NATIONAL AWARD COMPETITION FOR STUDENTS 2018 - 2019

Civil/Structural Engineering Students For Best Innovative Structural Steel Design

Competition Theme :

Steel Intensive Innovative Food Grain Godown

Institute for Steel Development & Growth

BRIEF OF NACS (C) 2018 - 2019

INTRODUCTION

Now-a days for storage of food grains and vegetables and fruits Food Grain Godown/ Cold storage are integral part in the city and its suburb area. Generally the major component of the food grain Godown consists of storage racks. Puff panel may be used for external walls and the chiller chamber in the in the cold storage or food grain storage Godown.

APPOINTMENT AS CONSULTANT

INSDAG wishes to provide most economical and aesthetically pleasing schemes and all relevant design and detail drawings thereof, to the client. Considering that you have been appointed as a structural consultant for this project and have been asked to furnish structural solution for **"Steel Intensive Innovative Food Grain Godown"**, the task is to prepare a report that should have the following scope:

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

Client/Architect has specified the following requirements for the proposed project:

1. Site Location	: Jalpaiguri, West Bengal
2. Area of Storage Down	: 57.6 m × 19 m / 26.7 m × 24 m (L Shaped area) See the schematic Plan. (Future extension area not in Scope of Design Competition)
3. Minimum clearance, FFL to bottom Chord of Truss if any / Eves level of Arch roof if any	: 9.5 m
4. Roof Structure	: To be covered with Colour Coated Steel Sheet
5. Maximum height of the building	: 13 m
6. No. of Storage levels	: 4 levels

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 E250) or Yst 310/355 or high tensile steel (grade E350 / E410
3. Roof & Cladding	: Standard Colour Coated Steel Sheet (Galvalume)
4. Walls	: Puff panel (Refer manufacturer catalogue)
5. Flooring	: Grating for storage area/ Chequerd plate for passage

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 –1987
b. Live Load on Deck - 750 kg/m^2 for food grains/vegetable/fruits etc. / 400 kg/m^2 on passage

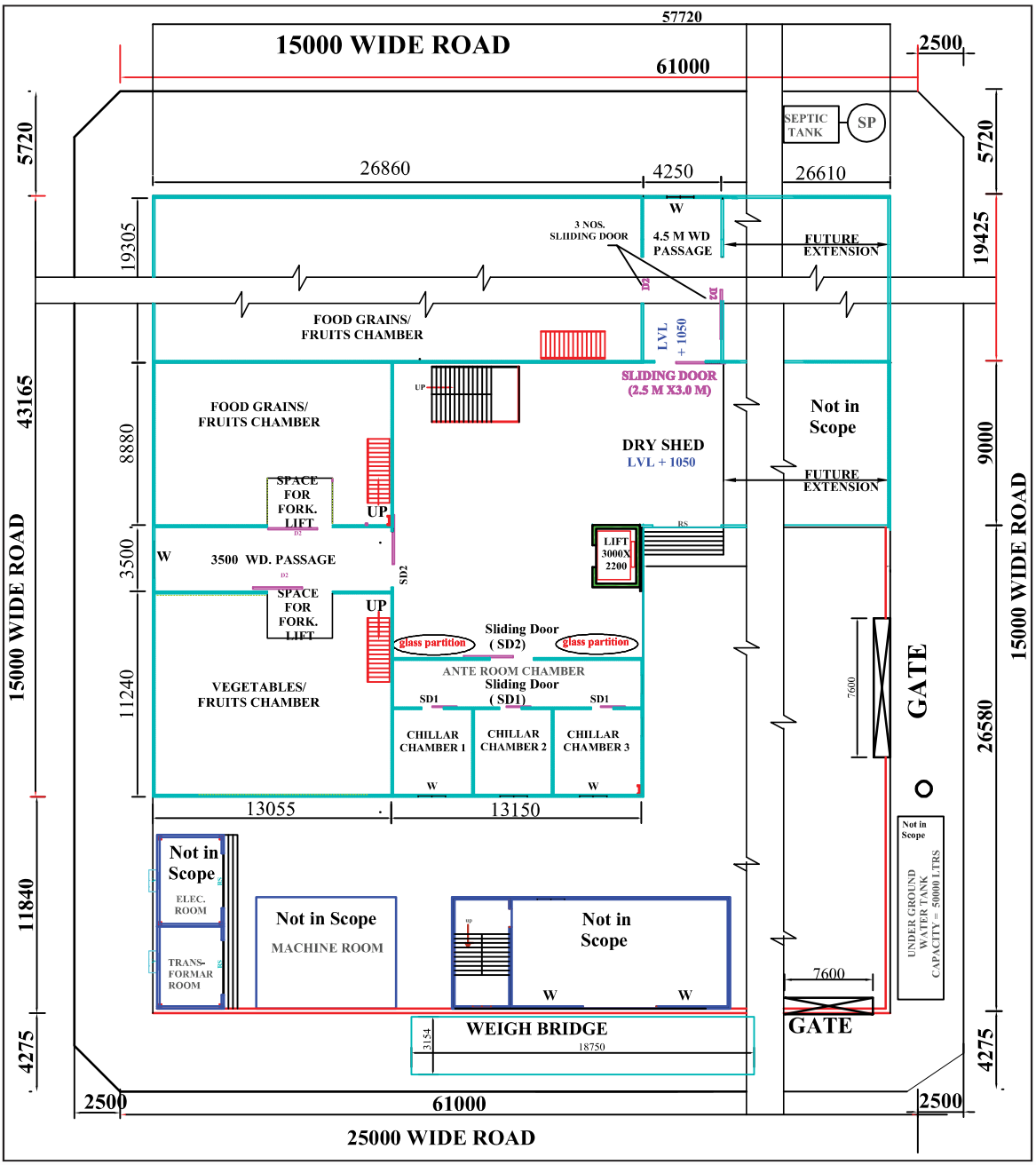
3. Wind Load:
Basic wind speed to be considered as per IS: 875 Part 3 – 2015 (Please check against Jalapaiguri).

4. Seismic Load:
Seismic Zone per IS: 1893 Latest version (Please check against Jalpaiguri location).

5. Other Loads:
Temperature variation of 15°C has to be considered. Please consult relevant specification for other specific loads and action points.

Checklist for Submission

Sl No	Description
1	Content page for report and all submissions
2	All pages and drawings are to be numbered
3	All soft copies are submitted on a CD (i.e. drawings, input and output files of analysis, excel spreadsheets for design checks etc). Soft copies should be sent the zonal coordinator through email also.
4	Hard copy report alongwith all required drawings.
5	Bonafide certificate in hard copy.
6	Student details alongwith photos in soft copy.



Ground Floor Plan

(Not to Scale- total Area shown with break line, Future Extension area not in Competition Scope)

Visit us at www.steel-insdag.org

The Announcement and the Brief of this year's Competition is also available at INSDAG website for free downloading.

YEAR – 2018-2019

COMPETITION TOPIC:

STEEL INTENSIVE INNOVATIVE FOOD GRAIN GODOWN

DESIGN OPTION

BY

1ST Prize Winner – Team N-05

from
Indian Institute of Technology, Kanpur, Uttar Pradesh

NATIONAL AWARD COMPETITION FOR STUDENTS

2018 - 2019

Competition Theme : Steel Intensive Innovative Food Grain Godown

Presented by

Aditya Raj

Malik Faisal Nissar

Under the guidance of

Dr. Chinmoy Kolay

Department of Civil Engineering

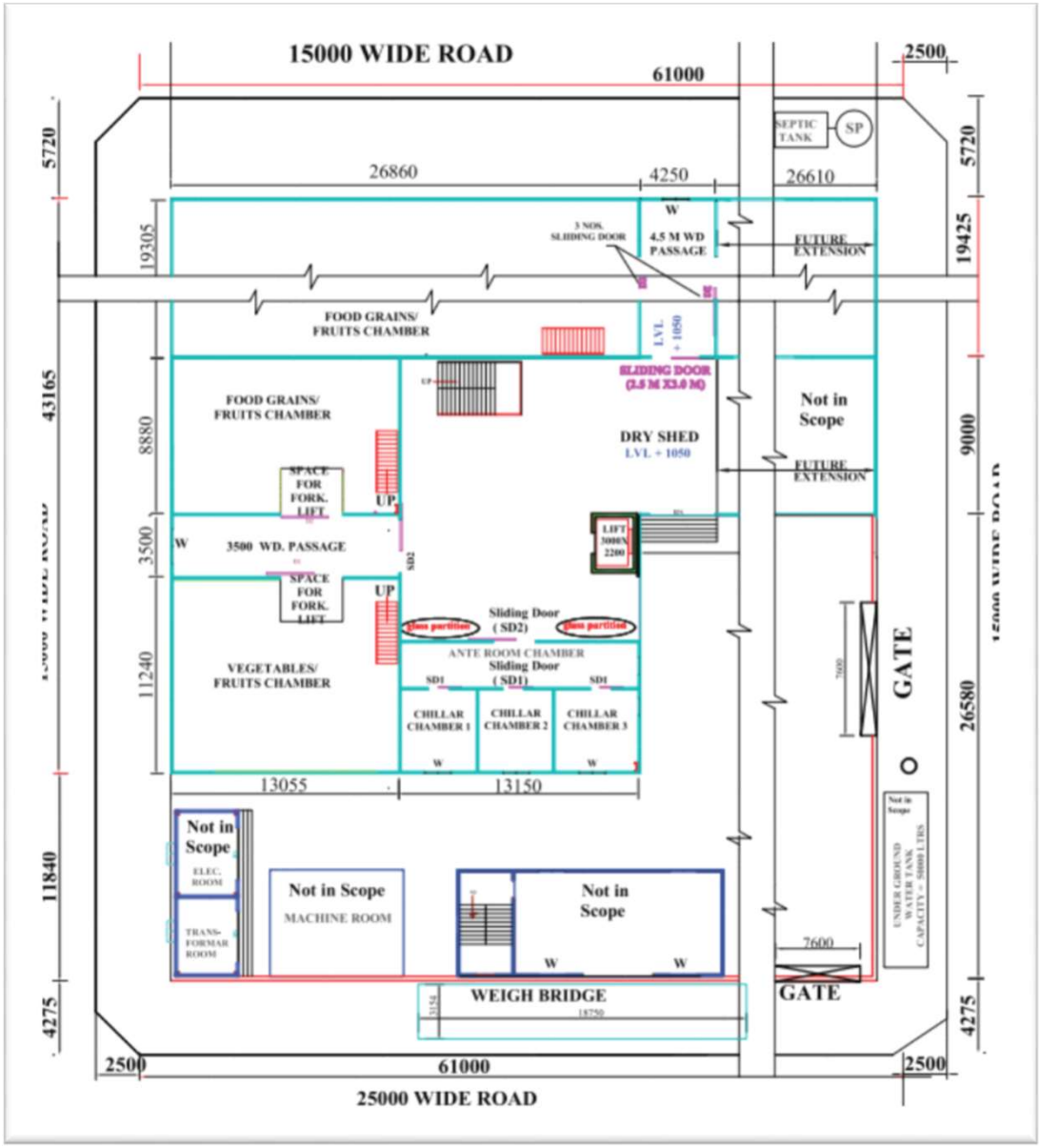
Indian Institute of Technology, Kanpur

(14th February, 2019)

