			Beam Top		
	Left	**Mid**	**Right**	**Left**	**Mid**	**Right**
Mud (kNm)	17.4	59.59	7.59	95.1	5.16	107.72
PtClc (%)	0.2	0.303	0.2	0.501	0.2	0.576
AstCalc (sqmm)	276	418.27	276	691.75	276	794.37
Ast Prv (sqmm)	452.4	452.4	452.4	942.48	942.48	942.48
Reinforcement	4-T12	4-T12	4-T12	3-T20	3-T20	3-T20

Shear Design

	Left	**Mid**	**Right**
Vut (kN)	94.73	36.52	101.76
Asv Torsion (sqmm/m)	320.05	130.29	343.65
Asv Reqd (sqmm/m)	443.15	443.15	443.15
Asv Prv (sqmm/m)	558.56	446.84	558.56
Reinforcement	2L-T8 @ 180	2L-T8 @ 225	2L-T8 @ 180

SFR : -

Beam No		:	**B8**	
Group No		:	**G3**	
Analysis Reference(Member)	3 m	:	56	
Breadth		:	400	mm
Depth		:	400	mm
Concrete Grade		:	M30	N/sqmm
Grade Of Steel (Main)		:	Fe500	N/sqmm
Grade Of Steel (Shear)		:	Fe500	N/sqmm
Top/Bottom Clear Cover		:	25	mm
Side Clear Cover		:	25	mm
Design Code		:	IS 456 : 2000 + IS 13920 : 2016	
Beam Type		:	Regular Beam	

Flexure Design

	Beam Bottom			Beam Top		
	Left	**Mid**	**Right**	**Left**	**Mid**	**Right**
Mud (kNm)	2.95	54.59	0.39	110.42	4.88	108.74
PtClc (%)	0.2	0.276	0.2	0.592	0.2	0.582
AstCalc (sqmm)	276	381.39	276	816.76	276	802.81
Ast Prv (sqmm)	392.7	392.7	392.7	942.48	942.48	1472.61
Reinforcement	5-T10	5-T10	5-T10	3-T20	3-T20	3-T25

Shear Design

	Left	**Mid**	**Right**
Vut (kN)	101.26	38.84	100.7

Asv Torsion (sqmm/m)	343.17	133.6	346.65
Asv Reqd (sqmm/m)	443.15	443.15	443.15
Asv Prv (sqmm/m)	558.56	446.84	558.56
Reinforcement	2L-T8 @ 180	2L-T8 @ 225	2L-T8 @ 180

SFR : -

Beam No		:	**B9**	
Group No		:	**G3**	
Analysis Reference(Member)	3 m	:	58	
Breadth		:	400	mm
Depth		:	400	mm
Concrete Grade		:	M30	N/sqmm
Grade Of Steel (Main)		:	Fe500	N/sqmm
Grade Of Steel (Shear)		:	Fe500	N/sqmm
Top/Bottom Clear Cover		:	25	mm
Side Clear Cover		:	25	mm
Design Code		:	IS 456 : 2000 + IS 13920 : 2016	
Beam Type		:	Regular Beam	

Flexure Design

	Beam Bottom			Beam Top		
	Left	**Mid**	**Right**	**Left**	**Mid**	**Right**
Mud (kNm)	31.43	16.82	61.21	172.63	113.72	39.02
PtClc (%)	0.2	0.2	0.312	1.002	0.612	0.2
AstCalc (sqmm)	276	276	430.31	1382.12	844.3	276
Ast Prv (sqmm)	452.4	452.4	452.4	1472.61	942.48	942.48
Reinforcement	4-T12	4-T12	4-T12	3-T25	3-T20	3-T20

Shear Design

	Left	**Mid**	**Right**
Vut (kN)	241.6	241.6	232.77
Asv Torsion (sqmm/m)	854.8	840.88	811.23
Asv Reqd (sqmm/m)	1314.3	1314.3	1408.69
Asv Prv (sqmm/m)	1365.91	1365.91	1428
Reinforcement	2L-T10 @ 115	2L-T10 @ 115	2L-T10 @ 110

SFR : -

Beam No		:	**B10**
Group No		:	**G3**
Analysis Reference(Member)	3 m	:	188

Breadth	:	400	mm
Depth	:	400	mm
Concrete Grade	:	M30	N/sqmm
Grade Of Steel (Main)	:	Fe500	N/sqmm
Grade Of Steel (Shear)	:	Fe500	N/sqmm
Top/Bottom Clear Cover	:	25	mm
Side Clear Cover	:	25	mm
Design Code	:	IS 456 : 2000 + IS 13920 : 2016	
Beam Type	:	Regular Beam	

Flexure Design

	Beam Bottom			Beam Top		
	Left	**Mid**	**Right**	**Left**	**Mid**	**Right**
Mud (kNm)	31.43	54.94	13.24	34.77	15.63	91.21
PtClc (%)	0.2	0.278	0.2	0.2	0.2	0.479
AstCalc (sqmm)	276	383.98	276	276	276	660.78
Ast Prv (sqmm)	392.7	392.7	392.7	942.48	942.48	942.48
Reinforcement	5-T10	5-T10	5-T10	3-T20	3-T20	3-T20

Shear Design

	Left	**Mid**	**Right**
Vut (kN)	72.99	36.42	90.46
Asv Torsion (sqmm/m)	-	152.41	-
Asv Reqd (sqmm/m)	443.15	443.15	443.15
Asv Prv (sqmm/m)	446.84	446.84	446.84
Reinforcement	2L-T8 @ 225	2L-T8 @ 225	2L-T8 @ 225

SFR : -

Beam No		**:**	**B11**	
Group No		**:**	**G4**	
Analysis Reference(Member)	3 m	:	69	
Breadth		:	400	mm
Depth		:	400	mm
Concrete Grade		:	M30	N/sqmm
Grade Of Steel (Main)		:	Fe500	N/sqmm
Grade Of Steel (Shear)		:	Fe500	N/sqmm
Top/Bottom Clear Cover		:	25	mm
Side Clear Cover		:	25	mm
Design Code		:	IS 456 : 2000 + IS 13920 : 2016	
Beam Type		:	Regular Beam	

Flexure Design

	Beam Bottom			Beam Top		
	Left	**Mid**	**Right**	**Left**	**Mid**	**Right**
Mud (kNm)	16.24	61.72	4.99	106.53	4.54	125.78
PtClc (%)	0.2	0.315	0.2	0.569	0.2	0.686
AstCalc (sqmm)	276	434.12	276	784.55	276	946.99
Ast Prv (sqmm)	452.4	452.4	452.4	942.48	942.48	1472.61
Reinforcement	4-T12	4-T12	4-T12	3-T20	3-T20	3-T25

Shear Design

	Left	**Mid**	**Right**
Vut (kN)	103.01	40.58	111.26
Asv Torsion (sqmm/m)	-	144.14	-
Asv Reqd (sqmm/m)	443.15	443.15	443.15
Asv Prv (sqmm/m)	446.84	446.84	558.56
Reinforcement	2L-T8 @ 225	2L-T8 @ 225	2L-T8 @ 180

SFR : -

Beam No		:	**B12**	
Group No		:	**G4**	
Analysis Reference(Member)	3 m	:	70	
Breadth		:	400	mm
Depth		:	400	mm
Concrete Grade		:	M30	N/sqmm
Grade Of Steel (Main)		:	Fe500	N/sqmm
Grade Of Steel (Shear)		:	Fe500	N/sqmm
Top/Bottom Clear Cover		:	25	mm
Side Clear Cover		:	25	mm
Design Code		:	IS 456 : 2000 + IS 13920 : 2016	
Beam Type		:	Regular Beam	

Flexure Design

	Beam Bottom			Beam Top		
	Left	**Mid**	**Right**	**Left**	**Mid**	**Right**
Mud (kNm)	3.1	56.24	1.83	120.82	4.83	118.01
PtClc (%)	0.2	0.285	0.2	0.655	0.2	0.638
AstCalc (sqmm)	276	393.58	276	904.32	276	880.42
Ast Prv (sqmm)	452.4	452.4	452.4	1472.61	942.48	1472.61
Reinforcement	4-T12	4-T12	4-T12	3-T25	3-T20	3-T25

Shear Design

	Left	**Mid**	**Right**
Vut (kN)	110.06	45.05	110.4

Asv Torsion (sqmm/m)	377.3	169.95	378.45
Asv Reqd (sqmm/m)	443.15	443.15	443.15
Asv Prv (sqmm/m)	558.56	446.84	558.56
Reinforcement	2L-T8 @ 180	2L-T8 @ 225	2L-T8 @ 180

SFR : -

Beam No		:	**B13**	
Group No		:	**G4**	
Analysis Reference(Member)	3 m	:	71,187	
Breadth		:	400	mm
Depth		:	400	mm
Concrete Grade		:	M30	N/sqmm
Grade Of Steel (Main)		:	Fe500	N/sqmm
Grade Of Steel (Shear)		:	Fe500	N/sqmm
Top/Bottom Clear Cover		:	25	mm
Side Clear Cover		:	25	mm
Design Code		:	IS 456 : 2000 + IS 13920 : 2016	
Beam Type		:	Regular Beam	

Flexure Design

	Beam Bottom			Beam Top		
	Left	**Mid**	**Right**	**Left**	**Mid**	**Right**
Mud (kNm)	43.83	61.84	28.62	166.94	15.02	101.85
PtClc (%)	0.22	0.315	0.2	0.961	0.2	0.541
AstCalc (sqmm)	303.23	435.06	276	1325.65	276	746.23
Ast Prv (sqmm)	452.4	452.4	452.4	1472.61	942.48	942.48
Reinforcement	4-T12	4-T12	4-T12	3-T25	3-T20	3-T20

Shear Design

	Left	**Mid**	**Right**
Vut (kN)	203.34	73.98	118.99
Asv Torsion (sqmm/m)	-	325.81	467.18
Asv Reqd (sqmm/m)	1172.44	443.15	443.15
Asv Prv (sqmm/m)	1182.82	558.56	558.56
Reinforcement	2L-T8 @ 85	2L-T8 @ 180	2L-T8 @ 180

SFR : -

Beam No		:	**B14**
Group No		:	**G5**
Analysis Reference(Member)	3 m	:	68

Breadth	:	400	mm
Depth	:	400	mm
Concrete Grade	:	M30	N/sqmm
Grade Of Steel (Main)	:	Fe500	N/sqmm
Grade Of Steel (Shear)	:	Fe500	N/sqmm
Top/Bottom Clear Cover	:	25	mm
Side Clear Cover	:	25	mm
Design Code	:	IS 456 : 2000 + IS 13920 : 2016	
Beam Type	:	Regular Beam	

Flexure Design

	Beam Bottom			Beam Top		
	Left	**Mid**	**Right**	**Left**	**Mid**	**Right**
Mud (kNm)	86.94	59.44	63.16	110.42	53.62	82.8
PtClc (%)	0.454	0.302	0.322	0.592	0.271	0.431
AstCalc (sqmm)	627.02	417.2	444.92	816.73	374.32	594.67
Ast Prv (sqmm)	791.7	565.5	565.5	1005.3	804.24	1005.3
Reinforcement	5-T12 2-T12	5-T12	5-T12	5-T16	4-T16	5-T16

Shear Design

	Left	**Mid**	**Right**
Vut (kN)	119.44	94.54	108.3
Asv Torsion (sqmm/m)	445.61	363.01	373.85
Asv Reqd (sqmm/m)	443.15	443.15	443.15
Asv Prv (sqmm/m)	558.56	558.56	558.56
Reinforcement	2L-T8 @ 180	2L-T8 @ 180	2L-T8 @ 180

SFR : -

Beam No		:	**B15**	
Group No		:	**G5**	
Analysis Reference(Member)	3 m	:	67	
Breadth		:	400	mm
Depth		:	400	mm
Concrete Grade		:	M30	N/sqmm
Grade Of Steel (Main)		:	Fe500	N/sqmm
Grade Of Steel (Shear)		:	Fe500	N/sqmm
Top/Bottom Clear Cover		:	25	mm
Side Clear Cover		:	25	mm
Design Code		:	IS 456 : 2000 + IS 13920 : 2016	
Beam Type		:	Regular Beam	

Flexure Design

	Beam Bottom			Beam Top		
	Left	**Mid**	**Right**	**Left**	**Mid**	**Right**
Mud (kNm)	52.19	28.9	44.2	72.7	47.44	99.39
PtClc (%)	0.264	0.2	0.222	0.375	0.239	0.526
AstCalc (sqmm)	363.85	276	305.85	516.83	329.27	726.29
Ast Prv (sqmm)	452.4	452.4	452.4	1005.3	804.24	1005.3
Reinforcement	4-T12	4-T12	4-T12	5-T16	4-T16	5-T16

Shear Design

	Left	**Mid**	**Right**
Vut (kN)	81.65	81.78	105.37
Asv Torsion (sqmm/m)	276.47	297.9	376.15
Asv Reqd (sqmm/m)	443.15	443.15	443.15
Asv Prv (sqmm/m)	558.56	558.56	558.56
Reinforcement	2L-T8 @ 180	2L-T8 @ 180	2L-T8 @ 180

SFR : -

Beam No		:	**B16**	
Group No		:	**G5**	
Analysis Reference(Member)	3 m	:	66	
Breadth		:	400	mm
Depth		:	400	mm
Concrete Grade		:	M30	N/sqmm
Grade Of Steel (Main)		:	Fe500	N/sqmm
Grade Of Steel (Shear)		:	Fe500	N/sqmm
Top/Bottom Clear Cover		:	25	mm
Side Clear Cover		:	25	mm
Design Code		:	IS 456 : 2000 + IS 13920 : 2016	
Beam Type		:	Regular Beam	

Flexure Design

	Beam Bottom			Beam Top		
	Left	**Mid**	**Right**	**Left**	**Mid**	**Right**
Mud (kNm)	31.23	68.08	55.11	120.95	28.93	125.98
PtClc (%)	0.2	0.349	0.279	0.656	0.2	0.687
AstCalc (sqmm)	276	481.83	385.23	905.42	276	948.66
Ast Prv (sqmm)	565.5	565.5	565.5	1005.3	392.7	1005.3
Reinforcement	5-T12	5-T12	5-T12	5-T16	5-T10	5-T16

Shear Design

	Left	**Mid**	**Right**
Vut (kN)	114.88	63.67	114.66

Asv Torsion (sqmm/m)	391.45	218.7	407.52
Asv Reqd (sqmm/m)	443.15	443.15	443.15
Asv Prv (sqmm/m)	558.56	558.56	558.56
Reinforcement	2L-T8 @ 180	2L-T8 @ 180	2L-T8 @ 180

SFR : -

Beam No		:	**B17**	
Group No		:	**G6**	
Analysis Reference(Member)	3 m	:	52	
Breadth		:	400	mm
Depth		:	400	mm
Concrete Grade		:	M30	N/sqmm
Grade Of Steel (Main)		:	Fe500	N/sqmm
Grade Of Steel (Shear)		:	Fe500	N/sqmm
Top/Bottom Clear Cover		:	25	mm
Side Clear Cover		:	25	mm
Design Code		:	IS 456 : 2000 + IS 13920 : 2016	
Beam Type		:	Regular Beam	

Flexure Design

	Beam Bottom			Beam Top		
	Left	**Mid**	**Right**	**Left**	**Mid**	**Right**
Mud (kNm)	65.82	45.4	44.05	81.79	39.26	61.48
PtClc (%)	0.337	0.228	0.221	0.425	0.2	0.313
AstCalc (sqmm)	464.79	314.53	304.76	586.76	276	432.33
Ast Prv (sqmm)	565.5	565.5	565.5	804.24	452.4	452.4
Reinforcement	5-T12	5-T12	5-T12	4-T16	4-T12	4-T12

Shear Design

	Left	**Mid**	**Right**
Vut (kN)	79.2	62.39	79.34
Asv Torsion (sqmm/m)	270.73	210.1	265.68
Asv Reqd (sqmm/m)	443.15	443.15	443.15
Asv Prv (sqmm/m)	558.56	558.56	558.56
Reinforcement	2L-T8 @ 180	2L-T8 @ 180	2L-T8 @ 180

SFR : -

Beam No		:	**B18**
Group No		:	**G6**
Analysis Reference(Member)	3 m	:	55

Breadth	:	400	mm
Depth	:	400	mm
Concrete Grade	:	M30	N/sqmm
Grade Of Steel (Main)	:	Fe500	N/sqmm
Grade Of Steel (Shear)	:	Fe500	N/sqmm
Top/Bottom Clear Cover	:	25	mm
Side Clear Cover	:	25	mm
Design Code	:	IS 456 : 2000 + IS 13920 : 2016	
Beam Type	:	Regular Beam	

Flexure Design

	Beam Bottom			Beam Top		
	Left	**Mid**	**Right**	**Left**	**Mid**	**Right**
Mud (kNm)	36.17	19.5	31.81	55.81	34.34	72.35
PtClc (%)	0.2	0.2	0.2	0.283	0.2	0.373
AstCalc (sqmm)	276	276	276	390.4	276	514.21
Ast Prv (sqmm)	452.4	452.4	452.4	452.4	452.4	804.24
Reinforcement	4-T12	4-T12	4-T12	4-T12	4-T12	4-T16

Shear Design

	Left	**Mid**	**Right**
Vut (kN)	61.01	56.55	72.53
Asv Torsion (sqmm/m)	206.18	193.49	249
Asv Reqd (sqmm/m)	443.15	443.15	443.15
Asv Prv (sqmm/m)	558.56	446.84	446.84
Reinforcement	2L-T8 @ 180	2L-T8 @ 225	2L-T8 @ 225

SFR : -

Beam No		:	**B19**	
Group No		:	**G6**	
Analysis Reference(Member)	3 m	:	60	
Breadth		:	400	mm
Depth		:	400	mm
Concrete Grade		:	M30	N/sqmm
Grade Of Steel (Main)		:	Fe500	N/sqmm
Grade Of Steel (Shear)		:	Fe500	N/sqmm
Top/Bottom Clear Cover		:	25	mm
Side Clear Cover		:	25	mm
Design Code		:	IS 456 : 2000 + IS 13920 : 2016	
Beam Type		:	Regular Beam	

Flexure Design

	Beam Bottom			Beam Top		
	Left	**Mid**	**Right**	**Left**	**Mid**	**Right**
Mud (kNm)	22.31	60.54	42.91	99.96	21.31	103.63
PtClc (%)	0.2	0.308	0.215	0.53	0.2	0.551
AstCalc (sqmm)	276	425.34	296.6	730.92	276	760.73
Ast Prv (sqmm)	452.4	452.4	452.4	804.24	314.16	804.24
Reinforcement	4-T12	4-T12	4-T12	4-T16	4-T10	4-T16

Shear Design

	Left	**Mid**	**Right**
Vut (kN)	94.61	56.75	88.14
Asv Torsion (sqmm/m)	-	193.59	-
Asv Reqd (sqmm/m)	443.15	443.15	443.15
Asv Prv (sqmm/m)	558.56	446.84	558.56
Reinforcement	2L-T8 @ 180	2L-T8 @ 225	2L-T8 @ 180

SFR : -

Beam No		**:**	**B20**	
Group No		**:**	**G7**	
Analysis Reference(Member)	3 m	:	234	
Breadth		:	400	mm
Depth		:	400	mm
Concrete Grade		:	M30	N/sqmm
Grade Of Steel (Main)		:	Fe500	N/sqmm
Grade Of Steel (Shear)		:	Fe500	N/sqmm
Top/Bottom Clear Cover		:	25	mm
Side Clear Cover		:	25	mm
Design Code		:	IS 456 : 2000 + IS 13920 : 2016	
Beam Type		:	Regular Beam	

Flexure Design

	Beam Bottom			Beam Top		
	Left	**Mid**	**Right**	**Left**	**Mid**	**Right**
Mud (kNm)	56.32	41.29	39.71	70.75	34.2	51.39
PtClc (%)	0.286	0.207	0.2	0.364	0.2	0.259
AstCalc (sqmm)	394.13	285.01	276	502.03	276	357.99
Ast Prv (sqmm)	452.4	452.4	452.4	804.24	452.4	452.4
Reinforcement	4-T12	4-T12	4-T12	4-T16	4-T12	4-T12

Shear Design

	Left	**Mid**	**Right**
Vut (kN)	79.76	62.87	75.69

Asv Torsion (sqmm/m)	300.77	240.93	273.2
Asv Reqd (sqmm/m)	443.15	443.15	443.15
Asv Prv (sqmm/m)	558.56	558.56	558.56
Reinforcement	2L-T8 @ 180	2L-T8 @ 180	2L-T8 @ 180

SFR : -

Beam No		:	**B21**	
Group No		:	**G7**	
Analysis Reference(Member)	3 m	:	61	
Breadth		:	400	mm
Depth		:	400	mm
Concrete Grade		:	M30	N/sqmm
Grade Of Steel (Main)		:	Fe500	N/sqmm
Grade Of Steel (Shear)		:	Fe500	N/sqmm
Top/Bottom Clear Cover		:	25	mm
Side Clear Cover		:	25	mm
Design Code		:	IS 456 : 2000 + IS 13920 : 2016	
Beam Type		:	Regular Beam	

Flexure Design

	Beam Bottom			Beam Top		
	Left	**Mid**	**Right**	**Left**	**Mid**	**Right**
Mud (kNm)	35.3	19.7	26.39	54.76	33.03	70.19
PtClc (%)	0.2	0.2	0.2	0.277	0.2	0.361
AstCalc (sqmm)	276	276	276	382.63	276	497.8
Ast Prv (sqmm)	452.4	452.4	452.4	452.4	452.4	804.24
Reinforcement	4-T12	4-T12	4-T12	4-T12	4-T12	4-T16

Shear Design

	Left	**Mid**	**Right**
Vut (kN)	59.61	56.85	72.82
Asv Torsion (sqmm/m)	206.73	199.27	254.97
Asv Reqd (sqmm/m)	443.15	443.15	443.15
Asv Prv (sqmm/m)	558.56	446.84	446.84
Reinforcement	2L-T8 @ 180	2L-T8 @ 225	2L-T8 @ 225

SFR : -

Beam No		:	**B22**
Group No		:	**G7**
Analysis Reference(Member)	3 m	:	53

Breadth	:	400	mm
Depth	:	400	mm
Concrete Grade	:	M30	N/sqmm
Grade Of Steel (Main)	:	Fe500	N/sqmm
Grade Of Steel (Shear)	:	Fe500	N/sqmm
Top/Bottom Clear Cover	:	25	mm
Side Clear Cover	:	25	mm
Design Code	:	IS 456 : 2000 + IS 13920 : 2016	
Beam Type	:	Regular Beam	

Flexure Design

	Beam Bottom			Beam Top		
	Left	**Mid**	**Right**	**Left**	**Mid**	**Right**
Mud (kNm)	17.92	60.57	37.89	94.39	17.03	95.75
PtClc (%)	0.2	0.308	0.2	0.497	0.2	0.505
AstCalc (sqmm)	276	425.59	276	686.09	276	696.99
Ast Prv (sqmm)	452.4	452.4	452.4	804.24	314.16	804.24
Reinforcement	4-T12	4-T12	4-T12	4-T16	4-T10	4-T16

Shear Design

	Left	**Mid**	**Right**
Vut (kN)	95.3	55.01	88.7
Asv Torsion (sqmm/m)	317.91	189.05	296.01
Asv Reqd (sqmm/m)	443.15	443.15	443.15
Asv Prv (sqmm/m)	558.56	446.84	558.56
Reinforcement	2L-T8 @ 180	2L-T8 @ 225	2L-T8 @ 180

SFR : -

Beam No		:	**B24**	
Group No		:	**G9**	
Analysis Reference(Member)	3 m	:	233	
Breadth		:	400	mm
Depth		:	400	mm
Concrete Grade		:	M30	N/sqmm
Grade Of Steel (Main)		:	Fe500	N/sqmm
Grade Of Steel (Shear)		:	Fe500	N/sqmm
Top/Bottom Clear Cover		:	25	mm
Side Clear Cover		:	25	mm
Design Code		:	IS 456 : 2000 + IS 13920 : 2016	
Beam Type		:	Regular Beam	

