NATIONAL AWARD COMPETITION FOR STUDENTS 2023

Civil / Structural Engineering Students
For Best Innovative Structural Steel Design

Competition Theme:

Steel Intensive Trade Fair Centre

Institute for Steel Development & Growth

BRIEF OF NACS (C) 2023

INTRODUCTION

Construction Industry in India is witnessing a phenomenal growth in all sectors of utility, be it the infra-structure, industrial, or commercial sector for the last few years. All these are evident from the visible growth that is taking place all around mostly in the urban environment. The urban society is witnessing this phenomenon through a wide spectrum of development mostly in the field of construction of urban amenities, like roads, bridges flyovers, commercial centers like shopping malls and multiplexes and last but not the least various state-of-the-art signature structures and buildings like world class Auditoriums, Art Galleries, Exhibition Halls etc. These places mainly act as the cultural nerve centers of the city.

APPOINTMENT AS CONSULTANT

One of the reputed structural consultants in India has been short listed to design a Trade Fair Centre having an exhibition hall of 23,750 sq. ft. and 2 storied Banquet and Display area. INSDAG has been able to convince the client that steel intensive design will not only complete the project in a much lesser time because of faster construction but also it will be cost competitive and more aesthetic and will have longer life than any of the other alternative methods of construction.

In view of the challenge taken up by INSDAG to implement the aforesaid benefits of steel intensive construction to the client, INSDAG seeks your expertise in providing Analysis, Design, Detail Engineering and Estimation of a **"Steel-Intensive Trade Fair Centre"**

1. Development of an Economical and Aesthetic structural scheme within the specified requirement.
2. Structural design engineering and Detail drawings for the developed structural scheme.
3. Bill of materials.

FACILITIES

The client has specified the following requirements for the proposed project:

1	Site Location	:	Kolkata
2	Building Dimension (Length x Width)	:	70.55 m x 40 m
3	Building Height		As per design
4	Minimum span of roof structure along width of the building in Exhibition Hall area	:	40 m
5	Minimum spacing of column along length of the building	:	As per design
6	Minimum column spacing along 40 m width of the building in Banquet Hall area	:	10 m
7	Minimum spacing of column along length of the building in Banquet Hall area	:	As per design
8	Minimum Clear Height at Exhibition Hall area	:	10 m

9	Clear Height in Banquet area	:	4 m (or as standard practice)
10	Height of plinth/Floor Level from existing GL	:	0.6 m
11	Material of Façade/ Roof	:	Colour Coated Steel Sheet/ As applicable
12	Floor in Banquet/ Conference Hall area	:	Steel- Concrete Composite
13	Roof Shape	:	Innovative
14	Minimum Clear Height at Entry/ Exit Gate	:	3 m
15	Provision of Roof Top Solar Panel	:	Consider Solar Panael Load
16	Minimum columns no with more open space is required	:	Showing advantage of Steel

MATERIALS FOR CONSTRUCTION

1. Foundation system : R.C.C. of minimum grade M25
2. Structural members like columns, beams, members and bracing systems : Structural steel of mild steel (grade E250BR or higher grade as required and applicable)
4. Roof & Cladding : Standard Colour Coated Steel Sheet (Galvalume)

STANDARD SHAPE OF THE STRUCTURE

While considering the shape and arrangement of the Structure, aesthetics, economy as well as structural integrity of the entire system has to be considered.

DESIGN LOADS

1. Dead Load:

Dead load will be the weight of the structure itself along with all permanent weight carried by it.

2. Live Load:

a. Live load on Roof - as per IS: 875 Part 2 latest version
b. Live Load on Deck - as per IS: 875 Part 2 latest version
c.

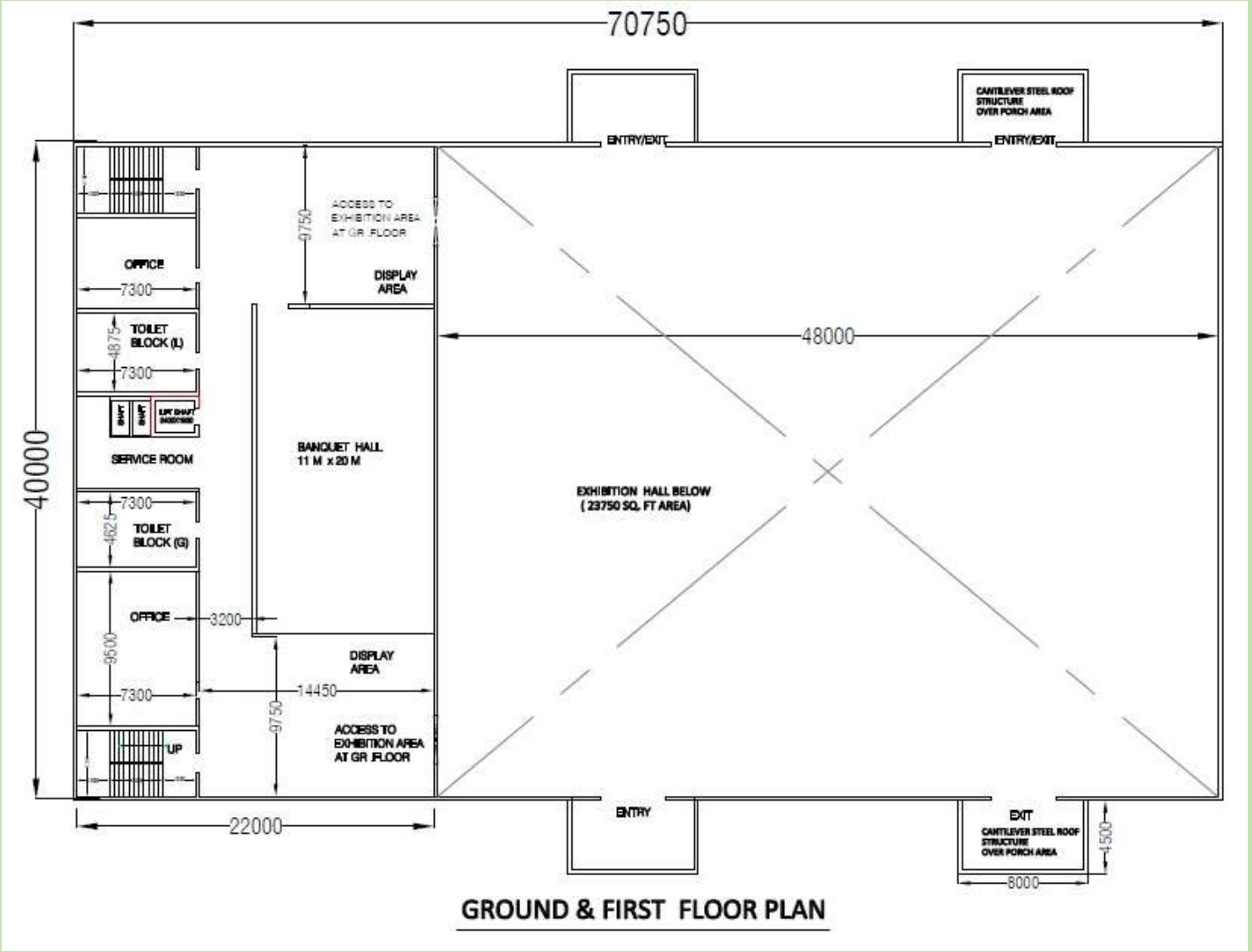
3. Wind Load:

a. Basic wind speed to be considered for the specified location as per IS: 875 Part 3 latest version

4. Seismic Load:

a. Seismic Zone for the mentioned location as per IS: 1893 latest version

Schematic Plan for Steel Intensive Trade Fair Centre



COMPETITION TOPIC:

STEEL INTENSIVE TRADE FAIR CENTRE

DESIGN OPTION

BY

1ST Prize Winner – Team N-05

from
IIT Roorkee, Uttrakhand

STEEL INTENSIVE TRADE FAIR CENTRE

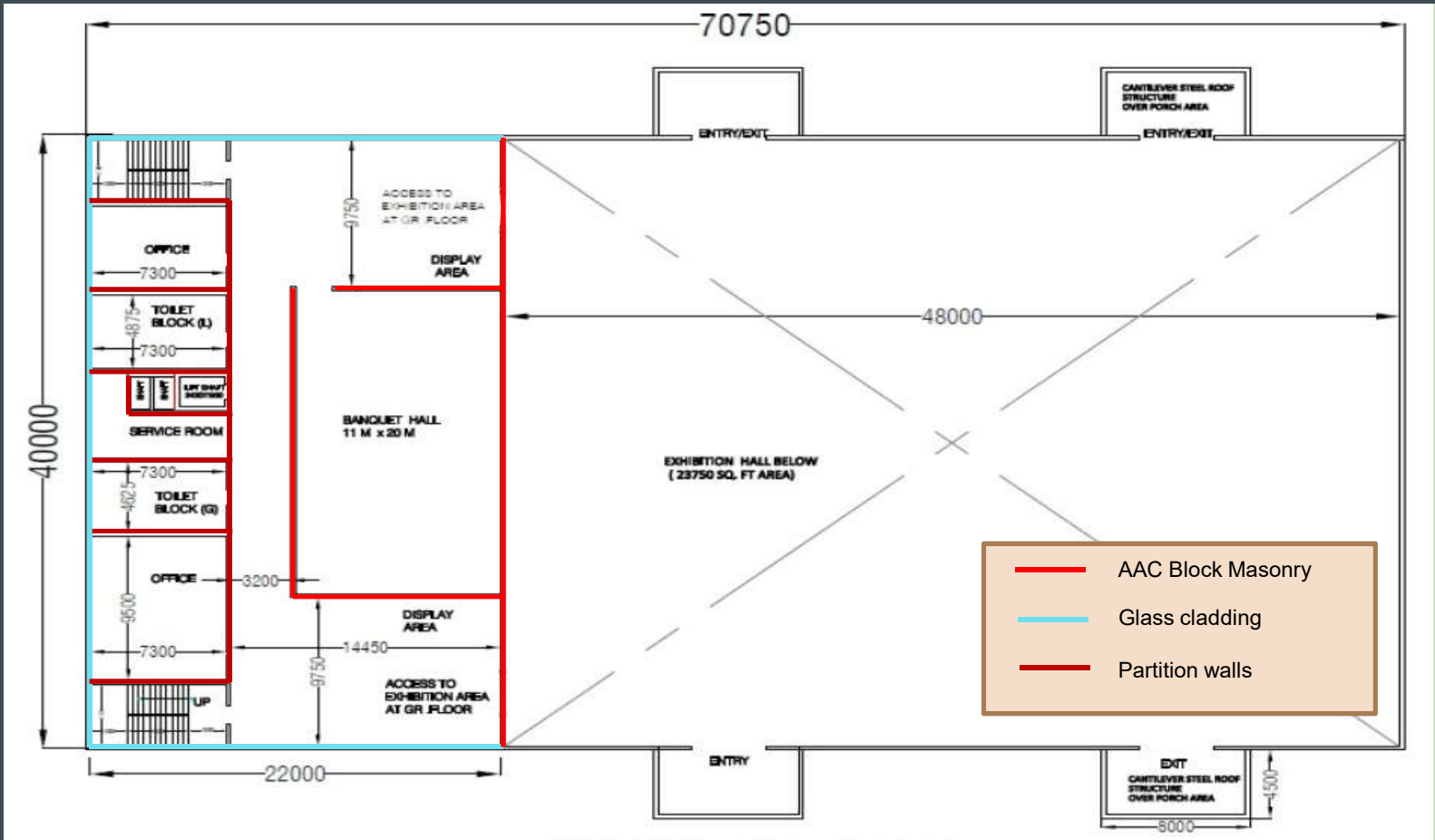
Presented By:- N-05

Akshay Kumar
Anirudh Painuly

Guided By:-

Prof. P.C Ashwin Kumar

GENERAL LAYOUT

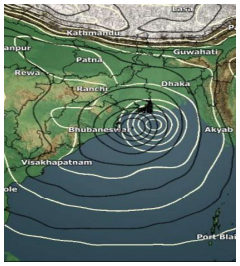


Factors governing design

01.

Soil Characteristics:
Alluvial deposit
Bearing Capacity: 200kN/m^2

02.



Wind Characteristics:
- Cyclone prone area
- High wind speed

Basic wind speed: 52.5m/s
(IS 875 Part 3)

03.

- High Relative Humidity
- Extreme corrosive environment

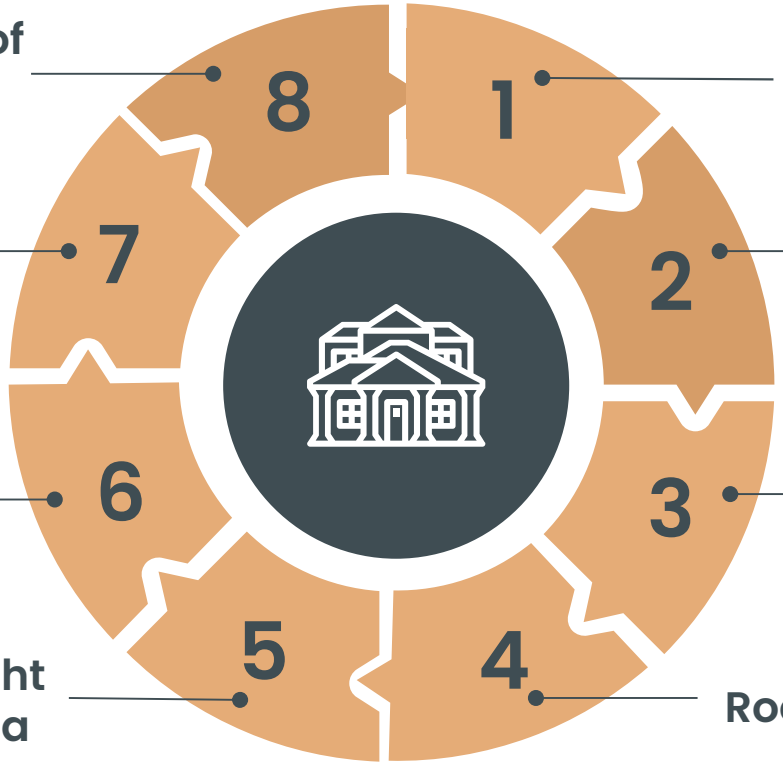
Corrosivity level: C1 (ASTM G50)

04.

- Large span requirement
- Heavily crowded

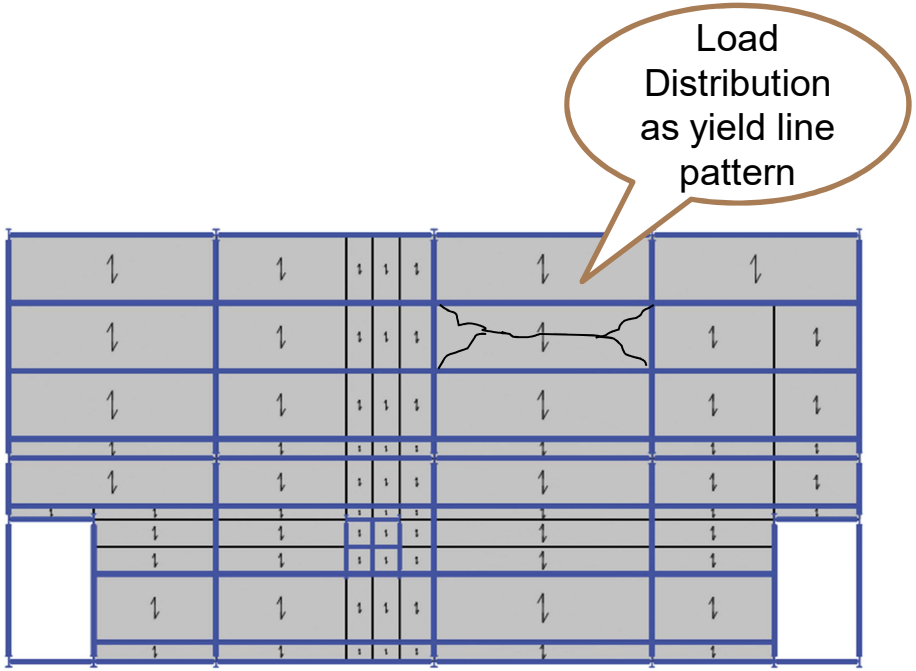
Importance factor(I): 1.5 (IS1893)

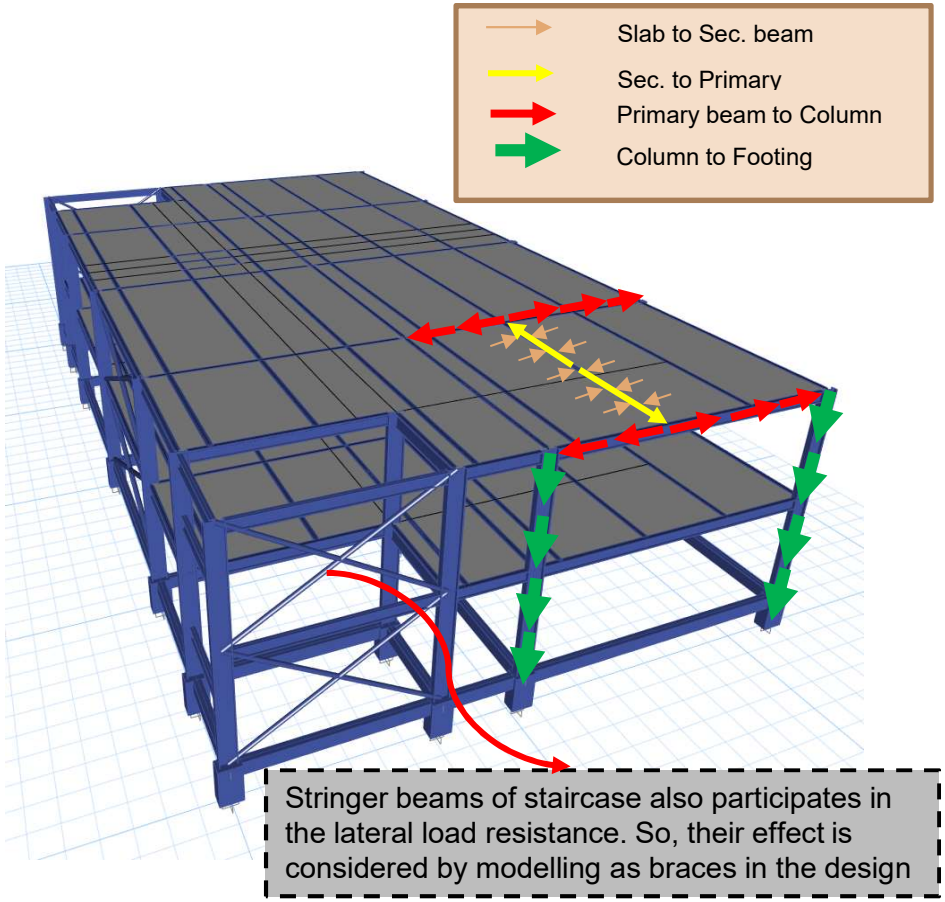
Parameters



1. **Building Dimensions** (70.55m x 40 m)
2. **Height of plinth** (0.6 m)
3. **Floor in Banquet/ Conference Hall area** (Steel concrete composite)
4. **Roof Shape** (innovative)
5. **Minimum Clear Height at Exhibition Hall area** (10 m)
6. **Clear Height in Banquet area** (4 m)
7. **Minimum span of roof structure along width of Exhibition Hall area** (40 m)
8. **Provision of Roof Top Solar Panel**