INTRODUCTION

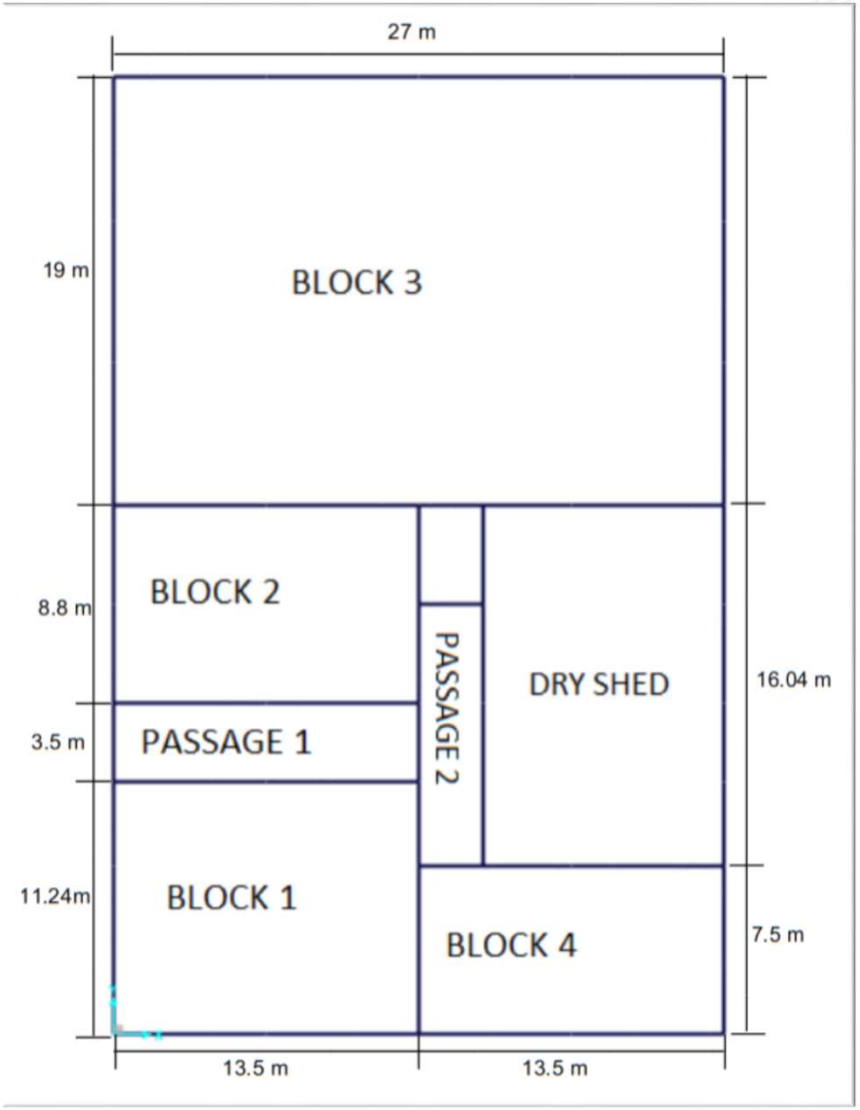
- Design of Multi-storey Food Grain Godown.
- Major Component : Storage Racks
- Scope of Design Project Report :
  - Development of an Economical and Aesthetic Structural Scheme
  - Structural Design Engineering and Detail Drawings for Structural Scheme
  - Bill of Material
- Facilities :
  - Site Location : Jalpaiguri, West Bengal
  - Area of Storage Godown : 57.6m * 19m / 26.7m * 24m (L-shaped)
  - Minimum Clearance : FFL to bottom Chord of the truss : 9.5m
  - Maximum Height of the Building : 13m
  - No. of Storage Levels : 4

PROBLEM STATEMENT

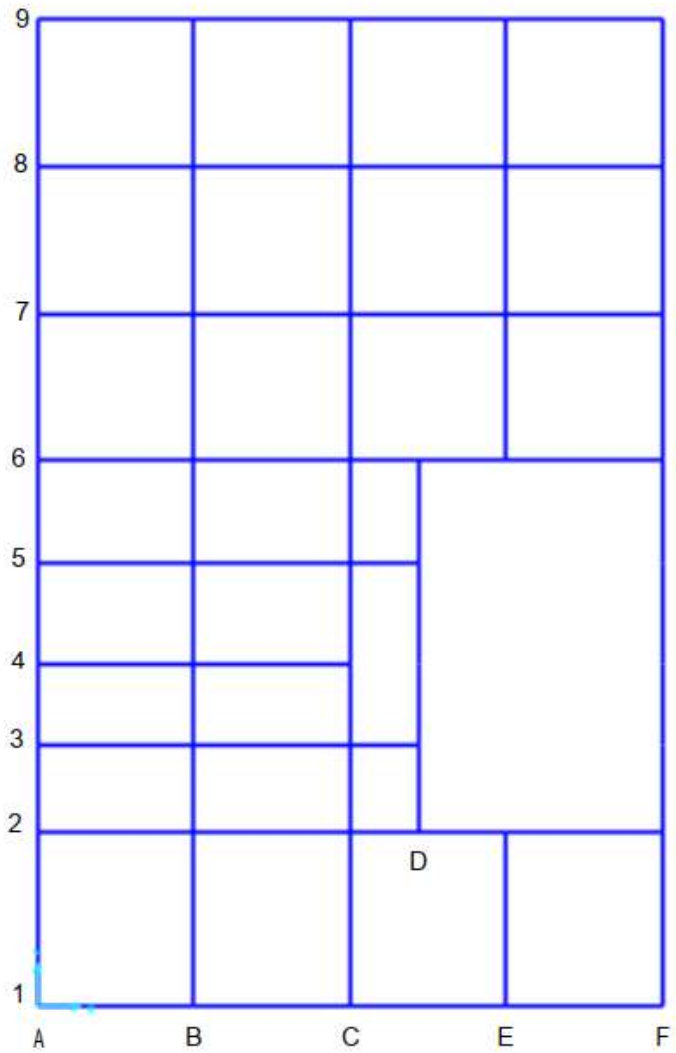


PROPOSED PLAN

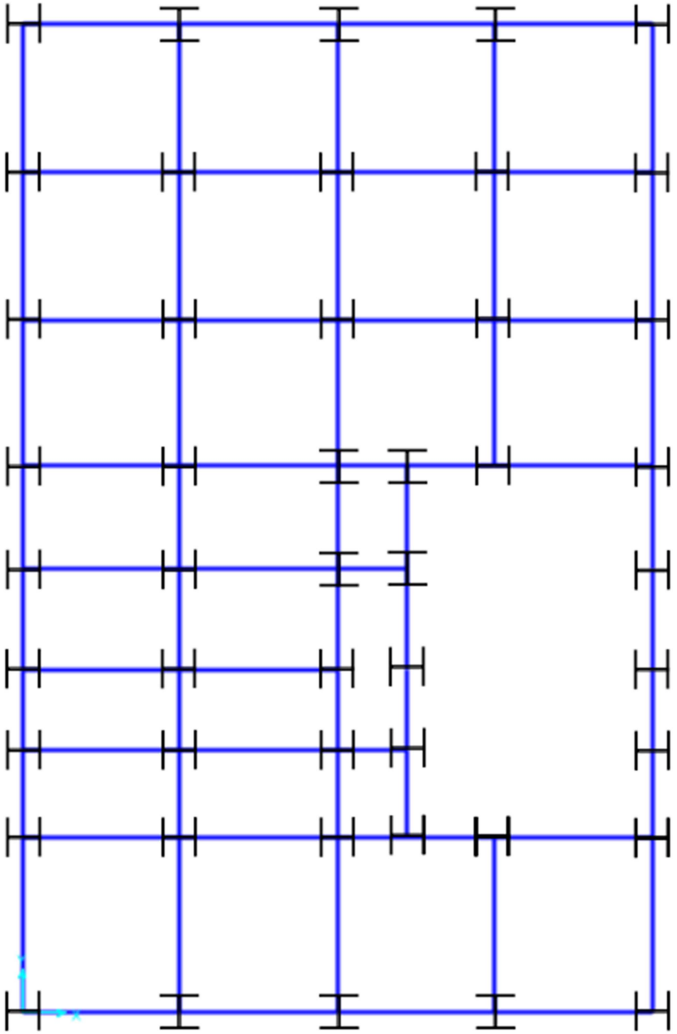
- Dimension of :
  - Block 1 : 11.24m × 13.5m
  - Block 2 : 8.8m × 13.5m
  - Block 3 : 19m × 27m
  - Block 4 : 7.5 m × 13.5m
  - Passage 1 : 3.5m × 13.5m
  - Passage 2 : 11.64m × 3m
  - Lift Area : 4.4m × 3m
  - Dry Shed : 16.04 × 13.5m