Flexure Design

	Beam Bottom			Beam Top		
	Left	**Mid**	**Right**	**Left**	**Mid**	**Right**
Mud (kNm)	97.49	68.62	67.92	113.59	55.26	96.15
PtClc (%)	0.515	0.352	0.348	0.611	0.28	0.507
AstCalc (sqmm)	710.97	485.87	480.58	843.19	386.33	700.21
Ast Prv (sqmm)	791.7	565.5	565.5	1005.3	804.24	1005.3
Reinforcement	5-T12 2-T12	5-T12	5-T12	5-T16	4-T16	5-T16

Shear Design

	Left	**Mid**	**Right**
Vut (kN)	111.47	110.41	135.31
Asv Torsion (sqmm/m)	380.33	444	526.6
Asv Reqd (sqmm/m)	443.15	443.15	444.59
Asv Prv (sqmm/m)	558.56	558.56	558.56
Reinforcement	2L-T8 @ 180	2L-T8 @ 180	2L-T8 @ 180

SFR : -

Beam No		**:**	**B25**	
Group No		**:**	**G9**	
Analysis Reference(Member)	3 m	:	73	
Breadth		:	400	mm
Depth		:	400	mm
Concrete Grade		:	M30	N/sqmm
Grade Of Steel (Main)		:	Fe500	N/sqmm
Grade Of Steel (Shear)		:	Fe500	N/sqmm
Top/Bottom Clear Cover		:	25	mm
Side Clear Cover		:	25	mm
Design Code		:	IS 456 : 2000 + IS 13920 : 2016	
Beam Type		:	Regular Beam	

Flexure Design

	Beam Bottom			Beam Top		
	Left	**Mid**	**Right**	**Left**	**Mid**	**Right**
Mud (kNm)	66.75	43.68	31.76	81.76	41.47	93.31
PtClc (%)	0.342	0.219	0.2	0.425	0.207	0.491
AstCalc (sqmm)	471.79	302.11	276	586.56	286.29	677.46
Ast Prv (sqmm)	565.5	565.5	565.5	1005.3	804.24	1005.3
Reinforcement	5-T12	5-T12	5-T12	5-T16	4-T16	5-T16

Shear Design

	Left	**Mid**	**Right**

Vut (kN)	86.25	89.79	113.38
Asv Torsion (sqmm/m)	314.26	337.01	415.25
Asv Reqd (sqmm/m)	443.15	443.15	443.15
Asv Prv (sqmm/m)	558.56	558.56	558.56
Reinforcement	2L-T8 @ 180	2L-T8 @ 180	2L-T8 @ 180

SFR : -

Beam No		:	**B26**	
Group No		:	**G9**	
Analysis Reference(Member)	3 m	:	72	
Breadth		:	400	mm
Depth		:	400	mm
Concrete Grade		:	M30	N/sqmm
Grade Of Steel (Main)		:	Fe500	N/sqmm
Grade Of Steel (Shear)		:	Fe500	N/sqmm
Top/Bottom Clear Cover		:	25	mm
Side Clear Cover		:	25	mm
Design Code		:	IS 456 : 2000 + IS 13920 : 2016	
Beam Type		:	Regular Beam	

Flexure Design

	Beam Bottom			Beam Top		
	Left	**Mid**	**Right**	**Left**	**Mid**	**Right**
Mud (kNm)	15.07	61.03	38.47	100.95	13.67	97.9
PtClc (%)	0.2	0.311	0.2	0.535	0.2	0.518
AstCalc (sqmm)	276	428.98	276	738.91	276	714.25
Ast Prv (sqmm)	452.4	452.4	452.4	1005.3	392.7	1005.3
Reinforcement	4-T12	4-T12	4-T12	5-T16	5-T10	5-T16

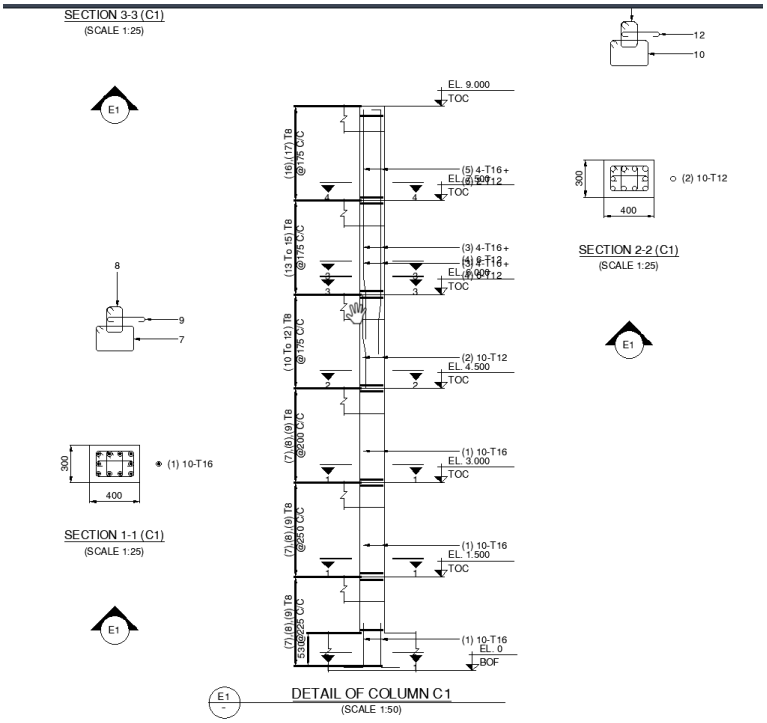
Shear Design

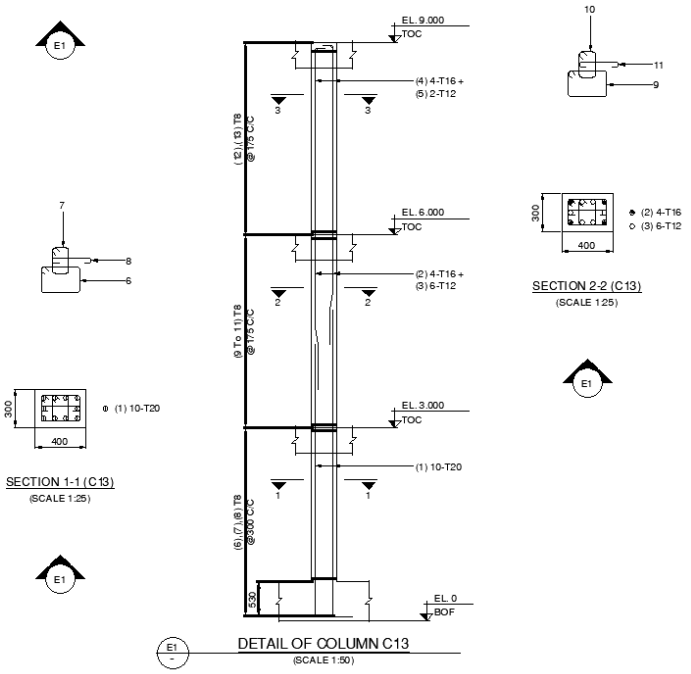
	Left	**Mid**	**Right**
Vut (kN)	109.74	58.53	96.78
Asv Torsion (sqmm/m)	387.5	214.47	325.43
Asv Reqd (sqmm/m)	443.15	443.15	443.15
Asv Prv (sqmm/m)	558.56	558.56	558.56
Reinforcement	2L-T8 @ 180	2L-T8 @ 180	2L-T8 @ 180

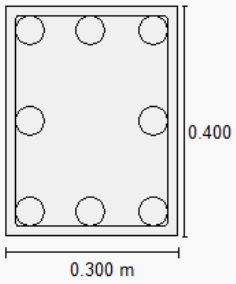
SFR : -

COLUMN DESIGN

Column elevation





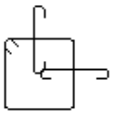
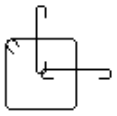
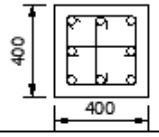
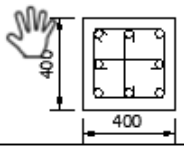
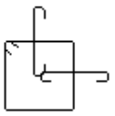
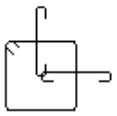
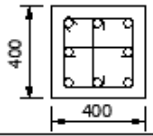
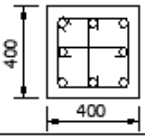


Design Load

Load	37
Location	End 1
Pu(Kns)	60.07
Mz(Kns-Mt)	12.15
My(Kns-Mt)	67.65

Design Parameter

Fy(Mpa)	500
Fc(Mpa)	30
As Reqd(mm2)	1515
As (%)	1.34
Bar Size	16
Bar No	8

3 M	M30 : Fe500 , COVER = 50MM	M30 : Fe500 , COVER = 50MM
		
TO	LINKS	LINKS
	T10 @ 175	T10 @ 175
6 M	 ◇T12	 ◇T12
	8-T12	8-T12
0 M	M30 : Fe500 , COVER = 50MM	M30 : Fe500 , COVER = 50MM
		
TO	LINKS	LINKS
	T10 @ 175	T10 @ 175
3 M	 ◇T12	 ◇T12
	8-T12	8-T12
COLUMN MARKED	C7	C16

COLUMN AND WALL SCHEDULE

(SCALE 1:25)

COLUMN DESIGN SUMMARY

Project Name	:	Unassigned
Client Name	:	Unassigned
Engineer Name	:	Unassigned
Design File	:	D:\report\column rcdc.rcdx
Analysis File	:	D:\staadpro\22CE02010_report.std
Analysis Last Modified	:	2/18/2025 7:20:31 PM

Design Code: IS 456 : 2000 + IS 13920 : 2016

Load Combinations :

L/C No	Analysis No	Load Definition
1	9	1.5 (LOAD 5: DL) +1.5 (LOAD 6: LL)
2	10	1.2 (LOAD 5: DL) +1.2 (LOAD 6: LL) +1.2 (LOAD 7: WLX)
3	11	1.2 (LOAD 5: DL) +1.2 (LOAD 6: LL) +1.2 (LOAD 8: WLZ)
4	12	1.2 (LOAD 5: DL) +1.2 (LOAD 6: LL) -1.2 (LOAD 7: WLX)
5	13	1.2 (LOAD 5: DL) +1.2 (LOAD 6: LL) -1.2 (LOAD 8: WLZ)
6	14	1.2 (LOAD 5: DL) +1.2 (LOAD 6: LL) +1.2 (LOAD 1: EQX+)
7	15	1.2 (LOAD 5: DL) +1.2 (LOAD 6: LL) +1.2 (LOAD 2: EQX-)
8	16	1.2 (LOAD 5: DL) +1.2 (LOAD 6: LL) +1.2 (LOAD 3: EQZ+)
9	17	1.2 (LOAD 5: DL) +1.2 (LOAD 6: LL) +1.2 (LOAD 4: EQZ-)
10	18	1.2 (LOAD 5: DL) +1.2 (LOAD 6: LL) -1.2 (LOAD 1: EQX+)
11	19	1.2 (LOAD 5: DL) +1.2 (LOAD 6: LL) -1.2 (LOAD 2: EQX-)
12	20	1.2 (LOAD 5: DL) +1.2 (LOAD 6: LL) -1.2 (LOAD 3: EQZ+)
13	21	1.2 (LOAD 5: DL) +1.2 (LOAD 6: LL) -1.2 (LOAD 4: EQZ-)
14	22	1.5 (LOAD 5: DL) +1.5 (LOAD 7: WLX)
15	23	1.5 (LOAD 5: DL) +1.5 (LOAD 8: WLZ)
16	24	1.5 (LOAD 5: DL) -1.5 (LOAD 7: WLX)
17	25	1.5 (LOAD 5: DL) -1.5 (LOAD 8: WLZ)
18	26	1.5 (LOAD 5: DL) +1.5 (LOAD 1: EQX+)
19	27	1.5 (LOAD 5: DL) +1.5 (LOAD 2: EQX-)
20	28	1.5 (LOAD 5: DL) +1.5 (LOAD 3: EQZ+)
21	29	1.5 (LOAD 5: DL) +1.5 (LOAD 4: EQZ-)
22	30	1.5 (LOAD 5: DL) -1.5 (LOAD 1: EQX+)
23	31	1.5 (LOAD 5: DL) -1.5 (LOAD 2: EQX-)
24	32	1.5 (LOAD 5: DL) -1.5 (LOAD 3: EQZ+)
25	33	1.5 (LOAD 5: DL) -1.5 (LOAD 4: EQZ-)
26	34	0.9 (LOAD 5: DL) +1.5 (LOAD 1: EQX+)
27	35	0.9 (LOAD 5: DL) +1.5 (LOAD 2: EQX-)
28	36	0.9 (LOAD 5: DL) +1.5 (LOAD 3: EQZ+)
29	37	0.9 (LOAD 5: DL) +1.5 (LOAD 4: EQZ-)
30	38	0.9 (LOAD 5: DL) -1.5 (LOAD 1: EQX+)
31	39	0.9 (LOAD 5: DL) -1.5 (LOAD 2: EQX-)
32	40	0.9 (LOAD 5: DL) -1.5 (LOAD 3: EQZ+)

33	41	0.9 (LOAD 5: DL) -1.5 (LOAD 4: EQZ-)

Levels :

1. FOUNDATION
2. 1.5 m
3. 3 m
4. 4.5 m
5. 6 m
6. 7.5 m
7. 9 m

Column/Wall : **C1**

FrameType : **Non-Ductile**

Level	Size (mm)	Material	LC	Analysis LC No	P (kN)	Mx (kNm)	My (kNm)	Pt (%)	Interaction Ratio	Main Reinforcement	Links
1 TO 2	300 X 400	M30 : Fe500 : Fe500	18	26	903.32	130.57	21.22	1.68	0.96	10-T16	T8 @ 225
2 TO 3	300 X 400	M30 : Fe500 : Fe500	28	36	193.98	-9.71	-85.4	1.68	0.88	10-T16	T8 @ 250
3 TO 4	300 X 400	M30 : Fe500 : Fe500	18	26	522.13	-144.39	-8.73	1.68	0.98	10-T16	T8 @ 200
4 TO 5	300 X 400	M30 : Fe500 : Fe500	28	36	160.65	-13.59	-65.75	0.94	1	10-T12	T8 @ 175
5 TO 6	300 X 400	M30 : Fe500 : Fe500	18	26	195.71	-101.3	-4.11	1.24	0.87	4-T16 + 6-T12	T8 @ 175
6 TO 7	300 X 400	M30 : Fe500 : Fe500	25	33	88.71	-33.79	-45.59	0.86	0.84	4-T16 + 2-T12	T8 @ 175

Column/Wall : **C2**

FrameType : **Non-Ductile**

Level	Size (mm)	Material	LC	Analysis LC No	P (kN)	Mx (kNm)	My (kNm)	Pt (%)	Interaction Ratio	Main Reinforcement	Links
1 TO 2	400 X 400	M30 : Fe500 : Fe500	18	26	-154.52	46.74	-3.21	0.79	0.73	4-T16 + 4-T12	T8 @ 175
2 TO 3	400 X 400	M30 : Fe500 : Fe500	25	33	55.14	21.77	26.79	0.57	0.58	8-T12	T8 @ 175
3 TO 4	400 X 400	M30 : Fe500 : Fe500	24	32	-14.24	-6.53	37.5	0.57	0.6	8-T12	T8 @ 175
4 TO 5	400 X 400	M30 : Fe500 : Fe500	25	33	-71.73	-13.36	-30.28	0.57	0.58	8-T12	T8 @ 175
5 TO 6	400 X 400	M30 : Fe500 : Fe500	24	32	37.2	-6.65	-23.56	0.57	0.34	8-T12	T8 @ 175
6 TO 7	400 X 400	M30 : Fe500 : Fe500	18	26	11.44	19.64	4.31	0.57	0.3	8-T12	T8 @ 175

Column/Wall : **C3**

FrameType : **Non-Ductile**

Level	Size (mm)	Material	LC	Analysis LC No	P (kN)	Mx (kNm)	My (kNm)	Pt (%)	Interaction Ratio	Main Reinforcement	Links
1 TO 2	300 X 400	M30 : Fe500 : Fe500	32	40	-75.86	12.48	-47.06	1.24	0.77	4-T16 + 6-T12	T8 @ 175
2 TO 3	300 X 400	M30 : Fe500 : Fe500	32	40	1.68	-25.14	-65.5	1.24	0.99	4-T16 + 6-T12	T8 @ 175
3 TO 4	300 X 400	M30 : Fe500 : Fe500	32	40	-9.42	-3.94	59.57	1.24	0.89	4-T16 + 6-T12	T8 @ 175
4 TO 5	300 X 400	M30 : Fe500 : Fe500	18	26	369.55	119.94	19.87	1.24	0.96	4-T16 + 6-T12	T8 @ 175
5 TO 6	300 X 400	M30 : Fe500 : Fe500	22	30	59.16	65.04	-6.13	0.94	0.79	10-T12	T8 @ 175
6 TO 7	300 X 400	M30 : Fe500 : Fe500	18	26	58.08	81.1	14.79	1.24	0.82	4-T16 + 6-T12	T8 @ 175

Column/Wall : **C4**

FrameType : **Non-Ductile**

Level	Size (mm)	Material	LC	Analysis LC No	P (kN)	Mx (kNm)	My (kNm)	Pt (%)	Interaction Ratio	Main Reinforcement	Links
2 TO 3	300 X 400	M30 : Fe500 : Fe500	24	32	610.97	0.05	-77.35	3.21	0.96	4-T25 + 6-T20	T8 @ 300
4 TO 5	300 X 400	M30 : Fe500 : Fe500	24	32	350.2	43.3	74.17	1.24	0.97	4-T16 + 6-T12	T8 @ 175
6 TO 7	300 X 400	M30 : Fe500 : Fe500	24	32	104.27	31.37	50.7	1.05	0.82	4-T16 + 4-T12	T8 @ 175

Column/Wall : **C5**

FrameType : **Non-Ductile**

Level	Size (mm)	Material	LC	Analysis LC No	P (kN)	Mx (kNm)	My (kNm)	Pt (%)	Interaction Ratio	Main Reinforcement	Links
2 TO 3	400 X 400	M30 : Fe500 : Fe500	24	32	975.07	20.18	-68.69	1.07	0.93	4-T16 + 8-T12	T8 @ 175
4 TO 5	300 X 400	M30 : Fe500 : Fe500	24	32	574.06	-9.89	70.42	0.57	0.93	6-T12	T8 @ 175
		M30 :									

6 TO 7	300 X 400	Fe500 : Fe500	24	32	191.48	-5.33	54.42	0.86	0.8	4-T16 + 2-T12	T8 @ 175

Column/Wall : **C6**

FrameType : **Non-Ductile**

Level	Size (mm)	Material	LC	Analysis LC No	P (kN)	Mx (kNm)	My (kNm)	Pt (%)	Interaction Ratio	Main Reinforcement	Links
2 TO 3	400 X 400	M30 : Fe500 : Fe500	24	32	962.14	17.95	-58.88	0.79	0.95	4-T16 + 4-T12	T8 @ 175
4 TO 5	300 X 400	M30 : Fe500 : Fe500	24	32	567.7	-6.79	65.45	0.57	0.87	6-T12	T8 @ 175
6 TO 7	300 X 400	M30 : Fe500 : Fe500	24	32	189.15	-5.47	50.74	0.57	0.95	6-T12	T8 @ 175

Column/Wall : **C7**

FrameType : **Non-Ductile**

Level	Size (mm)	Material	LC	Analysis LC No	P (kN)	Mx (kNm)	My (kNm)	Pt (%)	Interaction Ratio	Main Reinforcement	Links
2 TO 3	300 X 400	M30 : Fe500 : Fe500	24	32	587.95	-45.78	45.56	3.21	0.88	4-T25 + 6-T20	T8 @ 300
4 TO 5	300 X 400	M30 : Fe500 : Fe500	24	32	343.97	-52.84	60.85	1.05	0.91	4-T16 + 4-T12	T8 @ 175
6 TO 7	300 X 400	M30 : Fe500 : Fe500	24	32	101.95	-37.91	40.89	0.86	0.79	4-T16 + 2-T12	T8 @ 175

Column/Wall : **C8**

FrameType : **Non-Ductile**

Level	Size (mm)	Material	LC	Analysis LC No	P (kN)	Mx (kNm)	My (kNm)	Pt (%)	Interaction Ratio	Main Reinforcement	Links
2 TO 3	300 X 400	M30 : Fe500 : Fe500	25	33	604.3	30.49	-84.08	3.21	0.9	4-T25 + 6-T20	T8 @ 300
4 TO 5	300 X 400	M30 : Fe500 : Fe500	25	33	362.56	38.78	-93.76	2.05	0.92	4-T20 + 6-T16	T8 @ 250
6 TO 7	300 X 400	M30 : Fe500 : Fe500	25	33	121.62	38.38	-60.87	1.24	0.89	4-T16 + 6-T12	T8 @ 175

Column/Wall : **C9**

FrameType : **Non-Ductile**

Level	Size (mm)	Material	LC	Analysis LC No	P (kN)	Mx (kNm)	My (kNm)	Pt (%)	Interaction Ratio	Main Reinforcement	Links
2 TO 3	300 X 400	M30 : Fe500 : Fe500	25	33	973.19	-6.21	78.29	3.21	0.98	4-T25 + 6-T20	T8 @ 300
4 TO 5	300 X 400	M30 : Fe500 : Fe500	25	33	598.68	4.7	-87.92	1.24	0.92	4-T16 + 6-T12	T8 @ 175
6 TO 7	300 X 400	M30 : Fe500 : Fe500	28	36	142.96	2.7	-56.16	0.86	0.89	4-T16 + 2-T12	T8 @ 175

Column/Wall : **C10**

FrameType : **Non-Ductile**

Level	Size (mm)	Material	LC	Analysis LC No	P (kN)	Mx (kNm)	My (kNm)	Pt (%)	Interaction Ratio	Main Reinforcement	Links
2 TO 3	300 X 400	M30 : Fe500 : Fe500	25	33	972.18	-7.65	68.39	3.21	0.92	4-T25 + 6-T20	T8 @ 300
4 TO 5	300 X 400	M30 : Fe500 : Fe500	25	33	597.41	6.12	-79.95	1.05	0.92	4-T16 + 4-T12	T8 @ 175
6 TO 7	300 X 400	M30 : Fe500 : Fe500	28	36	141.83	3.7	-52.48	0.86	0.83	4-T16 + 2-T12	T8 @ 175

Column/Wall : **C11**

FrameType : **Non-Ductile**

Level	Size (mm)	Material	LC	Analysis LC No	P (kN)	Mx (kNm)	My (kNm)	Pt (%)	Interaction Ratio	Main Reinforcement	Links
2 TO 3	300 X 400	M30 : Fe500 : Fe500	25	33	578.34	-22.55	-58.96	1.68	0.98	10-T16	T8 @ 250
4 TO 5	300 X 400	M30 : Fe500 : Fe500	25	33	361.82	32.82	72.46	1.24	0.91	4-T16 + 6-T12	T8 @ 175
6 TO 7	300 X 400	M30 : Fe500 : Fe500	25	33	115.27	-34.07	-50.22	0.86	0.89	4-T16 + 2-T12	T8 @ 175

Column/Wall : **C12**

FrameType : **Non-Ductile**

Level	Size (mm)	Material	LC	Analysis LC No	P (kN)	Mx (kNm)	My (kNm)	Pt (%)	Interaction Ratio	Main Reinforcement	Links
2 TO 3	300 X 400	M30 : Fe500 : Fe500	24	32	490.21	25.99	75.89	2.05	0.96	4-T20 + 6-T16	T8 @ 250
4 TO 5	300 X 400	M30 : Fe500 : Fe500	25	33	271.4	33.62	-81.28	1.68	0.91	10-T16	T8 @ 250
6 TO 7	300 X 400	M30 : Fe500 : Fe500	25	33	91.33	33	-52.63	1.05	0.86	4-T16 + 4-T12	T8 @ 175