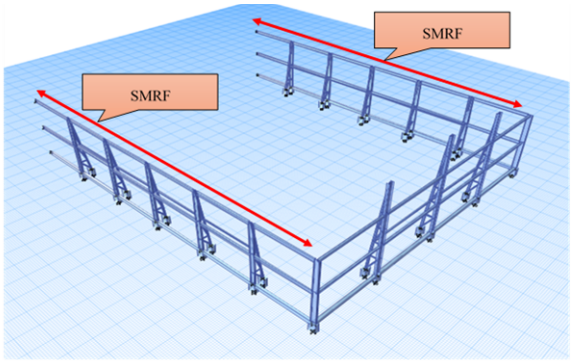
Gravity Load Resisting System



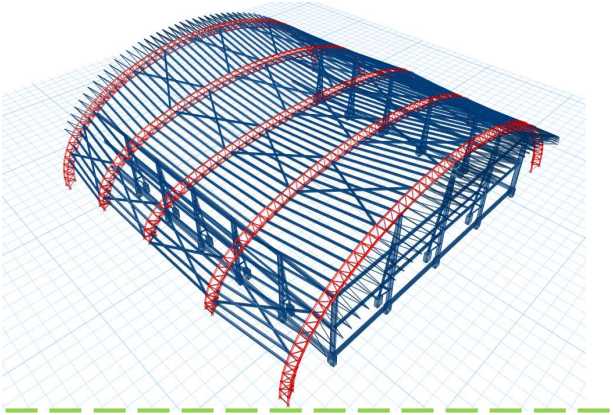


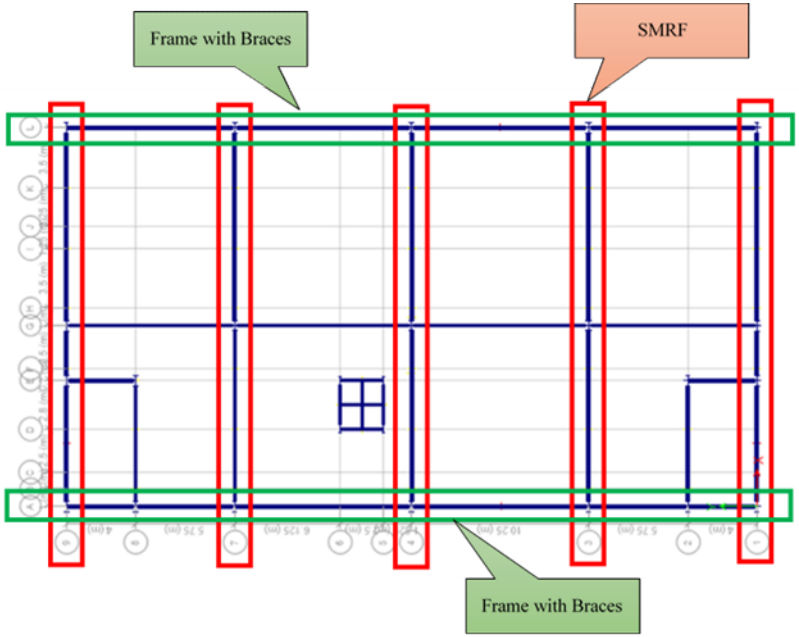
Stringer beams of staircase also participates in the lateral load resistance. So, their effect is considered by modelling as braces in the design

Lateral load resisting system (Earthquake)



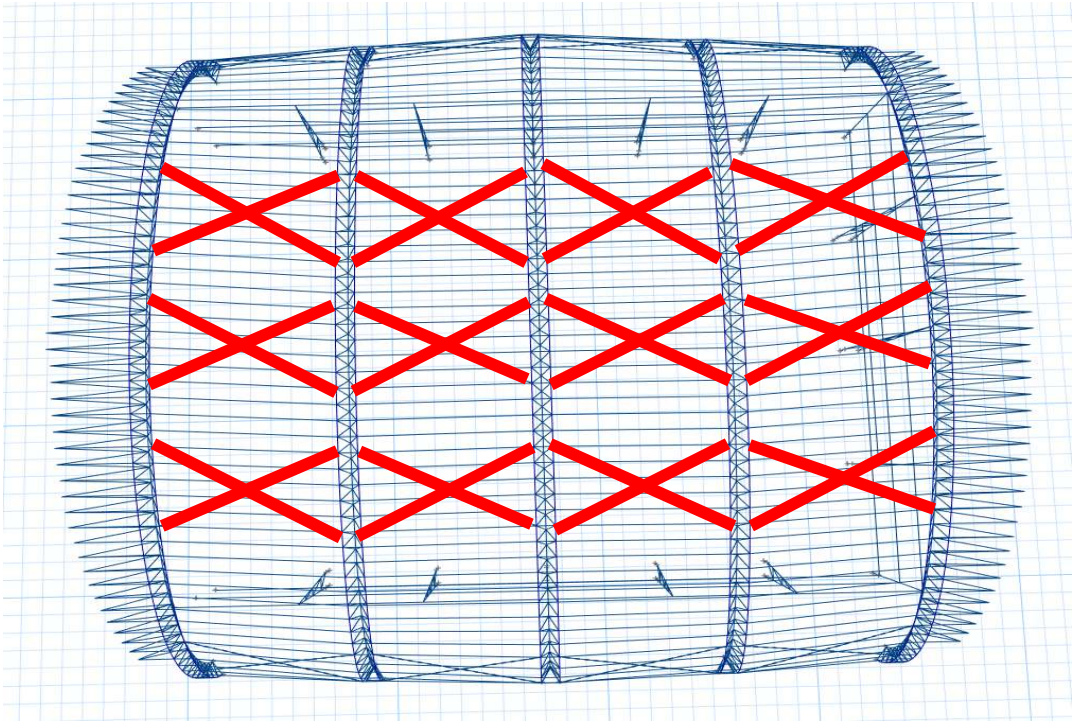
Along X direction: **Arches and Buttresses.**
Along Y direction: **Moment frames.**





Along X direction: **Moment frames (SMRF)**
Along Y direction: **Braced frames (OCBF).**

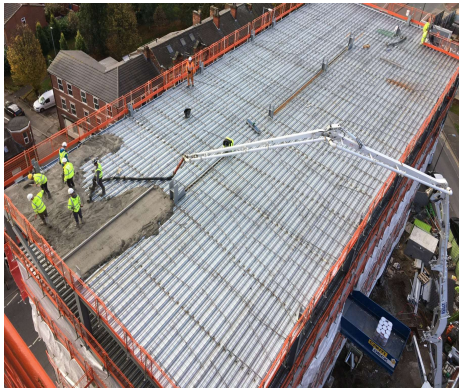
Lateral load resisting system (Wind)

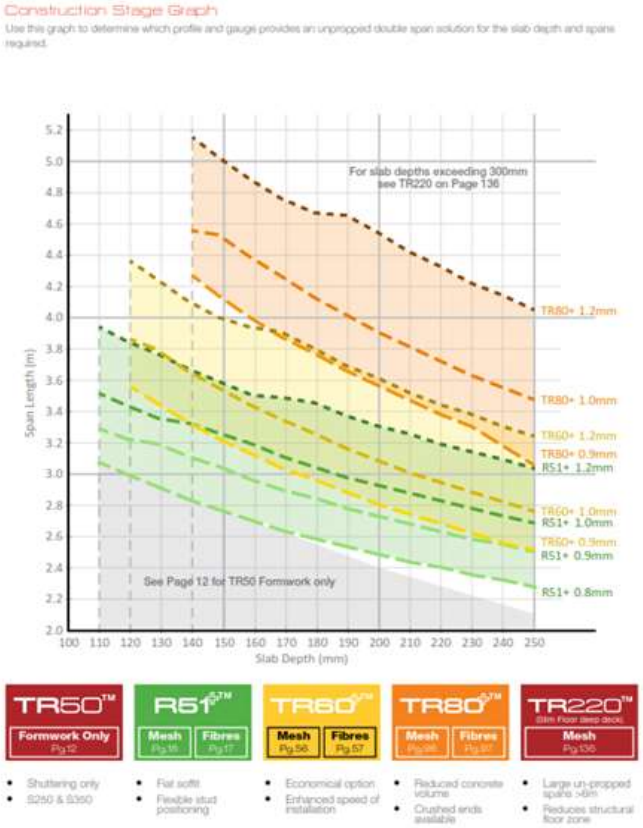


- Purlins are designed as per IS 800 considering the **uplift forces** due to wind.
- Lateral drift of the building is controlled by **X wind braces.**

Steel decking system

- ✓ Provides the tensile reinforcement requirements of the slab
- ✓ Composite construction reduces steelwork frame weight
- ✓ Can achieve up to 4hr fire rating for the slab
- ✓ Reduced lead in periods
- ✓ Proactive approach to late changes
- ✓ Excellence Quality Management (BS EN 1090)
- ✓ Manufactured from steel strip to BS EN 10143 and BS EN 10346

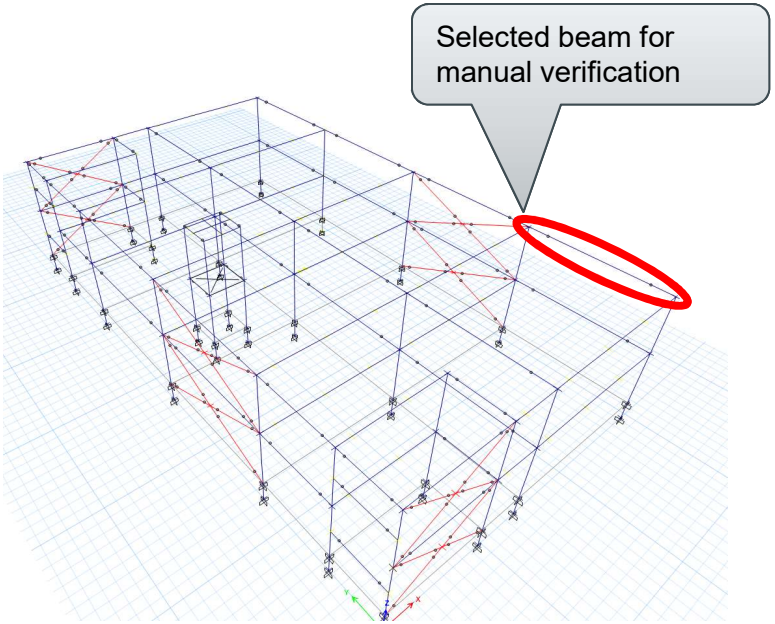




The White Book

❑ Beam Design –

- Beam Label – B15
- Beam Unique Id – 368
- Bending moment demand (mid span) – 139.13 kNm
- Shear Force demand (ends) – 54.4 kN



Selected section : ISMB 550 (Steel grade : E350)

Section Classification
- h/bf 2.894
- d/tw 45.66 :Plastic section
- h/tf 28.49

As per Table 2 of IS 800:2007

Check for flexure and shear
- Moment Capacity: 750.85 kN/m
- Shear Capacity: 1131.61 kN

As per Cl 8.2 and 8.4.1 of IS 800:2007

Check for web buckling
- d/tw = 45.67 > 67ε (56.67)

As per Cl 8.4.2 of IS 800:2007

Check for Lateral Torsional Buckling
- M_{LTB} = 211.73 kNm > 139.4
- (Hence, OK)

As per Cl 8.2.2.1 of IS 800:2007

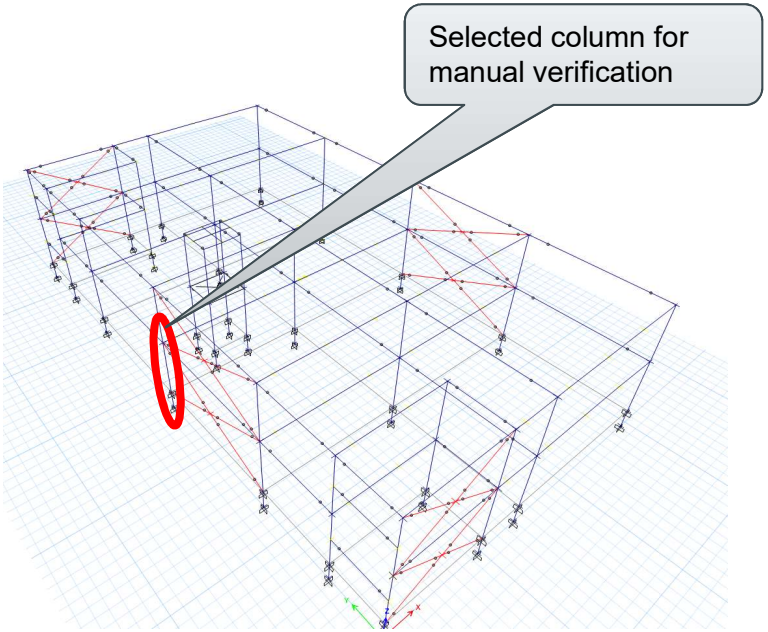
Check for Displacement
- Δmid = 7.62 mm
- Span/d = 31.5 mm (Hence, OK)

As per Cl 5.6.1 of IS 800:2007

Section Passed

❑ Column Design –

- ➢ Column Label – C4
- ➢ Unique Id – 14
- ➢ Max. Bending moment demand – 86.322 kNm
- ➢ Shear Force demand (ends) – 40.612 kN
- ➢ Axial demand – 548.2 kN



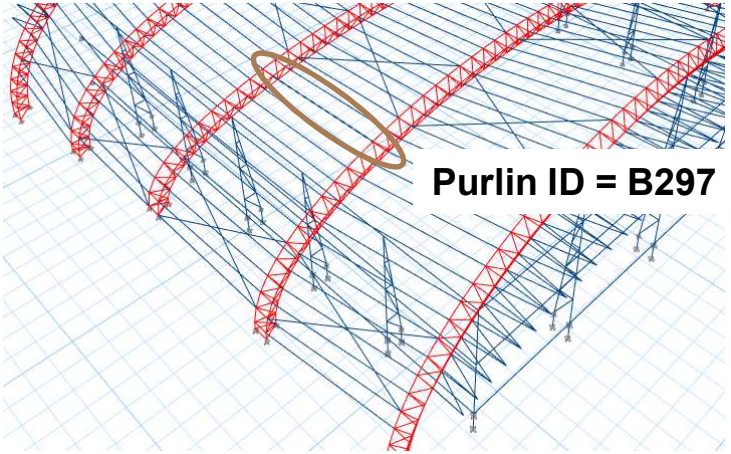
Selected section : WPB 600x300x177.8

Section classification	• h/bf 1.97 • d/tw 41.53 :Plastic section • h/tf 23.6	*As per Table 2 of IS 800:2007*
Check for pure compression	• Tension capacity = 7205.182 kN • Buckling capacity = 2591.8 kN	*As per Cl 6.2 and 7.1of IS 800:2007*
Check for flexure and shear	• Moment Capacity: 1702 (zz) , 367.1 (yy) kN/m • Shear Capacity: 2755.5 (zz) , 1408.9 (yy) kN	*As per Cl 8.2.1 and 8.4.1 of IS 800:2007*
Check for web buckling	• d/tw = 45.67 > 67ε (56.67)	*As per Cl 8.4.2 of IS 800:2007*
Check for Lateral Torsional Buckling	• MLTB = 1572.65 kNm > 86 • (Hence, OK)	*As per Cl 8.2.2.1 of IS 800:2007*
Biaxial Bending Check	• Ratio = 0.022 < 1 • Hence OK	*As per Cl 9.3.1.1 of IS 800:2007*
Bending and Axial Comp. check	• Ratio1 = 0.2681 < 1 • Ratio 2 = 0.1082 < 1, Hence OK	*As per Cl 9.3.2.2 of IS 800:2007*

Section Passed

❑ Purlin Design -

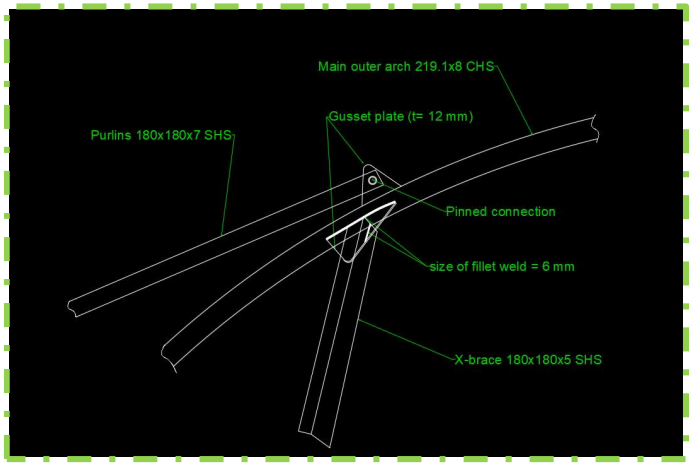
Section Selected – 180x180x7 SHS



Moment Demand: 51.4 kN/m
Shear Demand: 19.06 kN
Axial Demand: 10.97 kN

Section Classification:
d/tw = 23.71<24.76 (29.3ε)
h/tf = 23.71<30 (42 ε^2)
As per Table 2

Moment Capacity: 73.65 kN/m
Shear Capacity: 433.53 kN
Axial Capacity:
Td = 1501.81 kN
Pd = 338.59 kN



Ratio1 = 0.7275 < 1
Ratio 2 = 0.71 < 1,
As per Cl 9.3.2.2

Deflection check:
ΔLL = 26.62 mm < 72.1 mm (Span / 150)
As per Table 6

Hence, OK

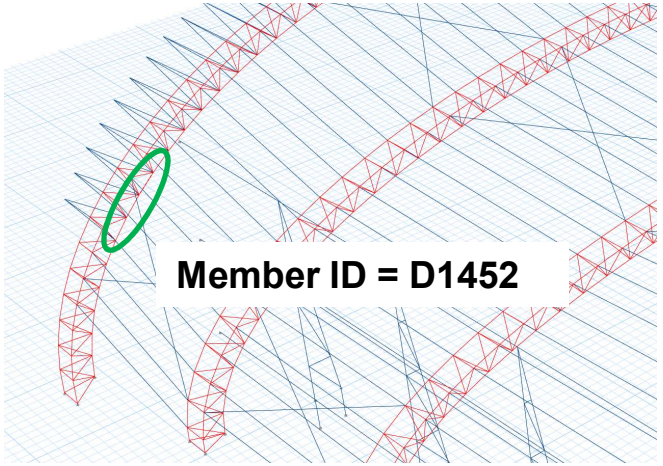
❑ Arch Design -

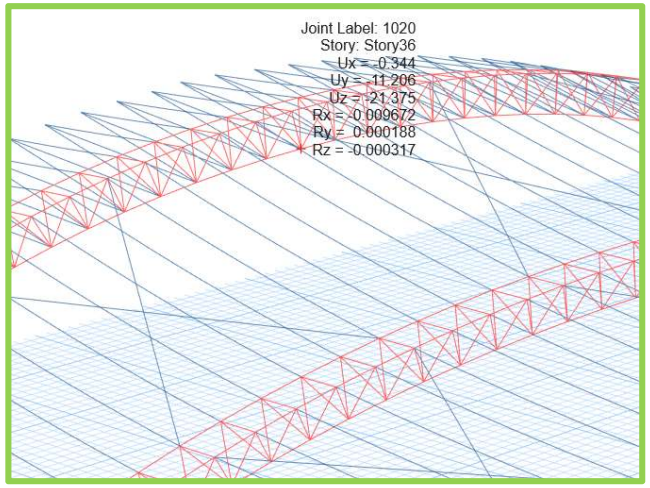
Section Selected – 219.1 x 8 CHS

Moment Demand: 7.52 kN/m
Shear Demand: 0.41 kN
Axial Demand: 1096.7 kN (C)

Section Classification:
D/t = 27.38 < 30 (42 ε^2)
As per Table 2

Moment Capacity: 55.75 kN/m
Shear Capacity: 620.58 kN
Axial Capacity:
Td = 1688.27 kN
Pd = 1688.15 kN





Ratio1 = 0.716 < 1
As per Cl 9.3.2.2

Deflection check:
ΔLL = 21.37 mm < 133 mm (Span / 300)
As per Table 6

Hence, OK

Column Base Plate design

STEP-1

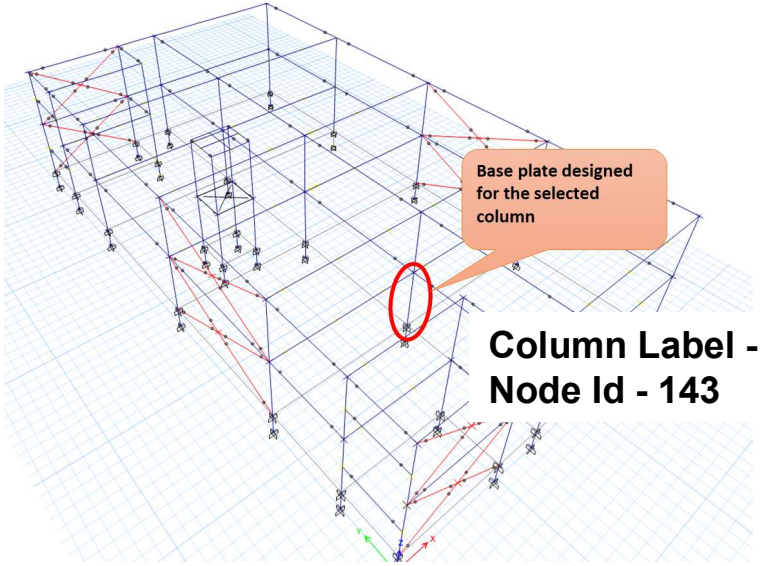
Max. Moment demand = 107.43 kNm
Axial load demand = 1203.8 kN

STEP-2

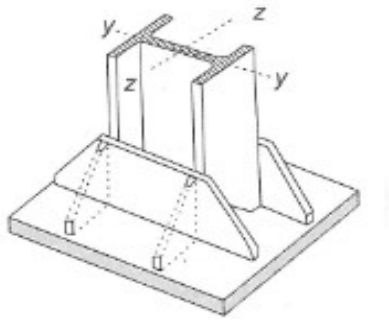
Thickness of the base plate (t) = 24 mm
Size of the weld = 3 mm