PROPOSED STRUCTURAL PLAN

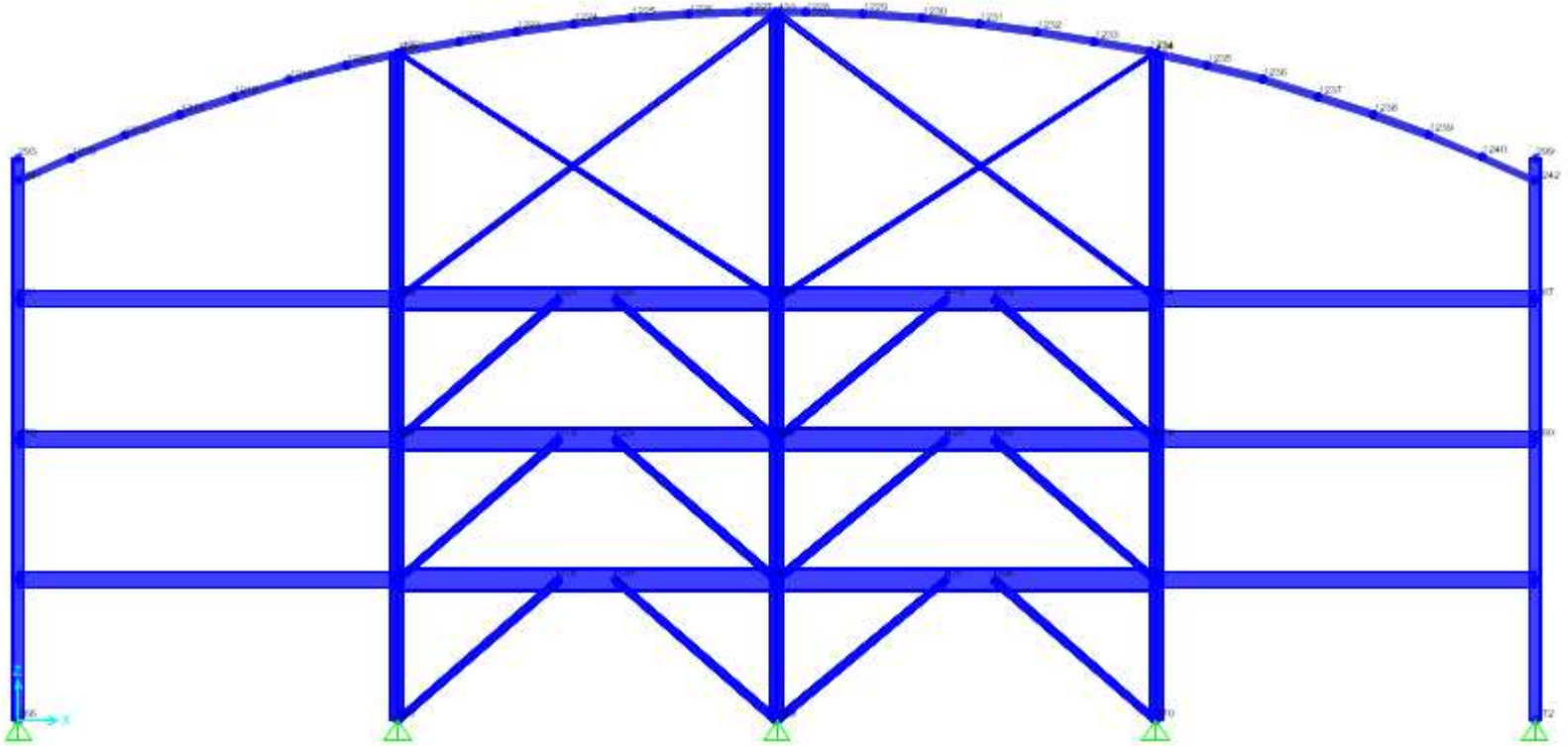


Primary Beam Orientation



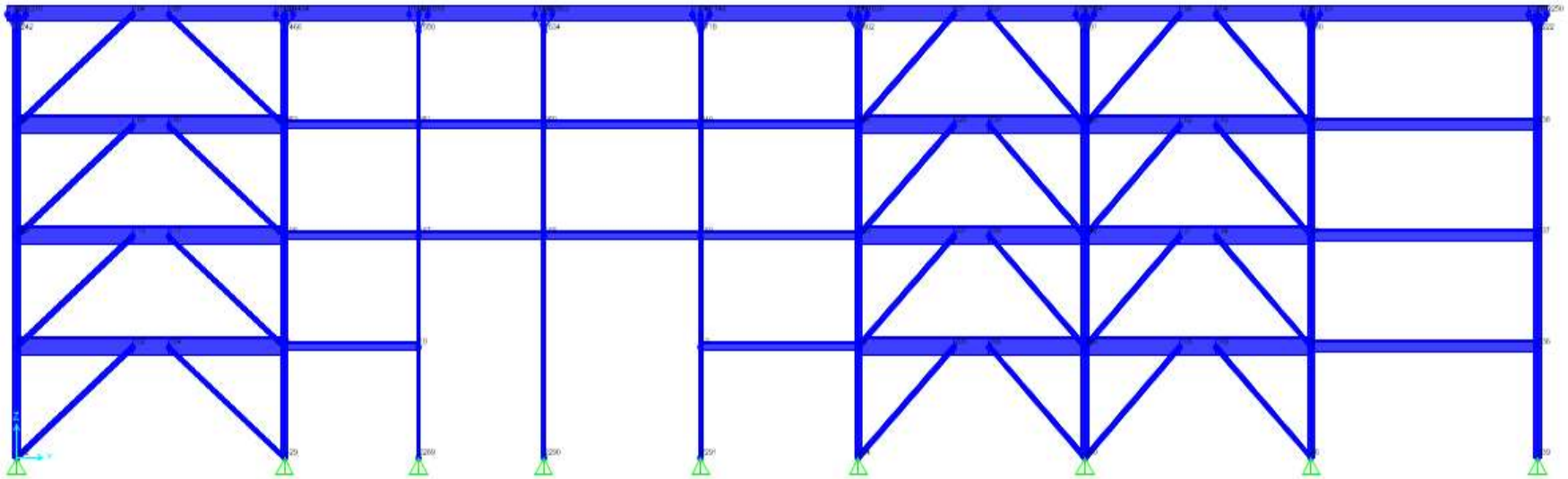
Column Orientation

PROPOSED STRUCTURAL PLAN



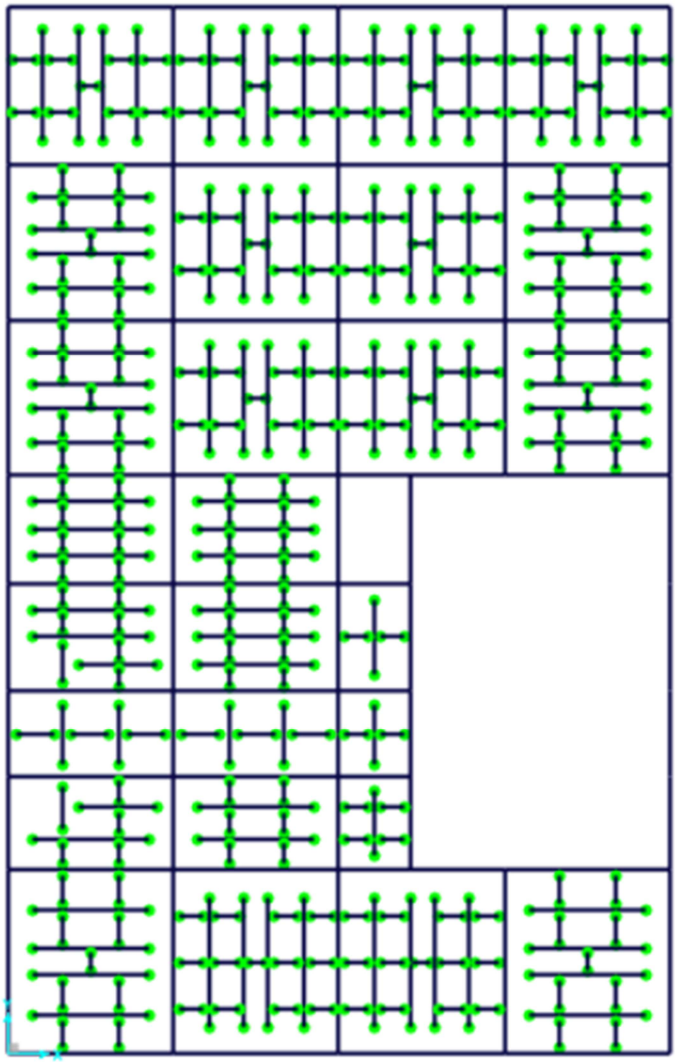
Configuration along X- direction

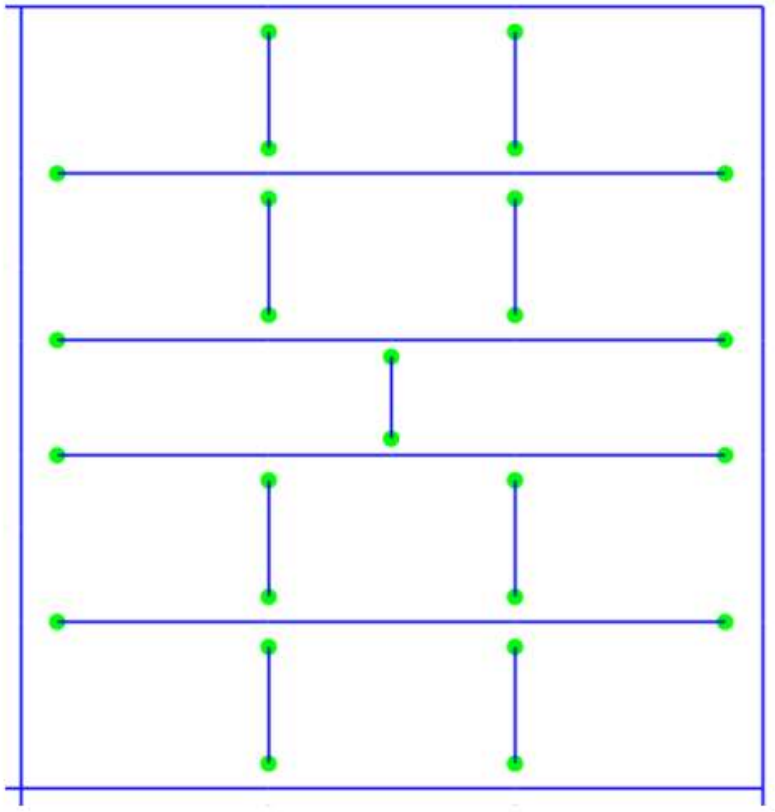
PROPOSED STRUCTURAL PLAN



Configuration along Y- direction

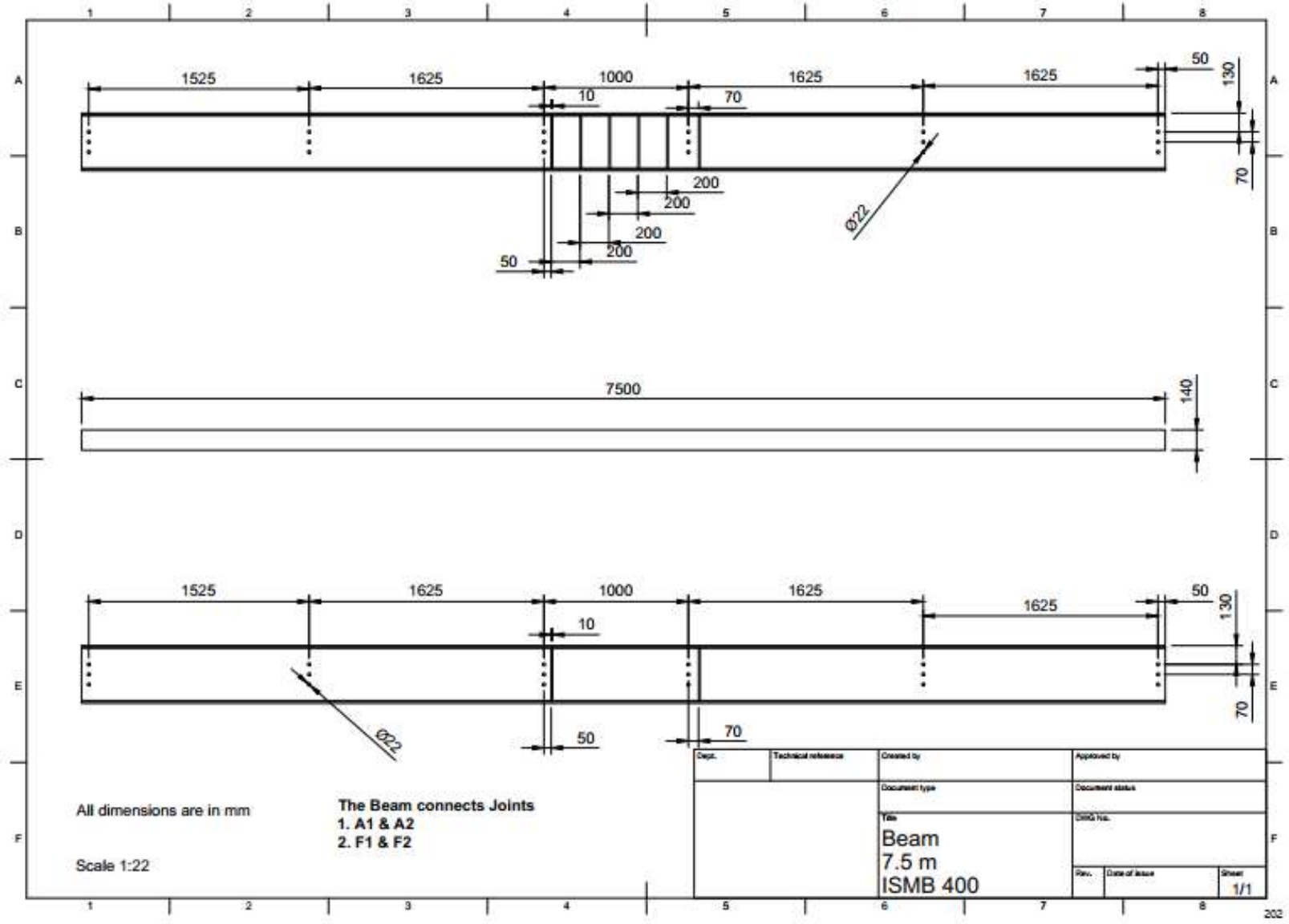
PROPOSED STRUCTURAL PLAN





Secondary Beam Orientation

SAMPLE DRAWINGS



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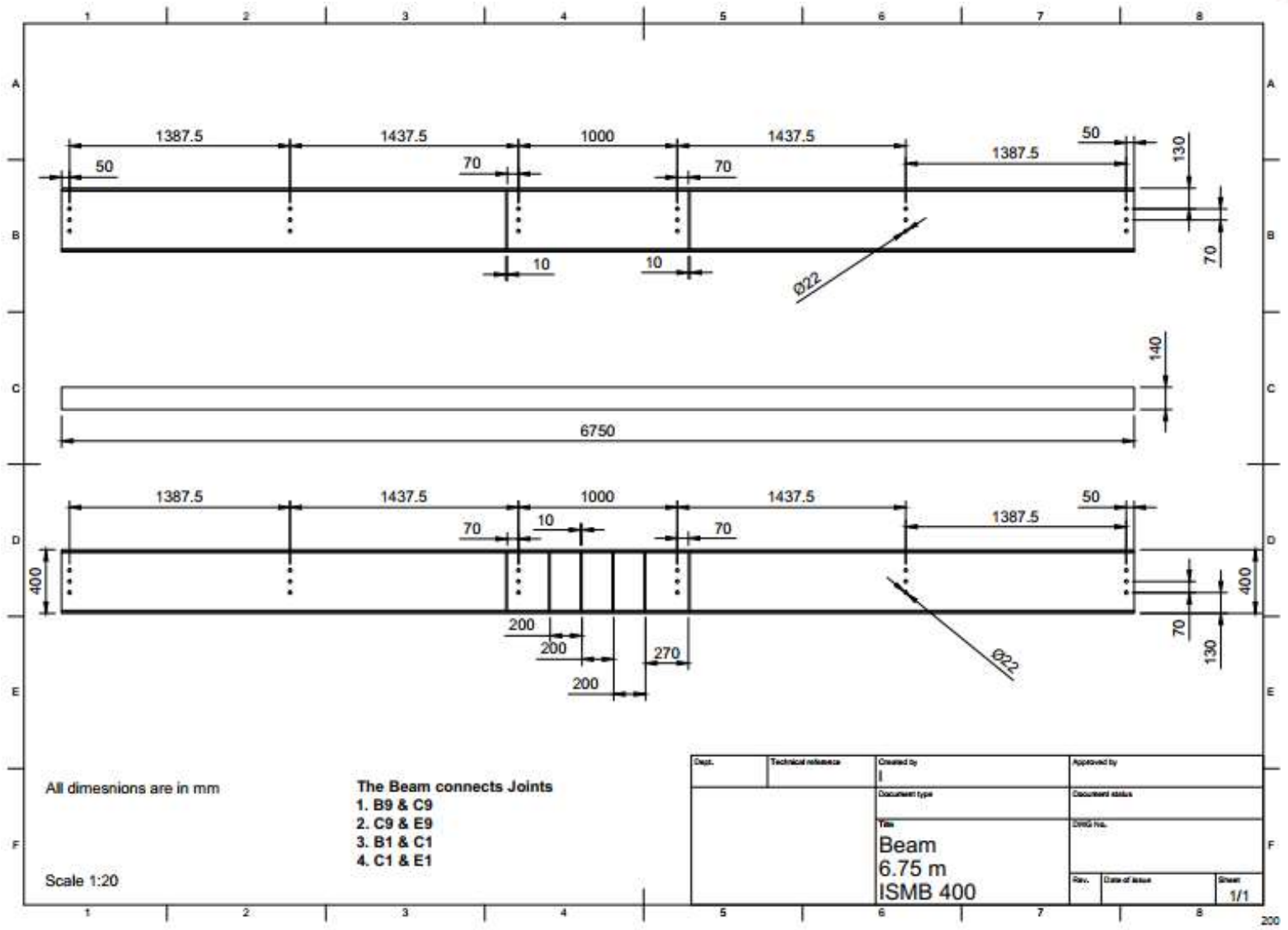