Column/Wall : **C13**

FrameType : **Non-Ductile**

Level	Size (mm)	Material	LC	Analysis LC No	P (kN)	Mx (kNm)	My (kNm)	Pt (%)	Interaction Ratio	Main Reinforcement	Links
2 TO 3	300 X 400	M30 : Fe500 : Fe500	24	32	793.79	0.32	-71.87	2.62	0.93	10-T20	T8 @ 300
4 TO 5	300 X 400	M30 : Fe500 : Fe500	28	36	271.71	-0.51	-76.45	1.24	0.87	4-T16 + 6-T12	T8 @ 175
6 TO 7	300 X 400	M30 : Fe500 : Fe500	28	36	106.94	0.05	-49.65	0.86	0.83	4-T16 + 2-T12	T8 @ 175

Column/Wall : **C14**

FrameType : **Non-Ductile**

Level	Size (mm)	Material	LC	Analysis LC No	P (kN)	Mx (kNm)	My (kNm)	Pt (%)	Interaction Ratio	Main Reinforcement	Links
2 TO 3	300 X 400	M30 : Fe500 : Fe500	24	32	952.48	-5.25	-60.29	2.62	0.93	10-T20	T8 @ 300
4 TO 5	300 X 400	M30 : Fe500 : Fe500	28	36	275.32	-1.72	-64.24	0.86	0.86	4-T16 + 2-T12	T8 @ 175
6 TO 7	300 X 400	M30 : Fe500 : Fe500	28	36	125.87	4.59	-41.92	0.57	0.88	6-T12	T8 @ 175

Column/Wall : **C15**

FrameType : **Non-Ductile**

Level	Size (mm)	Material	LC	Analysis LC No	P (kN)	Mx (kNm)	My (kNm)	Pt (%)	Interaction Ratio	Main Reinforcement	Links

2 TO 3	300 X 400	M30 : Fe500 : Fe500	25	33	545.04	-11.77	76.59	2.62	0.9	10-T20	T8 @ 300
4 TO 5	300 X 400	M30 : Fe500 : Fe500	25	33	297.76	44.19	-65.05	1.24	0.89	4-T16 + 6-T12	T8 @ 175
6 TO 7	300 X 400	M30 : Fe500 : Fe500	25	33	78.93	30.35	-40.64	0.57	0.99	6-T12	T8 @ 175

Column/Wall : **C16**

FrameType : **Non-Ductile**

Level	Size (mm)	Material	LC	Analysis LC No	P (kN)	Mx (kNm)	My (kNm)	Pt (%)	Interaction Ratio	Main Reinforcement	Links
2 TO 3	300 X 400	M30 : Fe500 : Fe500	25	33	822.93	-7	68.84	3.21	0.91	4-T25 + 6-T20	T8 @ 300
4 TO 5	300 X 400	M30 : Fe500 : Fe500	32	40	143.88	5.2	53.51	0.86	0.84	4-T16 + 2-T12	T8 @ 175
6 TO 7	300 X 400	M30 : Fe500 : Fe500	28	36	88.14	-2.33	-38.12	0.57	0.87	6-T12	T8 @ 175

Column/Wall : **C17**

FrameType : **Non-Ductile**

Level	Size (mm)	Material	LC	Analysis LC No	P (kN)	Mx (kNm)	My (kNm)	Pt (%)	Interaction Ratio	Main Reinforcement	Links
2 TO 3	300 X 400	M30 : Fe500 : Fe500	25	33	950.61	0.1	59.9	3.21	0.93	4-T25 + 6-T20	T8 @ 300
4 TO 5	300 X 400	M30 : Fe500 : Fe500	32	40	149.04	4.45	45.49	0.57	0.91	6-T12	T8 @ 175
6 TO 7	300 X 400	M30 : Fe500 : Fe500	25	33	132.9	11.21	-39.34	0.57	0.81	6-T12	T8 @ 175

Column/Wall : **C18**

FrameType : **Non-Ductile**

Level	Size (mm)	Material	LC	Analysis LC No	P (kN)	Mx (kNm)	My (kNm)	Pt (%)	Interaction Ratio	Main Reinforcement	Links
1 TO 2	400 X 400	M30 : Fe500 : Fe500	18	26	-41.66	37.56	-2.26	0.57	0.64	8-T12	T8 @ 175

Column/Wall : **C19**

FrameType : **Non-Ductile**

Level	Size (mm)	Material	LC	Analysis LC No	P (kN)	Mx (kNm)	My (kNm)	Pt (%)	Interaction Ratio	Main Reinforcement	Links
2 TO 3	400 X 400	M30 : Fe500 : Fe500	22	30	-244.2	-66.17	-0.51	1.07	0.83	4-T16 + 8-T12	T8 @ 175

Column/Wall : **C20**

FrameType : **Non-Ductile**

Level	Size (mm)	Material	LC	Analysis LC No	P (kN)	Mx (kNm)	My (kNm)	Pt (%)	Interaction Ratio	Main Reinforcement	Links
3 TO 4	400 X 400	M30 : Fe500 : Fe500	24	32	48.26	-31.66	-40.32	0.57	0.69	8-T12	T8 @ 175

Column/Wall : **C21**

FrameType : **Non-Ductile**

Level	Size (mm)	Material	LC	Analysis LC No	P (kN)	Mx (kNm)	My (kNm)	Pt (%)	Interaction Ratio	Main Reinforcement	Links
4 TO 5	400 X 400	M30 : Fe500 : Fe500	22	30	-155.74	-43.11	7.63	0.79	0.67	4-T16 + 4-T12	T8 @ 175

Column/Wall : **C22**

FrameType : **Non-Ductile**

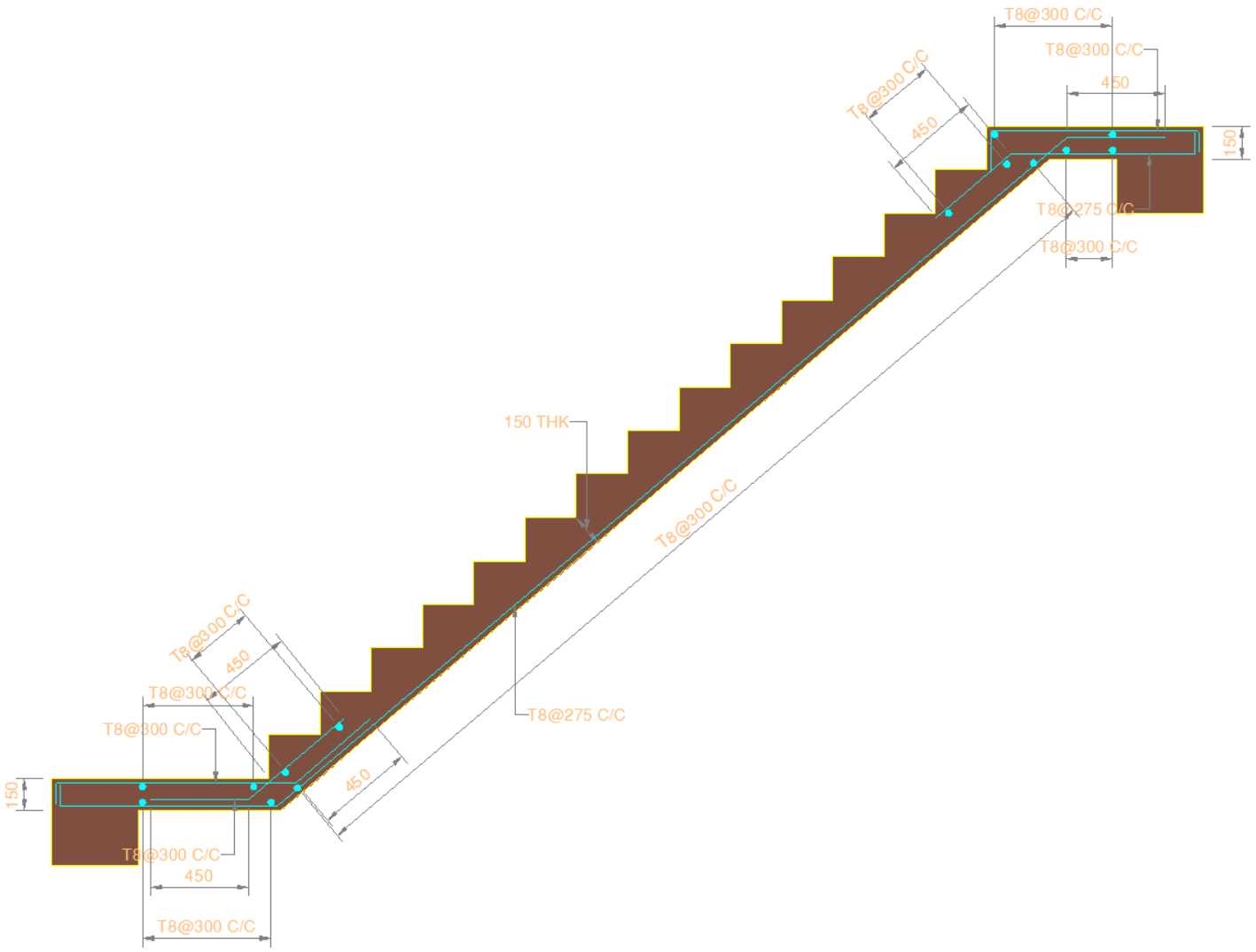
Level	Size (mm)	Material	LC	Analysis LC No	P (kN)	Mx (kNm)	My (kNm)	Pt (%)	Interaction Ratio	Main Reinforcement	Links
5 TO 6	400 X 400	M30 : Fe500 : Fe500	22	30	94.13	-41.89	3.53	0.57	0.54	8-T12	T8 @ 175

Column/Wall : **C23**

FrameType : **Non-Ductile**

Level	Size (mm)	Material	LC	Analysis LC No	P (kN)	Mx (kNm)	My (kNm)	Pt (%)	Interaction Ratio	Main Reinforcement	Links
6 TO 7	400 X 400	M30 : Fe500 : Fe500	22	30	-91.78	-30.13	1.12	0.57	0.6	8-T12	T8 @ 175

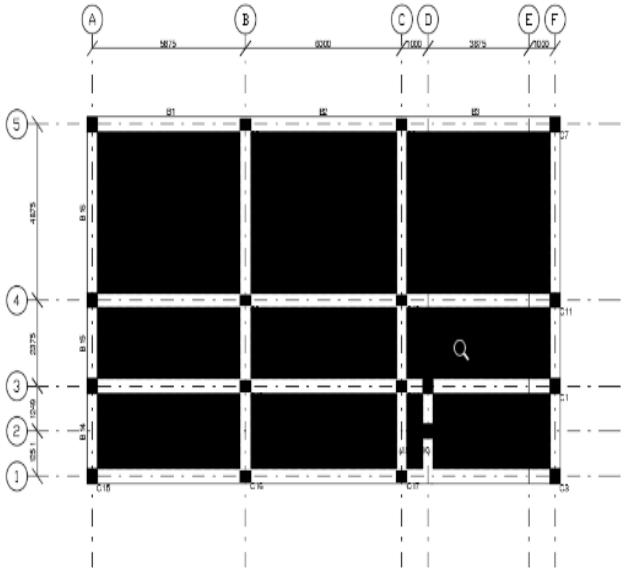
STAIRCASE DESIGN (detailing)



SLAB DESIGN

No	Slab	Thickness (mm)	Conc Grade	Steel Grade	Bottom @ Lx	Bottom @ Ly	Top @ Lx (Cont)	Top @ Lx (End
1	S1	150	M30	Fe500	T8 @ 200	T8 @ 240	T8 @ 300	---
2	S2	150	M30	Fe500	T8 @ 250	T8 @ 275	T8 @ 295	---
3	S3	150	M30	Fe500	T8 @ 200	T8 @ 240	T8 @ 300	---
4	S4	150	M30	Fe500	T8 @ 275	T8 @ 275	T8 @ 300	---
5	S5	150	M30	Fe500	T8 @ 275	T8 @ 275	T8 @ 300	---
6	S6	150	M30	Fe500	T8 @ 275	T8 @ 275	T8 @ 300	---
7	S7	150	M30	Fe500	T8 @ 275	T8 @ 275	T8 @ 300	---
8	S8	150	M30	Fe500	T8 @ 275	T8 @ 275	T8 @ 300	---
9	S9	150	M30	Fe500	T8 @ 275	T8 @ 275	T8 @ 300	---
10	S10	150	M30	Fe500	T8 @ 275	T8 @ 275	T8 @ 300	---

General arrangement plan

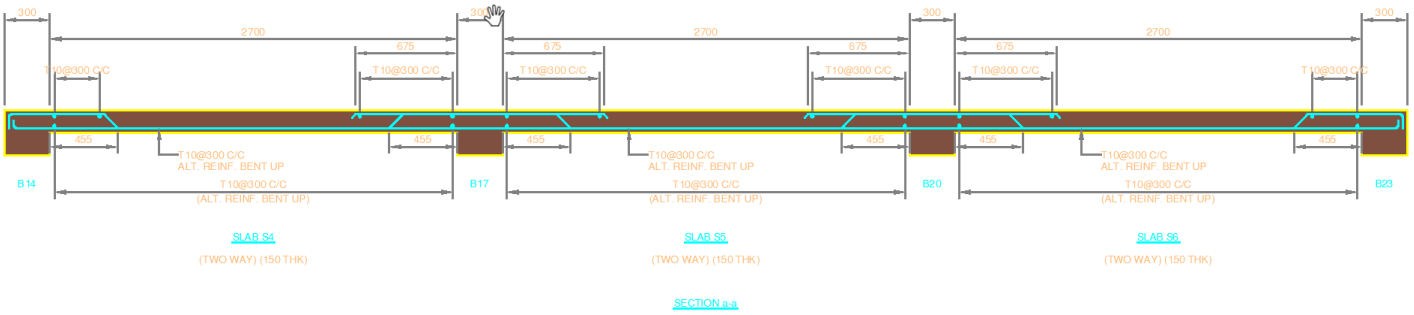


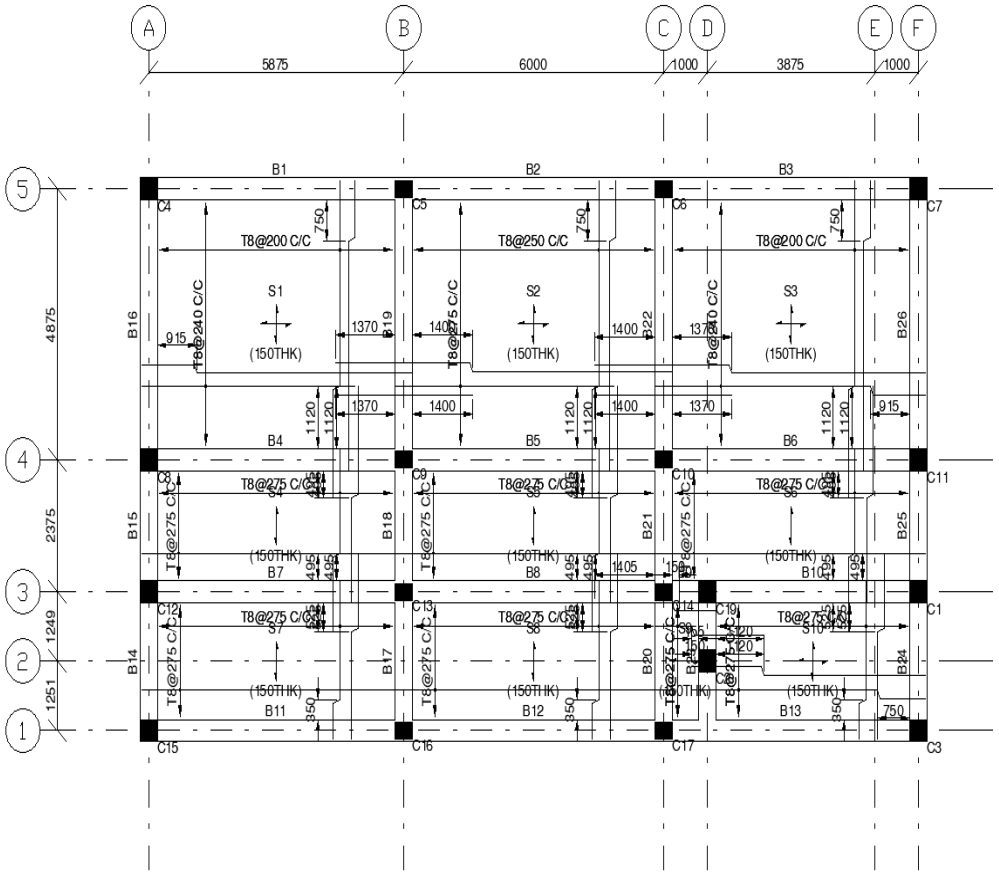
PLAN AT 3 M

BEAM LEGEND

BEAM	SIZE	
	B	D
B1,B2,B3,B4,,B5,B6,B7,B8,B9,B10,B11 B12,B13,B14,B15,B16,B17,B18,B19 B20,B21,B22,B23,B24,,B25,B26	400	400

REINFORCEMENT DETAILING OF SLABS





BENTUP REINFORCEMENT LAYOUT - 3 M
(SCALE: H = 1:100 / V = 1:100)

SLAB DESIGN SUMMARY

Project Name	:	Unassigned
Client Name	:	Unassigned
Engineer Name	:	Unassigned
Design File	:	D:\staadpro\slab rcdc hm.rcdx
Analysis File	:	D:\staadpro\22CE02010_report.std
Analysis Last Modified	:	2/18/2025 7:20:31 PM

Panel Types:

One Way Slab:
1. Simply Supported
2. End Span
3. Span Next to End Span
4. Interior Span

Two Way Slab:
1. Interior Panel
2. One Short Edge Discontinuous
3. One Long Edge Discontinuous
4. Two Adjacent Edges Discontinuous
5. Two Short Edges Discontinuous
6. Two Long Edges Discontinuous
7. Three Edges Discontinuous (One Long Edge Continuous)
8. Three Edges Discontinuous (One Short Edge Continuous)
9. Four Edges Discontinuous
10. Simply Supported On Four Sides

Level: 3 m

Slab No. : **S1**

Ly = 5.87 m	Lx = 4.88 m	
Live Load = 1 kN/sqm	Imposed Load = 2 kN/sqm	
Thickness = 150 mm	Span Type = 2-Way	Panel Type = 4
Design Code = IS 456 : 2000 + IS 13920 : 2016	Grade of Concrete = M30	Grade of Steel = Fe500

Bottom SS	Bottom LS	Top SS	Top LS	Distribution
T8 @ 200	T8 @ 240	T8 @ 300	T8 @ 300	T8 @ 300

Slab No. : **S2**

Ly = 6 m	Lx = 4.88 m

Live Load = 1 kN/sqm	Imposed Load = 2 kN/sqm	
Thickness = 150 mm	Span Type = 2-Way	Panel Type = 3
Design Code = IS 456 : 2000 + IS 13920 : 2016	Grade of Concrete = M30	Grade of Steel = Fe500

Bottom SS	Bottom LS	Top SS	Top LS	Distribution
T8 @ 250	T8 @ 275	T8 @ 295	T8 @ 300	T8 @ 300

Slab No. : **S3**

Ly = 5.87 m	Lx = 4.88 m	
Live Load = 1 kN/sqm	Imposed Load = 2 kN/sqm	
Thickness = 150 mm	Span Type = 2-Way	Panel Type = 4
Design Code = IS 456 : 2000 + IS 13920 : 2016	Grade of Concrete = M30	Grade of Steel = Fe500

Bottom SS	Bottom LS	Top SS	Top LS	Distribution
T8 @ 200	T8 @ 240	T8 @ 300	T8 @ 300	T8 @ 300

Slab No. : **S4**

Ly = 5.87 m	Lx = 2.38 m	
Live Load = 1 kN/sqm	Imposed Load = 2 kN/sqm	
Thickness = 150 mm	Span Type = 1-Way	Panel Type = 3
Design Code = IS 456 : 2000 + IS 13920 : 2016	Grade of Concrete = M30	Grade of Steel = Fe500

Bottom SS	Bottom LS	Top SS	Top LS	Distribution
T8 @ 275	--	T8 @ 300	--	T8 @ 300

Slab No. : **S5**

Ly = 6 m	Lx = 2.38 m	
Live Load = 1 kN/sqm	Imposed Load = 2 kN/sqm	
Thickness = 150 mm	Span Type = 1-Way	Panel Type = 3
Design Code = IS 456 : 2000 + IS 13920 : 2016	Grade of Concrete = M30	Grade of Steel = Fe500

Bottom SS	Bottom LS	Top SS	Top LS	Distribution
T8 @ 275	--	T8 @ 300	--	T8 @ 300

Slab No. : **S6**

Ly = 5.87 m	Lx = 2.38 m	
Live Load = 1 kN/sqm	Imposed Load = 2 kN/sqm	
Thickness = 150 mm	Span Type = 1-Way	Panel Type = 3
Design Code = IS 456 : 2000 + IS 13920 : 2016	Grade of Concrete = M30	Grade of Steel = Fe500

Bottom SS	Bottom LS	Top SS	Top LS	Distribution
T8 @ 275	--	T8 @ 300	--	T8 @ 300

Slab No. : **S7**

Ly = 5.87 m	Lx = 2.5 m	
Live Load = 1 kN/sqm	Imposed Load = 2 kN/sqm	
Thickness = 150 mm	Span Type = 1-Way	Panel Type = 2
Design Code = IS 456 : 2000 + IS 13920 : 2016	Grade of Concrete = M30	Grade of Steel = Fe500

Bottom SS	Bottom LS	Top SS	Top LS	Distribution
T8 @ 275	--	T8 @ 300	--	T8 @ 300

Slab No. : **S8**

Ly = 6 m	Lx = 2.5 m	
Live Load = 1 kN/sqm	Imposed Load = 2 kN/sqm	
Thickness = 150 mm	Span Type = 1-Way	Panel Type = 2
Design Code = IS 456 : 2000 + IS 13920 : 2016	Grade of Concrete = M30	Grade of Steel = Fe500

Bottom SS	Bottom LS	Top SS	Top LS	Distribution
T8 @ 275	--	T8 @ 300	--	T8 @ 300

Slab No. : **S9**

Ly = 2.5 m	Lx = 0.8 m	
Live Load = 1 kN/sqm	Imposed Load = 2 kN/sqm	
Thickness = 150 mm	Span Type = 1-Way	Panel Type = 3

Design Code = IS 456 : 2000 + IS 13920 : 2016 | Grade of Concrete = M30 | Grade of Steel = Fe500