STEP-3

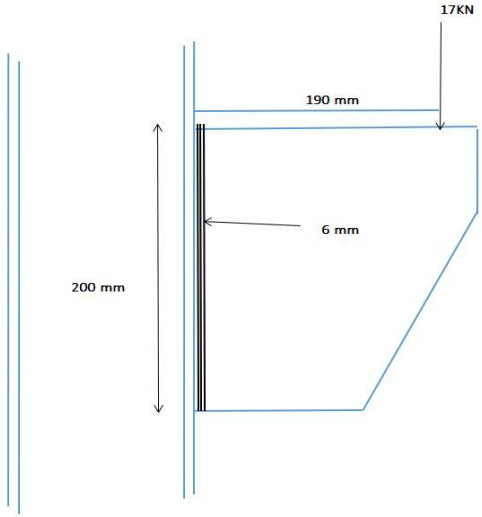
Design weld length at flange =987.65 mm
Design weld length at web =795.47 mm



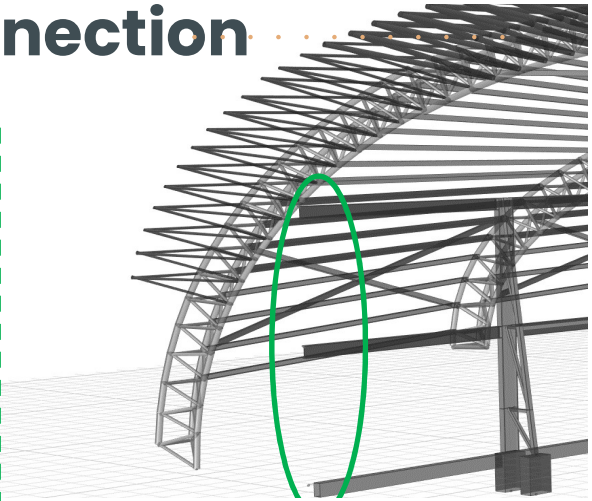
Column Label - C31
Node Id - 143

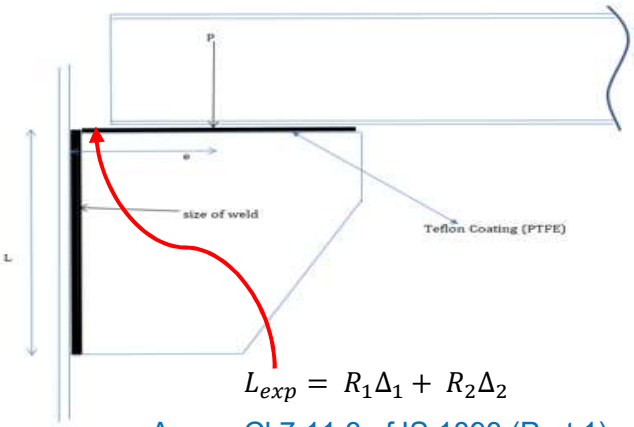


Bracket-column welded connection



	P	17KN			
	d	300 mm			
	e	190 mm			
permissible Shear Stress		110	KN/mm^2		
1	fa	28.033333 / t			Vertical shear
2	fa	106.52667 / t			Horizontal shear
3	fr	110.15 / t	N/mm^2		
4	t	1.001			
5	Size of Weld		1.43057	2 mm	6
6	t	4.2			mm
7	d	145 mm	200	mm	
8	t	4.2	mm		
	fa	10.011905	N/mm^2		
	fb	57.067857	N/mm^2		
	fr	57.94	N/mm^2	Safe	

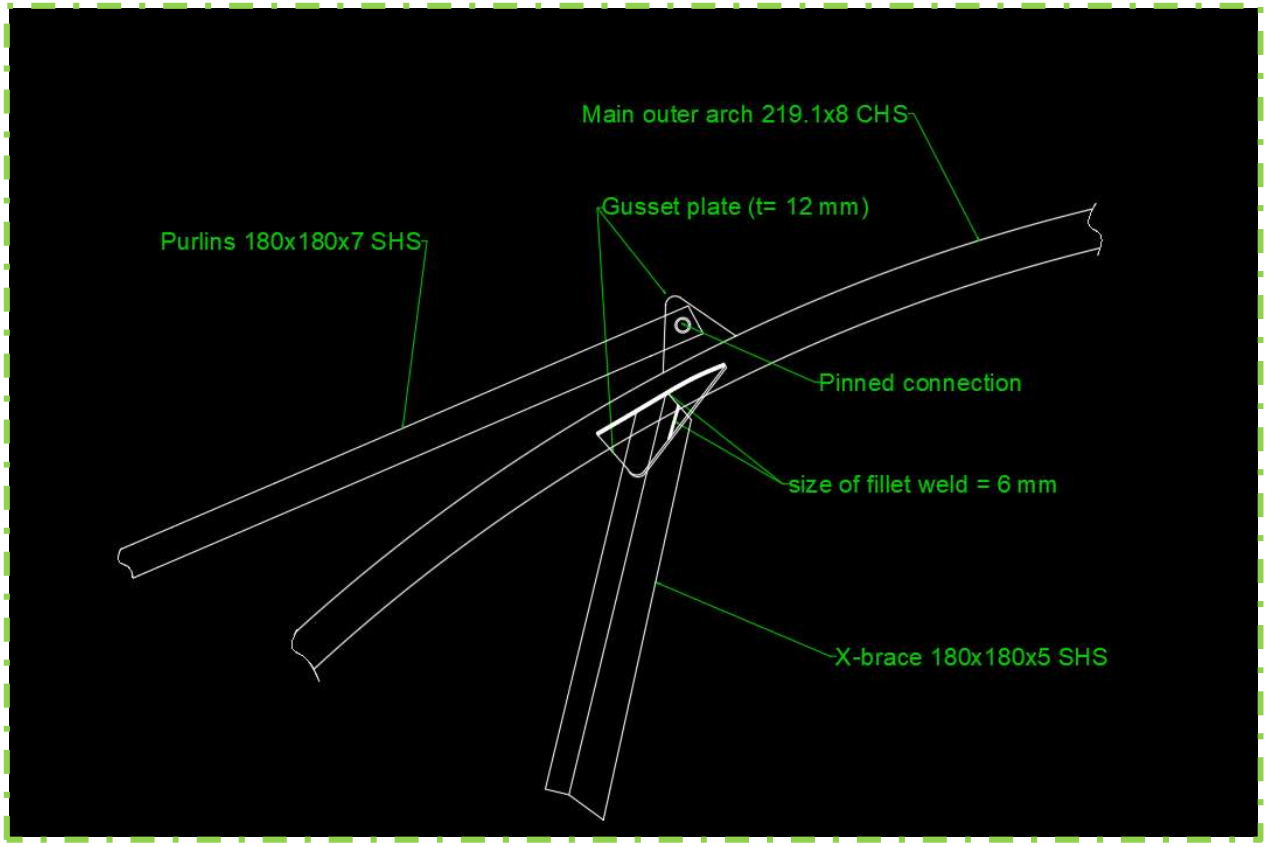




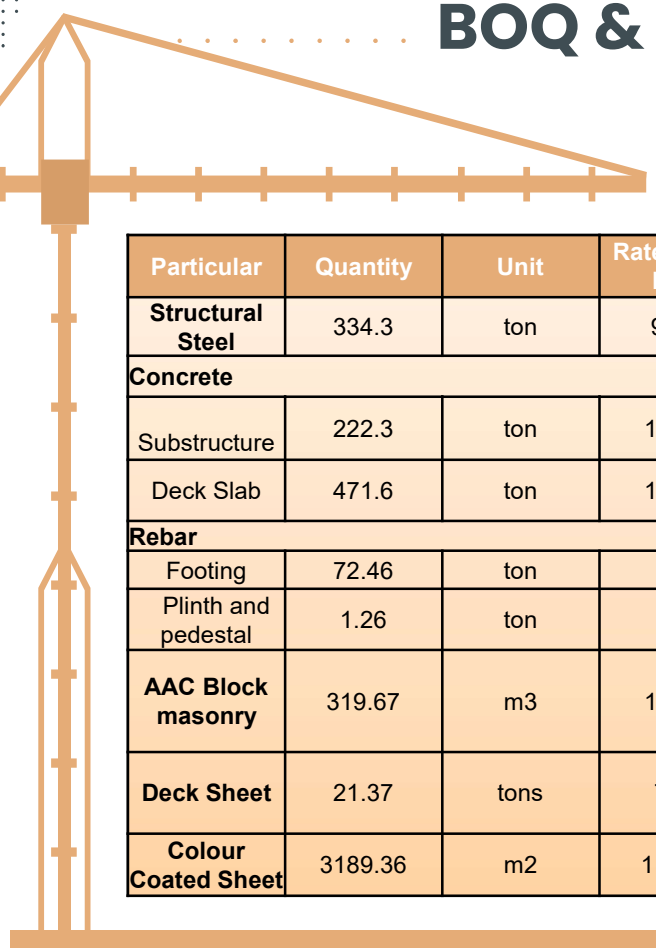
$$L_{exp} = R_1\Delta_1 + R_2\Delta_2$$

As per Cl 7.11.3 of IS 1893 (Part 1): 2016

Purlin & X-brace with Main Arch connection details



BOQ & Cost Estimation



Particular	Quantity	Unit	Rate as per DSR	per unit	Cost
Structural Steel	334.3	ton	9000	quintal	₹ 30,087,000.00
Concrete					
Substructure	222.3	ton	10037	cum	₹ 892,493.60
Deck Slab	471.6	ton	12863	cum	₹ 2,426,506.50
Rebar					
Footing	72.46	ton	85	Kg	₹ 6,159,100.00
Plinth and pedestal	1.26	ton	85	Kg	₹ 107,100.00
AAC Block masonry	319.67	m3	10668	cum	₹ 3,410,239.56
Deck Sheet	21.37	tons	74.4	sqm	₹ 107,427.57
Colour Coated Sheet	3189.36	m2	1173.6	sqm	₹ 3,743,032.90

Total Cost of Material
₹ 4.69 crore (approx.)

COMPETITION TOPIC:

STEEL INTENSIVE TRADE FAIR CENTRE

DESIGN OPTION

BY

2nd A Prize Winner – Team W-16

from
G.H Raisoni College of Engineering, Nagpur, Maharsahtra

INSTITUTE OF STEEL DEVELOPMENT AND GROWTH

STEEL INTENSIVE TRADE FAIR CENTRE

Prepared by:-

Shraddha Ingale
Group no. :- W-16
G.H.Raisoni College of Engineering

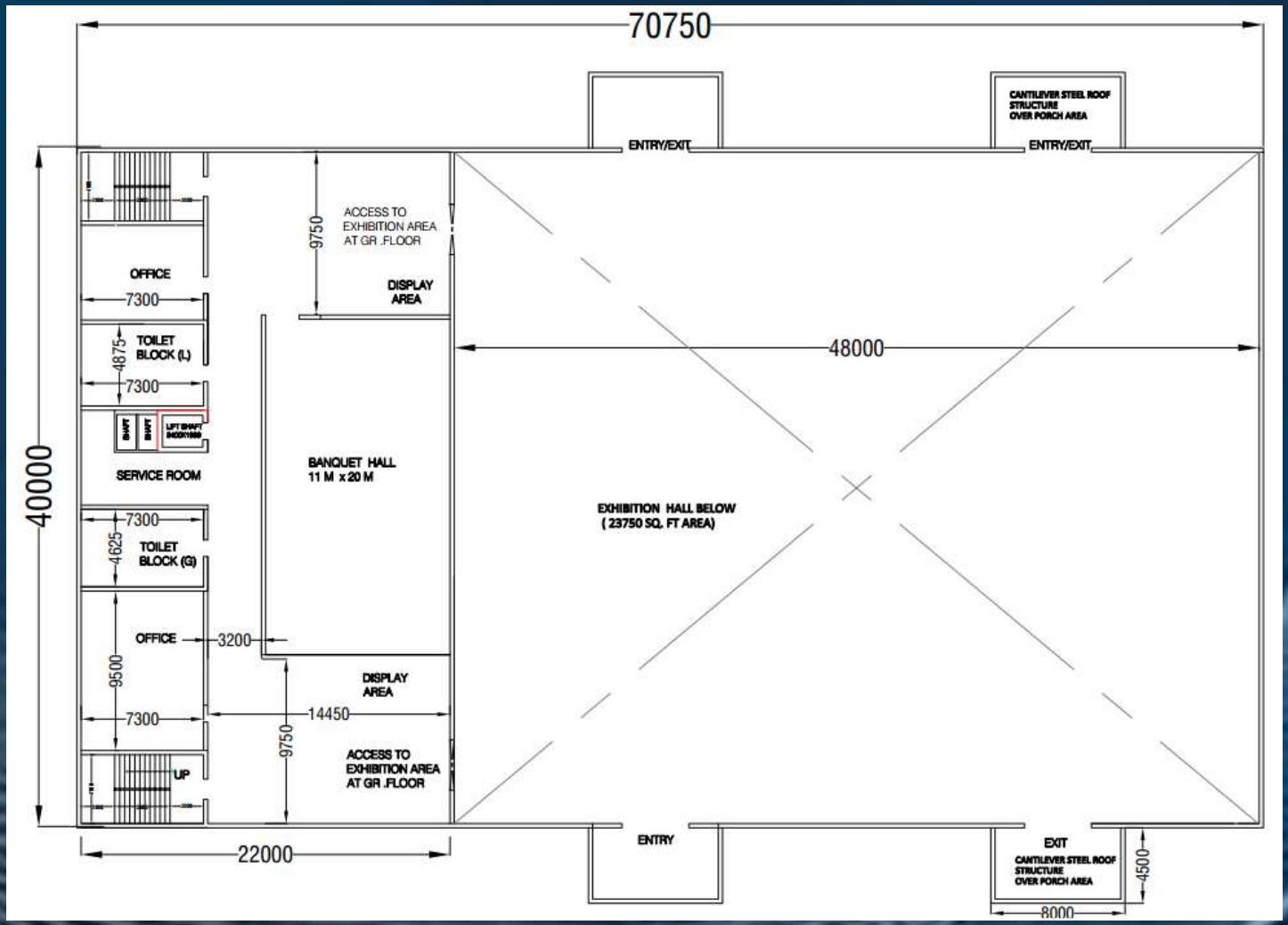
Guided by :-

Dr. Sanket Sanghai
Professor, G.H.R.C.E

PARAMETERS GIVEN

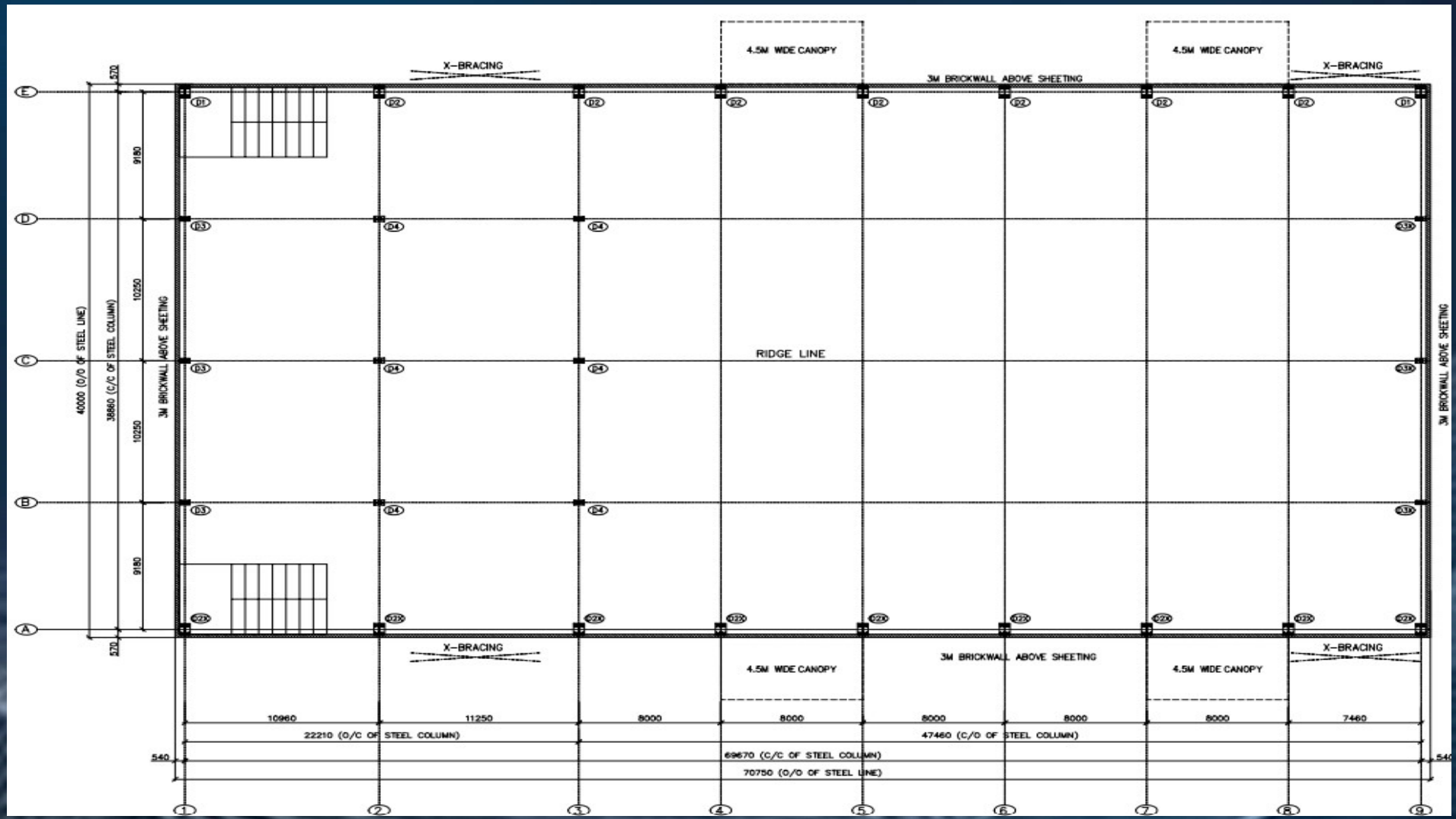
Parameters	
Site Location	Kolkata
Building Dimension (Length x Width)	70.55 m x 40 m
Minimum Clear Height at Exhibition Hall	10 m
Roof Height and Column spacings	As per design
Clear Height in Banquet area	4 m
Height of plinth	0.6 m
Floor in Banquet/ Conference Hall area	Steel- Concrete Composite
Minimum Clear Height at Entry/ Exit Gate	3 m
Building Floors	Ground + First Floor