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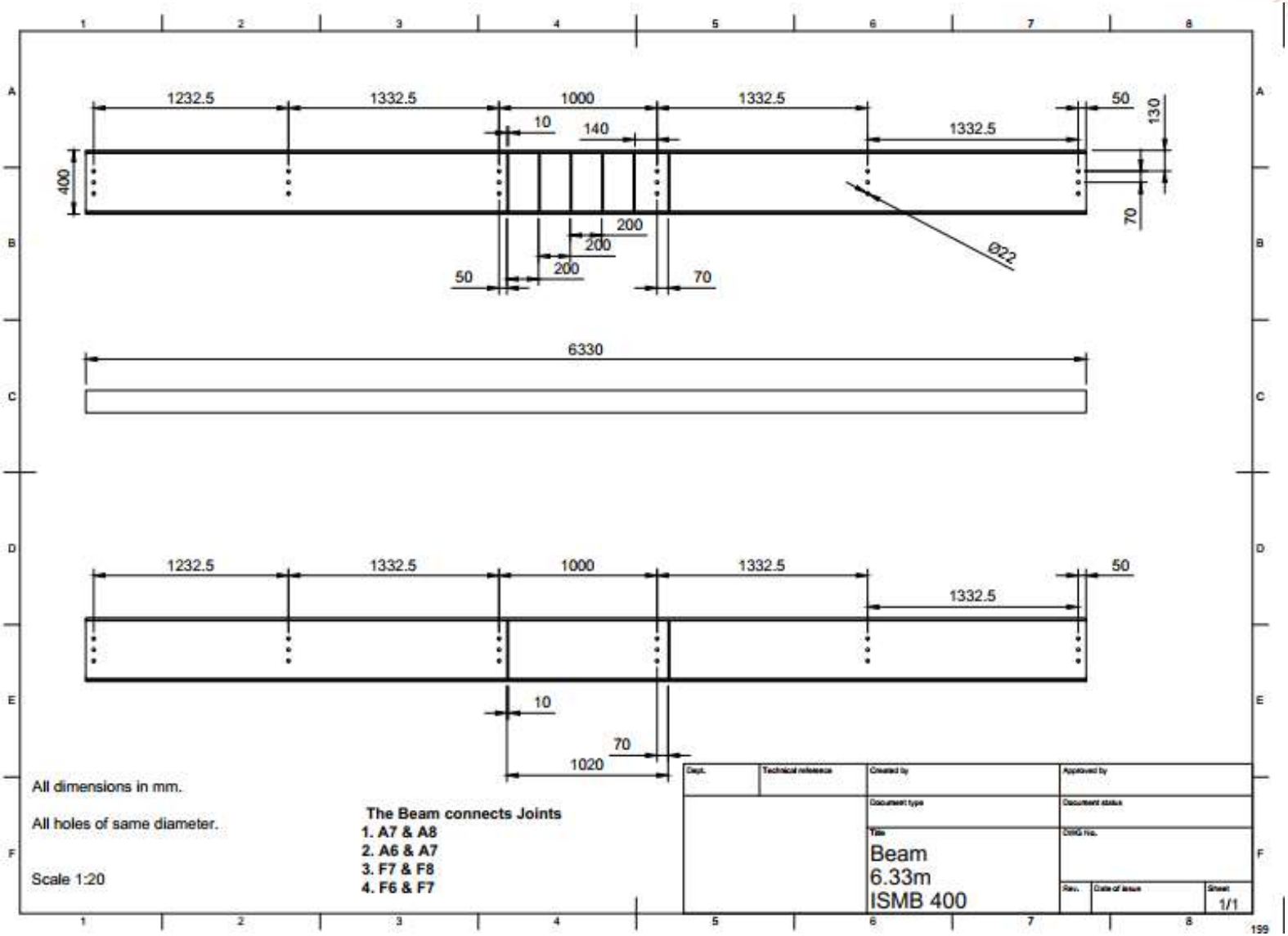

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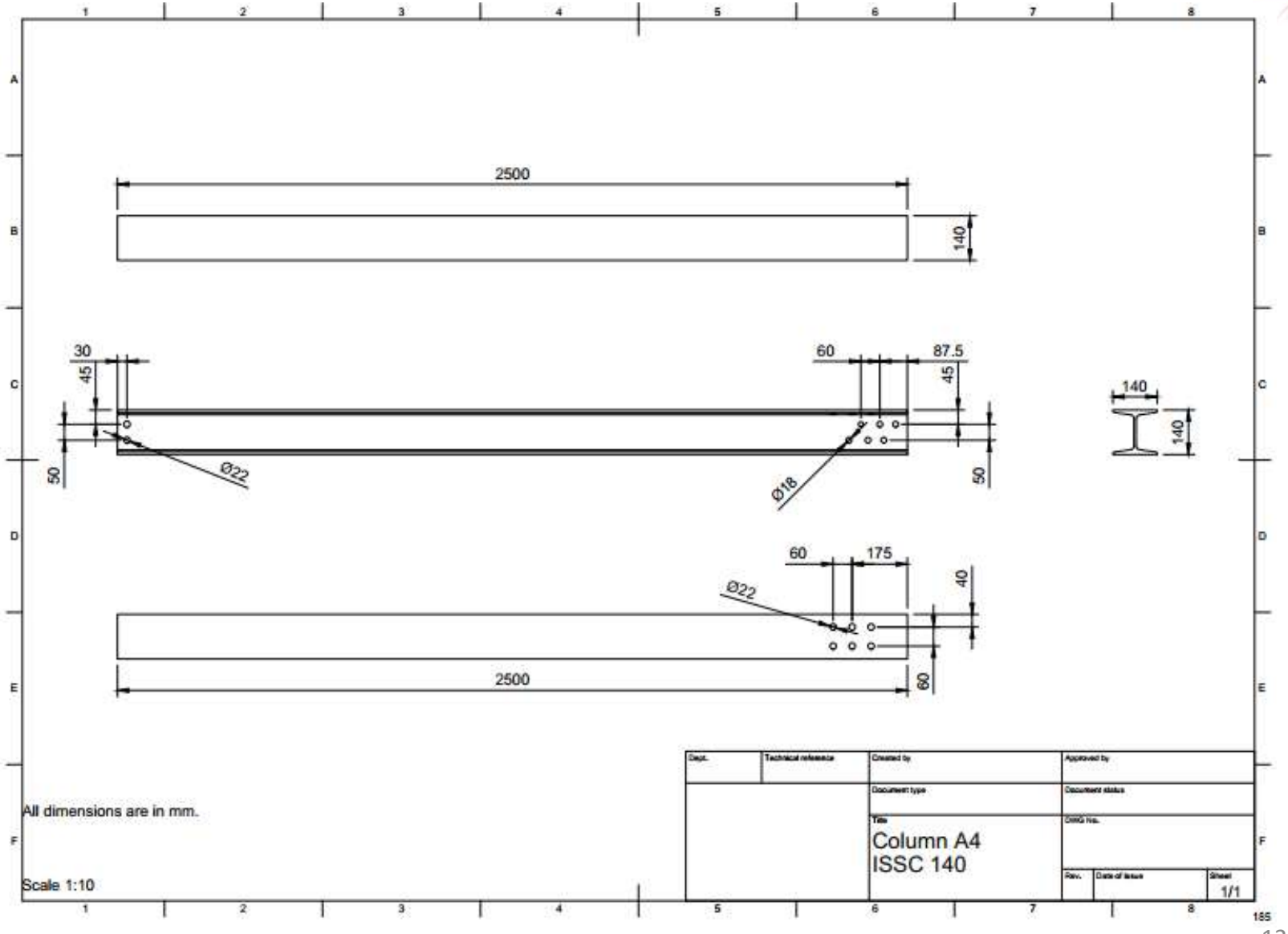

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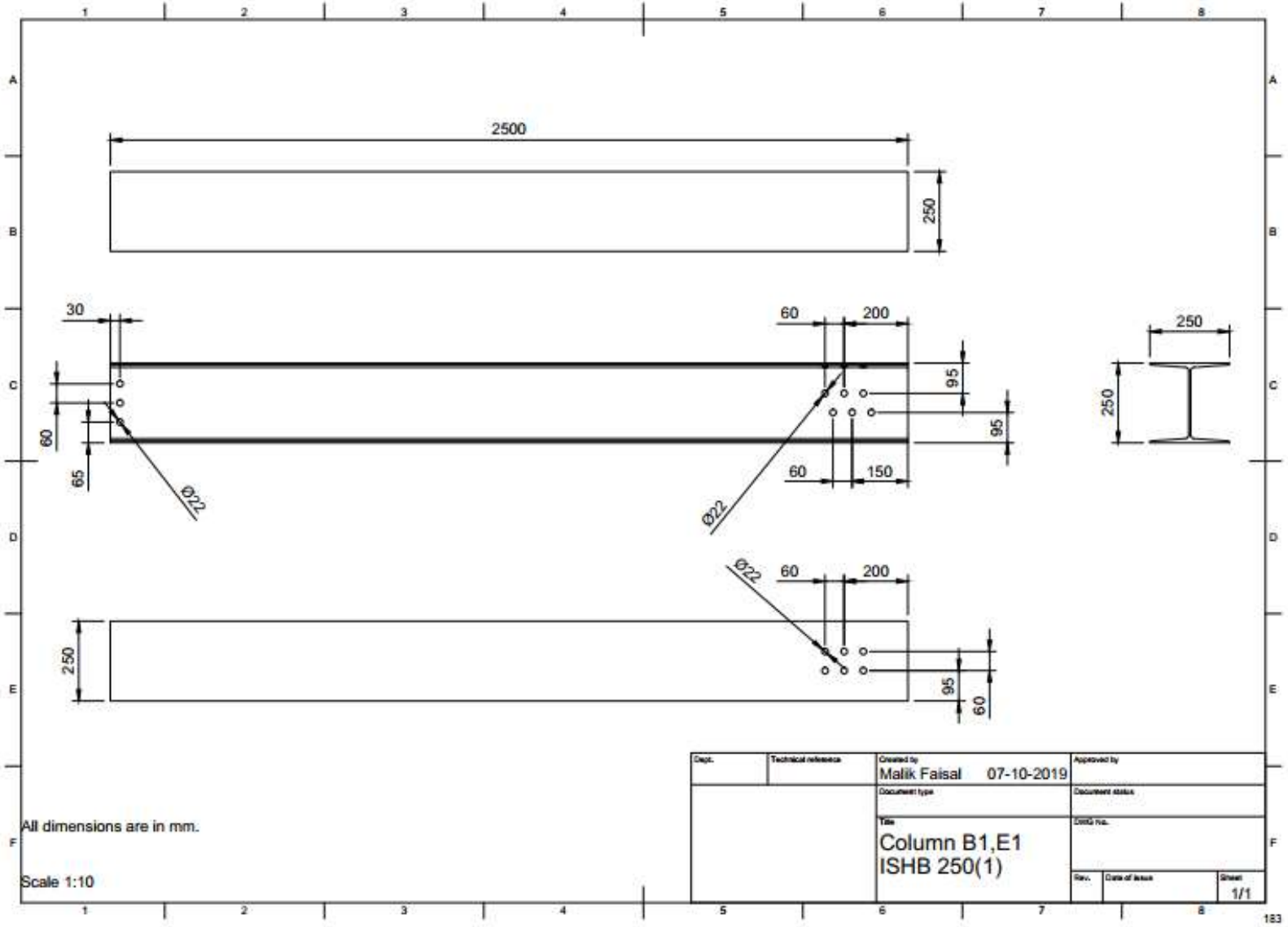