Bottom SS	Bottom LS	Top SS	Top LS	Distribution
T8 @ 275	--	T8 @ 300	--	T8 @ 300

Slab No. : **S10**

Ly = 4.68 m | Lx = 2.5 m

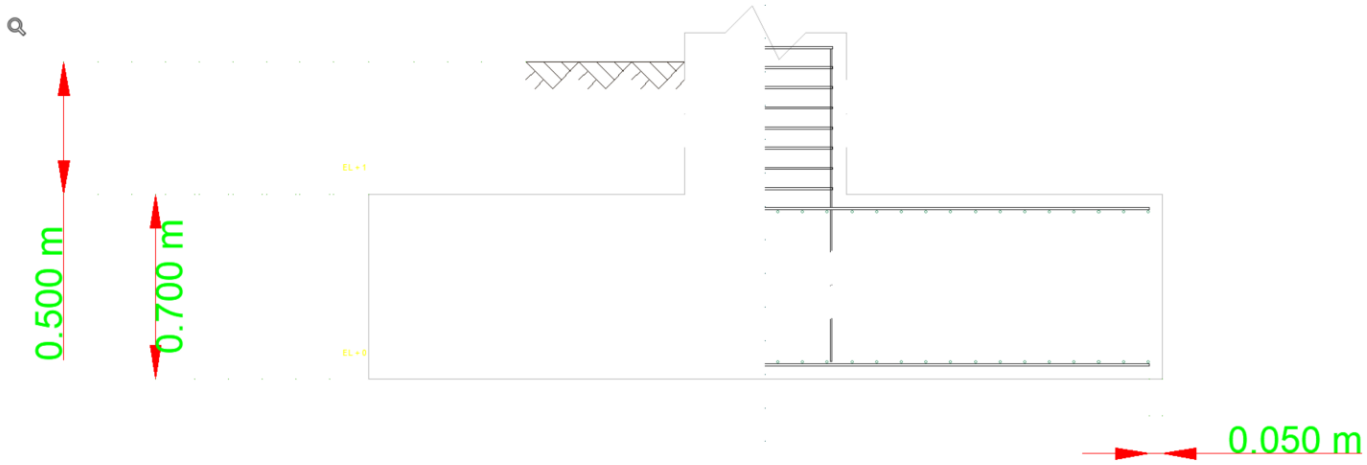
Live Load = 1 kN/sqm | Imposed Load = 2 kN/sqm

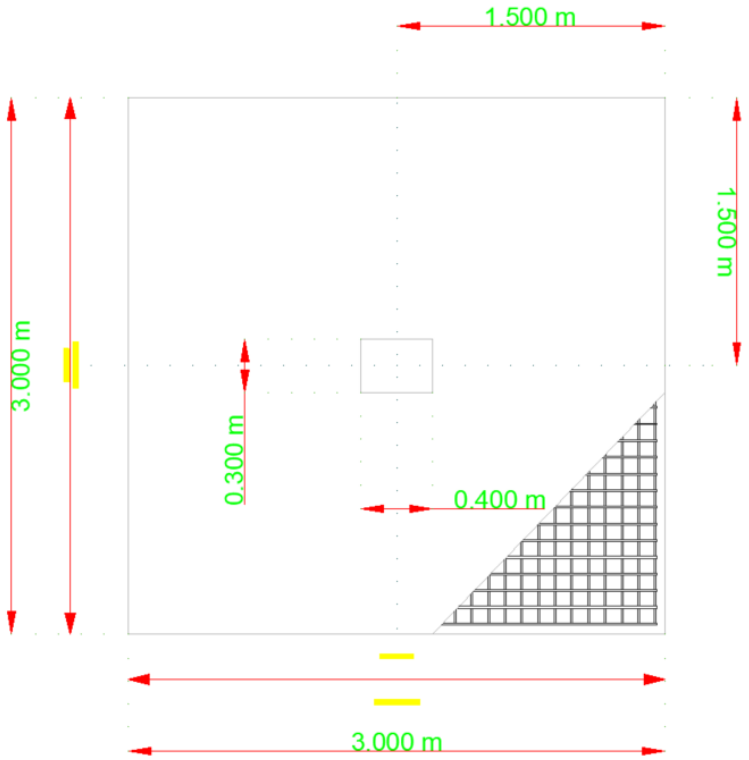
Thickness = 150 mm | Span Type = 2-Way | Panel Type = 4

Design Code = IS 456 : 2000 + IS 13920 : 2016 | Grade of Concrete = M30 | Grade of Steel = Fe500

Bottom SS	Bottom LS	Top SS	Top LS	Distribution
T8 @ 275	T8 @ 275	T8 @ 300	T8 @ 300	T8 @ 300

Foundation design:





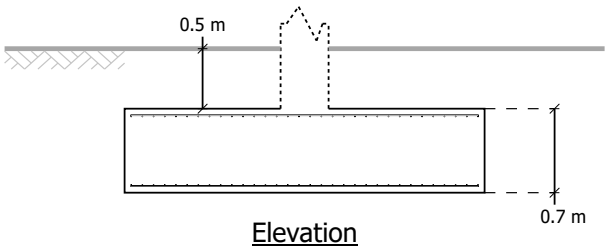
Print Calculation Sheet

Isolated Footing Design (IS 456-2000)

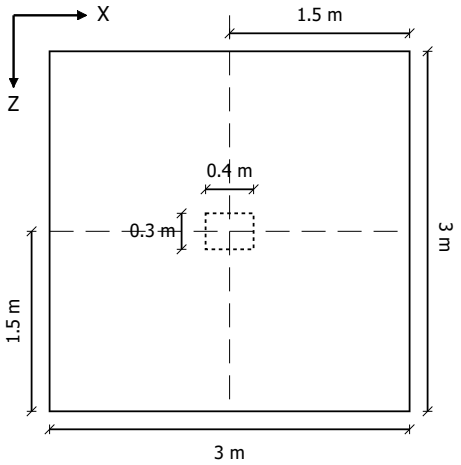
Footing No.	Group ID	Foundation Geometry		
-	-	Length	Width	Thickness
1	1	3.00m	3.00m	0.70m

Footing No.	Footing Reinforcement				Pedestal Reinforcement	
-	Bottom Reinforcement(M_z)	Bottom Reinforcement(M_x)	Top Reinforcement(M_z)	Top Reinforcement(M_x)	Main Steel	Trans Steel
1	Ø10 @ 90 mm c/c	Ø10 @ 90 mm c/c	Ø10 @ 90 mm c/c	Ø10 @ 90 mm c/c		N/A

Isolated Footing 1



Elevation



Plan

Input Values

Footing Geometry

Design Type	:	Calculate Dimension with user specified minimums as starting value
Minimum Footing Length - X(Fl)	:	2000.00 mm
Minimum Footing Width - Z (Fw)	:	2000.00 mm
Minimum Footing Thickness(Ft)	:	700.00 mm
Eccentricity along X (Oxd)	:	0.00 mm
Eccentricity along Z (Ozd)	:	0.00 mm

Column Dimensions

Column Shape	:	Rectangular
Column Length - X (Pl)	:	0.40 m

Column Width - Z (Pw) : 0.30 m

Pedestal

Include Pedestal : No

Pedestal Shape : N/A

Design Parameters

Concrete and Rebar Properties

Unit Weight of Concrete :	24.00	kN/m3
Strength of Concrete :	30.00	N/mm2
Yield Strength of Steel :	500.00	N/mm2
Minimum Bar Size :	Ø10	
Maximum Bar Size :	Ø20	
Pedestal Minimum Bar Size :	Ø8	
Pedestal Maximum Bar Size :	Ø40	
Minimum Bar Spacing :	60.00	mm
Maximum Bar Spacing :	450.00	mm
Pedestal Clear Cover (P, CL) :	50.00	mm
Footing Clear Cover (F, CL) :	50.00	mm

Soil Properties

Unit Weight :	17.60 kN/m3
Base Value of Soil Bearing Capacity :	120.00 kPa
Multiplying factor for soil bearing capacity for ultimate loads :	1.70
Soil Bearing Capacity Type :	Gross Bearing Capacity
Soil Surcharge :	0.00 kN/m2
Height of Soil above Footing :	500.00 mm
Type of Depth :	Fixed Top
Minimum Percentage of Slab area in Contact for Service Loads :	0.00
Minimum Percentage of Slab area in Contact for Ultimate Loads :	0.00

Sliding and Overturning

Coefficient of Friction :	0.50
Factor of Safety Against Sliding :	1.50
Factor of Safety Against Overturning :	1.50

Global Settings

Top Reinforcement Option : Calculate only when foundation is subjected to uplift forces

Concrete Design Option : Net Pressure(Gross Pressure - Self Weight Pressure)

Design Calculations

Load Combinations

Load Combination/s- Service Stress Level					
Load Combination Number	**Load Combination Title**	**Load Case Multiplier (a)**	**Soil Bearing Factor (b)**	**Self Weight Factor (c)**	**Code**
a - Value specified in the Load Multiplier table **b - Value specified in the Pile/Soil Bearing Capacity Factors table** **c - Value specified in the Apply Self Weight and Dead Weight Factor table**					

Load Combination/s- Service Stress Level					
Load Combination Number	Load Combination Title	Load Case Multiplier (a)	Soil Bearing Factor (b)	Self Weight Factor (c)	Code
a - Value specified in the Load Multiplier table b - Value specified in the Pile/Soil Bearing Capacity Factors table c - Value specified in the Apply Self Weight and Dead Weight Factor table					
1	EQX+	1.00	1.00	1.00	-
2	EQX-	1.00	1.00	1.00	-
3	EQZ+	1.00	1.00	1.00	-
4	EQZ-	1.00	1.00	1.00	-
5	DL	1.00	1.00	1.00	-
6	LL	1.00	1.00	1.00	-
7	WLX	1.00	1.00	1.00	-
8	WLZ	1.00	1.00	1.00	-
9	GENERATED INDIAN CODE GENRAL_STRUCTURES 1	1.00	1.00	1.00	-
10	GENERATED INDIAN CODE GENRAL_STRUCTURES 2	1.00	1.00	1.00	-
11	GENERATED INDIAN CODE GENRAL_STRUCTURES 3	1.00	1.00	1.00	-
12	GENERATED INDIAN CODE GENRAL_STRUCTURES 4	1.00	1.00	1.00	-
13	GENERATED INDIAN CODE GENRAL_STRUCTURES 5	1.00	1.00	1.00	-
14	GENERATED INDIAN CODE GENRAL_STRUCTURES 6	1.00	1.00	1.00	-
15	GENERATED INDIAN CODE GENRAL_STRUCTURES 7	1.00	1.00	1.00	-
16	GENERATED INDIAN CODE GENRAL_STRUCTURES 8	1.00	1.00	1.00	-
17	GENERATED INDIAN CODE GENRAL_STRUCTURES 9	1.00	1.00	1.00	-
18	GENERATED INDIAN CODE GENRAL_STRUCTURES 10	1.00	1.00	1.00	-
19	GENERATED INDIAN CODE GENRAL_STRUCTURES 11	1.00	1.00	1.00	-
20	GENERATED INDIAN CODE GENRAL_STRUCTURES 12	1.00	1.00	1.00	-
21	GENERATED INDIAN CODE GENRAL_STRUCTURES 13	1.00	1.00	1.00	-
22	GENERATED INDIAN CODE GENRAL_STRUCTURES 14	1.00	1.00	1.00	-
23	GENERATED INDIAN CODE GENRAL_STRUCTURES 15	1.00	1.00	1.00	-
24	GENERATED INDIAN CODE GENRAL_STRUCTURES 16	1.00	1.00	1.00	-
25	GENERATED INDIAN CODE GENRAL_STRUCTURES 17	1.00	1.00	1.00	-
26	GENERATED INDIAN CODE GENRAL_STRUCTURES 18	1.00	1.00	1.00	-
27	GENERATED INDIAN CODE GENRAL_STRUCTURES 19	1.00	1.00	1.00	-
28	GENERATED INDIAN CODE GENRAL_STRUCTURES 20	1.00	1.00	1.00	-
29	GENERATED INDIAN CODE GENRAL_STRUCTURES 21	1.00	1.00	1.00	-
30	GENERATED INDIAN CODE GENRAL_STRUCTURES 22	1.00	1.00	1.00	-
31	GENERATED INDIAN CODE GENRAL_STRUCTURES 23	1.00	1.00	1.00	-
32	GENERATED INDIAN CODE GENRAL_STRUCTURES 24	1.00	1.00	1.00	-
33	GENERATED INDIAN CODE GENRAL_STRUCTURES 25	1.00	1.00	1.00	-
34	GENERATED INDIAN CODE GENRAL_STRUCTURES 26	1.00	1.00	1.00	-
35	GENERATED INDIAN CODE GENRAL_STRUCTURES 27	1.00	1.00	1.00	-
36	GENERATED INDIAN CODE GENRAL_STRUCTURES 28	1.00	1.00	1.00	-
37	GENERATED INDIAN CODE GENRAL_STRUCTURES 29	1.00	1.00	1.00	-
38	GENERATED INDIAN CODE GENRAL_STRUCTURES 30	1.00	1.00	1.00	-
39	GENERATED INDIAN CODE GENRAL_STRUCTURES 31	1.00	1.00	1.00	-
40	GENERATED INDIAN CODE GENRAL_STRUCTURES 32	1.00	1.00	1.00	-
41	GENERATED INDIAN CODE GENRAL_STRUCTURES 33	1.00	1.00	1.00	-
Load Combination/s- Strength Level					
Load Combination Number	Load Combination Title	Load Case Multiplier (a)	Soil Bearing Factor (b)	Self Weight Factor (c)	Code
a - Value specified in the Load Multiplier table b - Value specified in the Pile/Soil Bearing Capacity Factors table c - Value specified in the Apply Self Weight and Dead Weight Factor table					
1	EQX+	1.00	1.00	1.00	-
2	EQX-	1.00	1.00	1.00	-
3	EQZ+	1.00	1.00	1.00	-
4	EQZ-	1.00	1.00	1.00	-
5	DL	1.00	1.00	1.00	-
6	LL	1.00	1.00	1.00	-
7	WLX	1.00	1.00	1.00	-
8	WLZ	1.00	1.00	1.00	-
9	GENERATED INDIAN CODE GENRAL_STRUCTURES 1	1.00	1.00	1.00	-
10	GENERATED INDIAN CODE GENRAL_STRUCTURES 2	1.00	1.00	1.00	-
11	GENERATED INDIAN CODE GENRAL_STRUCTURES 3	1.00	1.00	1.00	-
12	GENERATED INDIAN CODE GENRAL_STRUCTURES 4	1.00	1.00	1.00	-
13	GENERATED INDIAN CODE GENRAL_STRUCTURES 5	1.00	1.00	1.00	-

Load Combination/s- Strength Level					
Load Combination Number	**Load Combination Title**	**Load Case Multiplier (a)**	**Soil Bearing Factor (b)**	**Self Weight Factor (c)**	**Code**
a - Value specified in the Load Multiplier table **b - Value specified in the Pile/Soil Bearing Capacity Factors table** **c - Value specified in the Apply Self Weight and Dead Weight Factor table**					
14	GENERATED INDIAN CODE GENRAL_STRUCTURES 6	1.00	1.00	1.00	-
15	GENERATED INDIAN CODE GENRAL_STRUCTURES 7	1.00	1.00	1.00	-
16	GENERATED INDIAN CODE GENRAL_STRUCTURES 8	1.00	1.00	1.00	-
17	GENERATED INDIAN CODE GENRAL_STRUCTURES 9	1.00	1.00	1.00	-
18	GENERATED INDIAN CODE GENRAL_STRUCTURES 10	1.00	1.00	1.00	-
19	GENERATED INDIAN CODE GENRAL_STRUCTURES 11	1.00	1.00	1.00	-
20	GENERATED INDIAN CODE GENRAL_STRUCTURES 12	1.00	1.00	1.00	-
21	GENERATED INDIAN CODE GENRAL_STRUCTURES 13	1.00	1.00	1.00	-
22	GENERATED INDIAN CODE GENRAL_STRUCTURES 14	1.00	1.00	1.00	-
23	GENERATED INDIAN CODE GENRAL_STRUCTURES 15	1.00	1.00	1.00	-
24	GENERATED INDIAN CODE GENRAL_STRUCTURES 16	1.00	1.00	1.00	-
25	GENERATED INDIAN CODE GENRAL_STRUCTURES 17	1.00	1.00	1.00	-
26	GENERATED INDIAN CODE GENRAL_STRUCTURES 18	1.00	1.00	1.00	-
27	GENERATED INDIAN CODE GENRAL_STRUCTURES 19	1.00	1.00	1.00	-
28	GENERATED INDIAN CODE GENRAL_STRUCTURES 20	1.00	1.00	1.00	-
29	GENERATED INDIAN CODE GENRAL_STRUCTURES 21	1.00	1.00	1.00	-
30	GENERATED INDIAN CODE GENRAL_STRUCTURES 22	1.00	1.00	1.00	-
31	GENERATED INDIAN CODE GENRAL_STRUCTURES 23	1.00	1.00	1.00	-
32	GENERATED INDIAN CODE GENRAL_STRUCTURES 24	1.00	1.00	1.00	-
33	GENERATED INDIAN CODE GENRAL_STRUCTURES 25	1.00	1.00	1.00	-
34	GENERATED INDIAN CODE GENRAL_STRUCTURES 26	1.00	1.00	1.00	-
35	GENERATED INDIAN CODE GENRAL_STRUCTURES 27	1.00	1.00	1.00	-
36	GENERATED INDIAN CODE GENRAL_STRUCTURES 28	1.00	1.00	1.00	-
37	GENERATED INDIAN CODE GENRAL_STRUCTURES 29	1.00	1.00	1.00	-
38	GENERATED INDIAN CODE GENRAL_STRUCTURES 30	1.00	1.00	1.00	-
39	GENERATED INDIAN CODE GENRAL_STRUCTURES 31	1.00	1.00	1.00	-
40	GENERATED INDIAN CODE GENRAL_STRUCTURES 32	1.00	1.00	1.00	-
41	GENERATED INDIAN CODE GENRAL_STRUCTURES 33	1.00	1.00	1.00	-

Applied Loads on Top of Pedestal

Before consideration of self weight and load multiplier table

Moments are About the center of Column / Pedestal (does not include moments caused by lateral loads)
For the loads shown in this table, the sign convention is the same as that for JOINT LOADS in STAAD.Pro when global Y is the vertical axis.

Applied Loads for Column - Service Stress Level					
Load Case	**F_x** (kN)	**F_y** (kN) **Downwards is negative Upwards is positive**	**F_z** (kN)	**M_x** (kNm)	**M_z** (kNm)
1	12.53	18.70	-7.84	-12.30	-24.09
2	-12.53	-18.70	7.84	12.30	24.09
3	0.27	17.16	35.20	55.04	-0.38
4	-0.27	-17.16	-35.20	-55.04	0.38
5	-8.54	-318.00	0.10	0.30	8.75
6	-2.43	-31.98	0.02	0.05	2.53
7	3.60	0.01	0.02	0.04	-0.15
8	-0.00	0.03	-0.00	-0.00	0.00
9	-16.47	-524.97	0.18	0.52	16.93
10	-8.85	-419.97	0.17	0.46	13.36
11	-13.18	-419.94	0.14	0.41	13.55
12	-17.49	-419.99	0.11	0.37	13.72
13	-13.17	-420.01	0.15	0.42	13.54
14	1.87	-397.53	-9.26	-14.34	-15.37
15	-28.21	-442.42	9.55	15.17	42.45
16	-12.84	-399.39	42.39	66.46	13.09
17	-13.50	-440.57	-42.10	-65.63	13.99
18	-28.21	-442.42	9.55	15.17	42.45
19	1.87	-397.53	-9.26	-14.34	-15.37
20	-13.50	-440.57	-42.10	-65.63	13.99
21	-12.84	-399.39	42.39	66.46	13.09
22	-7.41	-476.99	0.18	0.51	12.91
23	-12.82	-476.96	0.14	0.45	13.14
24	-18.22	-477.01	0.11	0.40	13.36
25	-12.81	-477.04	0.15	0.46	13.13

Applied Loads for Column - Service Stress Level					
Load Case	**F_x** (kN)	**F_y** (kN) **Downwards is negative Upwards is positive**	**F_z** (kN)	**M_x** (kNm)	**M_z** (kNm)
26	5.98	-448.95	-11.61	-17.99	-23.01
27	-31.61	-505.06	11.90	18.90	49.27
28	-12.40	-451.26	52.95	83.00	12.57
29	-13.23	-502.74	-52.66	-82.10	13.70
30	-31.61	-505.06	11.90	18.90	49.27
31	5.98	-448.95	-11.61	-17.99	-23.01
32	-13.23	-502.74	-52.66	-82.10	13.70
33	-12.40	-451.26	52.95	83.00	12.57
34	11.11	-258.15	-11.67	-18.17	-28.26
35	-26.49	-314.26	11.84	18.71	44.02
36	-7.28	-260.46	52.89	82.82	7.31
37	-8.10	-311.94	-52.72	-82.28	8.44
38	-26.49	-314.26	11.84	18.71	44.02
39	11.11	-258.15	-11.67	-18.17	-28.26
40	-8.10	-311.94	-52.72	-82.28	8.44
41	-7.28	-260.46	52.89	82.82	7.31

Applied Loads for Column - Strength Level					
Load Case	**F_x** (kN)	**F_y** (kN) **Downwards is negative Upwards is positive**	**F_z** (kN)	**M_x** (kNm)	**M_z** (kNm)
1	12.53	18.70	-7.84	-12.30	-24.09
2	-12.53	-18.70	7.84	12.30	24.09
3	0.27	17.16	35.20	55.04	-0.38
4	-0.27	-17.16	-35.20	-55.04	0.38
5	-8.54	-318.00	0.10	0.30	8.75
6	-2.43	-31.98	0.02	0.05	2.53
7	3.60	0.01	0.02	0.04	-0.15
8	-0.00	0.03	-0.00	-0.00	0.00
9	-16.47	-524.97	0.18	0.52	16.93
10	-8.85	-419.97	0.17	0.46	13.36
11	-13.18	-419.94	0.14	0.41	13.55
12	-17.49	-419.99	0.11	0.37	13.72
13	-13.17	-420.01	0.15	0.42	13.54
14	1.87	-397.53	-9.26	-14.34	-15.37
15	-28.21	-442.42	9.55	15.17	42.45
16	-12.84	-399.39	42.39	66.46	13.09
17	-13.50	-440.57	-42.10	-65.63	13.99
18	-28.21	-442.42	9.55	15.17	42.45
19	1.87	-397.53	-9.26	-14.34	-15.37
20	-13.50	-440.57	-42.10	-65.63	13.99
21	-12.84	-399.39	42.39	66.46	13.09
22	-7.41	-476.99	0.18	0.51	12.91
23	-12.82	-476.96	0.14	0.45	13.14
24	-18.22	-477.01	0.11	0.40	13.36
25	-12.81	-477.04	0.15	0.46	13.13
26	5.98	-448.95	-11.61	-17.99	-23.01
27	-31.61	-505.06	11.90	18.90	49.27
28	-12.40	-451.26	52.95	83.00	12.57
29	-13.23	-502.74	-52.66	-82.10	13.70
30	-31.61	-505.06	11.90	18.90	49.27
31	5.98	-448.95	-11.61	-17.99	-23.01
32	-13.23	-502.74	-52.66	-82.10	13.70
33	-12.40	-451.26	52.95	83.00	12.57
34	11.11	-258.15	-11.67	-18.17	-28.26
35	-26.49	-314.26	11.84	18.71	44.02
36	-7.28	-260.46	52.89	82.82	7.31
37	-8.10	-311.94	-52.72	-82.28	8.44
38	-26.49	-314.26	11.84	18.71	44.02
39	11.11	-258.15	-11.67	-18.17	-28.26
40	-8.10	-311.94	-52.72	-82.28	8.44
41	-7.28	-260.46	52.89	82.82	7.31

Footing Size

Initial Length (L_o) = 2.00 m

Initial Width (W_o) = 2.00 m

Area from initial length and width, A_o = $L_o \times W_o$ = 4.00 m^2

Min. area required from bearing pressure, A_{min} = $\frac{P}{q_{max}}$ = 6.12 m^2

Note: A_{min} is an initial estimation.
P = Vertical load from column + selfweight of footing + weight of soil.
q_{max} = Respective Factored Bearing Capacity.