Given layout Plan For Ground Floor and First Floor

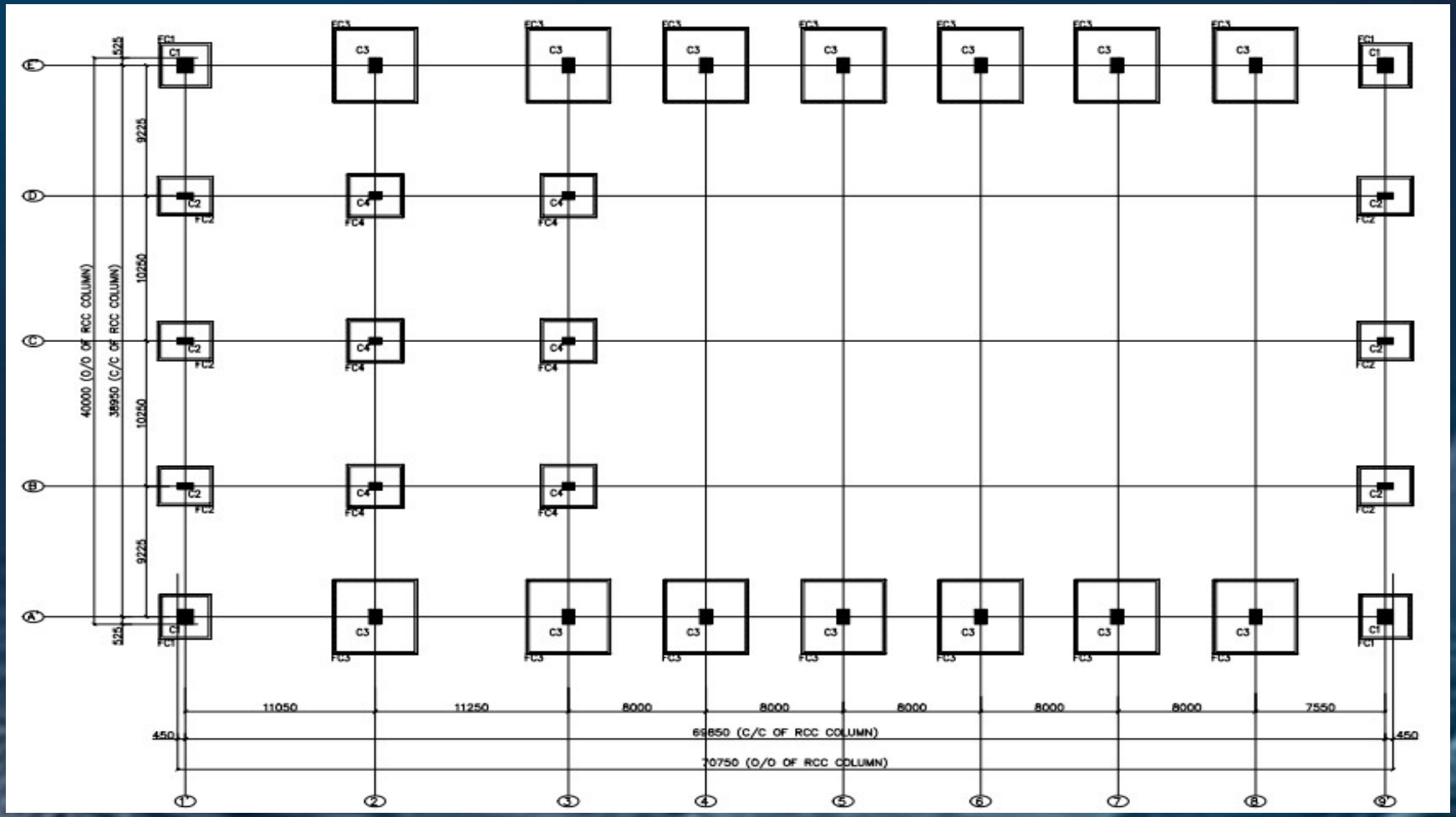


Typical Pre-engineered Building

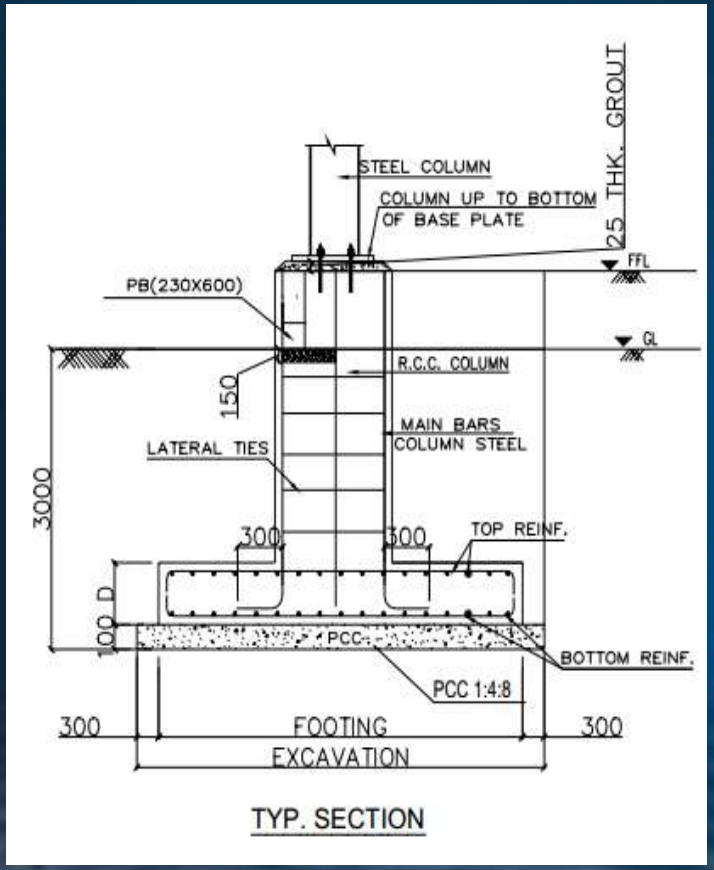
Base Plate Layout



Sub-Structure



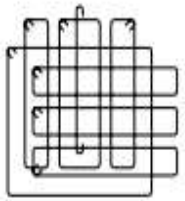
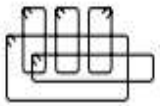
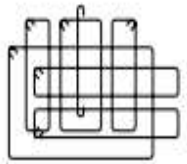
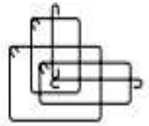
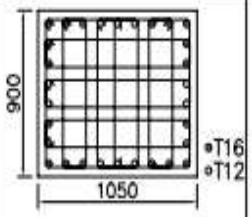
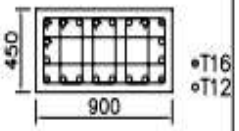
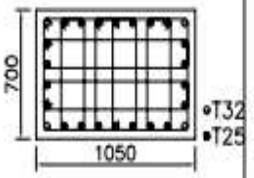
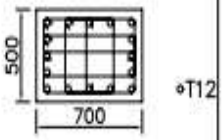
Column and Footing Layout Plan



TYP. SECTION

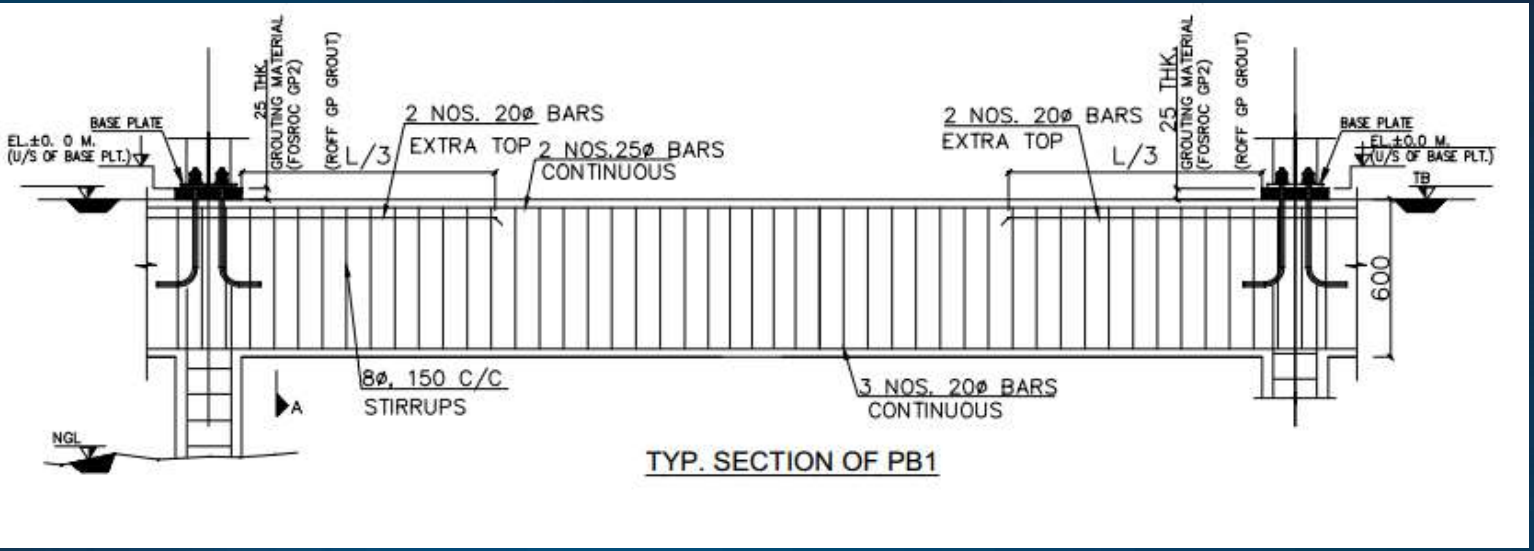
Footing Excavation Section

COLUMN SCHEDULE

COLUMN MARKED M25 : Fe500 COVER = 50mm				
				
	LINKS T8 @ 175	LINKS T8 @ 175	LINKS T8 @ 175	LINKS T8 @ 175
				
	20–T16 + 10–T12	4–T16 + 16–T12	4–T32 + 22–T25	16–T12
	C1	C2	C3	C4

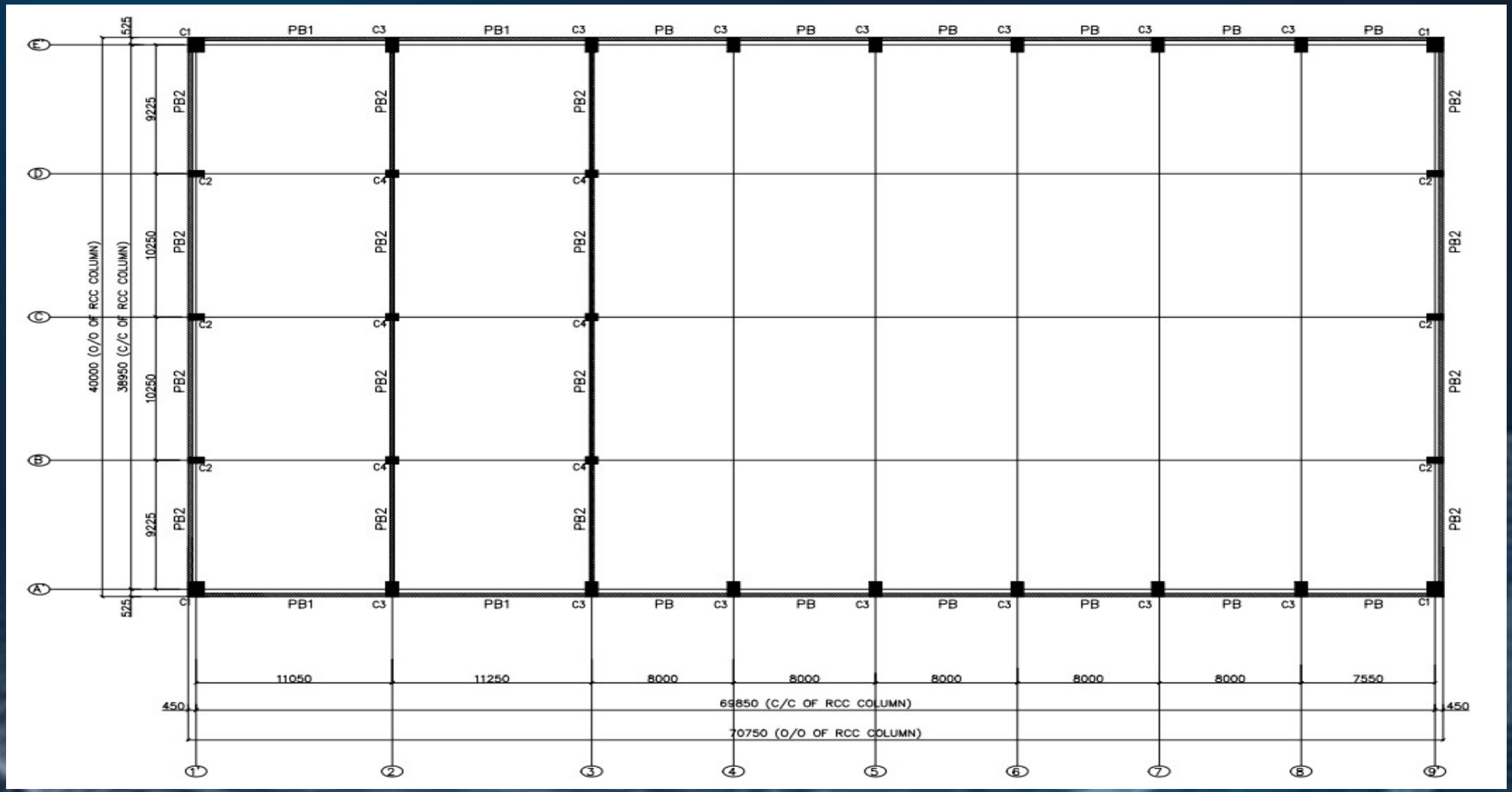
Column Reinforcement Schedule

Plinth Beam Section



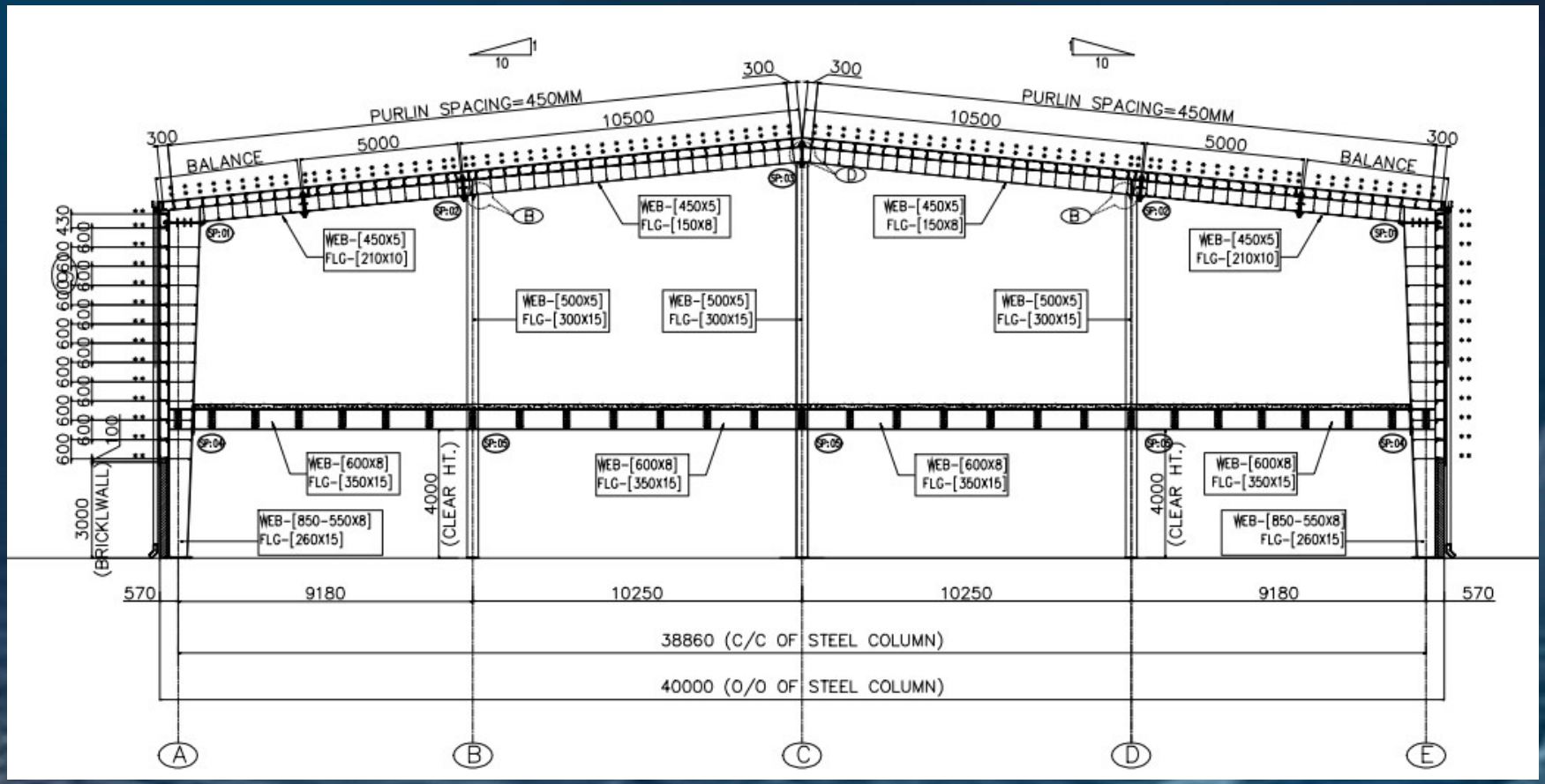
PLINTH BEAM SCHEDULE

BEAM NUMBERS	SIZE		BOTTOM REINF.	TOP REINFORCEMENT			STIRRUPS
	B	D	CONTINUOUS	CONTINUOUS	EXTRA LEFT SUPP	EXTRA RIGHT SUPP	
PB	230	600	3-T16	2-T20	2-T20	2-T20	T8@150c/c
PB1	230	600	3-T20	2-T25	2-T20	2-T20	T8@150c/c
PB2	230	600	2-T16	2-T16	2-T16	2-T16	T8@150c/c