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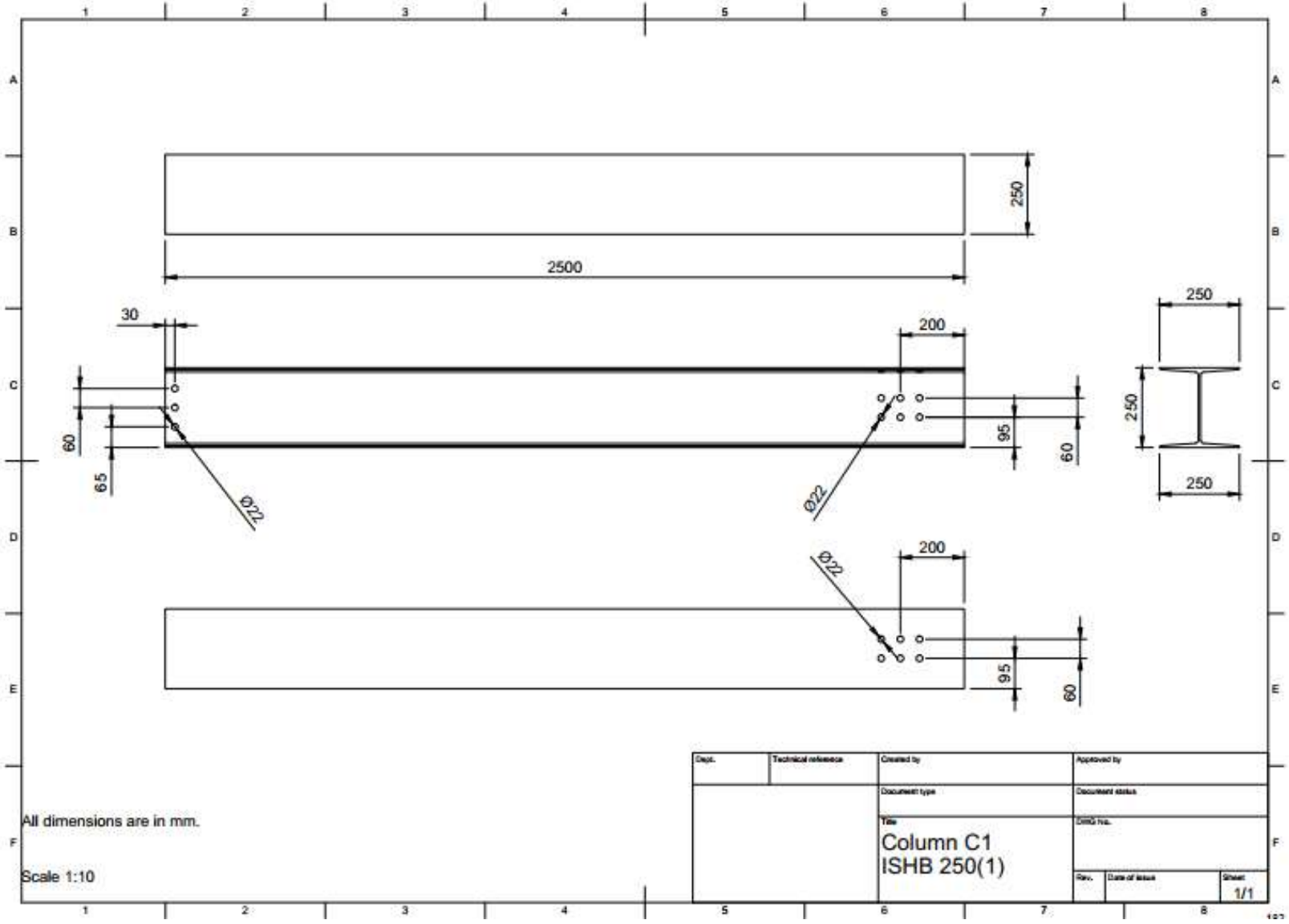

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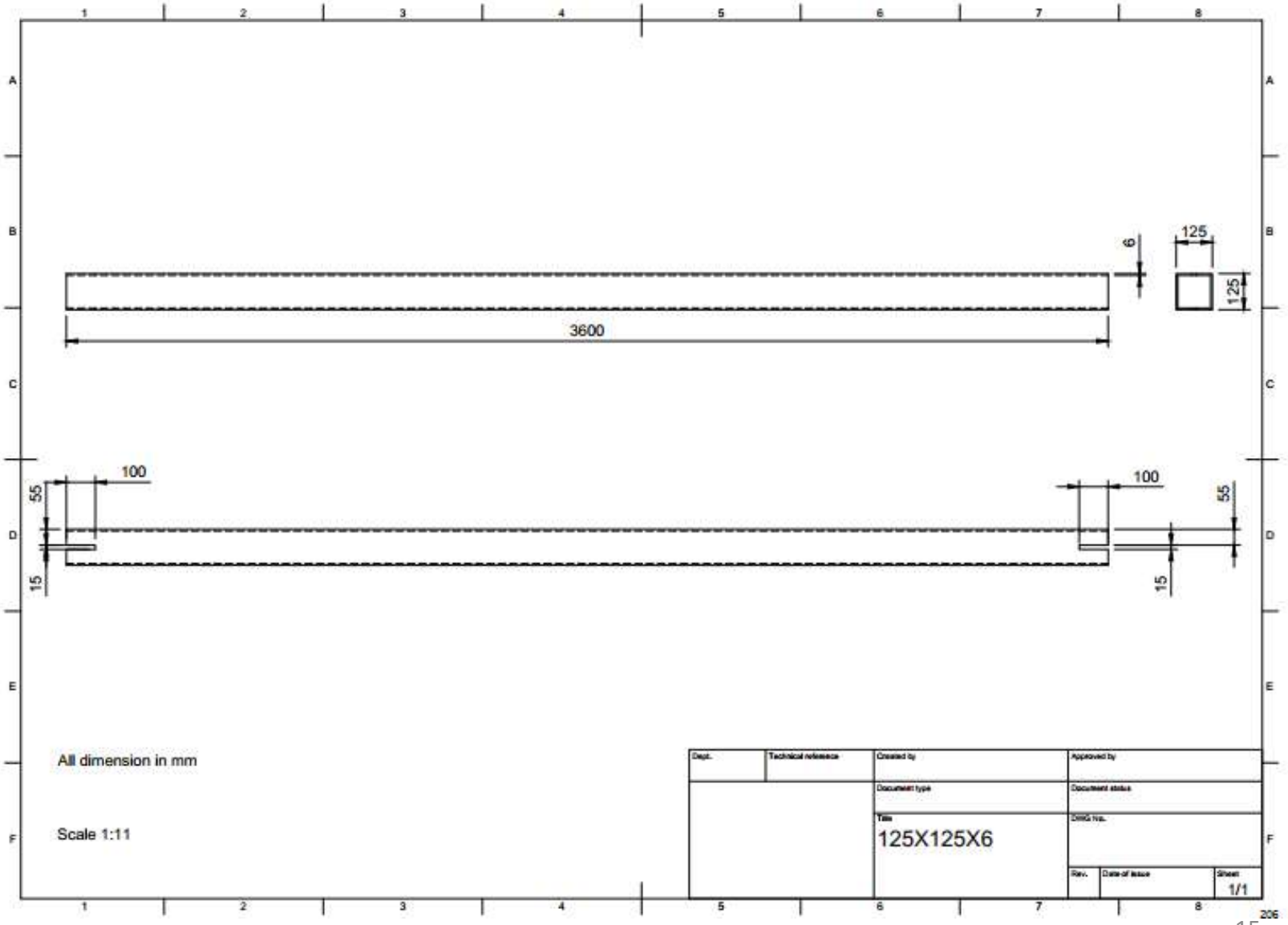

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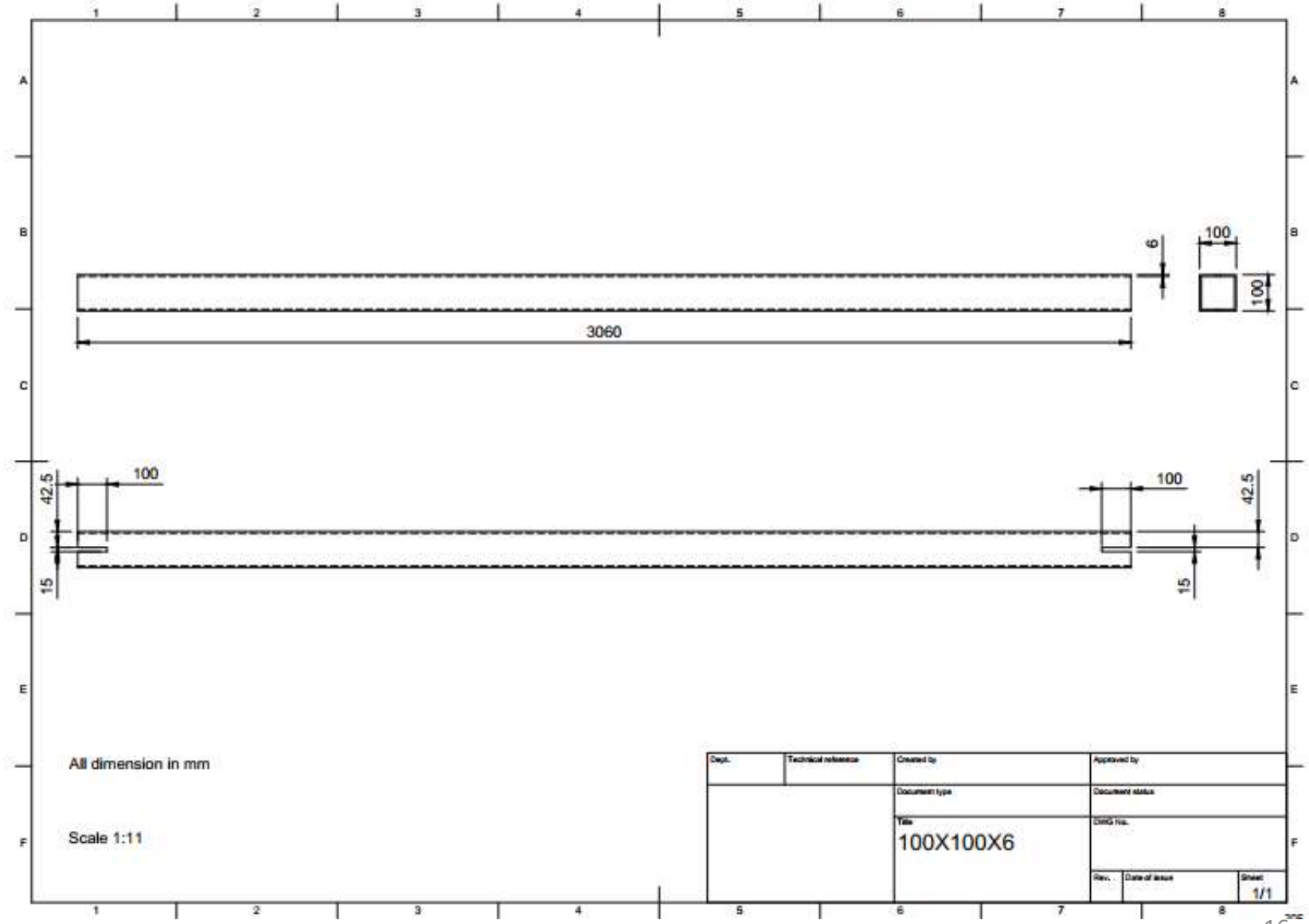

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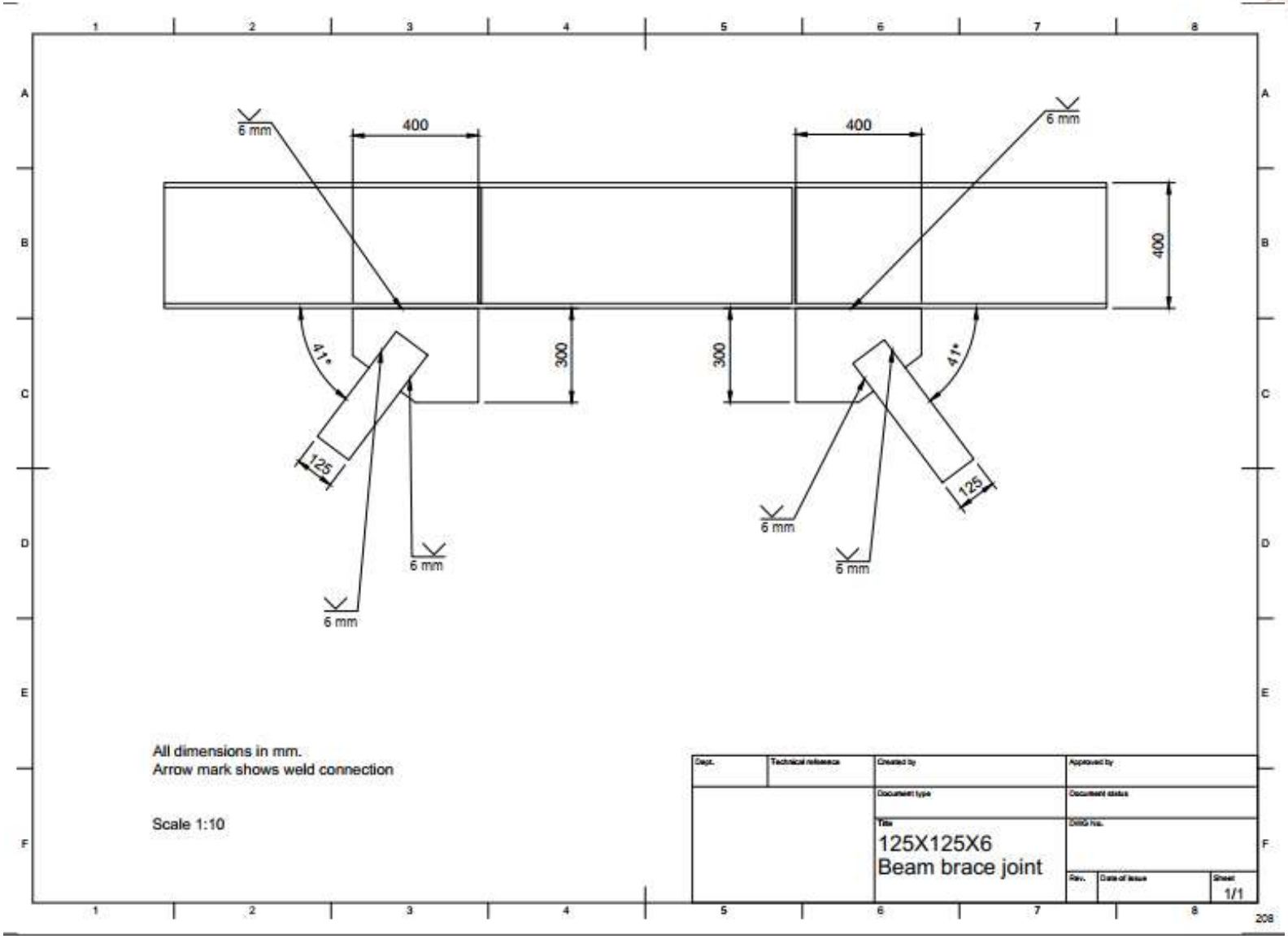