Final Footing Size

Length (L_2) =	3.00	m	Governing Load Case :	# 29
Width (W_2) =	3.00	m	Governing Load Case :	# 29
Depth (D_2) =	0.70	m		
Area (A_2) =	9.00	m^2		

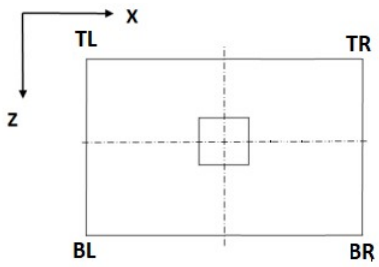
Depth is governed by Ultimate Load Case

(Service check is performed with footing thickness requirements from concrete check)

Final Soil Height = 0.50 m

Weight of the footing + pedestal (if any) =	151.20 kN
Weight of the soil above the footing (dry) =	78.14 kN
Uplift force due to buoyancy =	0.00 kN
Effect due to adhesion =	0.00 kN

Gross Pressures at 4 Corners



Load Case	Pressure at top left corner (kN/m2)	Pressure at top right corner (kN/m2)	Pressure at bottom right corner (kN/m2)	Pressure at bottom left corner (kN/m2)	Area of footing in uplift (A_u) (m^2)	Gross Bearing Capacity (kN/m2)
29	**112.8804**	102.6786	49.8051	60.0069	0.00	120.0000
29	112.8804	**102.6786**	49.8051	60.0069	0.00	120.0000
28	53.6630	44.2183	**97.5832**	107.0278	0.00	120.0000
28	53.6630	44.2183	97.5832	**107.0278**	0.00	120.0000

If A_u is zero, there is no uplift and no pressure adjustment is necessary. Otherwise, to account for uplift, areas of negative pressure will be set to zero and the pressure will be redistributed to remaining corners.

Summary of adjusted Gross Pressures at Four Corners

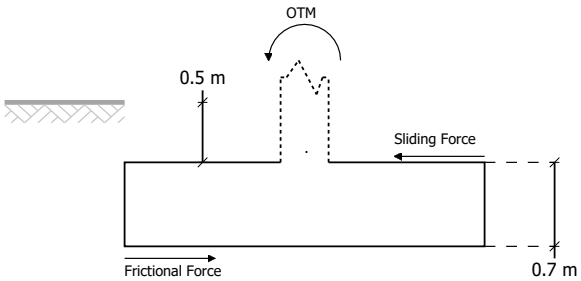
Load Case	Pressure at top left corner (kN/m2)	Pressure at top right corner (kN/m2)	Pressure at bottom right corner (kN/m2)	Pressure at bottom left corner (kN/m2)	Gross Bearing Capacity (kN/m2)
29	**112.8804**	102.6786	49.8051	60.0069	120.0000
29	112.8804	**102.6786**	49.8051	60.0069	120.0000
28	53.6630	44.2183	**97.5832**	107.0278	120.0000

Load Case	Pressure at top left corner (kN/m2)	Pressure at top right corner (kN/m2)	Pressure at bottom right corner (kN/m2)	Pressure at bottom left corner (kN/m2)	Gross Bearing Capacity (kN/m2)
28	53.6630	44.2183	97.5832	**107.0278**	120.0000

Details of Out-of-Contact Area (If Any)

Governing load case = N/A
Plan area of footing = 9.00 sq.m
Area not in contact with soil = = 0.00 sq.m
% of total area not in contact = 0.00%

Stability Check



-	Factor of safety against sliding				Factor of safety against overturning		
Load Case No.	Along X-Direction	Along Z-Direction	Resultant	Required FOS	About X-Direction	About Z-Direction	Required FOS
1	**8.40**	13.44	7.12	1.50	17.77	**9.61**	1.50
2	9.90	15.82	8.39	1.50	20.92	11.32	1.50
3	386.86	**3.01**	**3.01**	1.50	**3.99**	560.45	1.50
4	449.43	3.50	3.50	1.50	4.64	651.09	1.50
5	32.03	2841.89	32.03	1.50	2227.99	55.72	1.50
6	53.70	N/A	53.70	1.50	N/A	92.55	1.50
7	31.85	N/A	31.85	1.50	N/A	128.81	1.50
8	N/A	N/A	N/A	1.50	N/A	N/A	1.50
9	22.91	2106.70	22.90	1.50	1751.47	39.76	1.50
10	36.68	1888.22	36.67	1.50	1675.00	49.80	1.50
11	24.64	2330.98	24.64	1.50	1909.17	42.77	1.50
12	18.56	2835.35	18.56	1.50	2154.17	37.51	1.50
13	24.66	2206.15	24.65	1.50	1860.67	42.80	1.50
14	167.92	33.84	33.17	1.50	45.16	56.39	1.50
15	11.91	35.17	11.28	1.50	46.10	16.20	1.50
16	24.48	7.42	7.10	1.50	9.81	42.71	1.50
17	24.81	7.96	7.58	1.50	10.57	42.86	1.50
18	11.91	35.17	11.28	1.50	46.10	16.20	1.50
19	167.92	33.84	33.17	1.50	45.16	56.39	1.50
20	24.81	7.96	7.58	1.50	10.57	42.86	1.50
21	24.48	7.42	7.10	1.50	9.81	42.71	1.50
22	47.63	1958.34	47.62	1.50	1672.24	58.55	1.50
23	27.55	2531.38	27.54	1.50	1946.07	47.91	1.50
24	19.39	3253.47	19.39	1.50	2245.15	40.58	1.50

-	Factor of safety against sliding				Factor of safety against overturning		
Load Case No.	Along X-Direction	Along Z-Direction	Resultant	Required FOS	About X-Direction	About Z-Direction	Required FOS
25	27.57	2364.33	27.57	1.50	1888.41	47.96	1.50
26	56.68	29.20	25.96	1.50	38.95	37.41	1.50
27	11.62	30.85	10.87	1.50	40.46	15.43	1.50
28	27.43	6.43	6.26	1.50	8.50	48.04	1.50
29	27.67	6.95	6.74	1.50	9.23	47.84	1.50
30	11.62	30.85	10.87	1.50	40.46	15.43	1.50
31	56.68	29.20	25.96	1.50	38.95	37.41	1.50
32	27.67	6.95	6.74	1.50	9.23	47.84	1.50
33	27.43	6.43	6.26	1.50	8.50	48.04	1.50
34	21.94	20.88	15.13	1.50	27.76	20.29	1.50
35	10.26	22.95	9.37	1.50	30.19	13.03	1.50
36	33.65	4.63	4.59	1.50	6.13	59.21	1.50
37	33.41	5.13	5.07	1.50	6.81	57.53	1.50
38	10.26	22.95	9.37	1.50	30.19	13.03	1.50
39	21.94	20.88	15.13	1.50	27.76	20.29	1.50
40	33.41	5.13	5.07	1.50	6.81	57.53	1.50
41	33.65	4.63	4.59	1.50	6.13	59.21	1.50

Critical Load Case And The Governing Factor Of Safety For Overturning and Sliding X Direction

Critical Load Case for Sliding along X-Direction : 1
Governing Disturbing Force : 12.53 kN
Governing Restoring Force : 105.32 kN
Minimum Sliding Ratio for the Critical Load Case : 8.40
Critical Load Case for Overturning About X-Direction : 3
Governing Overturning Moment : 79.68 kNm
Governing Resisting Moment : 318.27 kNm
Minimum Overturning Ratio for the Critical Load Case : 3.99

Critical Load Case And The Governing Factor Of Safety For Overturning and Sliding Z Direction

Critical Load Case for Sliding along Z-Direction : 3
Governing Disturbing Force : 35.20 kN
Governing Restoring Force : 106.09 kN
Minimum Sliding Ratio for the Critical Load Case : 3.01
Critical Load Case for Overturning About Z-Direction : 1
Governing Overturning Moment : -32.87 kNm
Governing Resisting Moment : : 315.95 kNm
Minimum Overturning Ratio for the Critical Load Case : 9.61

Critical Load Case And The Governing Factor Of Safety For Sliding Along Resultant Direction

Critical Load Case for Sliding along Resultant Direction : : 3
Governing Disturbing Force : 35.20 kN
Governing Restoring Force : 106.09 kN
Minimum Sliding Ratio for the Critical Load Case : 3.01

Top Reinforcement Design Requirement

Top Reinforcement needs to be provided because of resultant negative pressure coming from net pressure calculations for bending.

Ultimate Gross Pressures

The base pressures reported in this table and the area of footing in contact include the effect of buoyancy (if any).

Load Case / Load	Pressure at top left	Pressure at top right	Pressure at bottom	Pressure at bottom left	Gross Factored	Area of footing in

Combination ID	corner (kN/m2)	corner (kN/m2)	right corner (kN/m2)	corner (kN/m2)	Bearing Capacity For Ultimate Load Case (kN/m2)	Contact with soil (A_u) (m^2)
1	20.0528	34.6599	26.7562	12.1491	204.0000	9.00
2	30.9126	16.3054	24.2091	38.8163	204.0000	9.00
3	5.7435	5.9959	41.4087	41.1563	204.0000	9.00
4	45.2218	44.9694	9.5566	9.8090	204.0000	9.00
5	64.0087	57.4599	57.6236	64.1725	204.0000	9.00
6	29.9633	28.0810	28.1086	29.9909	204.0000	9.00
7	24.8763	26.0633	26.0873	24.9003	204.0000	9.00
8	25.4823	25.4793	25.4769	25.4798	204.0000	9.00
9	89.9926	77.3459	77.6330	90.2797	204.0000	9.00
10	76.3630	67.6701	67.9285	76.6215	204.0000	9.00
11	77.0902	66.9693	67.1960	77.3169	204.0000	9.00
12	77.8182	66.2765	66.4774	78.0192	204.0000	9.00
13	77.0911	66.9773	67.2099	77.3238	204.0000	9.00
14	70.5748	77.9860	68.7312	61.3200	204.0000	9.00
15	83.6065	55.9606	65.6747	93.3206	204.0000	9.00
16	53.4036	43.5891	86.3142	96.1287	204.0000	9.00
17	100.7776	90.3574	48.0917	58.5120	204.0000	9.00
18	83.6065	55.9606	65.6747	93.3206	204.0000	9.00
19	70.5748	77.9860	68.7312	61.3200	204.0000	9.00
20	100.7776	90.3574	48.0917	58.5120	204.0000	9.00
21	53.4036	43.5891	86.3142	96.1287	204.0000	9.00
22	82.3622	74.3194	74.6010	82.6438	204.0000	9.00
23	83.2711	73.4435	73.6854	83.5130	204.0000	9.00
24	84.1812	72.5775	72.7872	84.3909	204.0000	9.00
25	83.2723	73.4534	73.7028	83.5217	204.0000	9.00
26	75.1269	87.2143	75.6044	63.5170	204.0000	9.00
27	91.4165	59.6826	71.7838	103.5177	204.0000	9.00
28	53.6630	44.2183	**97.5832**	**107.0278**	204.0000	9.00
29	**112.8804**	**102.6786**	49.8051	60.0069	204.0000	9.00
30	91.4165	59.6826	71.7838	103.5177	204.0000	9.00
31	75.1269	87.2143	75.6044	63.5170	204.0000	9.00
32	**112.8804**	**102.6786**	49.8051	60.0069	204.0000	9.00
33	53.6630	44.2183	**97.5832**	**107.0278**	204.0000	9.00
34	52.0112	68.0280	56.3199	40.3031	204.0000	9.00
35	68.3009	40.4963	52.4992	80.3039	204.0000	9.00
36	30.5473	25.0320	78.2986	83.8139	204.0000	9.00
37	89.7648	83.4923	30.5205	36.7930	204.0000	9.00
38	68.3009	40.4963	52.4992	80.3039	204.0000	9.00
39	52.0112	68.0280	56.3199	40.3031	204.0000	9.00
40	89.7648	83.4923	30.5205	36.7930	204.0000	9.00
41	30.5473	25.0320	78.2986	83.8139	204.0000	9.00

Minimum Required Contact Area for Ultimate Loads : 0.00 m^2

Actual Area in Contact for all ultimate load cases exceeds the minimum required. Hence Safe

Maximum Corner Pressure from all ultimate load cases is less than the allowable. Hence Safe

Moment Calculation

Check Trial Depth against moment (About Z Axis)

		Critical Load Case	=	**#27**
Effective Depth	=	$D-(cc+1.5\times d_b)$	=	0.64 m
Governing moment (M_u)	=		=	170.83 kNm

As Per IS 456 2000 ANNEX G G-1.1C

Limiting Factor1 (K_{umax})	=	$\frac{700}{[1100+(0.87\times f_y)]}$	=	0.46
Limiting Factor2 (R_{umax})	=	$0.36\times f_{ck}\times k_{umax}\times(1-0.42\times k_{umax})$	=	3981.78 kN/m2
Limiting Moment Of Resistance (M_{umax})	=	$R_{umax}\times B\times d^2$	=	4816.57 kNm

M_u <= M_{umax} hence, safe

Check Trial Depth against moment (About X Axis)

		Critical Load Case	=	**#29**
Effective Depth	=	$D-(cc+1.5\times d_b)$	=	0.64 m
Governing moment (M_u)	=		=	203.28 kNm

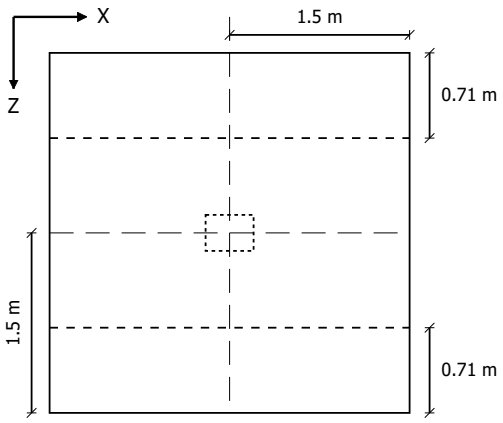
As Per IS 456 2000 ANNEX G G-1.1C

Limiting Factor1 (K_{umax})	=	$\frac{700}{[1100+(0.87\times f_y)]}$	=	0.46
Limiting Factor2 (R_{umax})	=	$0.36\times f_{ck}\times k_{umax}\times(1-0.42\times k_{umax})$	=	3981.78 kN/m2
Limiting Moment Of Resistance (M_{umax})	=	$R_{umax}\times B\times d^2$	=	4816.57 kNm

M_u <= M_{umax} hence, safe

One-Way Shear in XY plane

(Shear Plane Parallel to Global X Axis)



Plan

Critical Load Case = # 32

Distance of critical section from top left corner along Z, D_Z	=	0.72 m
Shear Force(S)	=	161.59 kN
Shear Stress(T_v)	=	84.82 kN/m2
Percentage Of Steel(P_t)	=	0.1319

As Per IS 456 2000 Clause 40 Table 19

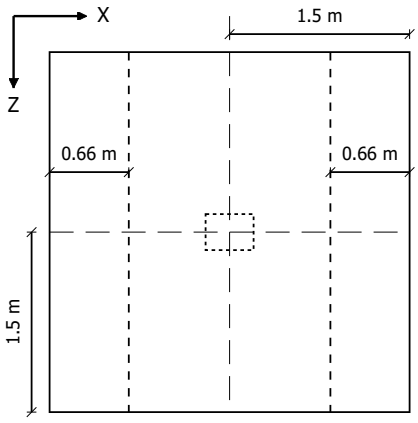
Shear Strength Of Concrete(T_c) = 290.00 kN/m2

Shear Enhancement Factor (if considered) is applied to (T_c), as per IS456 -2000 Clause No 40.5.1 and Fig 24

$T_v < T_c$ hence, safe

One-Way Shear in YZ plane

(Shear Plane Parallel to Global Z Axis)



Plan

Critical Load Case = # 30

Distance of critical section from top left corner along X, D_X = 0.67 m

Shear Force(S) = 137.95 kN

Shear Stress(T_v) = 72.41 kN/m2

Percentage Of Steel(P_t) = 0.13

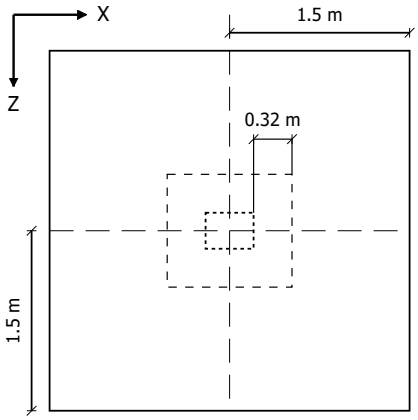
As Per IS 456 2000 Clause 40 Table 19

Shear Strength Of Concrete(T_c) = 290.00 kN/m2

Shear Enhancement Factor (if considered) is applied to (T_c), as per IS456 -2000 Clause No 40.5.1 and Fig 24

$T_v < T_c$ hence, safe

Punching Shear Check



Plan

Critical Load Case = #29

Shear Force(S) = 604.55 kN

Shear Stress(T_v) = 238.54 kN/m2

As Per IS 456 2000 Clause 31.6.3.1

$K_s = \min[(0.5+\beta), 1] =$ 1.00

Shear Strength(T_c) = $0.25 \times \sqrt{f_{ck}}$ = 1369.31 kN/m2

K_s x T_c = 1369.31 kN/m2

T_v<= K_s x T_c hence, safe

Reinforcement Calculation

Development Length Check

Along X Axis

Bar diameter corresponding to bar size used(d_b) = 10 mm

As Per IS 456 2000 Clause 26.2.1

Development Length(l_d) = $\frac{d_b \times 0.87 \times f_y}{4 \times \tau_{bd}}$ = 0.44 m

Available Development Length(l_{db}) = $\left[\frac{(B-b)}{2} - cc\right]$ = 1.25 m

l_{db} >=l_d hence, safe

Along Z Axis

Bar diameter corresponding to bar size used(d_b) = 10 mm

As Per IS 456 2000 Clause 26.2.1

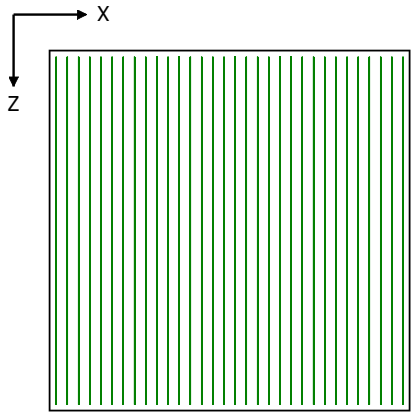
Development Length(l_d) = $\frac{d_b \times 0.87 \times f_y}{4 \times \tau_{bd}}$ = 0.44 m

Available Development Length(l_{db}) = $\left[\frac{(H-h)}{2} - cc\right]$ = 1.30 m

l_{db} >=l_d hence, safe

Flexure About X-Axis

Design For Bottom Reinforcement Parallel to Z Axis



32 - 10 mm

For moment About X Axis (M_x)

As Per IS 456 2000 Clause 26.5.2.1

Critical Load Case = #29

Minimum Area of Steel (A_{stmin}) = 2520 mm2

Calculated Area of Steel (A_{st}) = 2520 mm2

Note - "Area of Steel required" reported here is the larger value between the calculated area of steel and minimum steel required as per code stipulations

Provided Area of Steel ($A_{st,Provided}$) = 2513 mm2

$A_{st,Provided}$ >= A_{stmin} Hence OK.

Selected bar Size (d_b) = Ø10

Minimum spacing allowed (S_{min}) = 60.00 mm

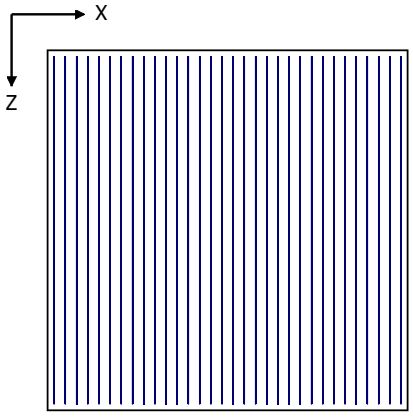
Selected spacing (S) = 93.23 mm

S_{min}<= S <= S_{max} and selected bar size < selected maximum bar size. Hence OK.

Based on spacing reinforcement increment; provided reinforcement is

Ø10 @ 90mm o.c.

Design For Top Reinforcement Parallel to Z Axis



32 - 10 mm

As Per IS 456 2000 Clause 26.5.2.1

Minimum Area of Steel (A_{stmin}) = 2520mm2

Calculated Area of Steel (A_{st}) = 2520mm2

Note - "Area of Steel required" reported here is the larger value between the calculated area of steel and minimum steel required as per code stipulations

Provided Area of Steel ($A_{st,Provided}$) = 2513mm2

$A_{st,Provided}$ >= A_{stmin} Hence OK.

Governing Moment = 77.76kNm

Selected bar Size (d_b) = Ø10

Minimum spacing allowed (S_{min}) = 60.00mm

Selected spacing (S) = 93.23mm

S_{min}<= S <= S_{max} and selected bar size < selected maximum bar size...

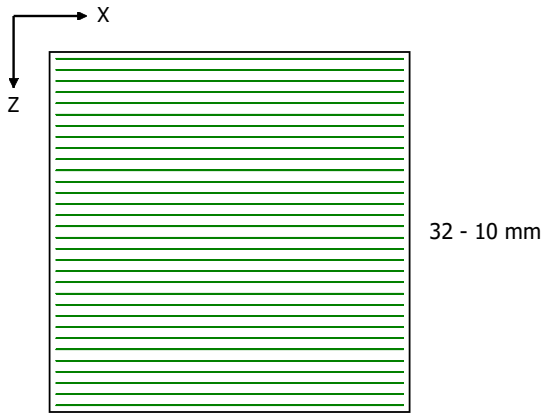
Hence OK.

Based on spacing reinforcement increment; provided reinforcement is

Ø10 @ 90mm o.c.

Flexure About Z-Axis

Design For Bottom Reinforcement Parallel to X Axis



For moment About Z Axis (M_z)

As Per IS 456 2000 Clause 26.5.2.1

Critical Load Case = #27

Minimum Area of Steel (A_{stmin}) = 2520 mm2

Calculated Area of Steel (A_{st}) = 2520 mm2

Note - "Area of Steel required" reported here is the larger value between the calculated area of steel and minimum steel required as per code stipulations

Provided Area of Steel ($A_{st,Provided}$) = 2513 mm2

$A_{st,Provided}$ >= A_{stmin} Hence OK.

Selected bar Size (d_b) = Ø10

Minimum spacing allowed (S_{min}) = 60.00 mm

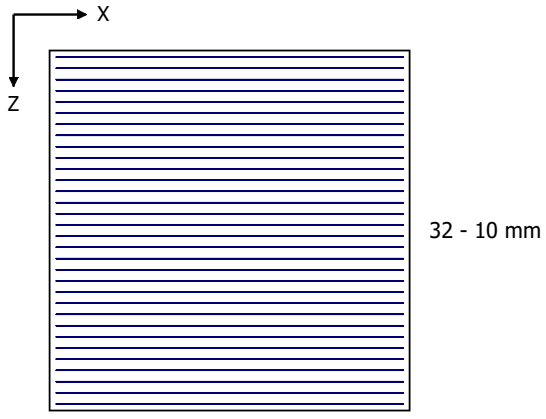
Selected spacing (S) = 93.23 mm

S_{min}<= S <= S_{max} and selected bar size < selected maximum bar size. Hence OK.

Based on spacing reinforcement increment; provided reinforcement is

Ø10 @ 90mm o.c.

Design For Top Reinforcement Parallel to X Axis



As Per IS 456 2000 Clause 26.5.2.1

Minimum Area of Steel (A_{stmin}) = 2520 mm2

Calculated Area of Steel (A_{st})	=	2520	mm2
Note - "Area of Steel required" reported here is the larger value between the calculated area of steel and minimum steel required as per code stipulations			
Provided Area of Steel ($A_{st,Provided}$)	=	2513	mm2
$A_{st,Provided}$ >= A_{stmin}	Hence OK.		
Governing Moment	=	72	kNm

Selected bar Size (d_b)	=	Ø10	
Minimum spacing allowed (S_{min})	=	60.00	mm
Selected spacing (S)	=	93.23	mm

S_{min}<= S <= S_{max} and selected bar size < selected maximum bar size. Hence OK.

Based on spacing reinforcement increment; provided reinforcement is

Ø10 @ 90mm o.c.