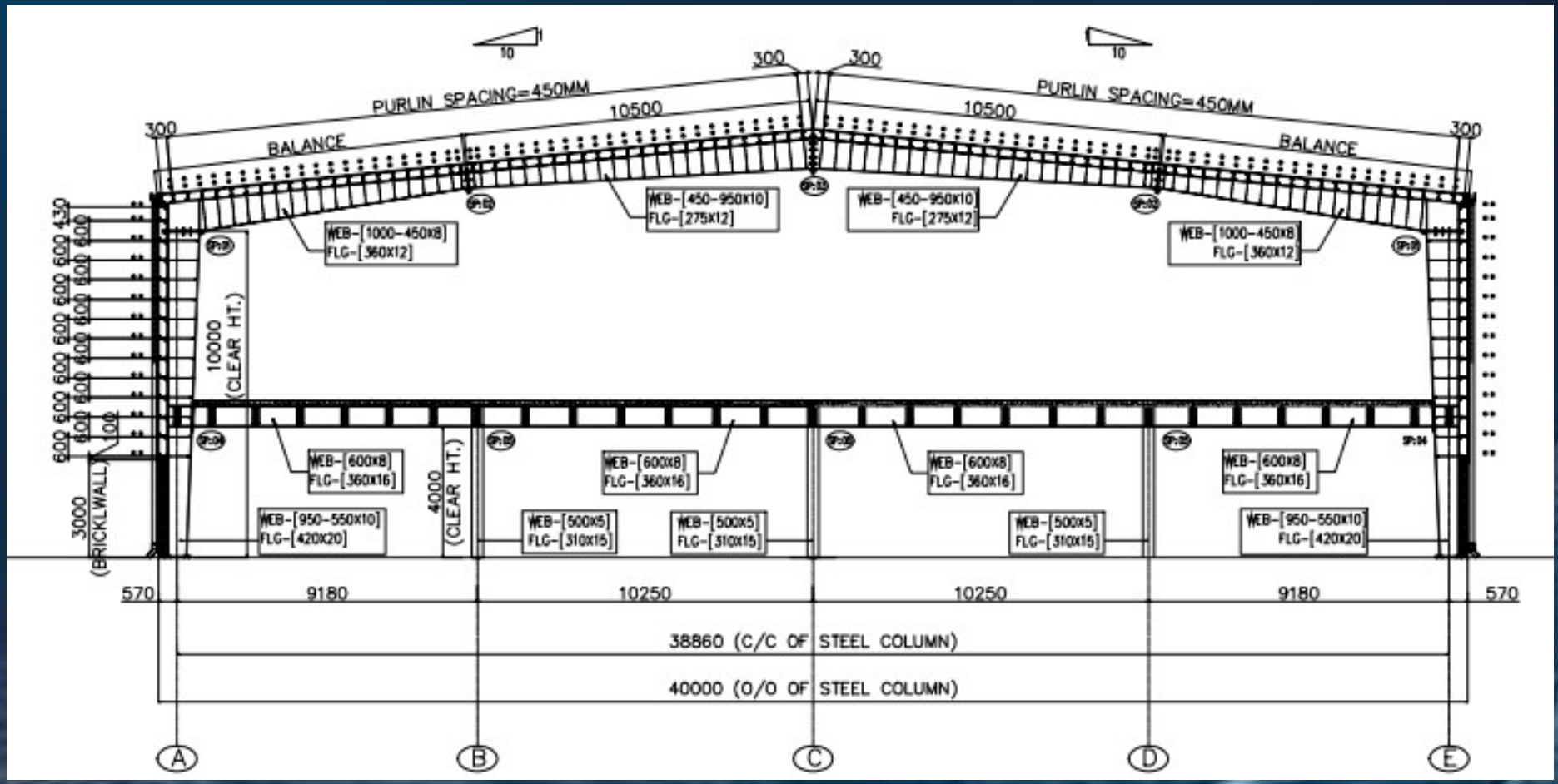


Plinth Beam Plan

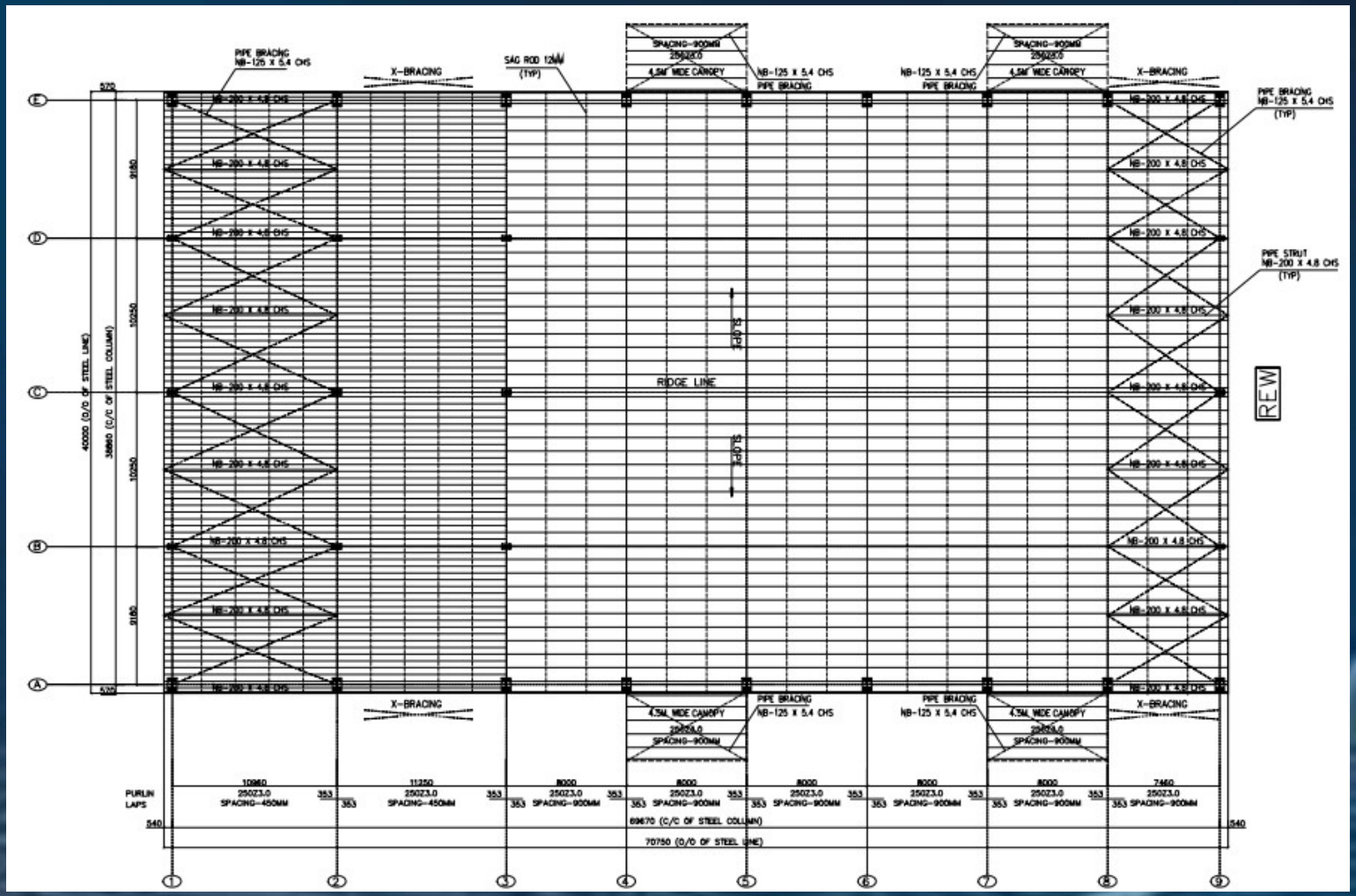
General Arrangement Drawings



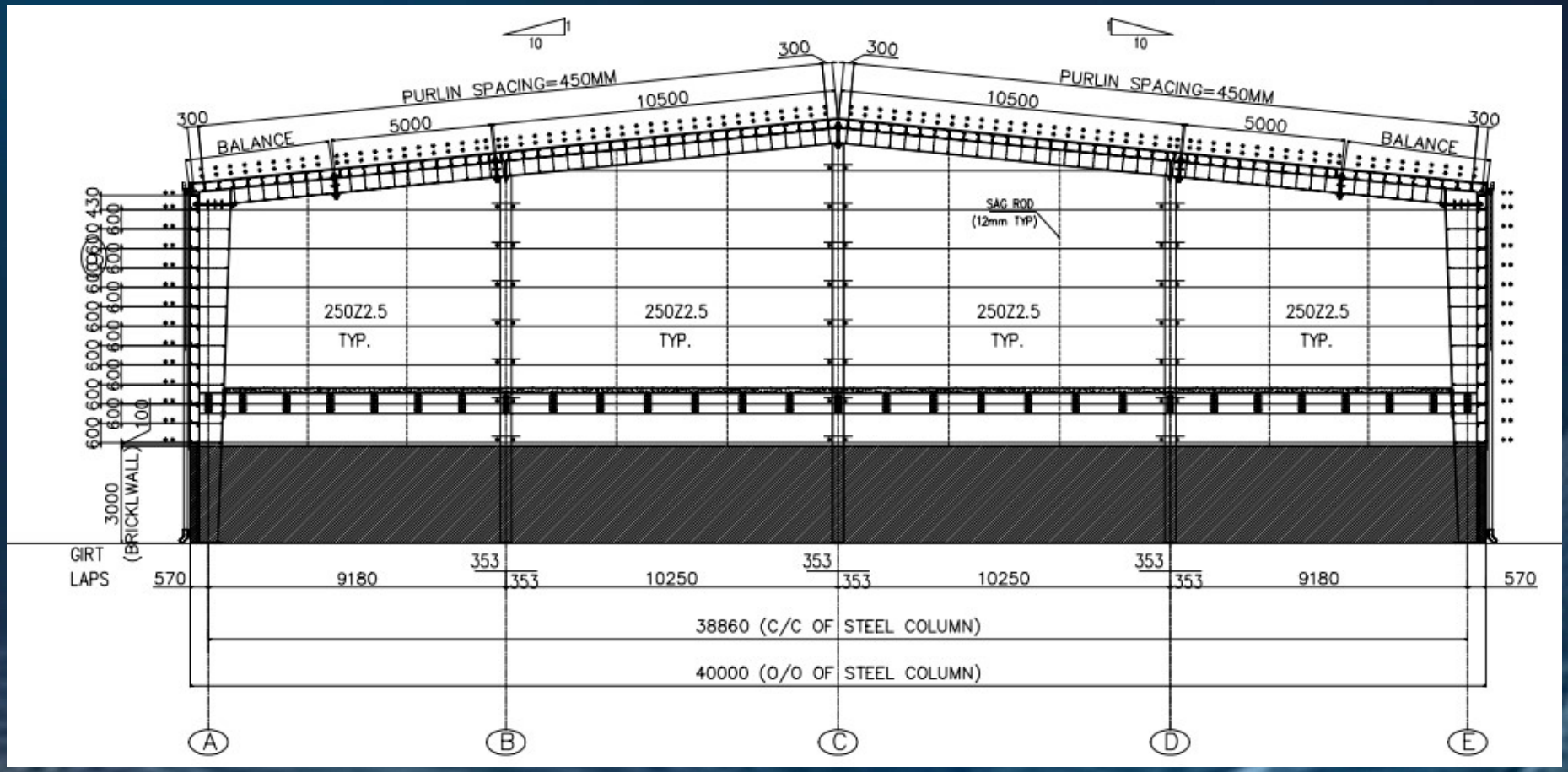
Cross-section of End Frame



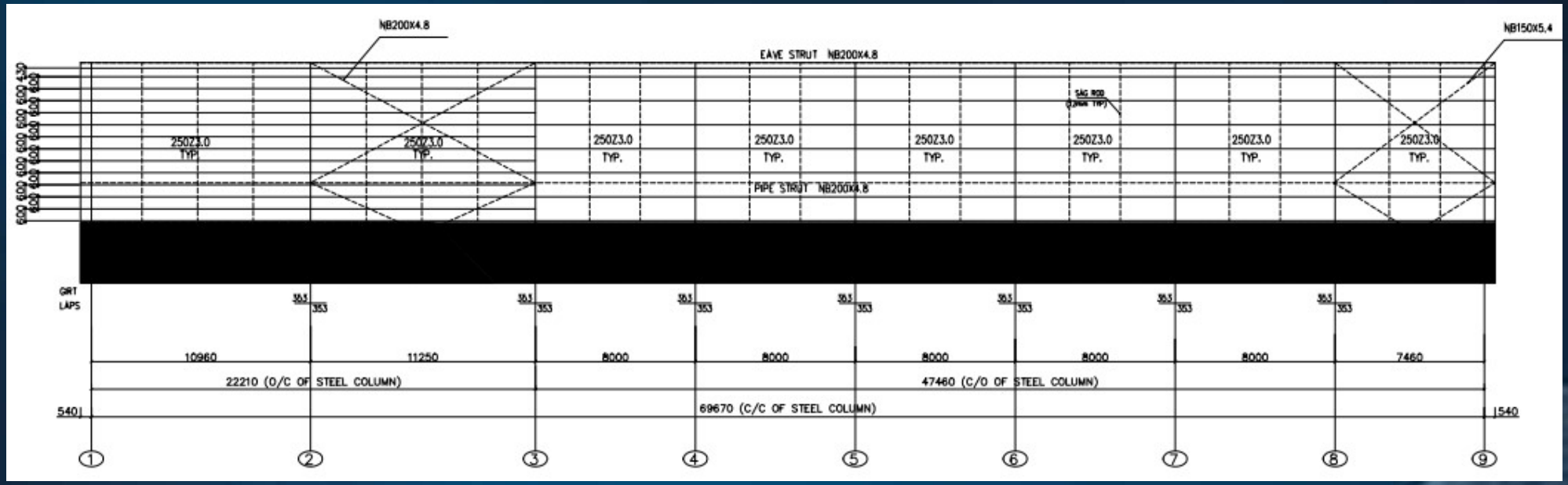
Cross-section of Main Frame



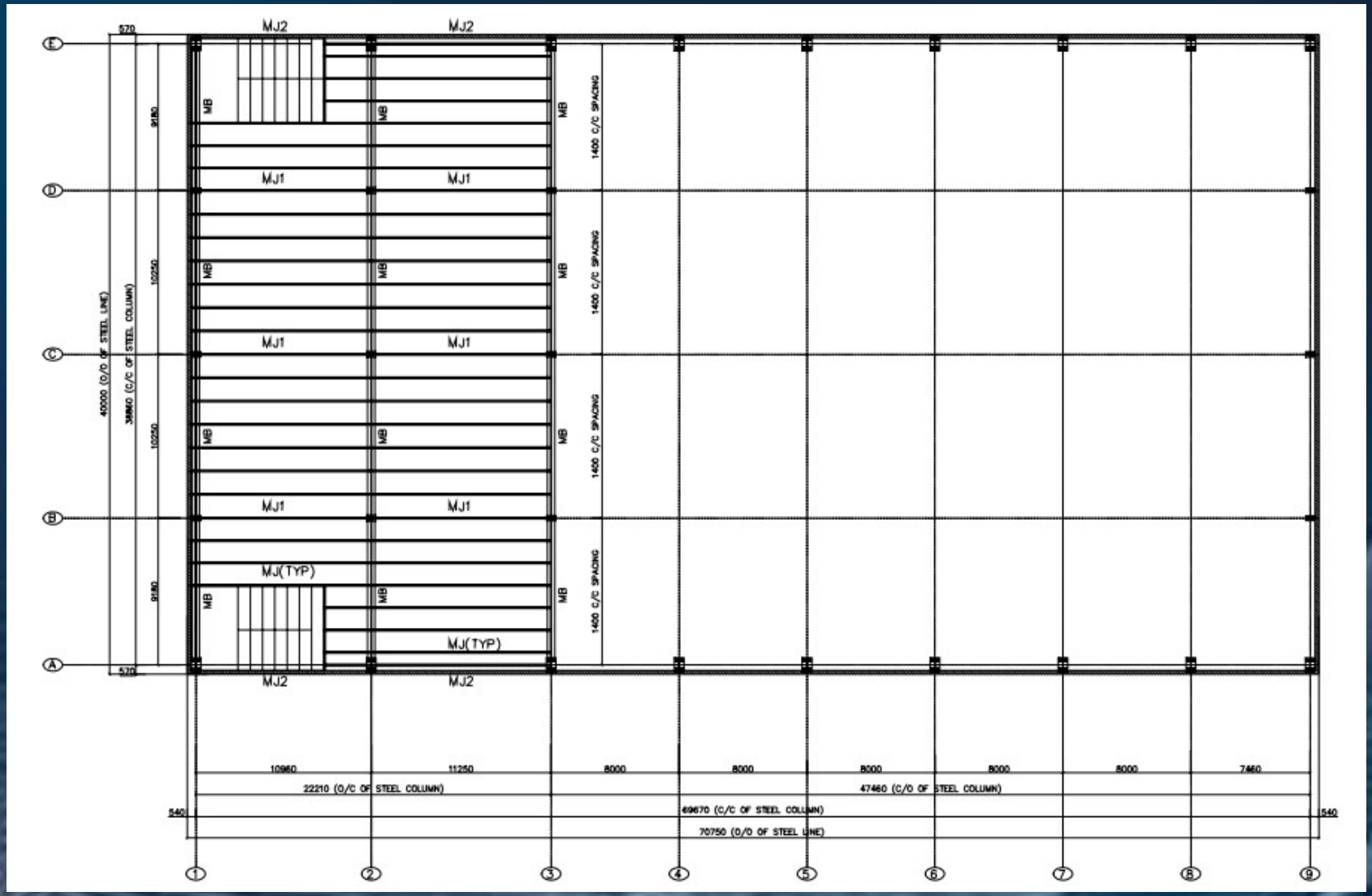
Roof Framing Plan



End Wall Framing



Side Wall Framing



Mezzanine Floor Plan

Estimation

Scope of Work	Cost	Time Required
Steel Scope of Work :- Manufacturing of Built-up Member and Secondary member, Primer single coat for Built-up member, Supply, Errection, Fixing of Sheeting and its accessories	Steel Work = 320.59 MT Rate/kg = 90 ₹/kg Total Cost = 320590 kg x 90 ₹/kg = **28853100 ₹**	Completion Time = 30-35 Days
Civil work :- Excavation, PCC, Footing, Pedestal, Plinth Beam, Back filling, Grade slab at Plinth level, 3m Brick work with Internal External Plaster, Deck slab above Mezzanine.	Rate = 280 ₹/Sq. Ft Area = Shed area 30450.8 Sq. Ft+ Mezzanine area 9791.6 Sq. Ft = 40242.4 Sq. Ft Cost = 280 ₹/Sq. Ft x 40242. Sq. Ft = **11267872 ₹**	Completion Time = 15-20 Days

COMPETITION TOPIC:

STEEL INTENSIVE TRADE FAIR CENTRE

DESIGN OPTION

BY

3rd A Prize Winner – Team W-02

from
L D College of Engineering, Ahmedabad, Gujarat

INSDAG
CIVIL AWARD COMPETITION 2023

"STEEL INTENSIVE TRADE FAIR CENTER"

Presented By:

TEAM W-02

Farzan Khambhatta – 2nd year, M.E. Structure

Umang Prajapati – 2nd year, M.E. Structure

MENTOR

Prof. Chintan D. Patel

Assistant Professor,

Applied Mechanics Department,

L.D. College of Engineering, Ahmedabad, Gujarat

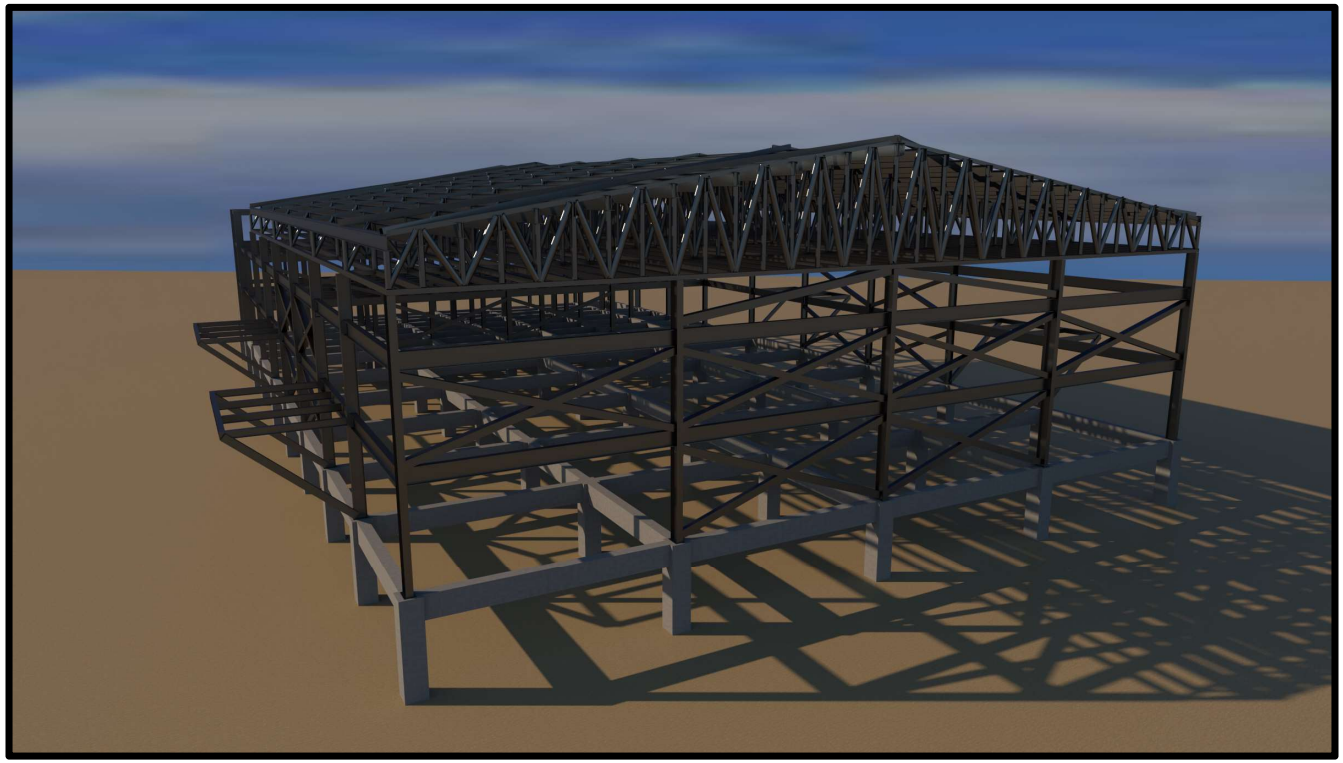
1	Site Location	:	Kolkata
2	Building Dimension (Length x Width)	:	70.55 m x 40 m
3	Building Height		As per design
4	Minimum span of roof structure along width of the building in Exhibition Hall area	:	40 m
5	Minimum spacing of column along length of the building	:	As per design
6	Minimum column spacing along 40 m width of the building in Banquet Hall area	:	10 m
7	Minimum spacing of column along length of the building in Banquet Hall area	:	As per design
8	Minimum Clear Height at Exhibition Hall area	:	10 m

9	Clear Height in Banquet area	:	4 m (or as standard practice)
10	Height of plinth/Floor Level from existing GL	:	0.6 m
11	Material of Façade/ Roof	:	Colour Coated Steel Sheet/ As applicable
12	Floor in Banquet/ Conference Hall area	:	Steel- Concrete Composite
13	Roof Shape	:	Innovative
14	Minimum Clear Height at Entry/ Exit Gate	:	3 m
15	Provision of Roof Top Solar Panel	:	Consider Solar Panael Load
16	Minimum columns no with more open space is required	:	Showing advantage of Steel

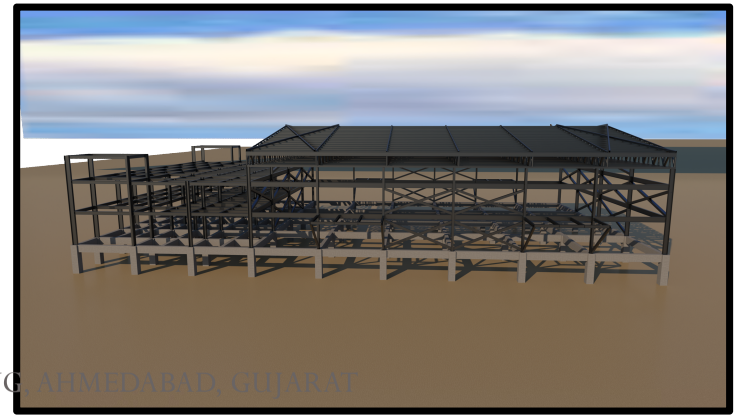
ADOPTED SPECIFICATIONS

MATERIAL SPECIFICATION	
I-Section	IS 1161:2014 And TATA Structura
Built-up I Section	IS 1161:2014, SP-6
SHS Section	IS 4923:2017
Weld joint details	IS 9595:1996
High Strength Bolts	IS 4000:1992
Concrete grade	M25,M30
Steel grade	Yst 310,E250
Reinforcement bars grade	Fe 500