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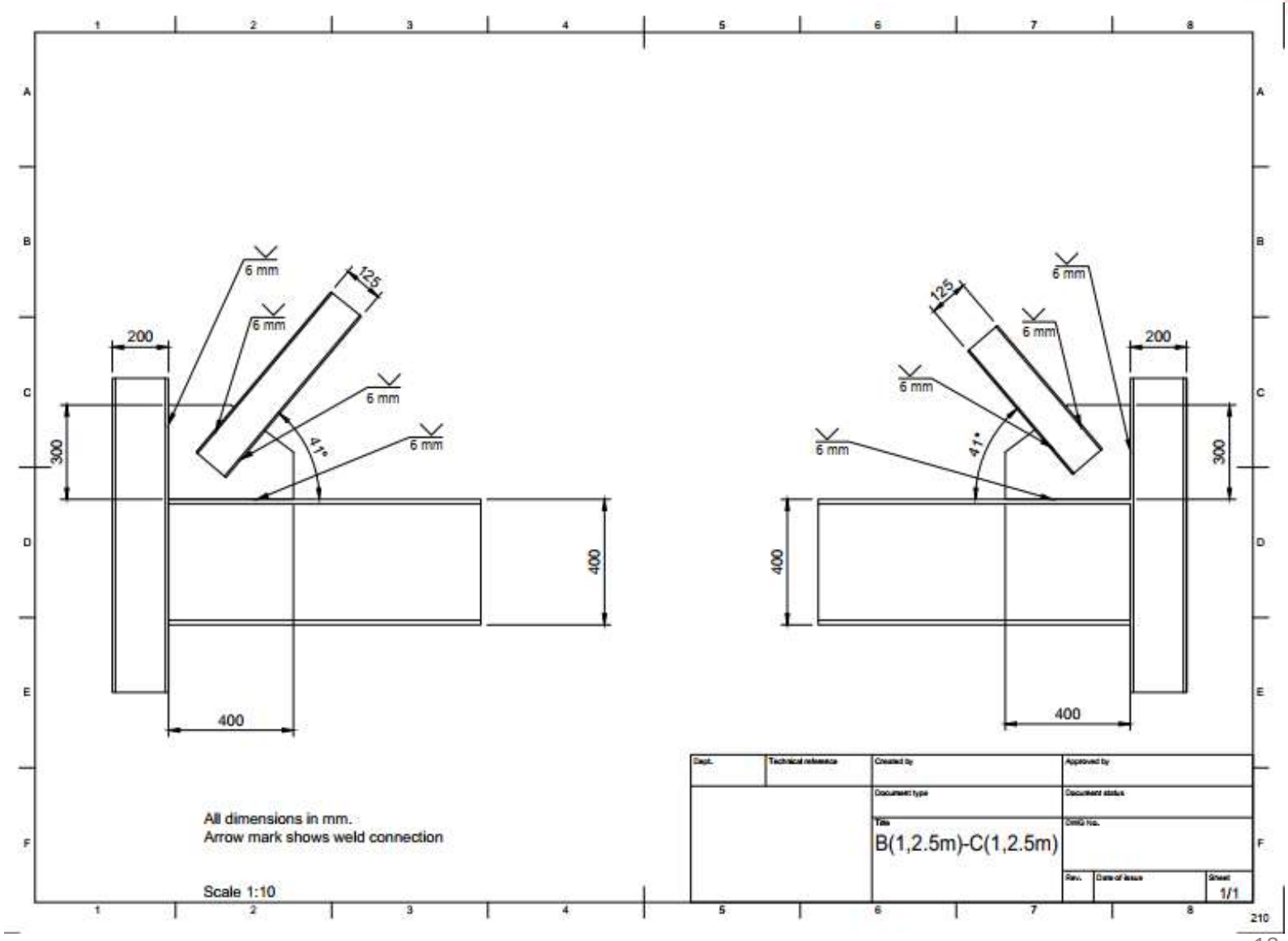

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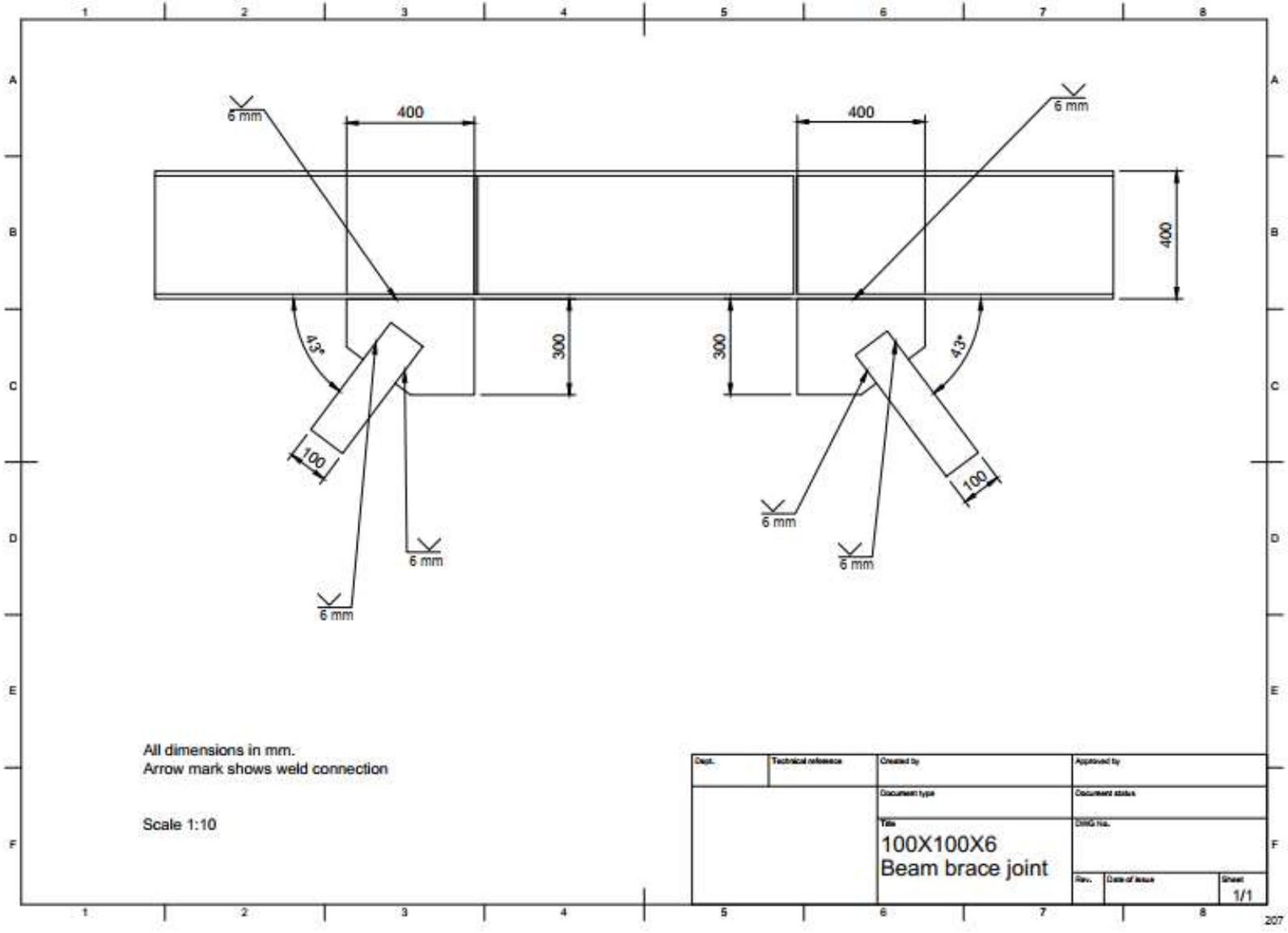

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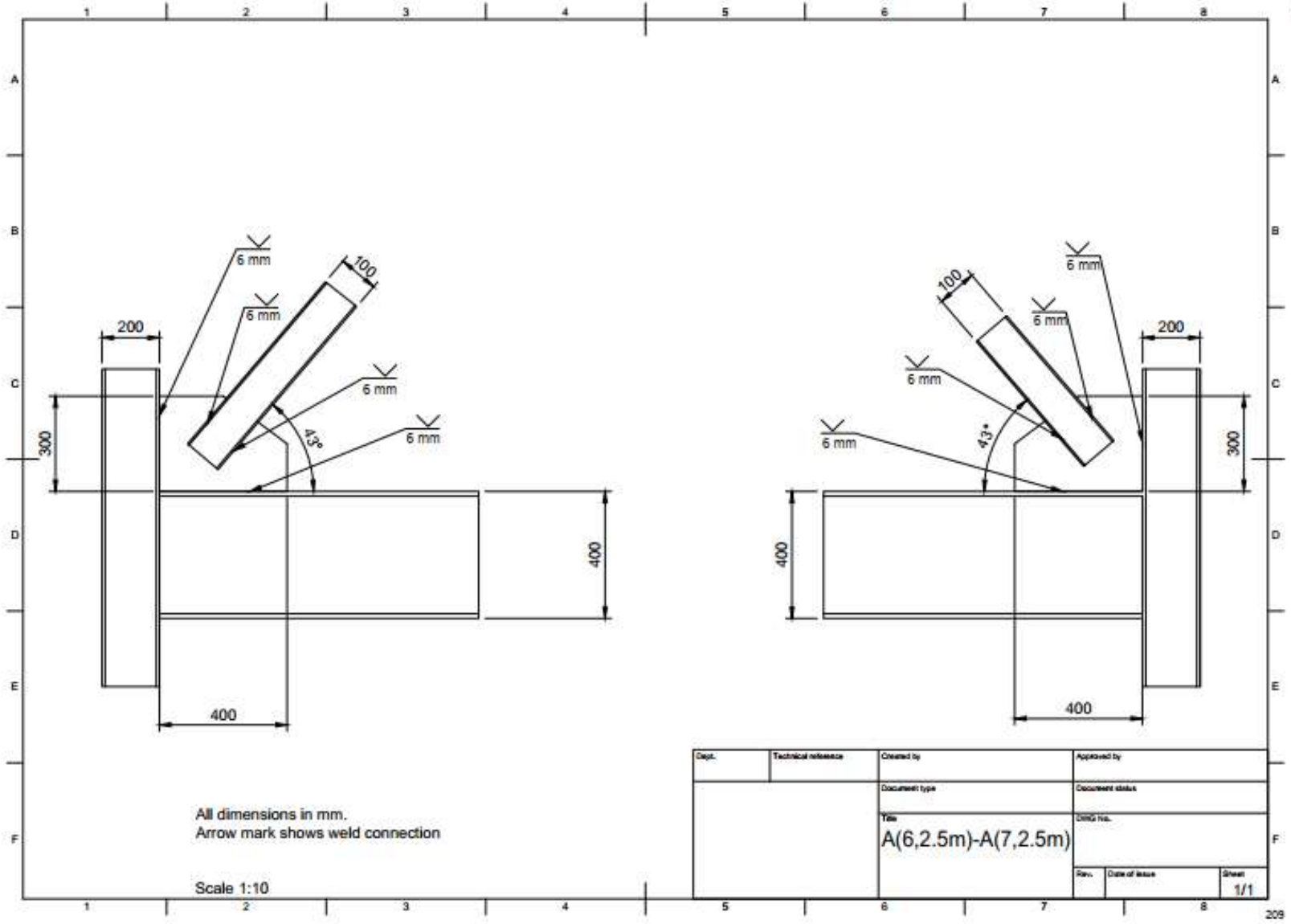