Crack Width Calculation (for Mz)

Modulus of Elasticity of Concrete(E_c)	=	27386127.88	kN/m2	Clause No. 6.2.3.1
Modulus of Elasticity of Steel(E_s)	=	200000000.00	kN/m2	Annexure F
Depth of Neutral Axis(X_u)	=	0.30	m	Annexure G, Clause No. G-1.1.a
Effective MOI(I_{eff})	=	30323419537.05	mm4	
Average Steel Strain at Considered Level(ε_m)	=	0.00 X 10^{-5}		
Distance from Nearest Tension Rod (a_{cr})	=	0.07	m	
Crack Width (W_{cr})	=	0.00	mm	Annexure F
				From IS 456-2000 Clause No. 35.3.2

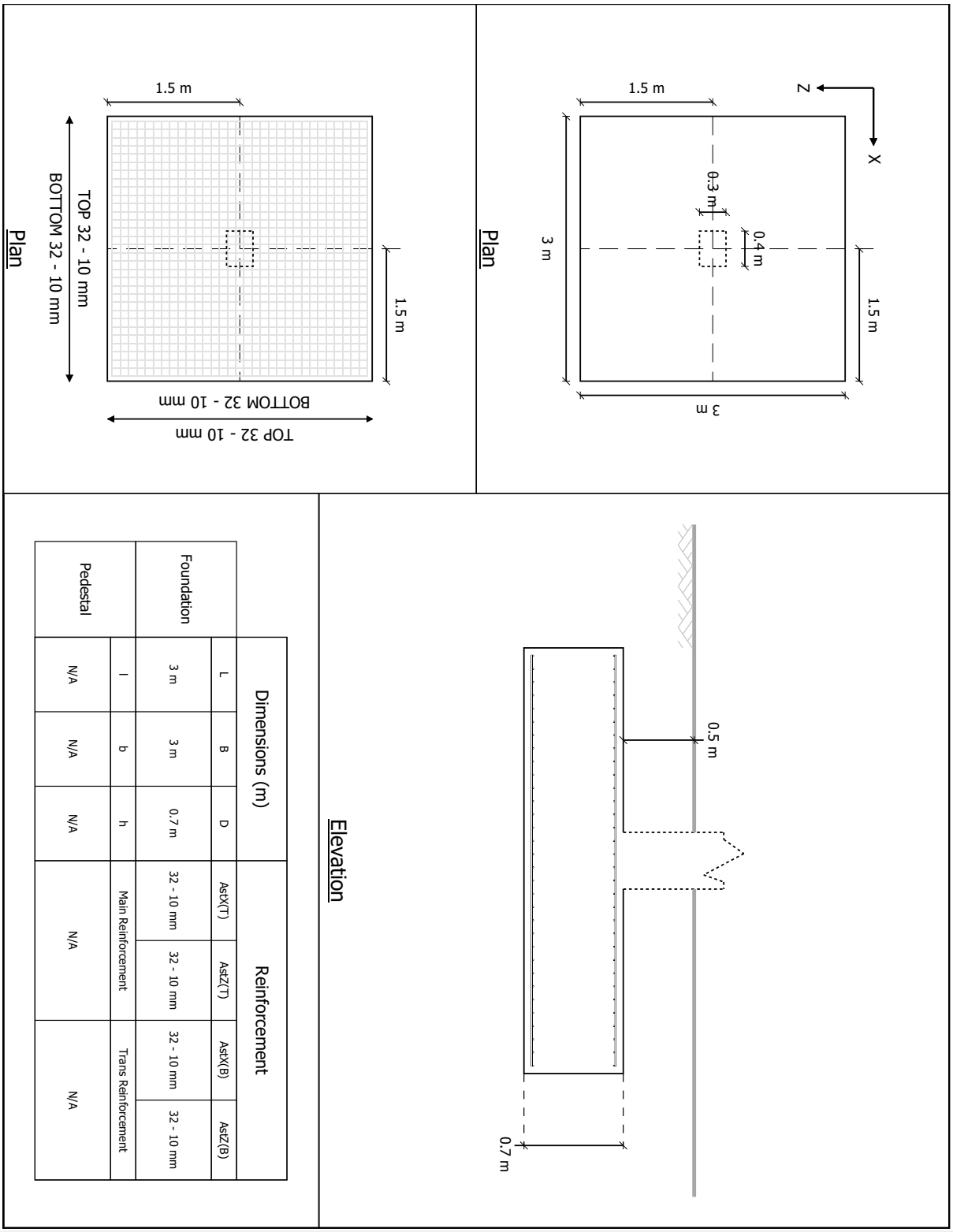
Section is uncracked.

Crack Width Calculation (for Mx)

Modulus of Elasticity of Concrete(E_c)	=	27386127.88	kN/m2	Clause No. 6.2.3.1
Modulus of Elasticity of Steel(E_s)	=	200000000.00	kN/m2	Annexure F
Depth of Neutral Axis(X_u)	=	0.30	m	Annexure G, Clause No. G-1.1.a
Effective MOI(I_{eff})	=	30323419537.05	mm4	
Average Steel Strain at Considered Level(ε_m)	=	0.00	X 10^{-5}	
Distance from Nearest Tension Rod (a_{cr})	=	0.07	m	
Crack Width (W_{cr})	=	0.00	mm	Annexure F

From IS 456-2000 Clause No. 35.3.2

Section is uncracked.



Dimensions (m)				Reinforcement				
	L	B	D	AstX(T)	AstZ(T)	AstX(B)	AstZ(B)
Foundation	3 m	3 m	0.7 m	32 - 10 mm	32 - 10 mm	32 - 10 mm	32 - 10 mm
	l	b	h	Main Reinforcement		Trans Reinforcement	
Pedestal	N/A	N/A	N/A	N/A		N/A	

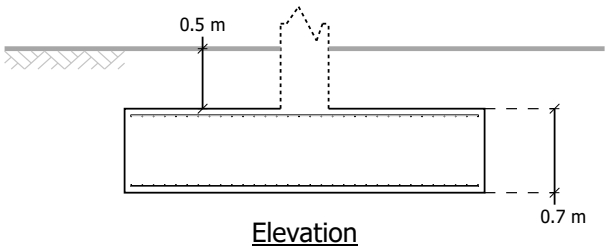
Print Calculation Sheet

Isolated Footing Design (IS 456-2000)

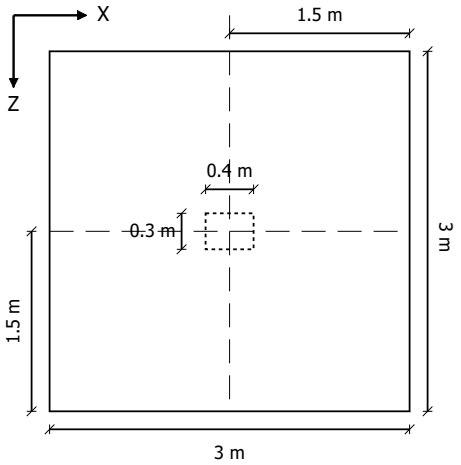
Footing No.	Group ID	Foundation Geometry		
-	-	Length	Width	Thickness
11	11	3.00m	3.00m	0.70m

Footing No.	Footing Reinforcement				Pedestal Reinforcement	
-	Bottom Reinforcement(M_z)	Bottom Reinforcement(M_x)	Top Reinforcement(M_z)	Top Reinforcement(M_x)	Main Steel	Trans Steel
11	Ø10 @ 90 mm c/c	Ø10 @ 90 mm c/c	Ø10 @ 90 mm c/c	Ø10 @ 90 mm c/c		N/A

Isolated Footing 11



Elevation



Plan

Input Values

Footing Geometry

Design Type	:	Calculate Dimension with user specified minimums as starting value
Minimum Footing Length - X(Fl)	:	2000.00 mm
Minimum Footing Width - Z (Fw)	:	2000.00 mm
Minimum Footing Thickness(Ft)	:	700.00 mm
Eccentricity along X (Oxd)	:	0.00 mm
Eccentricity along Z (Ozd)	:	0.00 mm

Column Dimensions

Column Shape	:	Rectangular
Column Length - X (Pl)	:	0.40 m

Column Width - Z (Pw) : 0.30 m

Pedestal

Include Pedestal : No

Pedestal Shape : N/A

Design Parameters

Concrete and Rebar Properties

Unit Weight of Concrete :	24.00	kN/m3
Strength of Concrete :	30.00	N/mm2
Yield Strength of Steel :	500.00	N/mm2
Minimum Bar Size :	Ø10	
Maximum Bar Size :	Ø20	
Pedestal Minimum Bar Size :	Ø8	
Pedestal Maximum Bar Size :	Ø40	
Minimum Bar Spacing :	60.00	mm
Maximum Bar Spacing :	450.00	mm
Pedestal Clear Cover (P, CL) :	50.00	mm
Footing Clear Cover (F, CL) :	50.00	mm

Soil Properties

Unit Weight :	17.60 kN/m3
Base Value of Soil Bearing Capacity :	120.00 kPa
Multiplying factor for soil bearing capacity for ultimate loads :	1.70
Soil Bearing Capacity Type :	Gross Bearing Capacity
Soil Surcharge :	0.00 kN/m2
Height of Soil above Footing :	500.00 mm
Type of Depth :	Fixed Top
Minimum Percentage of Slab area in Contact for Service Loads :	0.00
Minimum Percentage of Slab area in Contact for Ultimate Loads :	0.00

Sliding and Overturning

Coefficient of Friction :	0.50
Factor of Safety Against Sliding :	1.50
Factor of Safety Against Overturning :	1.50

Global Settings

Top Reinforcement Option : Calculate only when foundation is subjected to uplift forces

Concrete Design Option : Net Pressure(Gross Pressure - Self Weight Pressure)

Design Calculations

Load Combinations

Load Combination/s- Service Stress Level					
Load Combination Number	**Load Combination Title**	**Load Case Multiplier (a)**	**Soil Bearing Factor (b)**	**Self Weight Factor (c)**	**Code**
a - Value specified in the Load Multiplier table **b - Value specified in the Pile/Soil Bearing Capacity Factors table** **c - Value specified in the Apply Self Weight and Dead Weight Factor table**					

Load Combination/s- Service Stress Level					
Load Combination Number	Load Combination Title	Load Case Multiplier (a)	Soil Bearing Factor (b)	Self Weight Factor (c)	Code
a - Value specified in the Load Multiplier table b - Value specified in the Pile/Soil Bearing Capacity Factors table c - Value specified in the Apply Self Weight and Dead Weight Factor table					
1	EQX+	1.00	1.00	1.00	-
2	EQX-	1.00	1.00	1.00	-
3	EQZ+	1.00	1.00	1.00	-
4	EQZ-	1.00	1.00	1.00	-
5	DL	1.00	1.00	1.00	-
6	LL	1.00	1.00	1.00	-
7	WLX	1.00	1.00	1.00	-
8	WLZ	1.00	1.00	1.00	-
9	GENERATED INDIAN CODE GENRAL_STRUCTURES 1	1.00	1.00	1.00	-
10	GENERATED INDIAN CODE GENRAL_STRUCTURES 2	1.00	1.00	1.00	-
11	GENERATED INDIAN CODE GENRAL_STRUCTURES 3	1.00	1.00	1.00	-
12	GENERATED INDIAN CODE GENRAL_STRUCTURES 4	1.00	1.00	1.00	-
13	GENERATED INDIAN CODE GENRAL_STRUCTURES 5	1.00	1.00	1.00	-
14	GENERATED INDIAN CODE GENRAL_STRUCTURES 6	1.00	1.00	1.00	-
15	GENERATED INDIAN CODE GENRAL_STRUCTURES 7	1.00	1.00	1.00	-
16	GENERATED INDIAN CODE GENRAL_STRUCTURES 8	1.00	1.00	1.00	-
17	GENERATED INDIAN CODE GENRAL_STRUCTURES 9	1.00	1.00	1.00	-
18	GENERATED INDIAN CODE GENRAL_STRUCTURES 10	1.00	1.00	1.00	-
19	GENERATED INDIAN CODE GENRAL_STRUCTURES 11	1.00	1.00	1.00	-
20	GENERATED INDIAN CODE GENRAL_STRUCTURES 12	1.00	1.00	1.00	-
21	GENERATED INDIAN CODE GENRAL_STRUCTURES 13	1.00	1.00	1.00	-
22	GENERATED INDIAN CODE GENRAL_STRUCTURES 14	1.00	1.00	1.00	-
23	GENERATED INDIAN CODE GENRAL_STRUCTURES 15	1.00	1.00	1.00	-
24	GENERATED INDIAN CODE GENRAL_STRUCTURES 16	1.00	1.00	1.00	-
25	GENERATED INDIAN CODE GENRAL_STRUCTURES 17	1.00	1.00	1.00	-
26	GENERATED INDIAN CODE GENRAL_STRUCTURES 18	1.00	1.00	1.00	-
27	GENERATED INDIAN CODE GENRAL_STRUCTURES 19	1.00	1.00	1.00	-
28	GENERATED INDIAN CODE GENRAL_STRUCTURES 20	1.00	1.00	1.00	-
29	GENERATED INDIAN CODE GENRAL_STRUCTURES 21	1.00	1.00	1.00	-
30	GENERATED INDIAN CODE GENRAL_STRUCTURES 22	1.00	1.00	1.00	-
31	GENERATED INDIAN CODE GENRAL_STRUCTURES 23	1.00	1.00	1.00	-
32	GENERATED INDIAN CODE GENRAL_STRUCTURES 24	1.00	1.00	1.00	-
33	GENERATED INDIAN CODE GENRAL_STRUCTURES 25	1.00	1.00	1.00	-
34	GENERATED INDIAN CODE GENRAL_STRUCTURES 26	1.00	1.00	1.00	-
35	GENERATED INDIAN CODE GENRAL_STRUCTURES 27	1.00	1.00	1.00	-
36	GENERATED INDIAN CODE GENRAL_STRUCTURES 28	1.00	1.00	1.00	-
37	GENERATED INDIAN CODE GENRAL_STRUCTURES 29	1.00	1.00	1.00	-
38	GENERATED INDIAN CODE GENRAL_STRUCTURES 30	1.00	1.00	1.00	-
39	GENERATED INDIAN CODE GENRAL_STRUCTURES 31	1.00	1.00	1.00	-
40	GENERATED INDIAN CODE GENRAL_STRUCTURES 32	1.00	1.00	1.00	-
41	GENERATED INDIAN CODE GENRAL_STRUCTURES 33	1.00	1.00	1.00	-
Load Combination/s- Strength Level					
Load Combination Number	Load Combination Title	Load Case Multiplier (a)	Soil Bearing Factor (b)	Self Weight Factor (c)	Code
a - Value specified in the Load Multiplier table b - Value specified in the Pile/Soil Bearing Capacity Factors table c - Value specified in the Apply Self Weight and Dead Weight Factor table					
1	EQX+	1.00	1.00	1.00	-
2	EQX-	1.00	1.00	1.00	-
3	EQZ+	1.00	1.00	1.00	-
4	EQZ-	1.00	1.00	1.00	-
5	DL	1.00	1.00	1.00	-
6	LL	1.00	1.00	1.00	-
7	WLX	1.00	1.00	1.00	-
8	WLZ	1.00	1.00	1.00	-
9	GENERATED INDIAN CODE GENRAL_STRUCTURES 1	1.00	1.00	1.00	-
10	GENERATED INDIAN CODE GENRAL_STRUCTURES 2	1.00	1.00	1.00	-
11	GENERATED INDIAN CODE GENRAL_STRUCTURES 3	1.00	1.00	1.00	-
12	GENERATED INDIAN CODE GENRAL_STRUCTURES 4	1.00	1.00	1.00	-
13	GENERATED INDIAN CODE GENRAL_STRUCTURES 5	1.00	1.00	1.00	-

Load Combination/s- Strength Level					
Load Combination Number	Load Combination Title	Load Case Multiplier (a)	Soil Bearing Factor (b)	Self Weight Factor (c)	Code
a - Value specified in the Load Multiplier table b - Value specified in the Pile/Soil Bearing Capacity Factors table c - Value specified in the Apply Self Weight and Dead Weight Factor table					
14	GENERATED INDIAN CODE GENRAL_STRUCTURES 6	1.00	1.00	1.00	-
15	GENERATED INDIAN CODE GENRAL_STRUCTURES 7	1.00	1.00	1.00	-
16	GENERATED INDIAN CODE GENRAL_STRUCTURES 8	1.00	1.00	1.00	-
17	GENERATED INDIAN CODE GENRAL_STRUCTURES 9	1.00	1.00	1.00	-
18	GENERATED INDIAN CODE GENRAL_STRUCTURES 10	1.00	1.00	1.00	-
19	GENERATED INDIAN CODE GENRAL_STRUCTURES 11	1.00	1.00	1.00	-
20	GENERATED INDIAN CODE GENRAL_STRUCTURES 12	1.00	1.00	1.00	-
21	GENERATED INDIAN CODE GENRAL_STRUCTURES 13	1.00	1.00	1.00	-
22	GENERATED INDIAN CODE GENRAL_STRUCTURES 14	1.00	1.00	1.00	-
23	GENERATED INDIAN CODE GENRAL_STRUCTURES 15	1.00	1.00	1.00	-
24	GENERATED INDIAN CODE GENRAL_STRUCTURES 16	1.00	1.00	1.00	-
25	GENERATED INDIAN CODE GENRAL_STRUCTURES 17	1.00	1.00	1.00	-
26	GENERATED INDIAN CODE GENRAL_STRUCTURES 18	1.00	1.00	1.00	-
27	GENERATED INDIAN CODE GENRAL_STRUCTURES 19	1.00	1.00	1.00	-
28	GENERATED INDIAN CODE GENRAL_STRUCTURES 20	1.00	1.00	1.00	-
29	GENERATED INDIAN CODE GENRAL_STRUCTURES 21	1.00	1.00	1.00	-
30	GENERATED INDIAN CODE GENRAL_STRUCTURES 22	1.00	1.00	1.00	-
31	GENERATED INDIAN CODE GENRAL_STRUCTURES 23	1.00	1.00	1.00	-
32	GENERATED INDIAN CODE GENRAL_STRUCTURES 24	1.00	1.00	1.00	-
33	GENERATED INDIAN CODE GENRAL_STRUCTURES 25	1.00	1.00	1.00	-
34	GENERATED INDIAN CODE GENRAL_STRUCTURES 26	1.00	1.00	1.00	-
35	GENERATED INDIAN CODE GENRAL_STRUCTURES 27	1.00	1.00	1.00	-
36	GENERATED INDIAN CODE GENRAL_STRUCTURES 28	1.00	1.00	1.00	-
37	GENERATED INDIAN CODE GENRAL_STRUCTURES 29	1.00	1.00	1.00	-
38	GENERATED INDIAN CODE GENRAL_STRUCTURES 30	1.00	1.00	1.00	-
39	GENERATED INDIAN CODE GENRAL_STRUCTURES 31	1.00	1.00	1.00	-
40	GENERATED INDIAN CODE GENRAL_STRUCTURES 32	1.00	1.00	1.00	-
41	GENERATED INDIAN CODE GENRAL_STRUCTURES 33	1.00	1.00	1.00	-

Applied Loads on Top of Pedestal

Before consideration of self weight and load multiplier table

Moments are About the center of Column / Pedestal (does not include moments caused by lateral loads)
For the loads shown in this table, the sign convention is the same as that for JOINT LOADS in STAAD.Pro when global Y is the vertical axis.

Applied Loads for Column - Service Stress Level					
Load Case	F_x (kN)	F_y (kN) Downwards is negative Upwards is positive	F_z (kN)	M_x (kNm)	M_z (kNm)
1	16.98	15.70	-5.47	-9.96	-33.66
2	-16.98	-15.70	5.47	9.96	33.66
3	-5.28	40.57	26.07	46.01	10.55
4	5.28	-40.57	-26.07	-46.01	-10.55
5	-10.60	-366.59	-5.84	-5.55	10.52
6	-2.10	-34.66	-1.04	-1.00	2.20
7	3.59	0.00	0.01	0.02	-0.14
8	-0.04	0.02	4.27	0.08	0.07
9	-19.04	-601.87	-10.32	-9.83	19.07
10	-10.92	-481.49	-8.24	-7.84	15.09
11	-15.28	-481.48	-3.12	-7.77	15.35
12	-19.55	-481.50	-8.26	-7.88	15.42
13	-15.19	-481.52	-13.38	-7.95	15.17
14	5.14	-462.65	-14.81	-19.82	-25.13
15	-35.60	-500.34	-1.69	4.09	55.65
16	-21.57	-432.82	23.03	47.35	27.92
17	-8.90	-530.18	-39.53	-63.07	2.60
18	-35.60	-500.34	-1.69	4.09	55.65
19	5.14	-462.65	-14.81	-19.82	-25.13
20	-8.90	-530.18	-39.53	-63.07	2.60
21	-21.57	-432.82	23.03	47.35	27.92
22	-10.50	-549.87	-8.75	-8.30	15.57
23	-15.95	-549.86	-2.35	-8.22	15.89
24	-21.28	-549.88	-8.78	-8.35	15.98
25	-15.83	-549.90	-15.17	-8.44	15.66

Applied Loads for Column - Service Stress Level					
Load Case	F_x (kN)	F_y (kN) **Downwards is negative Upwards is positive**	F_z (kN)	M_x (kNm)	M_z (kNm)
26	9.57	-526.32	-16.96	-23.28	-34.71
27	-41.36	-573.44	-0.56	6.62	66.26
28	-23.81	-489.03	30.34	60.68	31.60
29	-7.97	-610.73	-47.86	-77.34	-0.05
30	-41.36	-573.44	-0.56	6.62	66.26
31	9.57	-526.32	-16.96	-23.28	-34.71
32	-7.97	-610.73	-47.86	-77.34	-0.05
33	-23.81	-489.03	30.34	60.68	31.60
34	15.93	-306.37	-13.46	-19.94	-41.02
35	-35.00	-353.48	2.94	9.95	59.95
36	-17.46	-269.08	33.84	64.01	25.29
37	-1.62	-390.77	-44.36	-74.01	-6.36
38	-35.00	-353.48	2.94	9.95	59.95
39	15.93	-306.37	-13.46	-19.94	-41.02
40	-1.62	-390.77	-44.36	-74.01	-6.36
41	-17.46	-269.08	33.84	64.01	25.29

Applied Loads for Column - Strength Level					
Load Case	F_x (kN)	F_y (kN) **Downwards is negative Upwards is positive**	F_z (kN)	M_x (kNm)	M_z (kNm)
1	16.98	15.70	-5.47	-9.96	-33.66
2	-16.98	-15.70	5.47	9.96	33.66
3	-5.28	40.57	26.07	46.01	10.55
4	5.28	-40.57	-26.07	-46.01	-10.55
5	-10.60	-366.59	-5.84	-5.55	10.52
6	-2.10	-34.66	-1.04	-1.00	2.20
7	3.59	0.00	0.01	0.02	-0.14
8	-0.04	0.02	4.27	0.08	0.07
9	-19.04	-601.87	-10.32	-9.83	19.07
10	-10.92	-481.49	-8.24	-7.84	15.09
11	-15.28	-481.48	-3.12	-7.77	15.35
12	-19.55	-481.50	-8.26	-7.88	15.42
13	-15.19	-481.52	-13.38	-7.95	15.17
14	5.14	-462.65	-14.81	-19.82	-25.13
15	-35.60	-500.34	-1.69	4.09	55.65
16	-21.57	-432.82	23.03	47.35	27.92
17	-8.90	-530.18	-39.53	-63.07	2.60
18	-35.60	-500.34	-1.69	4.09	55.65
19	5.14	-462.65	-14.81	-19.82	-25.13
20	-8.90	-530.18	-39.53	-63.07	2.60
21	-21.57	-432.82	23.03	47.35	27.92
22	-10.50	-549.87	-8.75	-8.30	15.57
23	-15.95	-549.86	-2.35	-8.22	15.89
24	-21.28	-549.88	-8.78	-8.35	15.98
25	-15.83	-549.90	-15.17	-8.44	15.66
26	9.57	-526.32	-16.96	-23.28	-34.71
27	-41.36	-573.44	-0.56	6.62	66.26
28	-23.81	-489.03	30.34	60.68	31.60
29	-7.97	-610.73	-47.86	-77.34	-0.05
30	-41.36	-573.44	-0.56	6.62	66.26
31	9.57	-526.32	-16.96	-23.28	-34.71
32	-7.97	-610.73	-47.86	-77.34	-0.05
33	-23.81	-489.03	30.34	60.68	31.60
34	15.93	-306.37	-13.46	-19.94	-41.02
35	-35.00	-353.48	2.94	9.95	59.95
36	-17.46	-269.08	33.84	64.01	25.29
37	-1.62	-390.77	-44.36	-74.01	-6.36
38	-35.00	-353.48	2.94	9.95	59.95
39	15.93	-306.37	-13.46	-19.94	-41.02
40	-1.62	-390.77	-44.36	-74.01	-6.36
41	-17.46	-269.08	33.84	64.01	25.29

Footing Size

Initial Length (L_o) = 2.00 m

Initial Width (W_o) = 2.00 m

Area from initial length and width, A_o = $L_o \times W_o$ = 4.00 m^2

Min. area required from bearing pressure, A_{min} = $\frac{P}{q_{max}}$ = 7.00 m^2

Note: A_{min} is an initial estimation.
P = Vertical load from column + selfweight of footing + weight of soil.
q_{max} = Respective Factored Bearing Capacity.