DESIGN SPECIFICATION	
Steel Design	IS 800:2007
Concrete design	IS 456:2000
Gravity load	IS 875 (PART 1 & 2)
Wind load	IS 875(PART 3)
Seismic load	IS 1893:2016(Part 1)



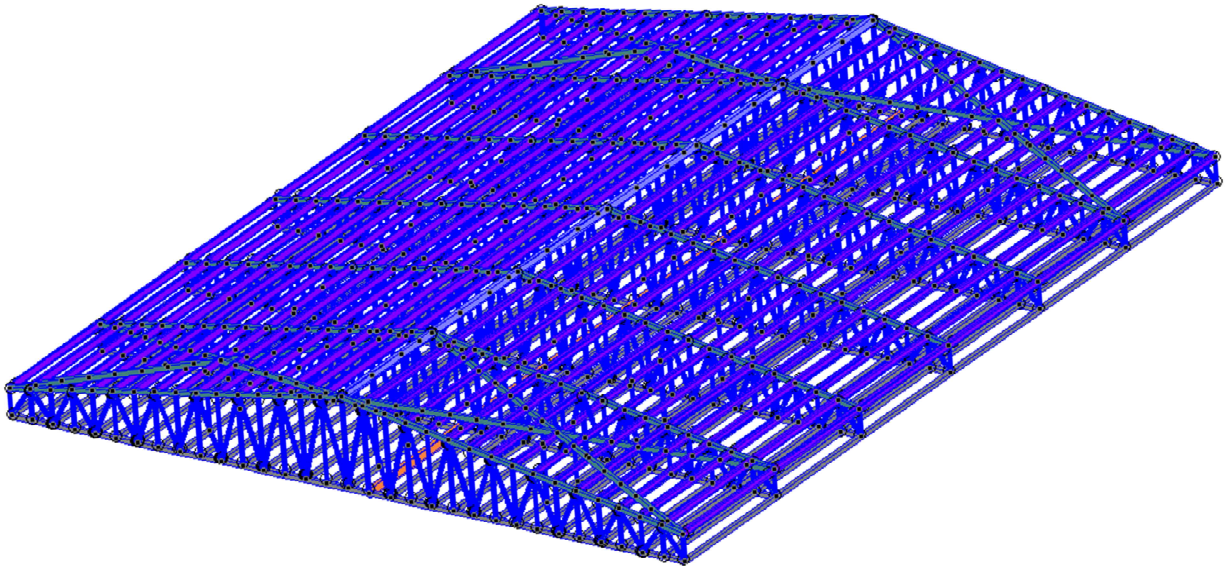
Structural



Skeleton

TRUSS SYSTEM

- Trapezoidal type truss is used considering the large span of the exhibition area (40m).
- A combination of I, channel, hollow (RHS, SHS, CHS) sections are used in the truss.
- Braces of hollow sections are used to control excessive lateral deflection of truss members

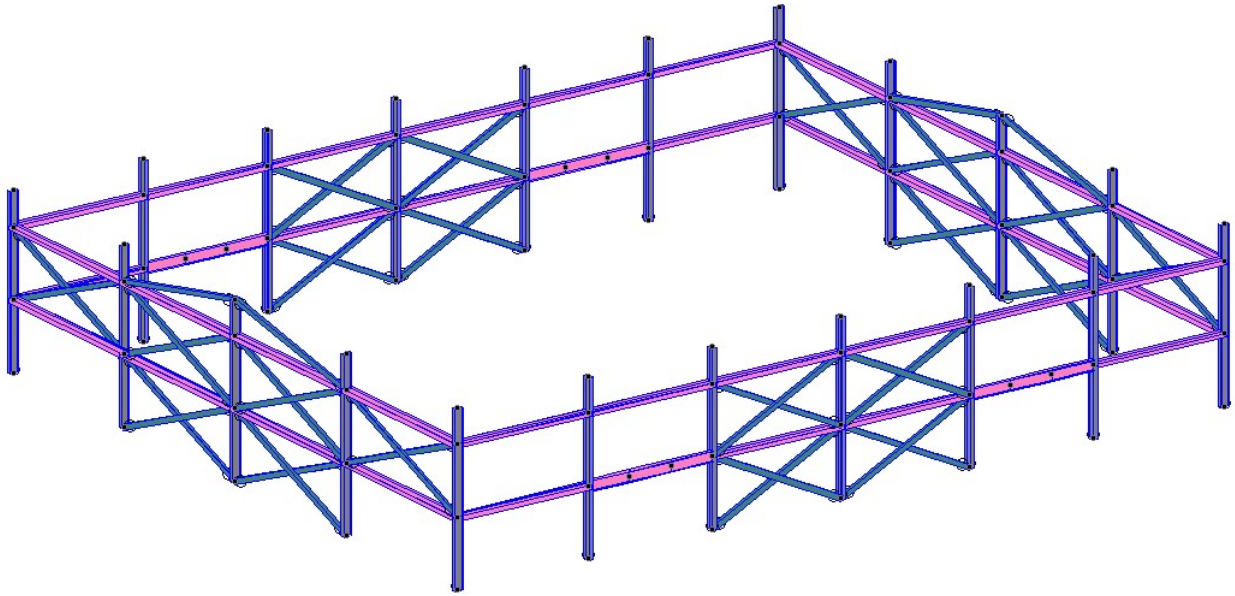


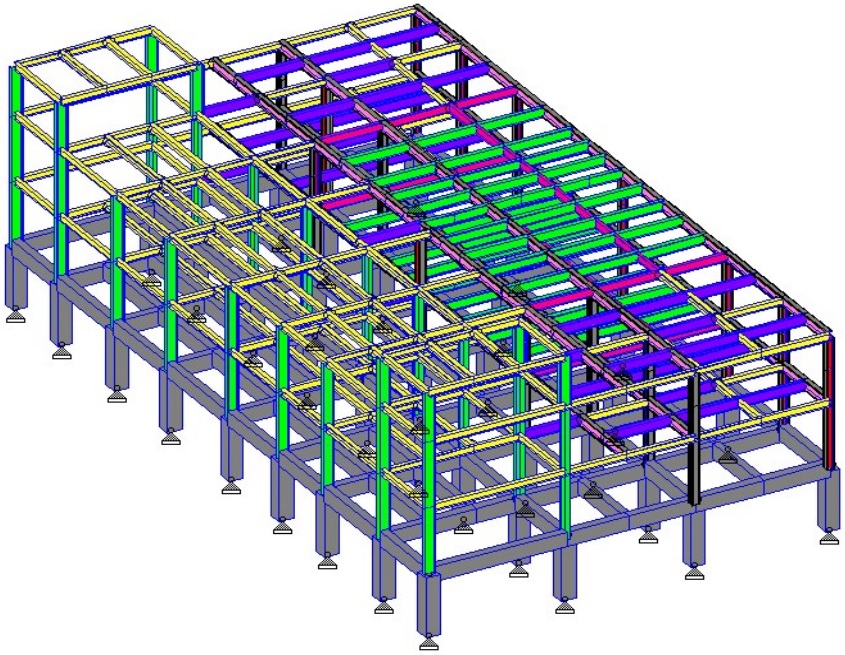
SECTIONS USED	MEMBER
SHS 250 X 250 X 10	BOTTOM CHORD
RHS 300 X 200 X 8	ROOF BRACES
ISMB 500	PURLINS
CHS 219.10 X 10	INCLINED AND VERTICAL SLINGS

BRACING SYSTEM

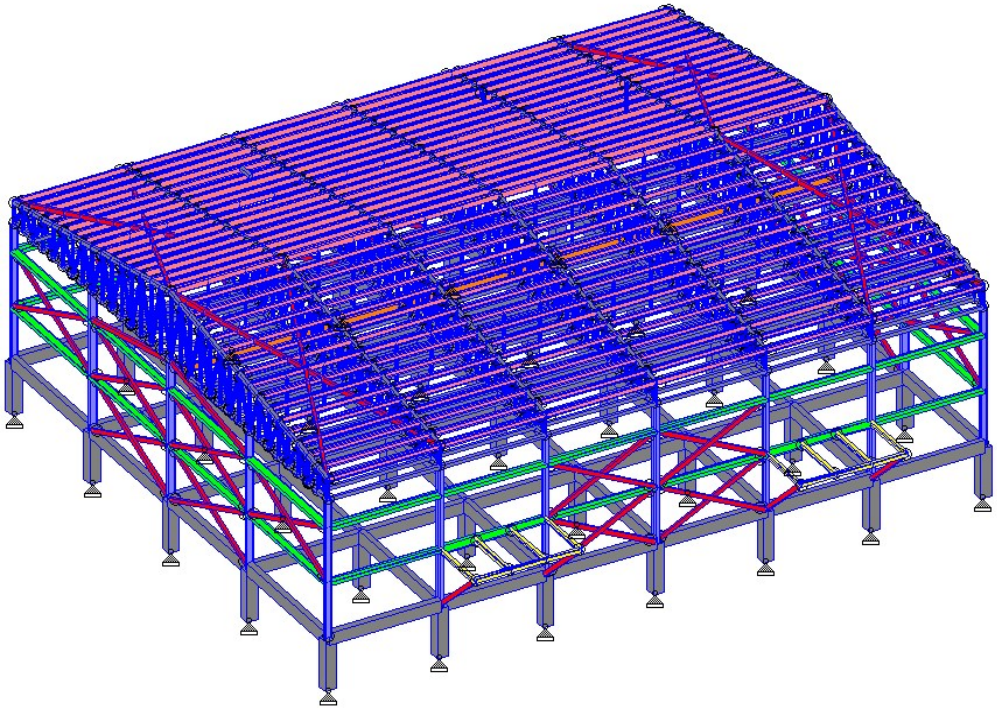
- Bracings are used in the exhibition area periphery to control excess lateral deflections.
- Hollow sections are used in the braces.

SECTIONS USED	MEMBER
RHS 300 X 200 X 8	BRACES
ISWB 600	GIRTS BEAMS
ISHB 300	PORCH ROOF BEAMS
ISHB 300	COLUMNS FOR TRUSS
ISWB 500	COLUMNS FOR TRUSS

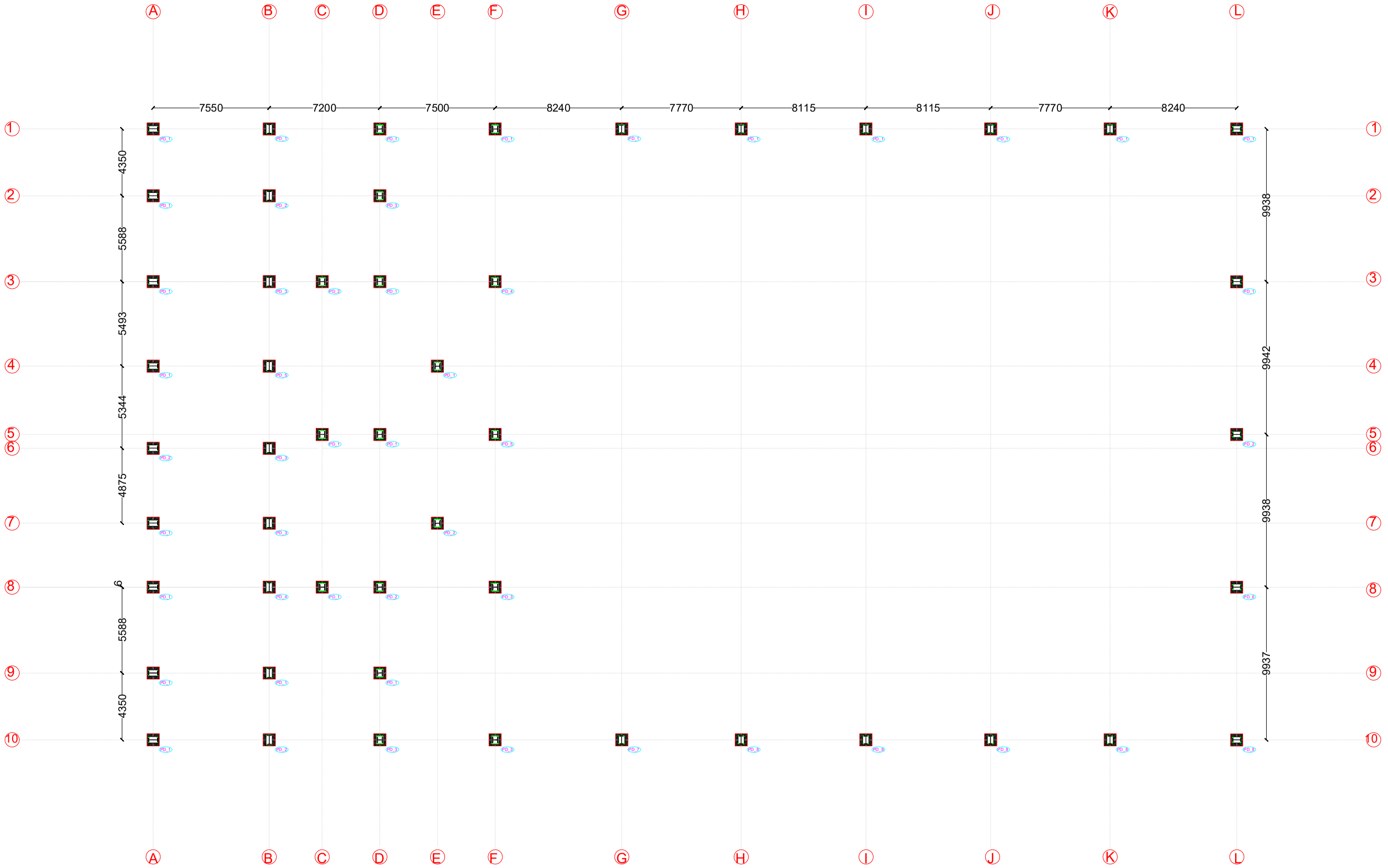




Banquet & Office Area



Exhibition Hall Area



BASE PLATE LAYOUT AND DETAILS

GENERAL NOTES

1. READ STRUCTURAL DRAWINGS IN CONJUNCTION WITH RELEVANT ARCHITECTURAL/ G.A. DRAWINGS & STRUCTURAL DWGS.
2. THE STRUCTURAL IS DESIGNED FOR THE PURPOSE OF GROUND+1 STORY AS MENTIONED IN ARCHITECTURAL DRAWING. HENCE THERE IS NO FUTURE EXPANSION IS CONSIDERED. ANY CHANGES MUSTBE BROUGHT TO THE NOTICE TO THE STRUCTURAL ENGINEER TO RECHECK THE STABILITY.
3. ALL PLAIN AND REINFORCED CEMENT CONCRETE WORKS SHALL CONFORM TO IS : 456-2000 & OTHER RELEVANT IS AND CODAL PROVISIONS.
4. UNLESS OTHERWISE SPECIFICALLY STATED. CONCRETE GRADE FOR R.C.C. WORK - M30. REINFORCEMENT BARS OF GRADE Fe 500 HYSD BARS
5. CEMENT FOR ALL STRUCTURAL WORK SHALL BE ORDINARY PORTLAND CEMENT.
6. ALL CONCRETE WORK SHALL BE MACHINE MIXED AND MACHINE VIBRATED.
7. # INDICATES TOR STEEL
8. ALL HYSD BARS SHALL CONFIRM TO IS : 1786-1966.
9. CLEAR COVER TO THE MAIN REINFORCEMENT.
(A) FOOTINGS : 50 mm
(B) COLUMNS : 50 mm BELOW GROUND,40 mm ABOVE GROUND
(C) BEAMS : 25 mm
(D) SLABS : 20 mm
(E) RCC WALL : 20 mm
10. BEFORE EXECUTING ANY R.C.C. ITEM , THE CONTRACTOR SHALL GET REINFORCEMENT WORK DULY CHECKED.
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16. ALL LEVELS ARE IN METRE OTHERWISE SPECIFIED.
17. LAP LENGTH(Ld) (D= Dia. of reinforcement bar) :-

MIX	Ld for H.Y.S.D.(Fe500)
M 20	55 D
M 25	50 D
M 30	46 D

18. LAPPING OF LONGITUDINAL BARS SHALL BE STAGGERED. TO AVOID CONGESTION OF REINFORCEMENT.
19. SPECIAL NOTE :- REGARDING SPLICING OF LONGITUDINAL BARS OF BEAMS/COLUMNS/WALLS
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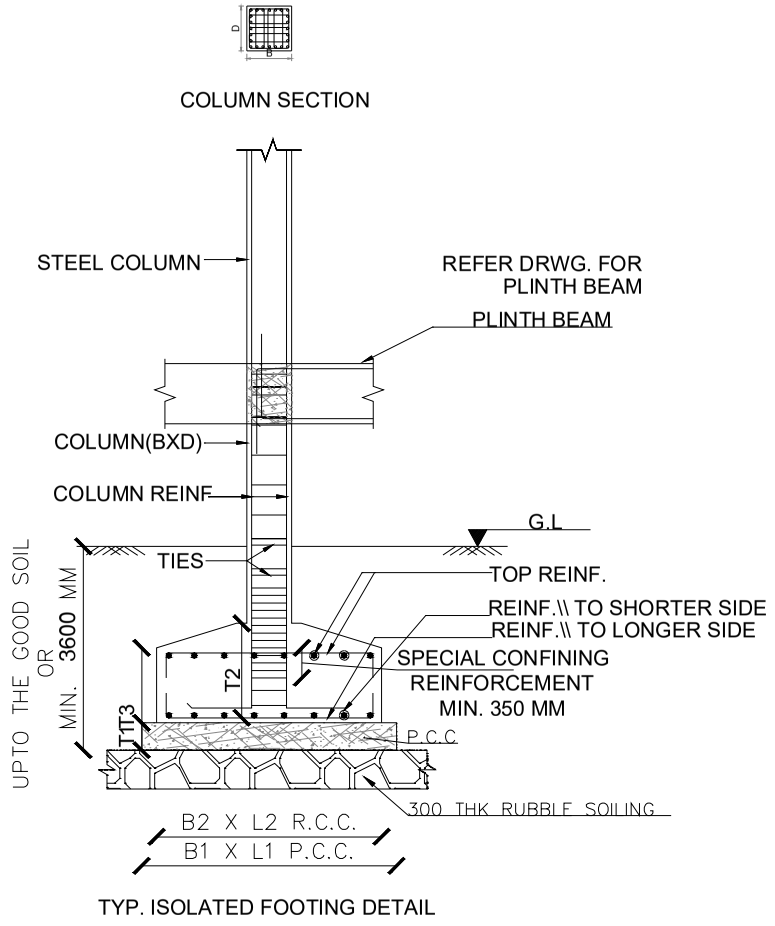
20. CLEAR DISTANCE BETWEEN TWO CONSECUTIVE LONGITUDINAL REINFORCEMENT SHALL BE EQUAL TO 25 MM OR DIAMETER OR LARGER REINFORCEMENT BAR, WHICHEVER IS MORE.