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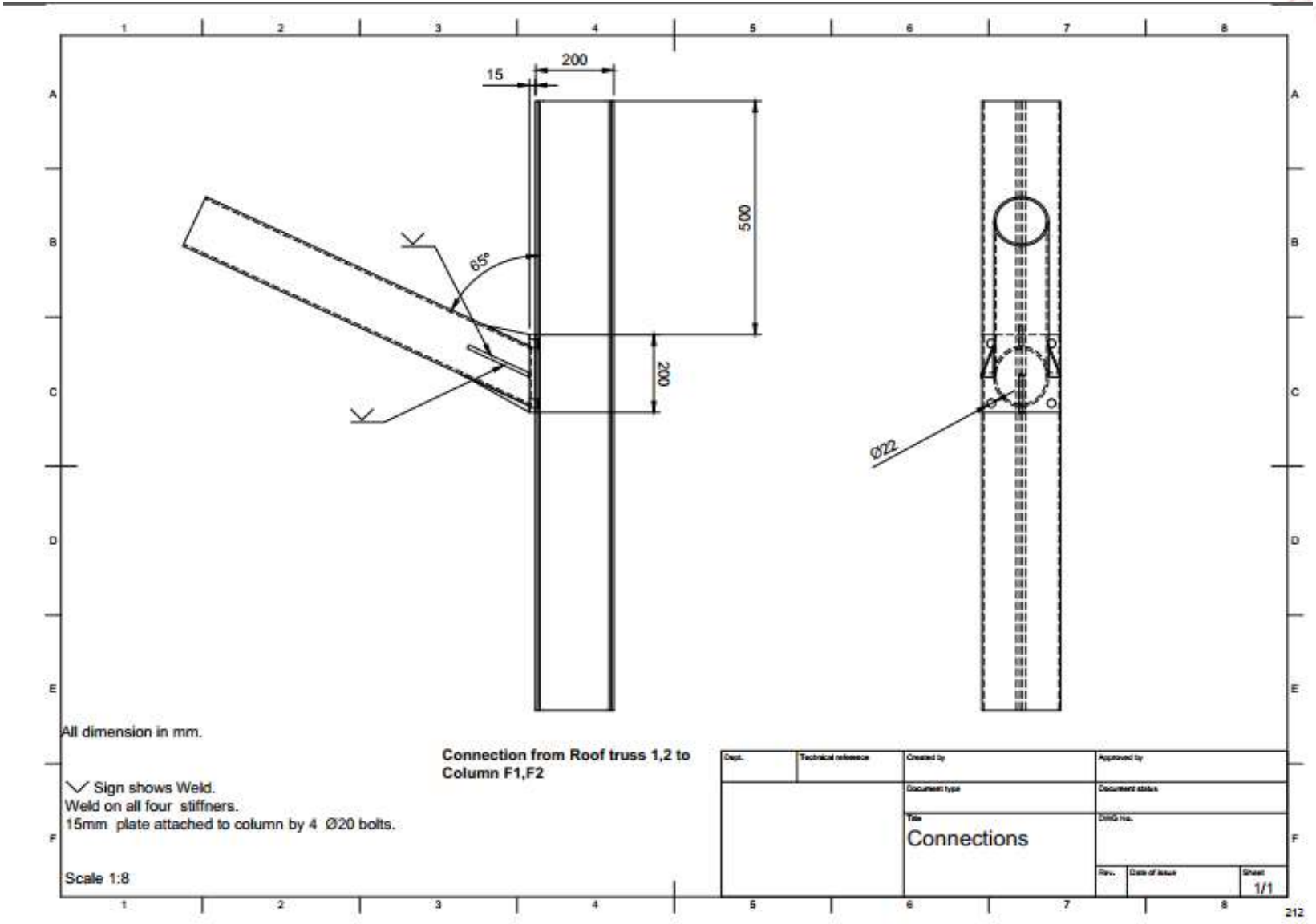

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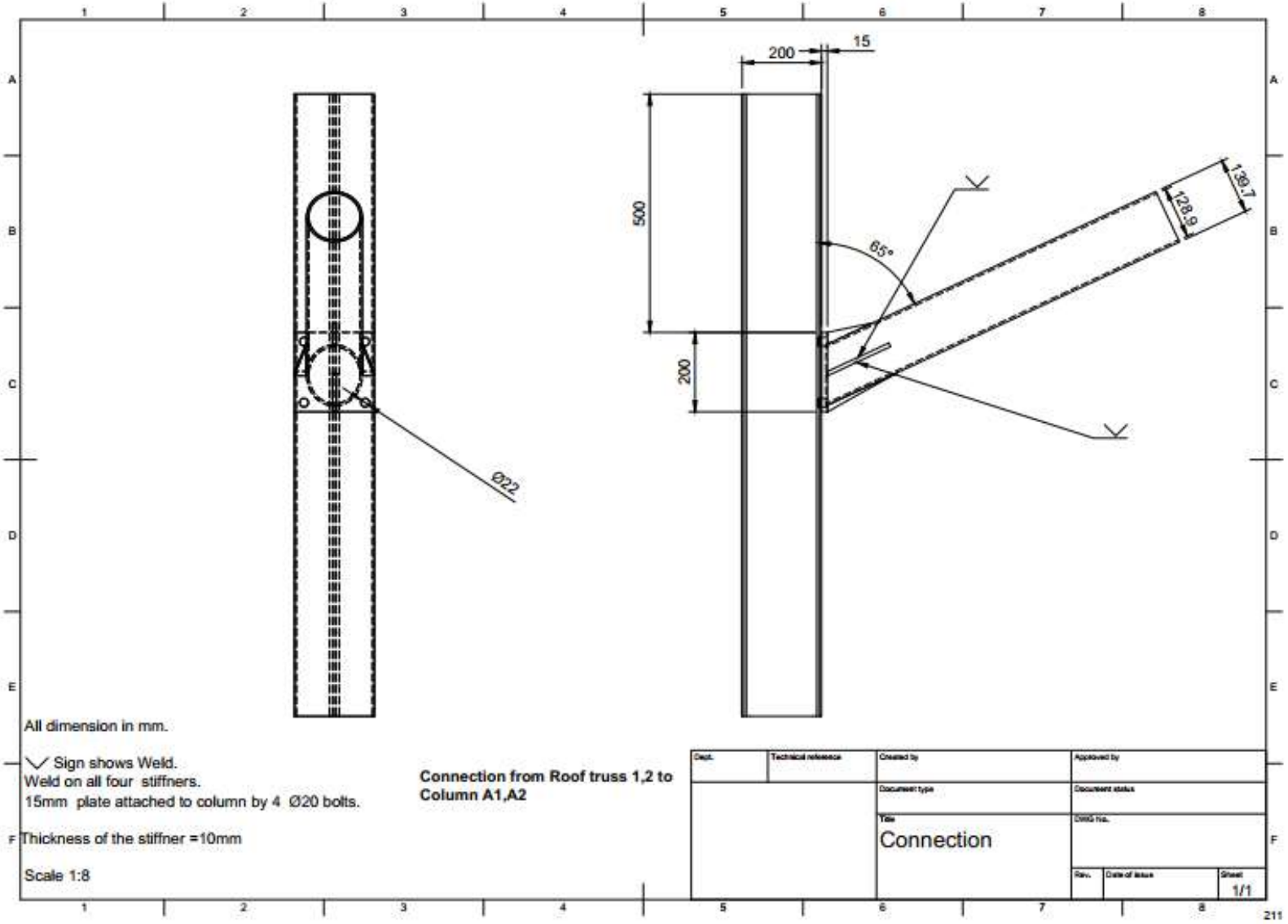


BILL OF MATERIALS

BILL OF MATERIAL

Sl. No.	Member	Section	Quantity	Length(m)	Mass(kg/m)	Total Mass(kg)	
1	Column	ISSC 100	5	10	20	1000	
2	Column	ISSC 140	5	10	33.3	1665	
3	Column	ISSC 150	5	10	37.1	1855	
4	Column	ISSC 180	3	10	50.5	1515	
5	Column	ISSC 200	1	10	60.3	603	
6	Column	ISSC 220	8	10	70.4	5632	
7	Column	ISHB 200(1)	17	10	37.3	6341	
8	Column	ISHB 250(1)	3	12	51	1836	
9	Beam	ISMB 400	14	6.75	61.5	5811.75	
10	Beam	ISMB 350	24	6.75	52.4	8488.8	
11	Beam	ISMB 300	5	6.75	44.2	1491.75	
12	Beam	ISMB 250	10	5	37.3	1865	
13	Secondary Beam	ISMB 300	5	6.4	44.2	1414.4	(For 1 bay)
14	Brace	100*100*6	64	3	18	3456	
15	Brace	125*125*6	32	3.6	22.18	2555.136	
16	Roof Truss	150H	324	1.03	21.3	7108.236	
17	Roof Truss	125H	243	1.03	17.9	4480.191	
18	Roof Truss	125L	162	1.03	15	2502.9	
19	Reinforcement	dia 16mm	24	2100	1.6	80640	(For 1 footing)
20	Stirrup	dia 8mm	12	160	0.4	768	(For 1 footing)
21	Grate Plates	Customized as per Sutati Enterprises					
22	Puff Panel	Customized as per Jindal Manufacturer Catalogue					
23	Concrete		3.045		2548	7758.66	(quantity in m^3)(For 1 footing)

YEAR – 2018-2019

COMPETITION TOPIC:

STEEL INTENSIVE INNOVATIVE FOOD GRAIN GODOWN

DESIGN OPTION

BY

2ND A Prize Winner – Team E-04

from
Kalinga Institute of Industrial Technology, KIIT Univetsity,
Bhubeneswar, Odisha

INSDAG

CIVIL AWARD COMPETITION 2018-19

STEEL INTENSIVE INNOVATIVE FOOD GRAIN GODOWN

Presented by

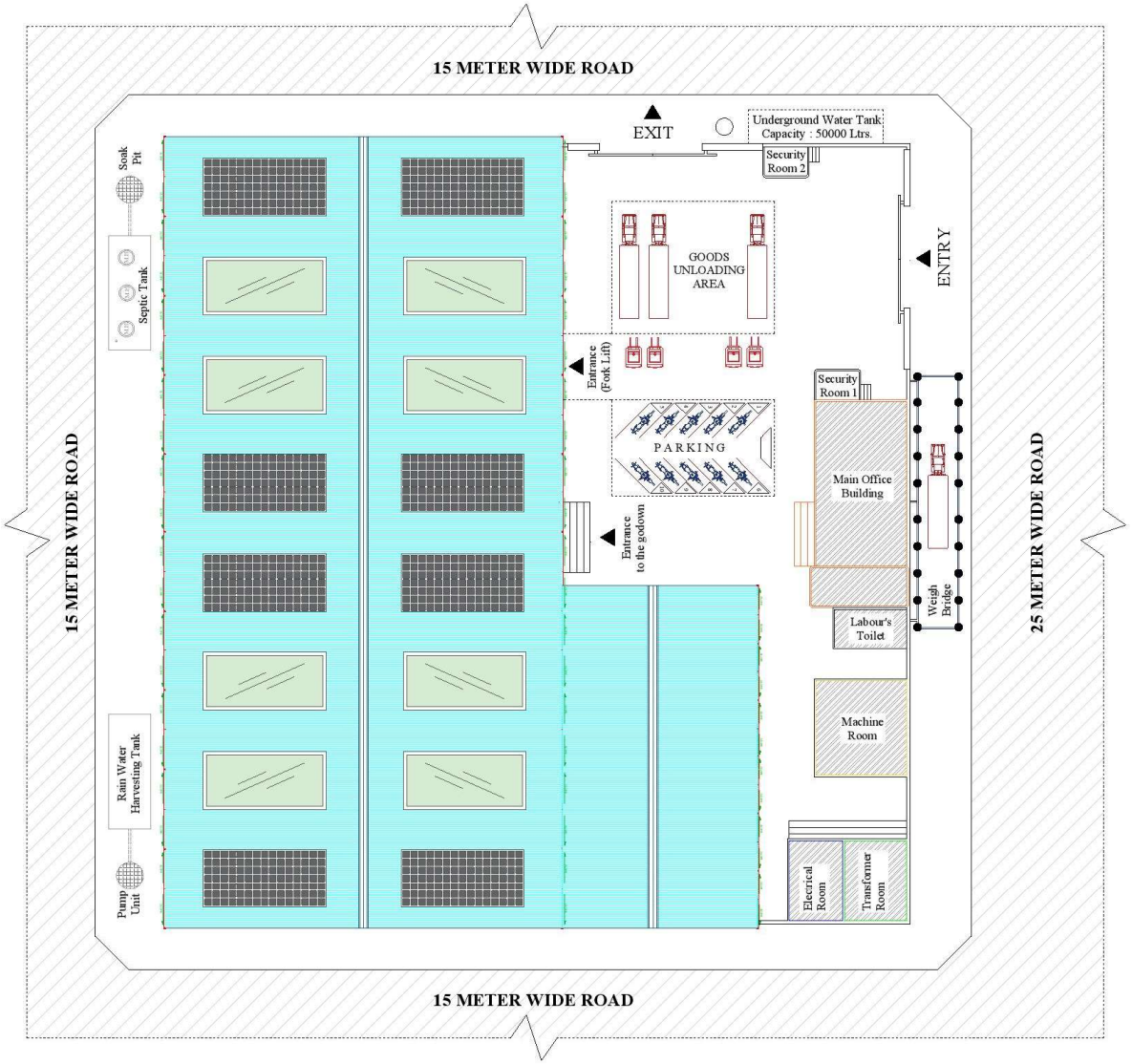
Group : E-04

Debarshi Sahoo (M.Tech 1st Year, S.E)
Salman Ashraf (4th Year B.Tech, C.E)
Nikhil Thawani (4th Year B.Tech, C.E)
Shubham Singh (3rd Year B.Tech, C.E)