Final Footing Size

Length (L_2) =	3.00	m	Governing Load Case :	# 29
Width (W_2) =	3.00	m	Governing Load Case :	# 29
Depth (D_2) =	0.70	m		
Area (A_2) =	9.00	m^2		

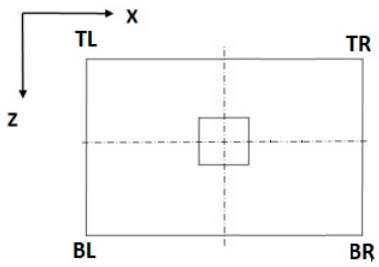
Depth is governed by Ultimate Load Case

(Service check is performed with footing thickness requirements from concrete check)

Final Soil Height = 0.50 m

Weight of the footing + pedestal (if any) =	151.20	kN
Weight of the soil above the footing (dry) =	78.14	kN
Uplift force due to buoyancy =	0.00	kN
Effect due to adhesion =	0.00	kN

Gross Pressures at 4 Corners



Load Case	Pressure at top left corner (kN/m2)	Pressure at top right corner (kN/m2)	Pressure at bottom right corner (kN/m2)	Pressure at bottom left corner (kN/m2)	Area of footing in uplift (A_u) (m^2)	Gross Bearing Capacity (kN/m2)
29	**119.2028**	116.7442	67.4795	69.9381	0.00	120.0000
29	119.2028	**116.7442**	67.4795	69.9381	0.00	120.0000
28	72.3415	50.8890	**87.2973**	108.7499	0.00	120.0000
27	108.9725	66.6562	69.4229	**111.7393**	0.00	120.0000

If A_u is zero, there is no uplift and no pressure adjustment is necessary. Otherwise, to account for uplift, areas of negative pressure will be set to zero and the pressure will be redistributed to remaining corners.

Summary of adjusted Gross Pressures at Four Corners

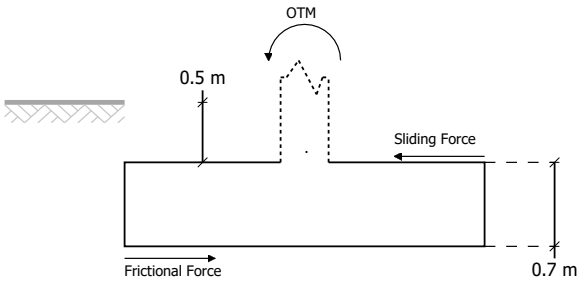
Load Case	Pressure at top left corner (kN/m2)	Pressure at top right corner (kN/m2)	Pressure at bottom right corner (kN/m2)	Pressure at bottom left corner (kN/m2)	Gross Bearing Capacity (kN/m2)
29	**119.2028**	116.7442	67.4795	69.9381	120.0000
29	119.2028	**116.7442**	67.4795	69.9381	120.0000
28	72.3415	50.8890	**87.2973**	108.7499	120.0000

Load Case	Pressure at top left corner (kN/m2)	Pressure at top right corner (kN/m2)	Pressure at bottom right corner (kN/m2)	Pressure at bottom left corner (kN/m2)	Gross Bearing Capacity (kN/m2)
27	108.9725	66.6562	69.4229	**111.7393**	120.0000

Details of Out-of-Contact Area (If Any)

Governing load case = N/A
Plan area of footing = 9.00 sq.m
Area not in contact with soil = = 0.00 sq.m
% of total area not in contact = 0.00%

Stability Check



-	Factor of safety against sliding				Factor of safety against overturning		
Load Case No.	Along X-Direction	Along Z-Direction	Resultant	Required FOS	About X-Direction	About Z-Direction	Required FOS
1	**6.29**	19.53	5.99	1.50	23.23	**7.04**	1.50
2	7.22	22.41	6.87	1.50	26.65	8.07	1.50
3	17.88	**3.62**	**3.55**	1.50	**4.41**	19.88	1.50
4	25.56	5.18	5.07	1.50	6.30	28.42	1.50
5	28.12	51.01	24.63	1.50	92.71	49.85	1.50
6	62.86	127.46	56.38	1.50	229.73	107.98	1.50
7	31.92	N/A	31.92	1.50	N/A	129.77	1.50
8	N/A	26.83	26.83	1.50	112.18	3407.58	1.50
9	21.82	40.29	19.19	1.50	73.13	38.48	1.50
10	32.54	43.13	25.97	1.50	78.33	46.89	1.50
11	23.26	113.75	22.79	1.50	107.06	40.94	1.50
12	18.18	43.01	16.75	1.50	78.02	36.64	1.50
13	23.40	26.56	17.56	1.50	61.57	41.33	1.50
14	67.37	23.36	22.07	1.50	34.38	36.13	1.50
15	10.25	215.79	10.24	1.50	375.93	13.58	1.50
16	15.35	14.38	10.49	1.50	15.65	23.09	1.50
17	42.68	9.61	9.37	1.50	12.55	129.08	1.50
18	10.25	215.79	10.24	1.50	375.93	13.58	1.50
19	67.37	23.36	22.07	1.50	34.38	36.13	1.50
20	42.68	9.61	9.37	1.50	12.55	129.08	1.50
21	15.35	14.38	10.49	1.50	15.65	23.09	1.50
22	37.09	44.53	28.50	1.50	81.00	50.99	1.50
23	24.42	165.64	24.16	1.50	118.50	43.21	1.50
24	18.31	44.39	16.92	1.50	80.62	37.86	1.50

-	Factor of safety against sliding				Factor of safety against overturning		
Load Case No.	Along X-Direction	Along Z-Direction	Resultant	Required FOS	About X-Direction	About Z-Direction	Required FOS
25	24.61	25.68	17.77	1.50	61.32	43.70	1.50
26	39.48	22.27	19.40	1.50	32.25	27.37	1.50
27	9.71	716.74	9.70	1.50	193.44	12.65	1.50
28	15.08	11.84	9.31	1.50	13.15	22.32	1.50
29	52.68	8.78	8.66	1.50	11.37	227.79	1.50
30	9.71	716.74	9.70	1.50	193.44	12.65	1.50
31	39.48	22.27	19.40	1.50	32.25	27.37	1.50
32	52.68	8.78	8.66	1.50	11.37	227.79	1.50
33	15.08	11.84	9.31	1.50	13.15	22.32	1.50
34	16.82	19.90	12.85	1.50	27.36	15.40	1.50
35	8.33	98.95	8.30	1.50	72.79	10.35	1.50
36	14.28	7.36	6.54	1.50	8.52	19.93	1.50
37	191.86	6.99	6.99	1.50	8.85	177.92	1.50
38	8.33	98.95	8.30	1.50	72.79	10.35	1.50
39	16.82	19.90	12.85	1.50	27.36	15.40	1.50
40	191.86	6.99	6.99	1.50	8.85	177.92	1.50
41	14.28	7.36	6.54	1.50	8.52	19.93	1.50

Critical Load Case And The Governing Factor Of Safety For Overturning and Sliding X Direction

Critical Load Case for Sliding along X-Direction : 1
Governing Disturbing Force : 16.98 kN
Governing Restoring Force : 106.82 kN
Minimum Sliding Ratio for the Critical Load Case : 6.29
Critical Load Case for Overturning About X-Direction : 3
Governing Overturning Moment : 64.25 kNm
Governing Resisting Moment : 283.16 kNm
Minimum Overturning Ratio for the Critical Load Case : 4.41

Critical Load Case And The Governing Factor Of Safety For Overturning and Sliding Z Direction

Critical Load Case for Sliding along Z-Direction : 3
Governing Disturbing Force : 26.07 kN
Governing Restoring Force : 94.39 kN
Minimum Sliding Ratio for the Critical Load Case : 3.62
Critical Load Case for Overturning About Z-Direction : 1
Governing Overturning Moment : -45.54 kNm
Governing Resisting Moment : : 320.45 kNm
Minimum Overturning Ratio for the Critical Load Case : 7.04

Critical Load Case And The Governing Factor Of Safety For Sliding Along Resultant Direction

Critical Load Case for Sliding along Resultant Direction : : 3
Governing Disturbing Force : 26.60 kN
Governing Restoring Force : 94.39 kN
Minimum Sliding Ratio for the Critical Load Case : 3.55

Top Reinforcement Design Requirement

Top Reinforcement needs to be provided because of resultant negative pressure coming from net pressure calculations for bending.

Ultimate Gross Pressures

The base pressures reported in this table and the area of footing in contact include the effect of buoyancy (if any).

Load Case / Load	Pressure at top left	Pressure at top right	Pressure at bottom	Pressure at bottom left	Gross Factored	Area of footing in

Combination ID	corner (kN/m2)	corner (kN/m2)	right corner (kN/m2)	corner (kN/m2)	Bearing Capacity For Ultimate Load Case (kN/m2)	Contact with soil (A_u) (m^2)
1	16.6824	36.9229	30.7930	10.5525	204.0000	9.00
2	34.2829	14.0424	20.1723	40.4128	204.0000	9.00
3	9.8622	3.5309	32.0886	38.4199	204.0000	9.00
4	41.1031	47.4344	18.8767	12.5454	204.0000	9.00
5	72.3423	64.3720	60.0865	68.0569	204.0000	9.00
6	30.5322	28.9022	28.1361	29.7660	204.0000	9.00
7	24.8880	26.0662	26.0764	24.8982	204.0000	9.00
8	24.8220	24.7771	26.1400	26.1849	204.0000	9.00
9	103.3464	88.9459	81.3685	95.7690	204.0000	9.00
10	87.0601	76.9535	70.9038	81.0104	204.0000	9.00
11	86.9808	75.4066	70.9802	82.5544	204.0000	9.00
12	88.4873	75.5531	69.4789	82.4131	204.0000	9.00
13	88.5665	77.1000	69.4026	80.8691	204.0000	9.00
14	77.2134	89.9816	76.5638	63.7955	204.0000	9.00
15	98.3340	62.5249	63.8190	99.6280	204.0000	9.00
16	69.0292	49.9112	78.1185	97.2365	204.0000	9.00
17	106.5182	102.5954	62.2642	66.1870	204.0000	9.00
18	98.3340	62.5249	63.8190	99.6280	204.0000	9.00
19	77.2134	89.9816	76.5638	63.7955	204.0000	9.00
20	106.5182	102.5954	62.2642	66.1870	204.0000	9.00
21	69.0292	49.9112	78.1185	97.2365	204.0000	9.00
22	94.8802	84.6919	78.2790	88.4673	204.0000	9.00
23	94.7811	82.7582	78.3744	90.3973	204.0000	9.00
24	96.6641	82.9413	76.4979	90.2207	204.0000	9.00
25	96.7632	84.8750	76.4024	88.2907	204.0000	9.00
26	82.5718	100.9770	85.3539	66.9487	204.0000	9.00
27	108.9725	66.6562	69.4229	**111.7393**	204.0000	9.00
28	72.3415	50.8890	**87.2973**	108.7499	204.0000	9.00
29	**119.2028**	**116.7442**	67.4795	69.9381	204.0000	9.00
30	108.9725	66.6562	69.4229	**111.7393**	204.0000	9.00
31	82.5718	100.9770	85.3539	66.9487	204.0000	9.00
32	**119.2028**	**116.7442**	67.4795	69.9381	204.0000	9.00
33	72.3415	50.8890	**87.2973**	108.7499	204.0000	9.00
34	54.4560	77.6435	64.5916	41.4042	204.0000	9.00
35	80.8567	43.3226	48.6606	86.1947	204.0000	9.00
36	44.2257	27.5554	66.5350	83.2054	204.0000	9.00
37	91.0870	93.4106	46.7172	44.3936	204.0000	9.00
38	80.8567	43.3226	48.6606	86.1947	204.0000	9.00
39	54.4560	77.6435	64.5916	41.4042	204.0000	9.00
40	91.0870	93.4106	46.7172	44.3936	204.0000	9.00
41	44.2257	27.5554	66.5350	83.2054	204.0000	9.00

Minimum Required Contact Area for Ultimate Loads : 0.00 m^2

Actual Area in Contact for all ultimate load cases exceeds the minimum required. Hence Safe

Maximum Corner Pressure from all ultimate load cases is less than the allowable. Hence Safe

Moment Calculation

Check Trial Depth against moment (About Z Axis)

		Critical Load Case =		**#27**
Effective Depth =	$D-(cc+1.5\times d_b)$	=	0.64	m
Governing moment (M_u) =		=	199.63	kNm

As Per IS 456 2000 ANNEX G G-1.1C

Limiting Factor1 (K_{umax}) =	$\frac{700}{[1100+(0.87\times f_y)]}$	=	0.46	
Limiting Factor2 (R_{umax}) =	$0.36\times f_{ck}\times k_{umax}\times(1-0.42\times k_{umax})$	=	3981.78	kN/m2
Limiting Moment Of Resistance (M_{umax}) =	$R_{umax}\times B\times d^2$	=	4816.57	kNm

M_u <= M_{umax} hence, safe

Check Trial Depth against moment (About X Axis)

		Critical Load Case =		**#29**
Effective Depth =	$D-(cc+1.5\times d_b)$	=	0.64	m
Governing moment (M_u) =		=	232.62	kNm

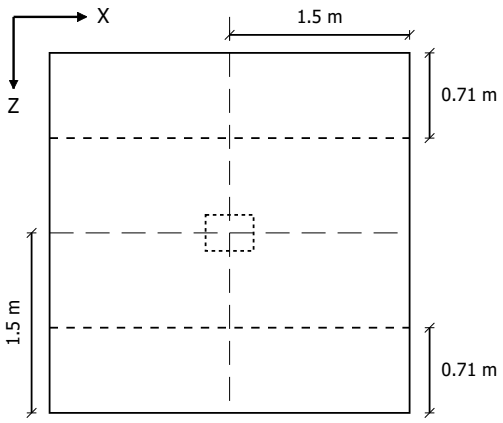
As Per IS 456 2000 ANNEX G G-1.1C

Limiting Factor1 (K_{umax}) =	$\frac{700}{[1100+(0.87\times f_y)]}$	=	0.46	
Limiting Factor2 (R_{umax}) =	$0.36\times f_{ck}\times k_{umax}\times(1-0.42\times k_{umax})$	=	3981.78	kN/m2
Limiting Moment Of Resistance (M_{umax}) =	$R_{umax}\times B\times d^2$	=	4816.57	kNm

M_u <= M_{umax} hence, safe

One-Way Shear in XY plane

(Shear Plane Parallel to Global X Axis)



Plan

Critical Load Case = # 32

Distance of critical section from top left corner along Z, D_Z =	0.72	m
Shear Force(S) =	184.21	kN
Shear Stress(T_v) =	96.70	kN/m2
Percentage Of Steel(P_t) =	0.1319	

As Per IS 456 2000 Clause 40 Table 19

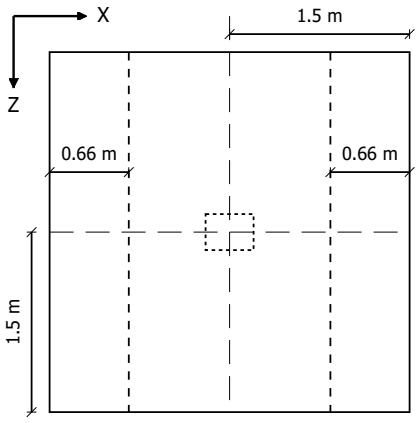
Shear Strength Of Concrete(T_c) = 290.00 kN/m2

Shear Enhancement Factor (if considered) is applied to (T_c), as per IS456 -2000 Clause No 40.5.1 and Fig 24

$T_v < T_c$ hence, safe

One-Way Shear in YZ plane

(Shear Plane Parallel to Global Z Axis)



Plan

Critical Load Case	=	**# 30**
Distance of critical section from top left corner along X, D_X	=	0.67 m
Shear Force(S)	=	161.48 kN
Shear Stress(T_v)	=	84.77 kN/m2
Percentage Of Steel(P_t)	=	0.13

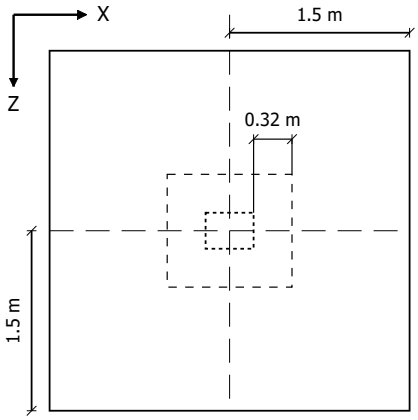
As Per IS 456 2000 Clause 40 Table 19

Shear Strength Of Concrete(T_c) = 290.00 kN/m2

Shear Enhancement Factor (if considered) is applied to (T_c), as per IS456 -2000 Clause No 40.5.1 and Fig 24

$T_v < T_c$ hence, safe

Punching Shear Check



Plan

Critical Load Case	=	**#29**
Shear Force(S)	=	672.90 kN
Shear Stress(T_v)	=	265.51 kN/m2

As Per IS 456 2000 Clause 31.6.3.1

$K_s = \min[(0.5 + \beta), 1] =$ 1.00

Shear Strength(T_c) = $0.25 \times \sqrt{f_{ck}}$ = 1369.31 kN/m2

K_s x T_c = 1369.31 kN/m2

T_v<= K_s x T_c hence, safe

Reinforcement Calculation

Development Length Check

Along X Axis

Bar diameter corresponding to bar size used(d_b) = 10 mm

As Per IS 456 2000 Clause 26.2.1

Development Length(l_d) = $\frac{d_b \times 0.87 \times f_y}{4 \times \tau_{bd}}$ = 0.44 m

Available Development Length(l_{db}) = $\left[\frac{(B-b)}{2} - cc\right]$ = 1.25 m

l_{db} >=l_d hence, safe

Along Z Axis

Bar diameter corresponding to bar size used(d_b) = 10 mm

As Per IS 456 2000 Clause 26.2.1

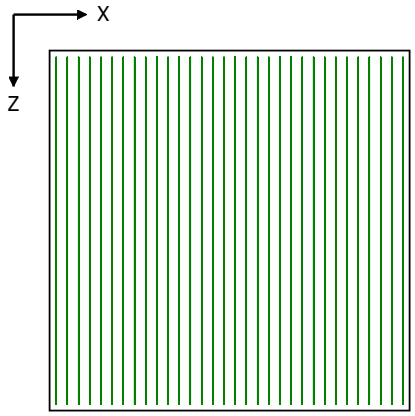
Development Length(l_d) = $\frac{d_b \times 0.87 \times f_y}{4 \times \tau_{bd}}$ = 0.44 m

Available Development Length(l_{db}) = $\left[\frac{(H-h)}{2} - cc\right]$ = 1.30 m

l_{db} >=l_d hence, safe

Flexure About X-Axis

Design For Bottom Reinforcement Parallel to Z Axis



32 - 10 mm

For moment About X Axis (M_x)

As Per IS 456 2000 Clause 26.5.2.1

Critical Load Case = #29

Minimum Area of Steel (A_{stmin}) = 2520 mm2

Calculated Area of Steel (A_{st}) = 2520 mm2

Note - "Area of Steel required" reported here is the larger value between the calculated area of steel and minimum steel required as per code stipulations

Provided Area of Steel ($A_{st,Provided}$) = 2513 mm2

$A_{st,Provided}$ >= A_{stmin} Hence OK.

Selected bar Size (d_b) = Ø10

Minimum spacing allowed (S_{min}) = 60.00 mm

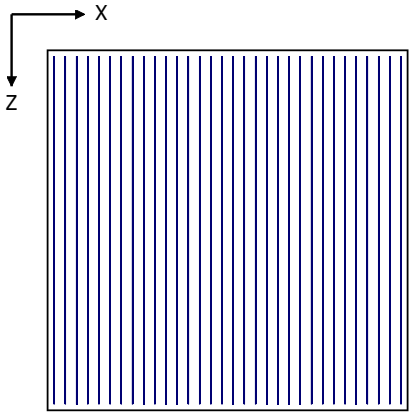
Selected spacing (S) = 93.23 mm

S_{min}<= S <= S_{max} and selected bar size < selected maximum bar size. Hence OK.

Based on spacing reinforcement increment; provided reinforcement is

Ø10 @ 90mm o.c.

Design For Top Reinforcement Parallel to Z Axis



32 - 10 mm

As Per IS 456 2000 Clause 26.5.2.1

Minimum Area of Steel (A_{stmin}) = 2520mm2

Calculated Area of Steel (A_{st}) = 2520mm2

Note - "Area of Steel required" reported here is the larger value between the calculated area of steel and minimum steel required as per code stipulations

Provided Area of Steel ($A_{st,Provided}$) = 2513mm2

$A_{st,Provided}$ >= A_{stmin} Hence OK.

Governing Moment = 77.76kNm

Selected bar Size (d_b) = Ø10

Minimum spacing allowed (S_{min}) = 60.00mm

Selected spacing (S) = 93.23mm

S_{min}<= S <= S_{max} and selected bar size < selected maximum bar size...

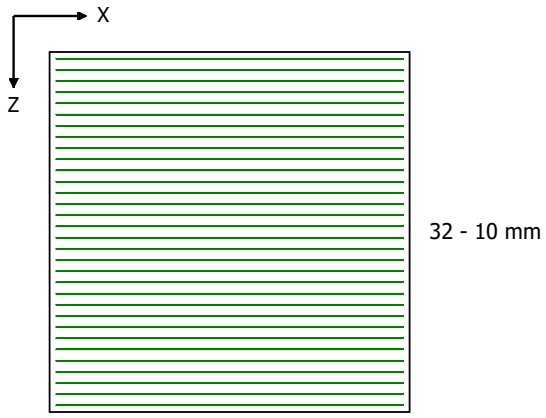
Hence OK.

Based on spacing reinforcement increment; provided reinforcement is

Ø10 @ 90mm o.c.

Flexure About Z-Axis

Design For Bottom Reinforcement Parallel to X Axis



For moment About Z Axis (M_z)

As Per IS 456 2000 Clause 26.5.2.1

Critical Load Case = #27

Minimum Area of Steel (A_{stmin}) = 2520 mm2

Calculated Area of Steel (A_{st}) = 2520 mm2

Note - "Area of Steel required" reported here is the larger value between the calculated area of steel and minimum steel required as per code stipulations

Provided Area of Steel ($A_{st,Provided}$) = 2513 mm2

$A_{st,Provided}$ >= A_{stmin} Hence OK.