SCALE:		PROJECT:-	INSDAG 2023
DATE:-	15/12/23		
DRAWN:	UMANG	TITLE:-	BASE PLATE DRAWING
CKD.:	DDP		L.D. COLLEGE OF ENGINEERING, AHMEDABAD
PROJECT NO.	P-01/23		
DWG. NO.:-			GRP. NO
REV. NO.:-	R-01		W-02

FOUNDATION PLAN



TYP. ISOLATED FOOTING DETAIL

SCHEDULE OF FOOTINGS												
		P.C.C DETAILS			FOOTING DETAILS							
									BOTTOM. REINF.		TOP. REINF.	
FOOTING MARK	CONC. GRADE	B1 (mm)	L1 (mm)	T1 (mm)	B2 (mm)	L2 (mm)	T2 (mm)	T3 (mm)	REINF.IITO SHORT SIDE	REINF.IITO LONG SIDE	REINF.IITO SHORT SIDE	REINF.IITO LONG SIDE
F1	M30	1800	1800	150	1500	1500	375	175	T12@300 C/C	T12@300 C/C	T12@300 C/C	T12@300 C/C
F2,F3,F4,F57,F58,F59	M30	1800	1800	150	1500	1500	350	150	T12@300 C/C	T12@300 C/C	T12@300 C/C	T12@300 C/C
F5	M30	2000	2000	150	1700	1700	400	200	T10@300 C/C	T10@300 C/C	T10@250 C/C	T10@250 C/C
F6,F7,F8,F12,F48,F50,F51,F52	M30	2250	2250	150	1950	1950	475	225	T10@300 C/C	T10@300 C/C	T10@200 C/C	T10@200 C/C
F9,F24	M30	2000	2000	150	1700	1700	400	175	T10@300 C/C	T10@300 C/C	T10@250 C/C	T10@250 C/C
F10,F19,F20,F21,F22,F23,F56	M30	1800	1800	150	1500	1500	300	150	T10@300 C/C	T10@300 C/C	T10@300 C/C	T10@300 C/C
F11,F29,F53	M30	1950	1950	150	1650	1650	375	175	T12@300 C/C	T12@300 C/C	T12@300 C/C	T12@300 C/C
F13,F55	M30	2150	2150	150	1850	1850	450	200	T12@300 C/C	T12@300 C/C	T12@300 C/C	T12@300 C/C
F14,F42	M30	2050	2050	150	1750	1750	400	200	T12@300 C/C	T12@300 C/C	T12@300 C/C	T12@300 C/C
F15,F40,F43,F47,F49,F54	M30	2300	2300	150	2000	2000	500	225	T12@300 C/C	T12@300 C/C	T12@300 C/C	T12@300 C/C
F16,F44,F65	M30	1800	1800	150	1500	1500	325	150	T12@300 C/C	T12@300 C/C	T12@300 C/C	T12@300 C/C
F17	M30	2700	2700	150	2400	2400	600	300	T12@250 C/C	T12@300 C/C	T12@200 C/C	T12@200 C/C
F18,F26,F46	M30	2400	2400	150	2100	2100	525	250	T12@300 C/C	T12@300 C/C	T12@250 C/C	T12@250 C/C
F25,F27,F37	M30	1900	1900	150	1600	1600	375	175	T12@300 C/C	T12@300 C/C	T12@300 C/C	T12@300 C/C
F28	M30	2800	2800	150	2500	2500	650	300	T12@250 C/C	T12@250 C/C	T12@200 C/C	T12@200 C/C
F30,F45	M30	2650	2650	150	2350	2350	600	275	T12@250 C/C	T12@300 C/C	T12@225 C/C	T12@225 C/C
F31	M30	1900	1900	150	1600	1600	750	300	T10@150 C/C	T10@150 C/C	T10@125 C/C	T10@125 C/C
F32,F33,F34,F39,F41	M30	1850	1850	150	1550	1550	350	150	T10@300 C/C	T10@300 C/C	T10@300 C/C	T10@300 C/C
F35,F38	M30	2050	2050	150	1750	1750	425	200	T10@300 C/C	T10@300 C/C	T10@200 C/C	T10@200 C/C
F36	M30	2200	2200	150	1900	1900	450	225	T10@250 C/C	T10@300 C/C	T10@200 C/C	T10@200 C/C
F60,F64	M30	2350	2350	150	2050	2050	500	250	T10@250 C/C	T10@250 C/C	T10@150 C/C	T10@150 C/C
F61,F63	M30	2550	2550	150	2250	2250	550	275	T10@200 C/C	T10@200 C/C	T10@150 C/C	T10@150 C/C
F62	M30	2550	2550	150	2250	2250	575	275	T10@200 C/C	T10@200 C/C	T10@150 C/C	T10@150 C/C

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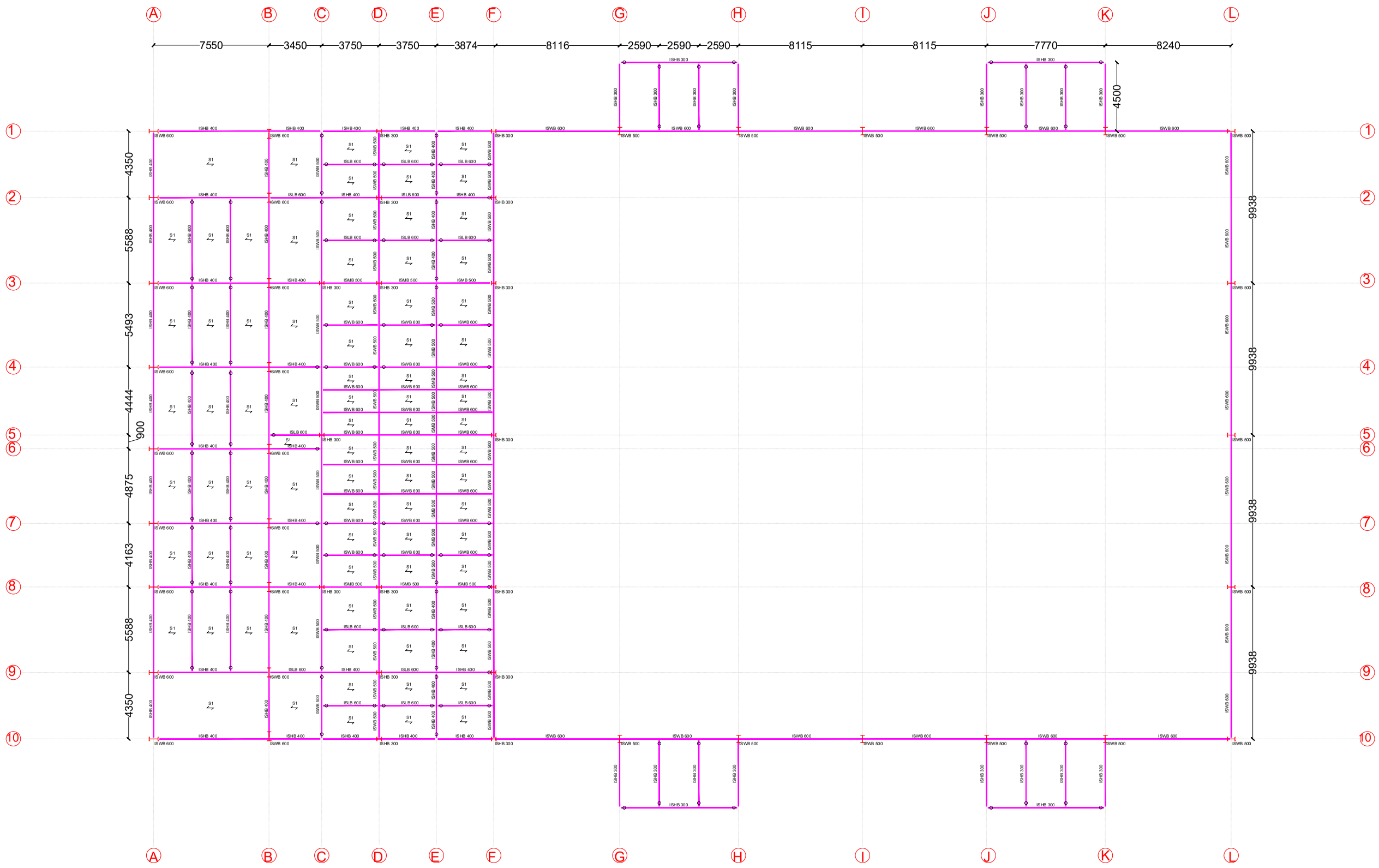
SCALE:		PROJECT:-	INSDAG 2023
DATE:-	15/12/23	TITLE:-	FOOTING DRAWING
DRAWN:	UMANG		
CHD :	DDP		L.D. COLLEGE OF ENGINEERING, AHMEDABAD
PROJECT NO.	P-01/23		
DWG. NO. :-			GRP. NO
REV. NO.:-	R-01		W-02



FIRST FLOOR BEAM PLAN

GENERAL NOTES

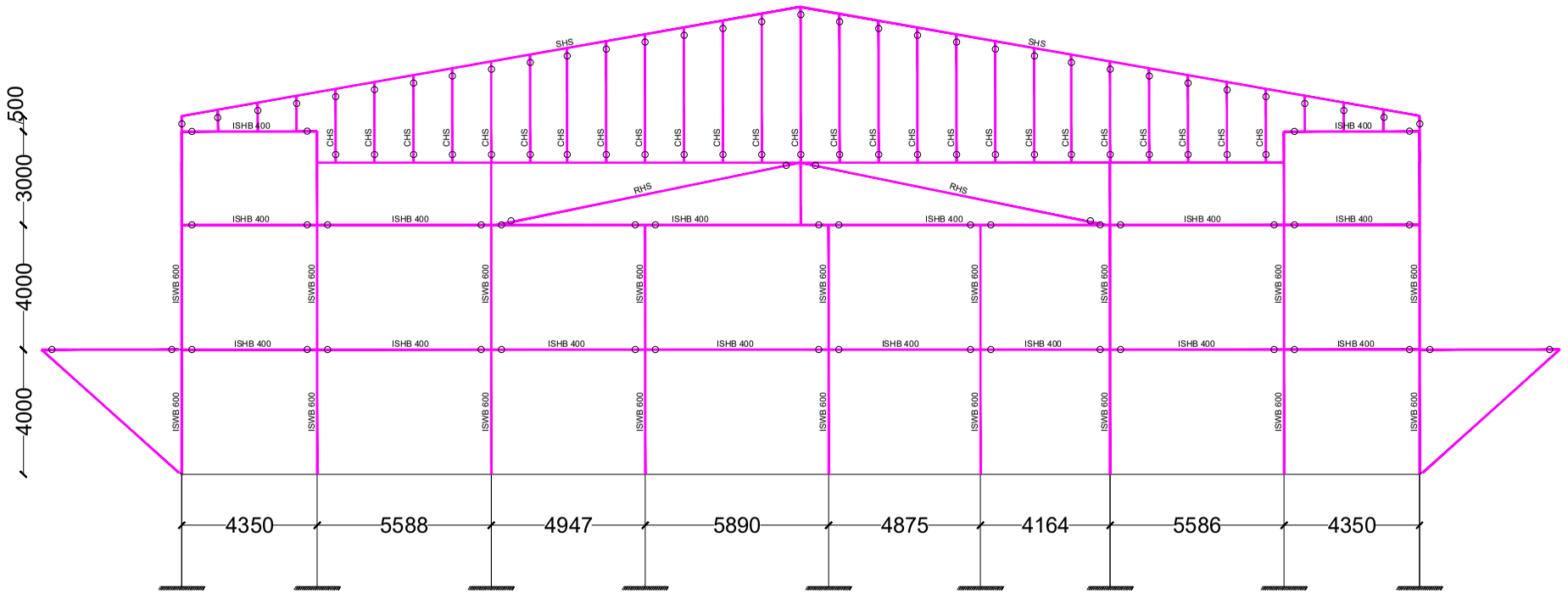
1. READ STRUCTURAL DRAWINGS IN CONJUNCTION WITH RELEVANT ARCHITECTURAL/ G.A. DRAWINGS & STRUCTURAL DWGS.
2. THE STRUCTURAL IS DESIGNED FOR THE PURPOSE OF GROUND+1 STORY AS MENTIONED IN ARCHITECTURAL DRAWING. HENCE THERE IS NO FUTURE EXPANSION IS CONSIDERED. ANY CHANGES MUSTBE BROUGHT TO THE NOTICE TO THE STRUCTURAL ENGINEER TO RECHECK THE STABILITY.
3. ALL PLAIN AND REINFORCED CEMENT CONCRETE WORKS SHALL CONFORM TO IS : 456-2000 & OTHER RELEVANT IS AND CODAL PROVISIONS.
4. UNLESS OTHERWISE SPECIFICALLY STATED. CONCRETE GRADE FOR R.C.C. WORK - M30. REINFORCEMENT BARS OF GRADE Fe 500 HYSD BARS
5. CEMENT FOR ALL STRUCTURAL WORK SHALL BE ORDINARY PORTLAND CEMENT.
6. ALL CONCRETE WORK SHALL BE MACHINE MIXED AND MACHINE VIBRATED.
7. # INDICATES TOR STEEL
8. ALL HYSD BARS SHALL CONFIRM TO IS : 1786-1966.
9. CLEAR COVER TO THE MAIN REINFORCEMENT.
(A) FOOTINGS : 50 mm
(B) COLUMNS : 50 mm BELOW GROUND,40 mm ABOVE GROUND
(C) BEAMS : 25 mm
(D) SLABS : 20 mm
(E) RCC WALL : 20 mm
10. BEFORE EXECUTING ANY R.C.C. ITEM , THE CONTRACTOR SHALL GET REINFORCEMENT WORK DULY CHECKED.
11. THE SITE ENGINEER OR SITE INCHARGE SHALL BE FULLY RESPONSIBLE FOR ALL EXECUTION WORK AT SITE.
12. STRUCTURAL ENGINEER IS NOT RESPONSIBLE FOR CENTERING, SHUTTERING, QUALITY OF CONSTRUCTION MATERIAL AND WRONG INTERPRETATION OF DRAWINGS.
13. ANY DISCREPANCY , IF FOUND, SHALL BE BROUGHT TO THE NOTICE OF STRUCTURAL ENGINEER WELL BEFORE EXECUTION.
14. ALL DIMENSIONS ARE TO BE READ NOT TO BE MEASURED.
15. ALL DIMENSIONS ARE IN MM OTHERWISE SPECIFIED.
16. ALL LEVELS ARE IN METRE OTHERWISE SPECIFIED.
17. LAP LENGTH(Ld) (D= Dia. of reinforcement bar) :-

MIX	Ld for H.Y.S.D.(Fe500)
M 20	55 D
M 25	50 D
M 30	46 D

18. LAPPING OF LONGITUDINAL BARS SHALL BE STAGGERED. TO AVOID CONGESTION OF REINFORCEMENT.
19. SPECIAL NOTE :- REGARDING SPLICING OF LONGITUDINAL BARS OF BEAMS/COLUMNS/WALLS
- LAP SPLICES SHALL BE PROVIDED ONLY IN THE CENTRAL HALF OF THE LENGTH.
- NOT MORE THAN 50% OF THE BARS SHALL BE SPLICED AT ONE SECTION.
- HOOPS SHALL BE PROVIDED OVER THE ENTIRE SPLICE LENGTH NOT EXCEEDING 100 mm C/C
- STAGGERING OF SPLICE/LAP JOINTS CENTER TO CENTER DISTANCE BETWEEN TWO ADJACENT SPLICE/LAP JOINT SHALL NOT BE LESS THAN 1.3 XLd

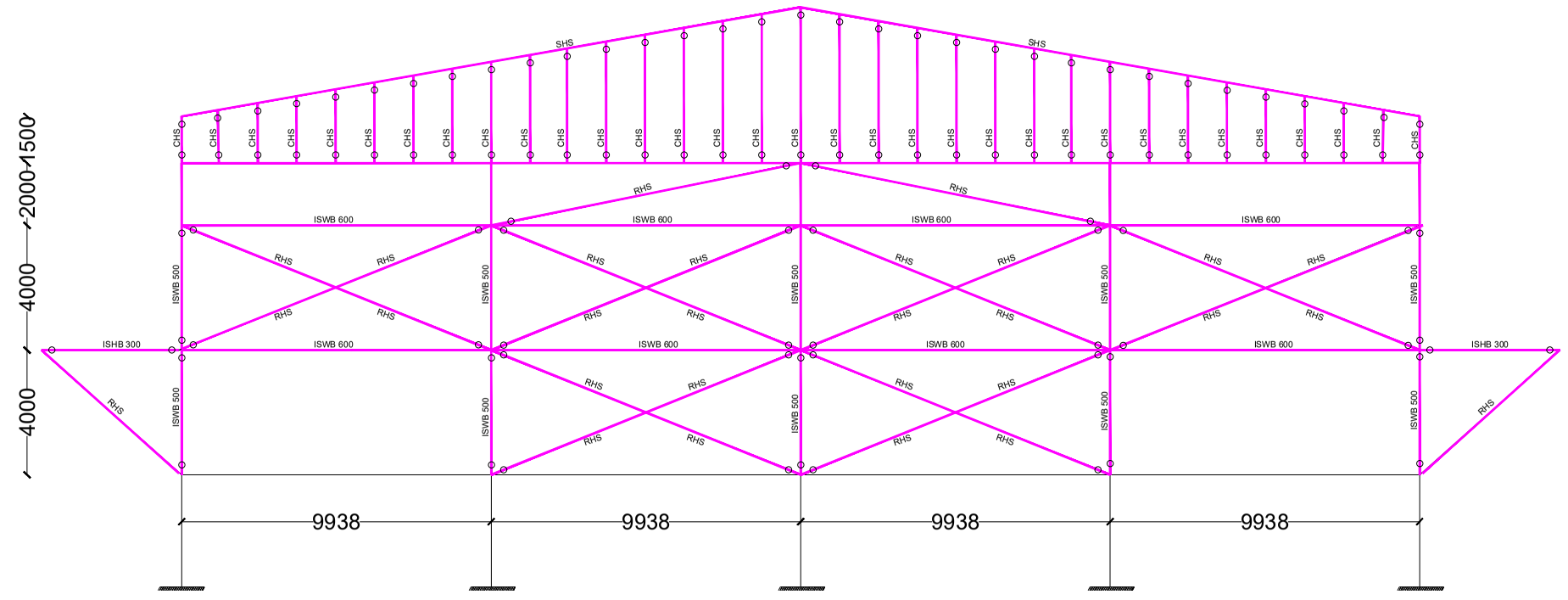
20. CLEAR DISTANCE BETWEEN TWO CONSECUTIVE LONGITUDINAL REINFORCEMENT SHALL BE EQUAL TO 25 MM OR DIAMETER OR LARGER REINFORCEMENT BAR, WHICHEVER IS MORE.

SCALE:		PROJECT:-	INSDAG 2023
DATE:-	15/12/23	TITLE:-	FIRST FLOOR BEAM DRAWING
DRAWN:	UMANG		L.D. COLLEGE
CHD:	CDP		OF ENGINEERING,
PROJECT NO.	P-01/23		AHMEDABAD
DWG. NO.:-			GRP. NO
REV. NO.:-	R-01		W-02



FRONT ELEVATION VIEW

MEMBER	MEMBER SIZE
SHS	250 X 250 X 10
RHS	300 X 200 X 8
RHS	219.1 X 10



BACK ELEVATION VIEW

GENERAL NOTES

1. READ STRUCTURAL DRAWINGS IN CONJUNCTION WITH RELEVANT ARCHITECTURAL/ G.A. DRAWINGS & STRUCTURAL DWGS.
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3. ALL PLAIN AND REINFORCED CEMENT CONCRETE WORKS SHALL CONFORM TO IS : 456-2000 & OTHER RELEVANT IS AND CODAL PROVISIONS.
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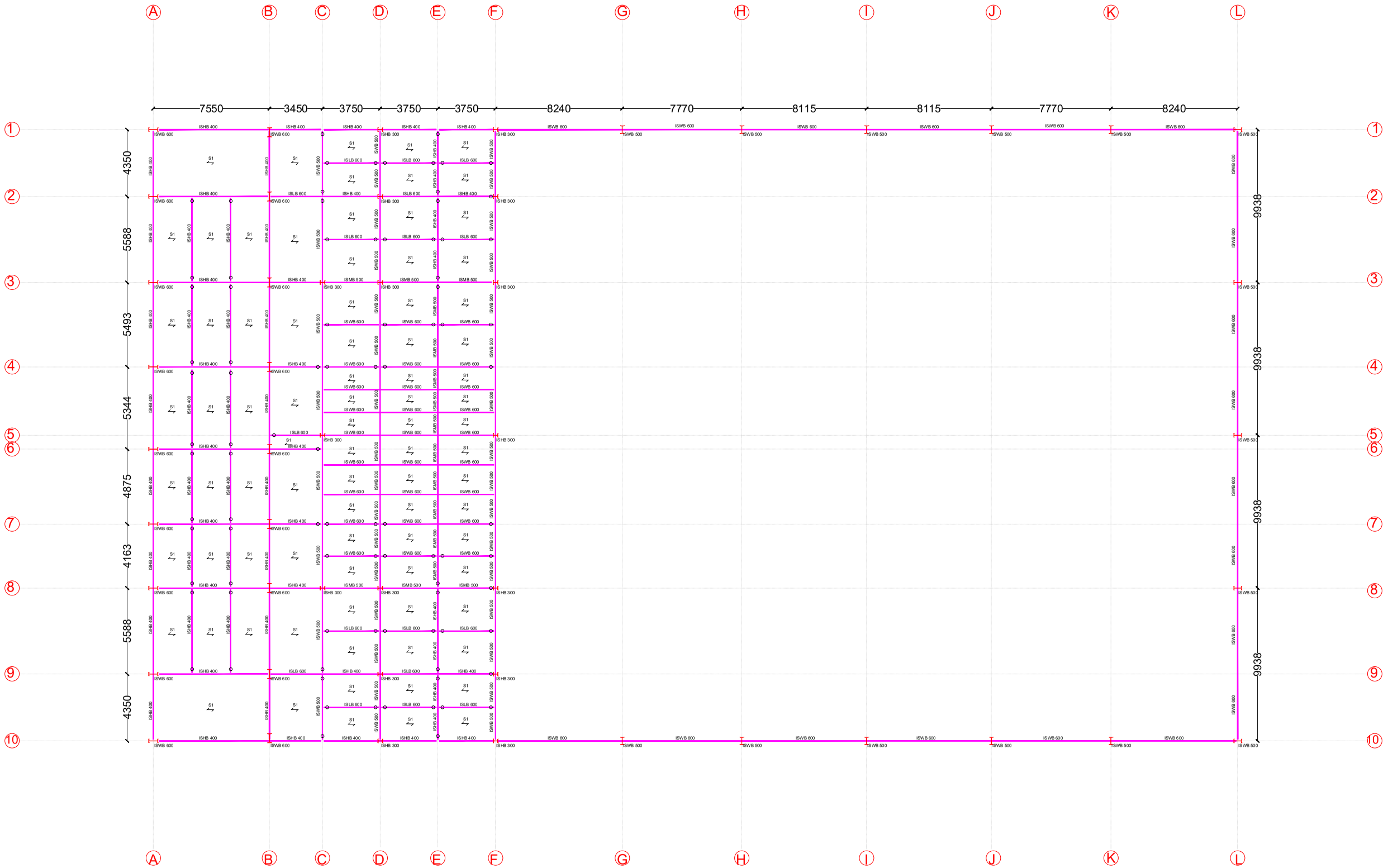
20. CLEAR DISTANCE BETWEEN TWO CONSECUTIVE LONGITUDINAL REINFORCEMENT SHALL BE EQUAL TO 25 MM OR DIAMETER OR LARGER REINFORCEMENT BAR, WHICHEVER IS MORE.