Selected bar Size (d_b) = Ø10

Minimum spacing allowed (S_{min}) = 60.00 mm

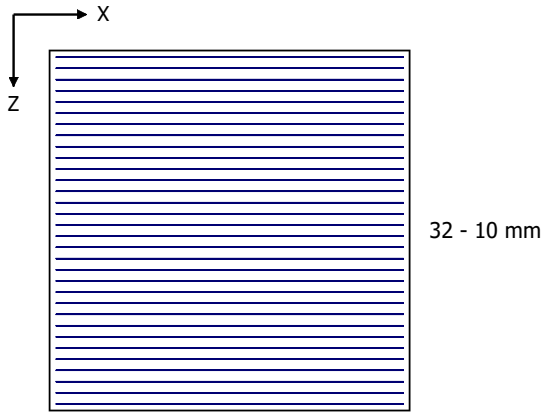
Selected spacing (S) = 93.23 mm

S_{min}<= S <= S_{max} and selected bar size < selected maximum bar size. Hence OK.

Based on spacing reinforcement increment; provided reinforcement is

Ø10 @ 90mm o.c.

Design For Top Reinforcement Parallel to X Axis



As Per IS 456 2000 Clause 26.5.2.1

Minimum Area of Steel (A_{stmin}) = 2520 mm2

Calculated Area of Steel (A_{st})	=	2520	mm2
Note - "Area of Steel required" reported here is the larger value between the calculated area of steel and minimum steel required as per code stipulations			
Provided Area of Steel ($A_{st,Provided}$)	=	2513	mm2
$A_{st,Provided}$ >= A_{stmin}	Hence OK.		
Governing Moment	=	72	kNm

Selected bar Size (d_b)	=	Ø10	
Minimum spacing allowed (S_{min})	=	60.00	mm
Selected spacing (S)	=	93.23	mm

S_{min}<= S <= S_{max} and selected bar size < selected maximum bar size. Hence OK.

Based on spacing reinforcement increment; provided reinforcement is

Ø10 @ 90mm o.c.

Crack Width Calculation (for Mz)

Modulus of Elasticity of Concrete(E_c)	=	27386127.88	kN/m2	Clause No. 6.2.3.1
Modulus of Elasticity of Steel(E_s)	=	200000000.00	kN/m2	Annexure F
Depth of Neutral Axis(X_u)	=	0.30	m	Annexure G, Clause No. G-1.1.a
Effective MOI(I_{eff})	=	30323419537.05	mm4	
Average Steel Strain at Considered Level(ε_m)	=	0.00 X 10^{-5}		
Distance from Nearest Tension Rod (a_{cr})	=	0.07	m	
Crack Width (W_{cr})	=	0.00	mm	Annexure F
				From IS 456-2000 Clause No. 35.3.2

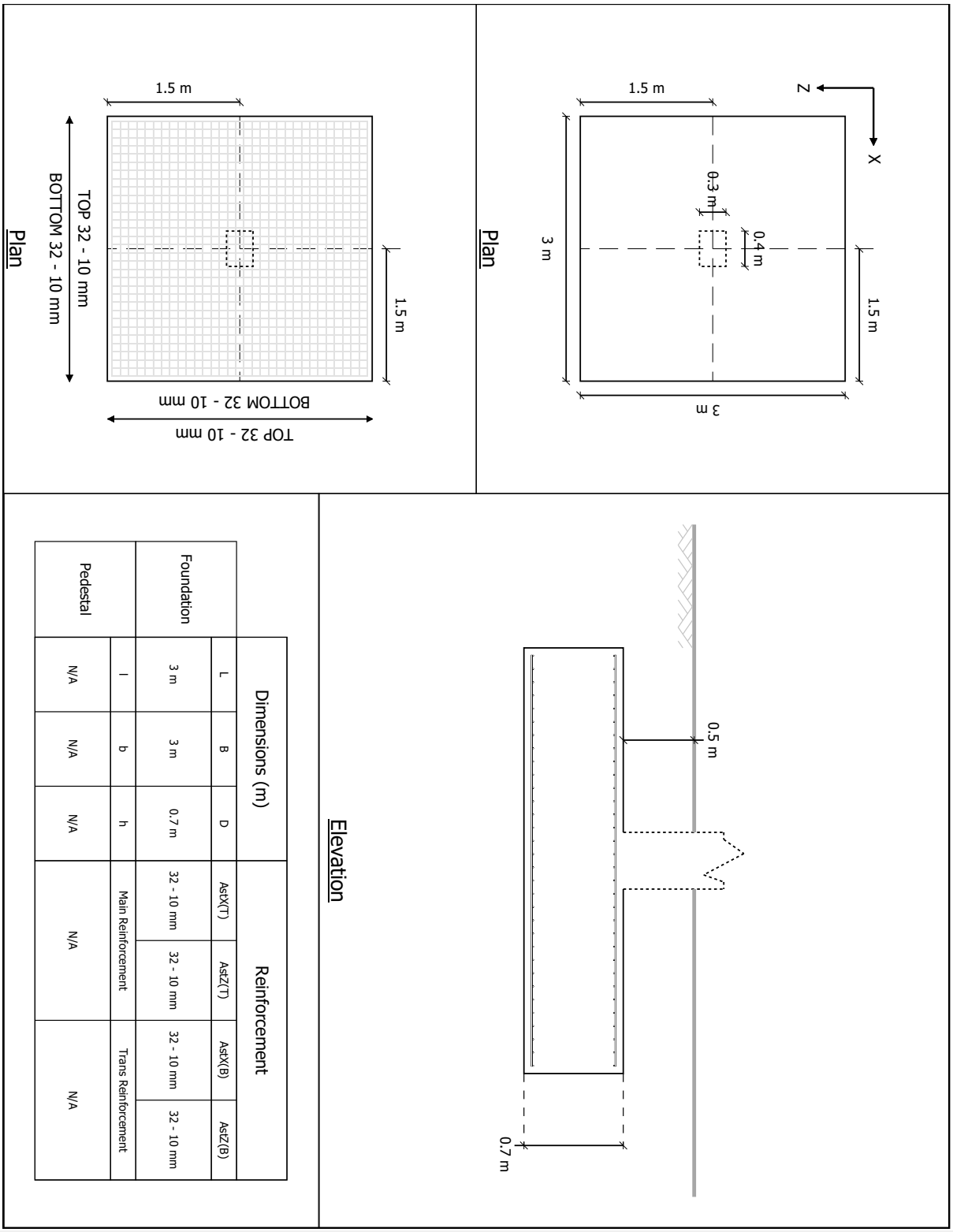
Section is uncracked.

Crack Width Calculation (for Mx)

Modulus of Elasticity of Concrete(E_c)	=	27386127.88	kN/m2	Clause No. 6.2.3.1
Modulus of Elasticity of Steel(E_s)	=	200000000.00	kN/m2	Annexure F
Depth of Neutral Axis(X_u)	=	0.30	m	Annexure G, Clause No. G-1.1.a
Effective MOI(I_{eff})	=	30323419537.05	mm4	
Average Steel Strain at Considered Level(ε_m)	=	0.00	X 10^{-5}	
Distance from Nearest Tension Rod (a_{cr})	=	0.07	m	
Crack Width (W_{cr})	=	0.00	mm	Annexure F

From IS 456-2000 Clause No. 35.3.2

Section is uncracked.



Dimensions (m)				Reinforcement				
	L	B	D	AstX(T)	AstZ(T)	AstX(B)	AstZ(B)
Foundation	3 m	3 m	0.7 m	32 - 10 mm	32 - 10 mm	32 - 10 mm	32 - 10 mm
	l	b	h	Main Reinforcement		Trans Reinforcement	
Pedestal	N/A	N/A	N/A	N/A		N/A	

ANNEXURE I

(STAAD pro input file)

STAAD SPACE DXF IMPORT OF HOME PLAN CENTRELINE.DXF
START JOB INFORMATION
ENGINEER DATE 18-Jan-25
END JOB INFORMATION
INPUT WIDTH 79
UNIT METER KN
JOINT COORDINATES
1 6.3665e-12 0 -2.5; 2 17.75 0 -2.5; 3 4.5475e-12 0 -4.875; 4 17.75 0 -4.875;
5 5.875 0 -6.1391e-12; 6 5.875 0 -9.75; 7 17.75 0 -9.75;
8 17.75 0 -1.84173e-11; 9 11.875 0 -9.75; 10 11.875 0 -1.29603e-11;
11 0 0 -9.75; 12 9.0949e-12 0 0; 13 5.875 0 -2.5; 14 11.875 0 -2.5;
15 5.875 0 -4.875; 16 11.875 0 -4.875; 17 6.3665e-12 3 -2.5; 18 17.75 3 -2.5;
19 4.5475e-12 3 -4.875; 20 17.75 3 -4.875; 21 5.875 3 -6.1391e-12;
22 5.875 3 -9.75; 23 17.75 3 -9.75; 24 17.75 3 -1.84173e-11; 25 11.875 3 -9.75;
26 11.875 3 -1.29603e-11; 27 0 3 -9.75; 28 9.0949e-12 3 0; 29 5.875 3 -2.5;
30 11.875 3 -2.5; 31 5.875 3 -4.875; 32 11.875 3 -4.875; 33 6.3665e-12 6 -2.5;
34 17.75 6 -2.5; 35 4.5475e-12 6 -4.875; 36 17.75 6 -4.875;
37 5.875 6 -6.1391e-12; 38 5.875 6 -9.75; 39 17.75 6 -9.75;
40 17.75 6 -1.84173e-11; 41 11.875 6 -9.75; 42 11.875 6 -1.29603e-11;
43 0 6 -9.75; 44 9.0949e-12 6 0; 45 5.875 6 -2.5; 46 11.875 6 -2.5;
47 5.875 6 -4.875; 48 11.875 6 -4.875; 49 6.3665e-12 9 -2.5; 50 17.75 9 -2.5;
51 4.5475e-12 9 -4.875; 52 17.75 9 -4.875; 53 5.875 9 -6.1391e-12;
54 5.875 9 -9.75; 55 17.75 9 -9.75; 56 17.75 9 -1.84173e-11; 57 11.875 9 -9.75;
58 11.875 9 -1.29603e-11; 59 0 9 -9.75; 60 9.0949e-12 9 0; 61 5.875 9 -2.5;
62 11.875 9 -2.5; 63 5.875 9 -4.875; 64 11.875 9 -4.875;
65 12.875 -6.0074e-06 -1.29603e-11; 67 17.75 1.5 -2.5;
68 17.75 1.5 -1.84173e-11; 69 16.75 1.5 -2.5; 70 16.75 1.5 -1.84173e-11;
72 12.875 -6.0074e-06 -1.25125; 74 16.75 1.5 -1.24875;
76 12.875 3 -1.38892e-11; 77 12.875 3 -2.5; 78 12.875 3 -1.25;
80 17.75 4.5 -2.5; 81 17.75 4.5 -1.84173e-11; 83 16.75 4.5 -2.5;
84 16.75 4.5 -1.84173e-11; 85 16.75 4.5 -1.25; 86 12.875 6 -1.38892e-11;
87 12.875 6 -2.5; 88 12.875 6 -1.25; 89 17.75 7.50001 -2.5;
90 17.75 7.50001 -1.84173e-11; 92 16.75 7.50001 -2.5;
93 16.75 7.50001 -1.84173e-11; 94 16.75 7.50001 -1.25;
95 12.875 9 -1.38892e-11; 96 12.875 9 -2.5; 97 12.875 9.00001 -1.25;
MEMBER INCIDENCES
35 1 17; 36 2 67; 37 3 19; 38 4 20; 40 6 22; 41 7 23; 42 8 68; 43 9 25;
44 10 26; 45 11 27; 46 12 28; 48 14 30; 49 15 31; 50 16 32; 51 19 31; 52 21 29;
53 25 32; 54 17 29; 55 29 31; 56 29 30; 58 30 77; 59 31 32; 60 31 22; 61 32 30;
62 32 20; 63 27 22; 64 22 25; 65 25 23; 66 27 19; 67 19 17; 68 17 28; 69 28 21;
70 21 26; 71 26 76; 72 23 20; 73 20 18; 75 17 33; 76 18 80; 77 19 35; 78 20 36;
79 21 37; 80 22 38; 81 23 39; 82 24 81; 83 25 41; 84 26 42; 85 27 43; 86 28 44;
87 29 45; 88 30 46; 89 31 47; 90 32 48; 91 35 47; 92 37 45; 93 41 48; 94 33 45;
95 45 47; 96 45 46; 97 46 42; 98 46 87; 99 47 48; 100 47 38; 101 48 46;
102 48 36; 103 43 38; 104 38 41; 105 41 39; 106 43 35; 107 35 33; 108 33 44;
109 44 37; 110 37 42; 111 42 86; 112 39 36; 113 36 34; 114 34 40; 115 33 49;
116 34 89; 117 35 51; 118 36 52; 119 37 53; 120 38 54; 121 39 55; 122 40 90;
123 41 57; 124 42 58; 125 43 59; 126 44 60; 127 45 61; 128 46 62; 129 47 63;

130 48 64; 131 51 63; 132 53 61; 133 57 64; 134 49 61; 135 61 63; 136 61 62;
137 62 58; 138 62 96; 139 63 64; 140 63 54; 141 64 62; 142 64 52; 143 59 54;
144 54 57; 145 57 55; 146 59 51; 147 51 49; 148 49 60; 149 60 53; 150 53 58;
151 58 95; 152 55 52; 153 52 50; 154 50 56; 182 29 13; 183 21 5; 184 67 18;
185 68 24; 187 76 24; 188 77 18; 194 65 70; 195 72 74; 197 69 70; 198 67 68;
199 70 68; 200 69 67; 201 77 76; 202 77 69; 203 69 74; 204 78 74; 206 80 34;
207 81 40; 208 86 40; 209 87 34; 210 76 84; 211 78 85; 212 84 83; 213 83 80;
214 80 81; 215 84 81; 216 87 88; 217 88 86; 218 88 85; 219 87 83; 220 89 50;
221 90 56; 222 95 56; 223 96 50; 224 86 93; 225 88 94; 226 92 89; 227 89 90;
228 92 93; 229 93 90; 230 96 92; 231 97 94; 232 96 95; 233 18 24; 234 30 26;
ELEMENT INCIDENCES SHELL
155 27 22 31 19; 156 22 25 32 31; 157 25 23 20 32; 158 19 31 29 17;
159 31 32 30 29; 160 32 20 18 30; 161 17 29 21 28; 162 29 30 26 21;
164 43 38 47 35; 165 38 41 48 47; 166 41 39 36 48; 167 35 47 45 33;
168 47 48 46 45; 169 48 36 34 46; 170 33 45 37 44; 171 45 46 42 37;
173 59 54 63 51; 174 54 57 64 63; 175 57 55 52 64; 176 51 63 61 49;
177 63 64 62 61; 178 64 52 50 62; 179 49 61 53 60; 180 61 62 58 53;
189 65 70 74 72; 190 70 69 67 68; 191 78 74 69 77; 192 30 26 76 77;
235 78 85 84 76; 236 87 83 85 88; 237 46 87 86 42; 238 88 94 93 86;
239 92 89 90 93; 240 96 92 94 97; 241 62 96 95 58; 242 83 80 81 84;
ELEMENT PROPERTY
155 TO 162 164 TO 171 173 TO 180 189 TO 192 235 TO 242 THICKNESS 0.125
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
51 TO 56 58 TO 73 91 TO 114 131 TO 154 187 188 194 195 197 TO 204 208 TO 219 -
222 TO 234 PRIS YD 0.4 ZD 0.4
35 TO 38 40 TO 46 48 TO 50 75 TO 90 115 TO 130 182 TO 185 206 207 220 -
221 PRIS YD 0.4 ZD 0.3
CONSTANTS
MATERIAL CONCRETE ALL
SUPPORTS
1 TO 16 65 72 FIXED
DEFINE 1893 LOAD
ZONE 0.16 RF 5 I 1 SS 2 ST 1 DM 0.05
SELFWEIGHT 1
MEMBER WEIGHT
35 TO 38 40 TO 46 48 TO 56 58 TO 73 75 TO 154 182 TO 185 187 188 194 195 197 -
198 TO 204 206 TO 234 UNI 15
51 TO 56 58 TO 62 91 TO 102 188 209 234 UNI 7.5
FLOOR WEIGHT
YRANGE 1 7 FLOAD -0.625
DEFINE WIND LOAD
TYPE 1 WIND 1
INT 0.96 HEIG 10
EXP 1 JOINT 1 TO 65 67 TO 70 72 74 76 TO 78 80 81 83 TO 90 92 TO 97
LOAD 1 LOADTYPE Seismic-H TITLE EQX+

1893 LOAD X 1
LOAD 2 LOADTYPE Seismic-H TITLE EQX-
1893 LOAD X -1
LOAD 3 LOADTYPE Seismic-H TITLE EQZ+
1893 LOAD Z 1
LOAD 4 LOADTYPE Seismic-H TITLE EQZ-
1893 LOAD Z -1
LOAD 5 LOADTYPE Dead TITLE DL
SELFWEIGHT Y -1
MEMBER LOAD
63 TO 73 103 TO 114 187 208 233 UNI GY -15
51 TO 56 58 TO 62 91 TO 102 188 209 234 UNI GY -7.5
FLOOR LOAD
YRANGE 0 10 FLOAD -1 GY
ELEMENT LOAD
189 191 235 236 238 240 PR PY -3.125
LOAD 6 LOADTYPE Live REDUCIBLE TITLE LL
FLOOR LOAD
YRANGE 0 7 FLOAD -2.5 GY
LOAD 7 LOADTYPE Wind TITLE WLX
WIND LOAD X 1 TYPE 1
WIND LOAD X -1 TYPE 1
LOAD 8 LOADTYPE Wind TITLE WLZ
WIND LOAD Z 1 TYPE 1
WIND LOAD Z -1 TYPE 1
LOAD COMB 9 GENERATED INDIAN CODE GENRAL_STRUCTURES 1
5 1.5 6 1.5
LOAD COMB 10 GENERATED INDIAN CODE GENRAL_STRUCTURES 2
5 1.2 6 1.2 7 1.2
LOAD COMB 11 GENERATED INDIAN CODE GENRAL_STRUCTURES 3
5 1.2 6 1.2 8 1.2
LOAD COMB 12 GENERATED INDIAN CODE GENRAL_STRUCTURES 4
5 1.2 6 1.2 7 -1.2
LOAD COMB 13 GENERATED INDIAN CODE GENRAL_STRUCTURES 5
5 1.2 6 1.2 8 -1.2
LOAD COMB 14 GENERATED INDIAN CODE GENRAL_STRUCTURES 6
5 1.2 6 1.2 1 1.2
LOAD COMB 15 GENERATED INDIAN CODE GENRAL_STRUCTURES 7
5 1.2 6 1.2 2 1.2
LOAD COMB 16 GENERATED INDIAN CODE GENRAL_STRUCTURES 8
5 1.2 6 1.2 3 1.2
LOAD COMB 17 GENERATED INDIAN CODE GENRAL_STRUCTURES 9
5 1.2 6 1.2 4 1.2
LOAD COMB 18 GENERATED INDIAN CODE GENRAL_STRUCTURES 10
5 1.2 6 1.2 1 -1.2
LOAD COMB 19 GENERATED INDIAN CODE GENRAL_STRUCTURES 11
5 1.2 6 1.2 2 -1.2
LOAD COMB 20 GENERATED INDIAN CODE GENRAL_STRUCTURES 12
5 1.2 6 1.2 3 -1.2
LOAD COMB 21 GENERATED INDIAN CODE GENRAL_STRUCTURES 13
5 1.2 6 1.2 4 -1.2
LOAD COMB 22 GENERATED INDIAN CODE GENRAL_STRUCTURES 14
5 1.5 7 1.5
LOAD COMB 23 GENERATED INDIAN CODE GENRAL_STRUCTURES 15
5 1.5 8 1.5

LOAD COMB 24 GENERATED INDIAN CODE GENRAL_STRUCTURES 16
5 1.5 7 -1.5
LOAD COMB 25 GENERATED INDIAN CODE GENRAL_STRUCTURES 17
5 1.5 8 -1.5
LOAD COMB 26 GENERATED INDIAN CODE GENRAL_STRUCTURES 18
5 1.5 1 1.5
LOAD COMB 27 GENERATED INDIAN CODE GENRAL_STRUCTURES 19
5 1.5 2 1.5
LOAD COMB 28 GENERATED INDIAN CODE GENRAL_STRUCTURES 20
5 1.5 3 1.5
LOAD COMB 29 GENERATED INDIAN CODE GENRAL_STRUCTURES 21
5 1.5 4 1.5
LOAD COMB 30 GENERATED INDIAN CODE GENRAL_STRUCTURES 22
5 1.5 1 -1.5
LOAD COMB 31 GENERATED INDIAN CODE GENRAL_STRUCTURES 23
5 1.5 2 -1.5
LOAD COMB 32 GENERATED INDIAN CODE GENRAL_STRUCTURES 24
5 1.5 3 -1.5
LOAD COMB 33 GENERATED INDIAN CODE GENRAL_STRUCTURES 25
5 1.5 4 -1.5
LOAD COMB 34 GENERATED INDIAN CODE GENRAL_STRUCTURES 26
5 0.9 1 1.5
LOAD COMB 35 GENERATED INDIAN CODE GENRAL_STRUCTURES 27
5 0.9 2 1.5
LOAD COMB 36 GENERATED INDIAN CODE GENRAL_STRUCTURES 28
5 0.9 3 1.5
LOAD COMB 37 GENERATED INDIAN CODE GENRAL_STRUCTURES 29
5 0.9 4 1.5
LOAD COMB 38 GENERATED INDIAN CODE GENRAL_STRUCTURES 30
5 0.9 1 -1.5
LOAD COMB 39 GENERATED INDIAN CODE GENRAL_STRUCTURES 31
5 0.9 2 -1.5
LOAD COMB 40 GENERATED INDIAN CODE GENRAL_STRUCTURES 32
5 0.9 3 -1.5
LOAD COMB 41 GENERATED INDIAN CODE GENRAL_STRUCTURES 33
5 0.9 4 -1.5
PERFORM ANALYSIS
PERFORM ANALYSIS
PERFORM ANALYSIS
PERFORM ANALYSIS
START CONCRETE DESIGN
CODE INDIAN
CLEAR 0.03 MEMB 35 TO 38 40 TO 46 48 TO 56 58 TO 73 75 TO 162 164 TO 171 173 -
174 TO 180
FC 30000 MEMB 35 TO 38 40 TO 46 48 TO 56 58 TO 73 75 TO 162 164 TO 171 173 -
174 TO 180
FYMAIN 500000 MEMB 35 TO 38 40 TO 46 48 TO 56 58 TO 73 75 TO 162 164 TO 171 -
173 TO 180
FYSEC 500000 MEMB 35 TO 38 40 TO 46 48 TO 56 58 TO 73 75 TO 154 184 185 187 -
188 206 TO 209 220 TO 223
MAXMAIN 25 MEMB 35 TO 38 40 TO 46 48 TO 56 58 TO 73 75 TO 154 184 185 187 -
188 206 TO 209 220 TO 223
MAXSEC 16 MEMB 35 TO 38 40 TO 46 48 TO 56 58 TO 73 75 TO 154 184 185 187 188 -
206 TO 209 220 TO 223
MINMAIN 16 MEMB 35 TO 38 40 TO 46 48 TO 56 58 TO 73 75 TO 154 184 185 187 -

188 206 TO 209 220 TO 223
MINSEC 8 MEMB 35 TO 38 40 TO 46 48 TO 56 58 TO 73 75 TO 154 184 185 187 188 -
206 TO 209 220 TO 223
DESIGN BEAM 51 TO 56 58 TO 73 91 TO 114 131 TO 154 187 188 208 209 222 223
DESIGN COLUMN 35 TO 38 40 TO 46 48 TO 50 75 TO 90 115 TO 130 184 185 206 207 -
220 221
DESIGN ELEMENT 155 TO 162 164 TO 171 173 TO 180
CONCRETE TAKE
END CONCRETE DESIGN
PERFORM ANALYSIS
PERFORM ANALYSIS
PERFORM ANALYSIS
PERFORM ANALYSIS
FINISH