SCALE:		PROJECT:-	INSDAG 2023
DATE:-	15/12/23	TITLE:-	FRONT & BACK ELEVATION DRAWING
DRAWN:	UMANG		
CHD.:	CDP		L.D. COLLEGE OF ENGINEERING, AHMEDABAD
PROJECT NO.	P-01/23		GRP. NO
DWG. NO.:-			W-02
REV. NO.:-	R-01		



TERRACE FLOOR BEAM PLAN

GENERAL NOTES

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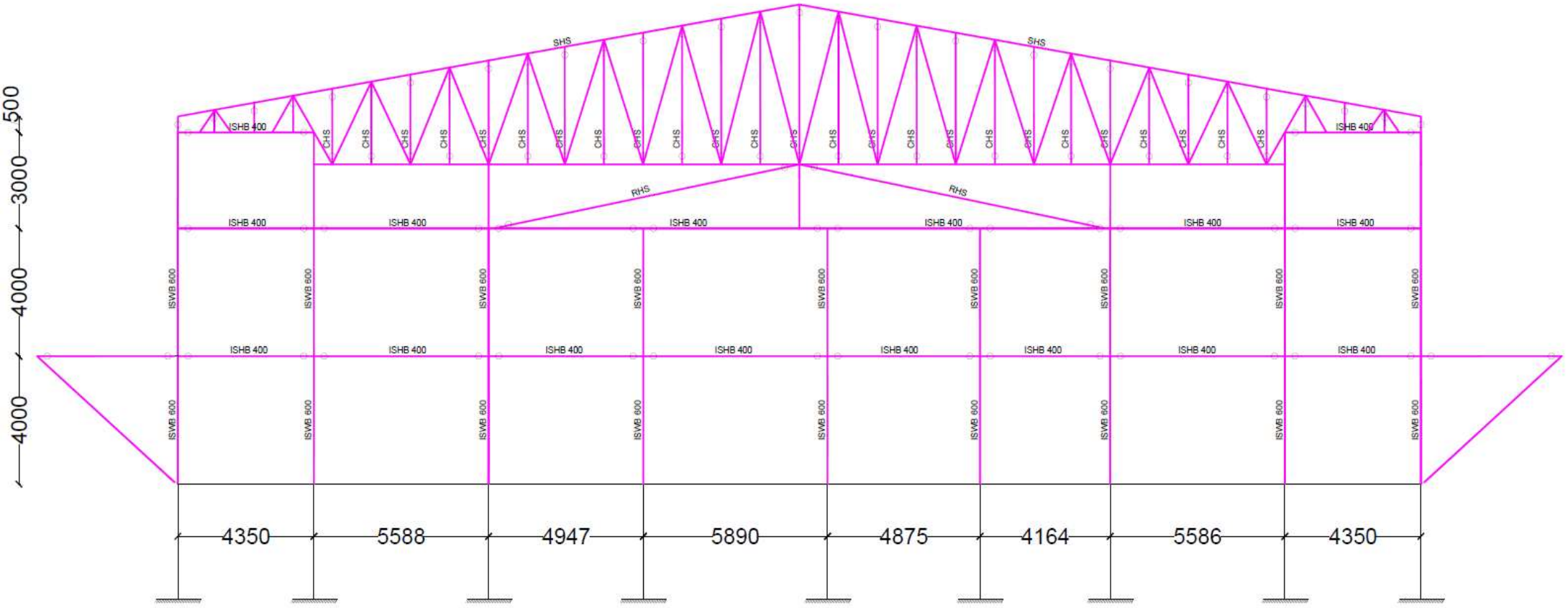
SCALE:		PROJECT:-	INSDAG 2023
DATE:-	15/12/23	TITLE:-	TERRACE FLOOR BEAM DRAWING
DRAWN:	UMANG		
CKD:	CDP		L.D. COLLEGE OF ENGINEERING, AHMEDABAD
PROJECT NO.	P-01/23		
DWG. NO.:-			GRP. NO
REV. NO.:-	R-01		W-02



FRONT ELEVATION

MEMBER	MEMBER SIZE
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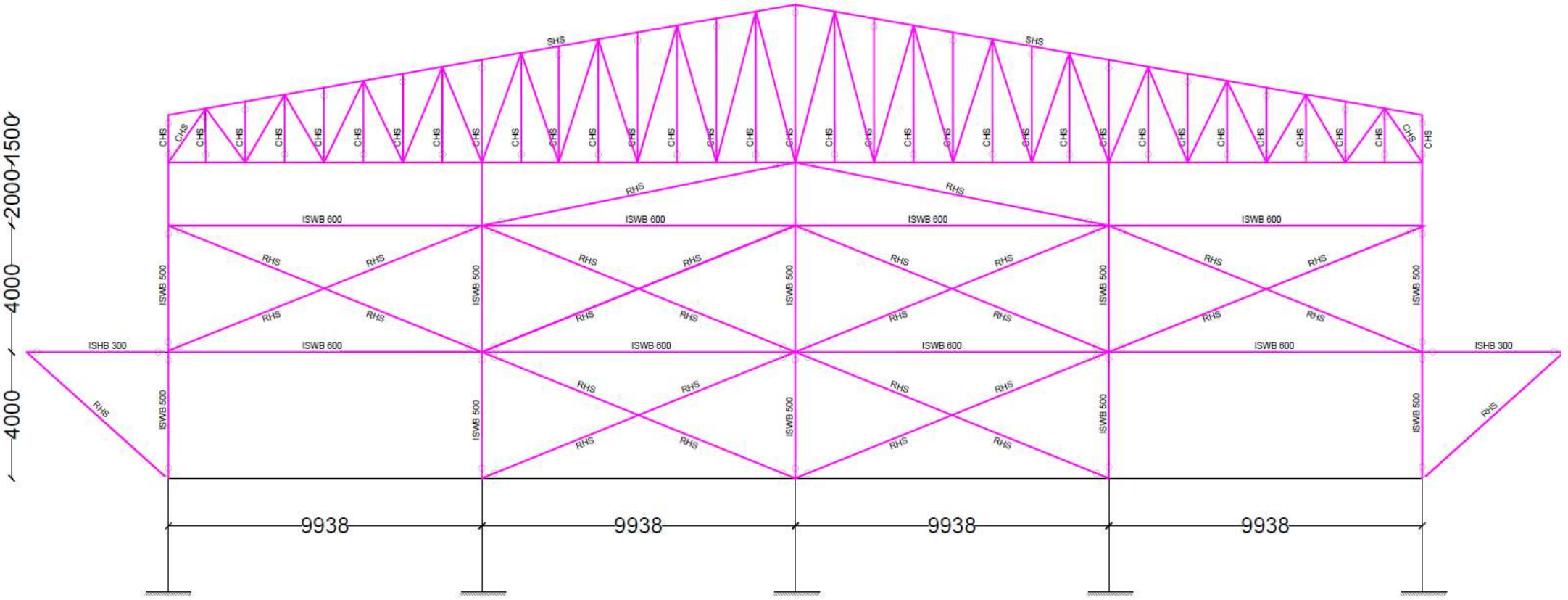
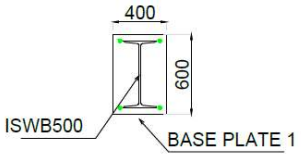
RHS	300 X 200 X 8
RHS	219.1 X 10

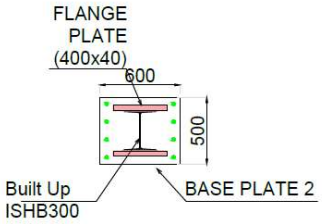


BACK ELEVATION

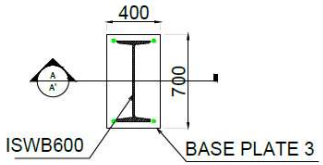
CONNECTION DRAWINGS



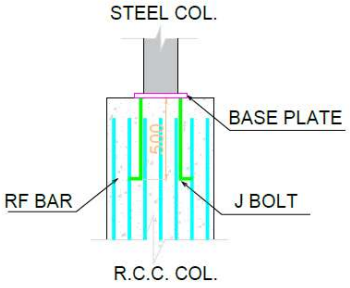
PLAN VIEW 1



PLAN VIEW 2



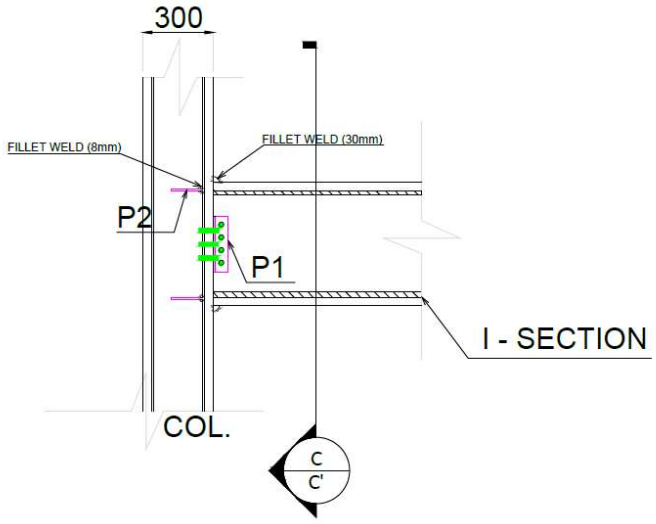
PLAN VIEW 3



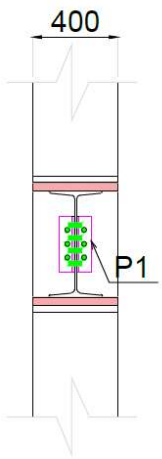
A-A'

CONNECTION DETAILS	
BASE PLATE 1	400 X 600 X 18
ANCHOR BOLT	4-24mm
BASE PLATE 2	600 X 500 X 40
ANCHOR BOLT	8-24mm
BASE PLATE 3	400 X 700 X 14
ANCHOR BOLT	4-20mm

BASE PLATE TO COLUMN CONNECTION



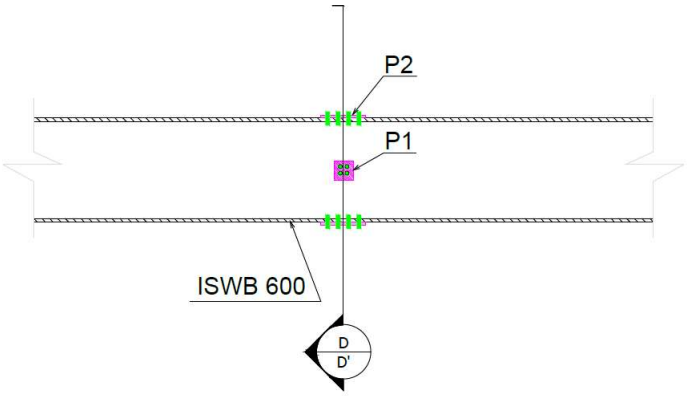
ELEVATION VIEW



C-C'

CONNECTION DETAILS	
COL.	ISHB 300 (400 X 40 Flange Plate)
BEAM	ISWB 500 (400 X 40 Flange Plate)
P1	ISA 70 X 70 X 10
P1 BOLT DIA.	20mm
P2	190 X 150 X 10
P1 BOLT	PITCH = 50mm EDGE = 40mm
P2 BOLT	PITCH = 50mm EDGE = 40mm

BEAM TO COLUMN CONNECTION

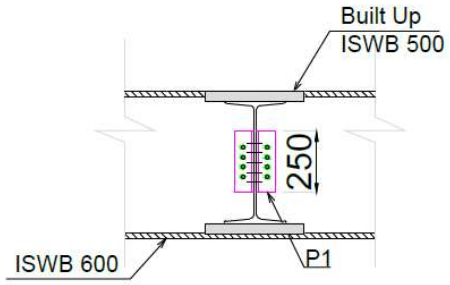


ELEVATION VIEW

BEAM SPLICE CONNECTION(FOR LONG BEAM)

D-D'

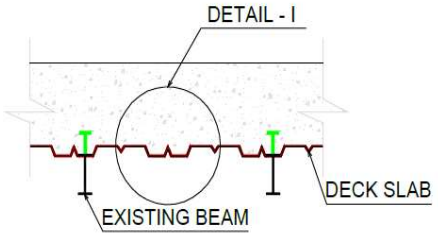
CONNECTION DETAILS	
P1	400 X 260 X 14
P2	110 X 110 X 6
ISWB 600 (D)	600
ISWB 600 (Bf)	250
ISWB 600 (Tf)	21.3
ISWB 600 (Tw)	11.2
P1 BOLT	PITCH = 40mm EDGE = 35mm
P2 BOLT	PITCH = 60mm EDGE = 40mm



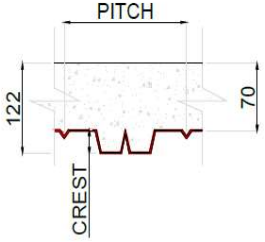
ELEVATION VIEW

BEAM TO BEAM CONNECTION

CONNECTION DETAILS	
ISWB 600 (D)	600
ISWB 600 (Bf)	250
ISWB 600 (Tf)	21.3
ISWB 600 (Tw)	11.2
ISWB 500 (D)	500
ISWB 500 (Bf)	250 (WITH 400mm WIDE FLANGE PLATE)
ISWB 500 (Tf)	14.7 + 40(FLANGE PLATE)
ISWB 500 (Tw)	9.9
P1	ISA 70 X 70 X 10
P1 BOLT DIA	16mm
P1 BOLT	PITCH = 40mm EDGE = 35mm



DETAILING OF DECK SLAB



DETAIL - I

CONNECTION DETAILS	
CREST	52 mm
PITCH	270 mm

PART A. STEEL QUANTITY

	SECTION DETAIL	LENGTH (M)	WEIGHT (kN)	WEIGHT (Kg)	COST IN Rs./Kg	COST IN Rs.	COMPONENT NAME
BANQUET HALL AREA MODEL	ST ISWB600	370.5	483.848	49321.92	66	3255246.72	OFFICE AREA COLUMNS AND BANQUET AREA SECONDARY BEAMS
	TB ISHB300	128	270.208	27544.14	66	1817913.24	BANQUET AREA COLUMNS
	ST ISHB400	646.44	490.136	49962.9	66	3297551.4	PRIMARY BEAMS
	TB ISWB500	238.5	690.719	70409.69	66	4647039.54	BANQUET AREA PRIMARY BEAMS
	ST ISMB500	85.46	72.871	7428.24	66	490263.84	BANQUET AREA BEAMS - 2
	ST ISLB600	125.7	122.634	12500.92	66	825060.72	DISPLAY AREA BEAMS
EXHIBITION AREA MODEL	ST 250X250X10.0SHS	2108.26	1513.147	154245.37	66	10180194.42	TOP RAFTERS AND LOWER BEAMS SUPPORTING TRUSS
	ST ISWB500	200	185.903	18950.36	66	1250723.76	STEEL COLUMNS
	ST ISWB600	353	460.994	46992.26	66	3101489.16	HORIZONTAL GIRTS
	ST ISHB400	48.25	36.584	3729.26	66	246131.16	TOP RIDGE BEAM
	D ISMC400	1544	1513.455	154276.76	66	10182266.16	DOUBLE CHANNEL PURLINS
	ST 219.1X10CHS	1661.25	838.311	85454.75	66	5640013.5	TRUSS STRUTS AND VERTICAL PURLIN SUPPORT MEMBERS
	ST ISHB300	103.08	59.231	6037.82	66	398496.12	PORCH ROOF BEAMS
	ST 300X200X8.0RHS	667.5	388.629	39615.6	66	2614629.6	BRACINGS
	ST ISWB550	48.25	53.004	5403.06	66	356601.96	BEAM LOWER TO RIDGE
			TOTAL (Kg)	731873.05		48303621.3	

PART B: DINING AREA RCC

	MATERIAL			QUANTITY (m^3)	RATE PER cum.	COST IN Rs.
FOOTING	CONCRETE M30			40.72	5000	203600
PEDESTAL	CONCRETE M25			80.64	4800	387072
PLINTH BEAM	CONCRETE M25			183.01	4800	878448
						1469120

	MATERIAL			QUANTITY (Kg)	RATE PER Kg.	COST IN Rs.
FOOTING	REBAR 12DIA. FE500			1862.52	63	117338.76
	REBAR 8DIA. FE500			5382.16	63	339076.08
PEDESTAL	REBAR 16DIA. FE500			3408	63	214704
	REBAR 20DIA. FE500			4499	63	283437
	REBAR 25DIA. FE500			158	63	9954
	REBAR 8DIA. FE500			4448.45	63	280252.35
	REBAR 10DIA. FE500			53.13	63	3347.19
PLINTH BEAM	REBAR 12DIA. FE500			2073.62	63	130638.06
	REBAR 16DIA. FE500			6141	63	386883
	REBAR 20DIA. FE500			2350	63	148050
	REBAR 25DIA. FE500			566.97	63	35719.11
						1949399.55

PART E: DECK SLAB

Sr. No.	MATERIAL	VOLUME	WEIGHT Kg	COST / UNIT	TOTAL RATE
1	DECK SHEET	1.64	12874	65	836810
	(DECKSPAN)				
2	CONCRETE	115		4800	552000
				TOTAL COST	1388810

PART C: EXHIBITION AREA RCC

	MATERIAL			QUANTITY (m^3)	RATE PER cum.	COST IN Rs.
FOOTING	CONCRETE M30			38.98	5000	194900
PEDESTAL	CONCRETE M30			80.64	5000	403200
PLINTH BEAM	CONCRETE M30			192.31	5000	961550
						1559650
	MATERIAL			QUANTITY (Kg)	RATE PER Kg.	COST IN Rs.
FOOTING	REBAR 10DIA. FE500			1487.38	63	93704.94
	REBAR 8DIA. FE500			5216.16	63	328618.08
PEDESTAL	REBAR 16DIA. FE500			2518	63	158634
	REBAR 20DIA. FE500			3294	63	207522
	REBAR 25DIA. FE500			2528	63	159264
	REBAR 32DIA. FE500			3455	63	217665
	REBAR 8DIA. FE500			5113.62	63	322158.06
PLINTH BEAM	REBAR 12DIA. FE500			2101.36	63	132385.68
	REBAR 16DIA. FE500			4029.12	63	253834.56
	REBAR 20DIA. FE500			4741.68	63	298725.84
	REBAR 25DIA. FE500			1199.13	63	75545.19
	REBAR 32DIA. FE500			2236.4	63	140893.2
						2388950.55

PART D: BASE PLATE AND GALVALUME SHEET

PER Kg IN Rs.

COMPONENT	LENGTH (m)	WIDTH (m)	THICKNESS(m)	QUANTITY (cum.)	NOS.	WEIGHT (Kg	COST	TOTAL COST
BASE PLATE 01	0.7	0.4	0.014	0.00392	18	553.896	65	36003.24
BASE PLATE 02	0.5	0.5	0.04	0.01	16	1256	65	81640
BASE PLATE 03	0.6	0.35	0.018	0.00378	15	445.095	65	28931.175
GALVALUME SHEET	1959.336		0.0005	0.979668	1	7690.3938	65	499875.597
	(m^2)							
					TOTAL COST			646450.012

TOTAL COST FOR RC AND STEEL

Rs. 57706001.41

CONSIDERING 20% EXTRA COST FOR LABOUR CHARGE, CONNECTIONS, SHUTTERING, EXCAVATION, ETC.

Rs. 69247201.69

Total cost of structure= **69247202/-**