Guided By:
Prof (Dr.) Purnachandra Saha
Senior Associate Professor-II
KIIT Deemed to be University

PARAMETER GIVEN

- Site Location : Jalpaiguri, West Bengal
- Basic Wind Speed : 47 m/s
- Seismic Zone : Zone IV
- Area of Storage Down : 57.6 m × 19 m / 26.7 m × 24 m (L Shaped area)
- Minimum clearance (FFL to bottom Chord of Struss) : 10 m
- Roof Structure : To be covered with Colour Coated Steel Sheet
- Maximum height of the building : 13 m
- No. of Storage : 4 levels



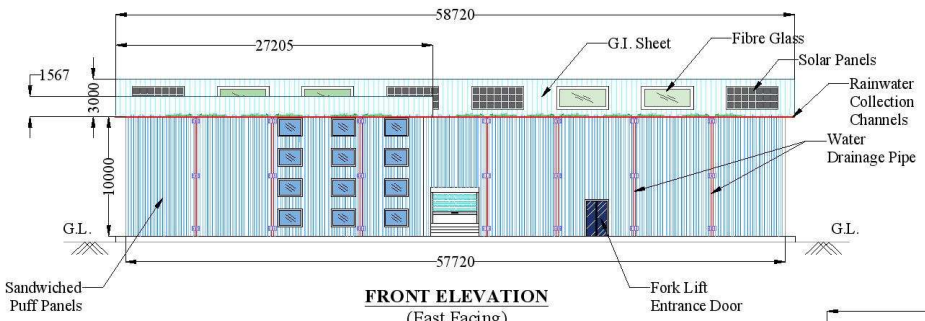
N

NOTE:-

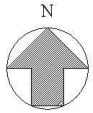
1) All dimensions are in "mm".
2) SCALE 1:300

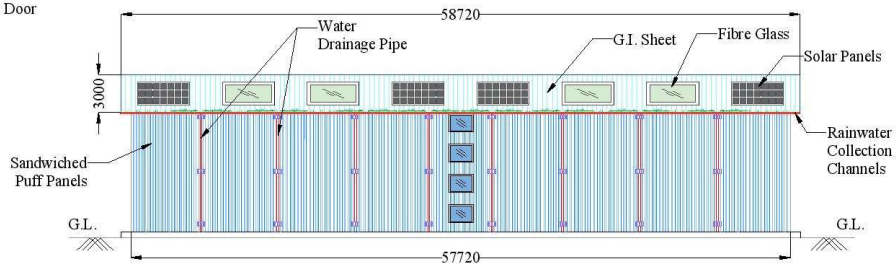
FOOD GRAIN GODOWN - LAYOUT

National Award Competition for Civil/Structural Engineering Students 2018-19	
Submitted by : Group - E04 KIIT Deemed to be University Bhubaneswar	
DRAWN BY : E04	CHECKED BY :
DESIGNED BY : E04	APPROVED BY :
DWG NO.: KIIT/INSDAG/2018-19/FGG/E04/01	

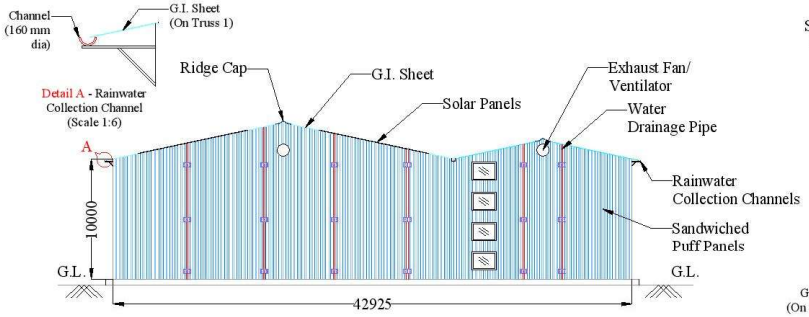


FRONT ELEVATION
(East Facing)

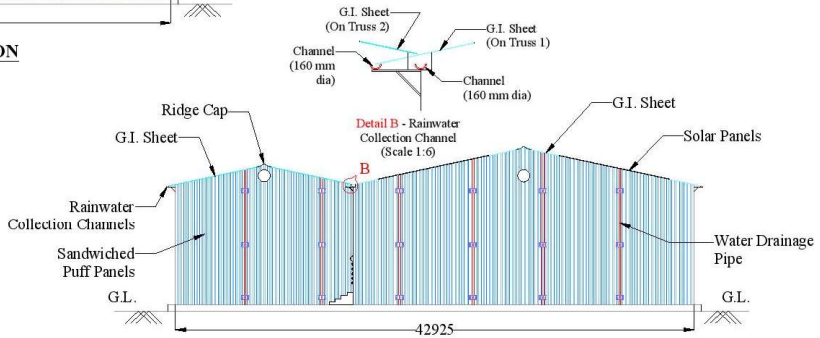




REAR ELEVATION
(West Facing)



LEFT SIDE ELEVATION
(South Facing)



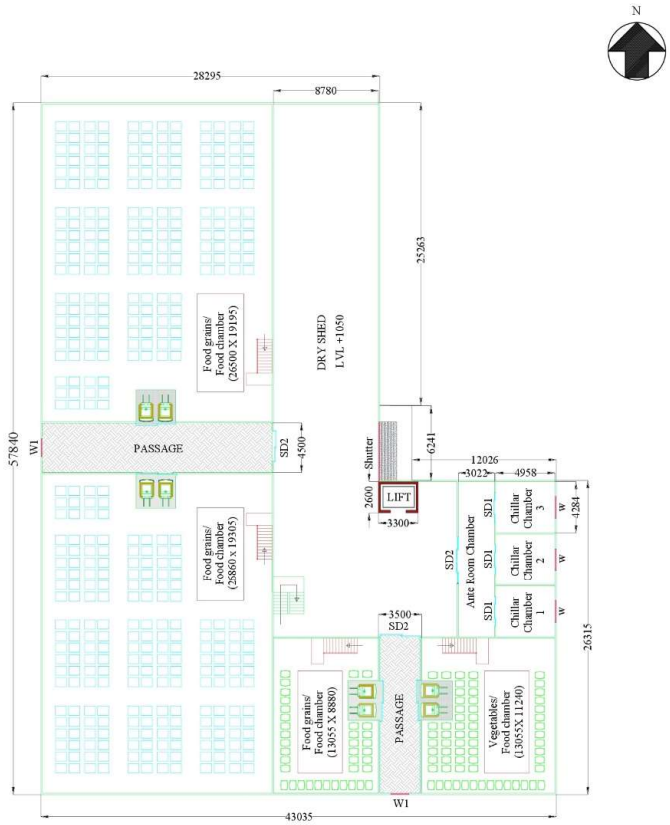
RIGHT SIDE ELEVATION
(North Facing)

NOTE:-

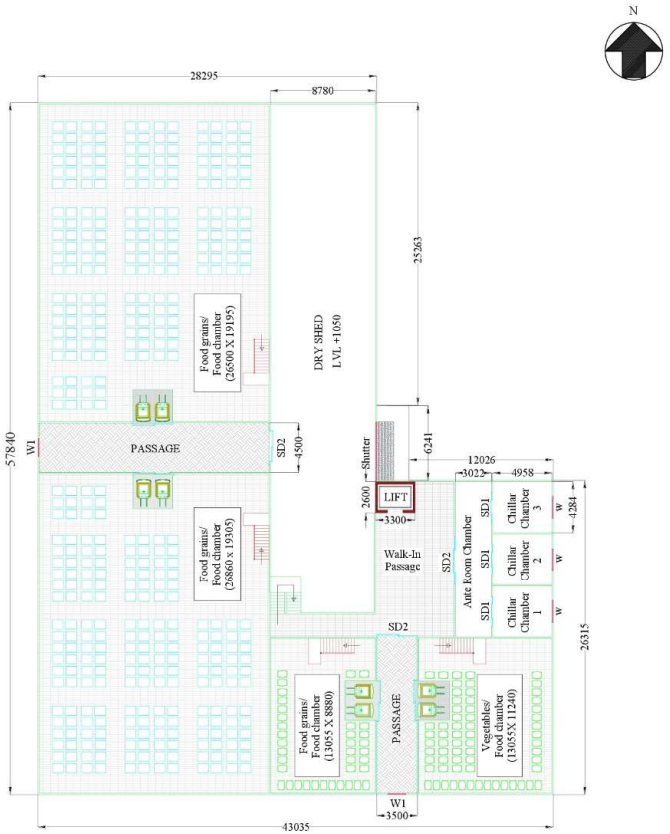
1) All dimensions are in "mm".
2) SCALE 1:350

FOOD GRAIN GODOWN - ELEVATION

National Award Competition for Civil/Structural Engineering Students 2018-19	
Submitted by : Group - E04 KIIT Deemed to be University Bhubaneswar	
DRAWN BY : E04	CHECKED BY :
DESIGNED BY : E04	APPROVED BY :
DWG NO.: KIIT/INSDAG/2018-19/FGG/E04/02	



GROUND FLOOR PLAN



1ST, 2ND, 3RD FLOOR PLAN

NOTE: -

1) All dimensions are in "mm".
2) SCALE 1:250

DOOR WINDOW SCHEDULE :-

SYMBOL	DIMENSION (mm)	REMARK
W	1830 X 1830	Window
W1	1525 X 1830	Window
S	4500 X 3000	Rolling Shutter
SD1	2000 X 2500	Sliding Door
SD2	2500 X 3000	Sliding Door

TYPICAL GROUND FLOOR PLAN

National Award Competition for Civil/Structural Engineering Students 2018-19

Submitted by : Group - E04
KIIT Deemed to be University
Bhubaneswar

DRAWN BY : E04 | CHECKED BY :

DESIGNED BY : E04 | APPROVED BY :

DWG NO.: KIIT/INSDAG/2018-19/FGG/E04/03

NOTE: -

1) All dimensions are in "mm".
2) SCALE 1:250

DOOR WINDOW SCHEDULE :-

SYMBOL	DIMENSION (mm)	REMARK
W	1830 X 1830	Window
W1	1525 X 1830	Window
S	4500 X 3000	Rolling Shutter
SD1	2000 X 2500	Sliding Door
SD2	2500 X 3000	Sliding Door

TYPICAL 1ST, 2ND 3RD FLOOR PLAN

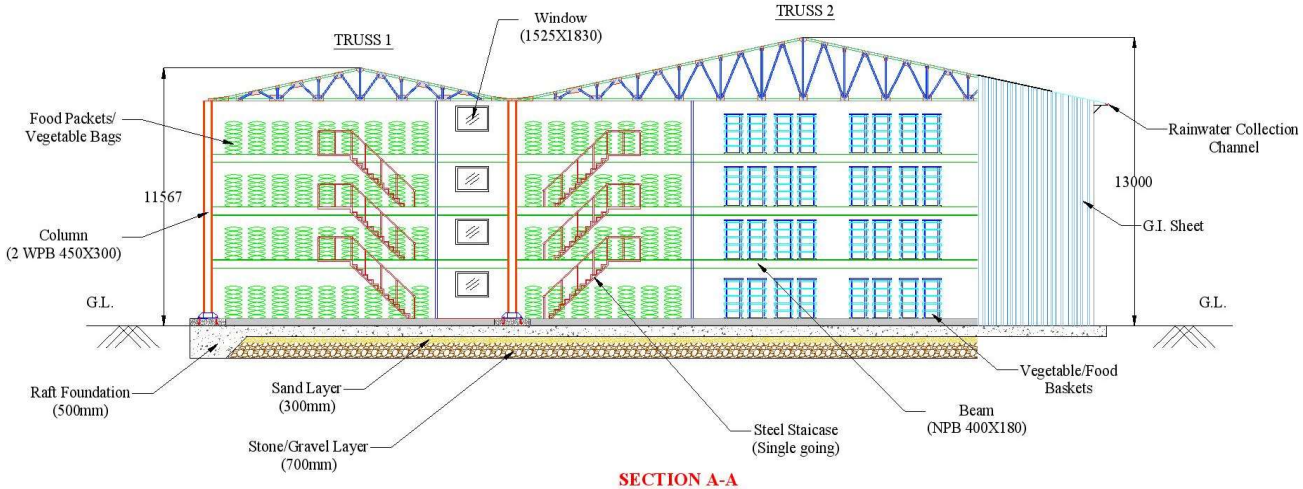
National Award Competition for Civil/Structural Engineering Students 2018-19

Submitted by : Group - E04
KIIT Deemed to be University
Bhubaneswar

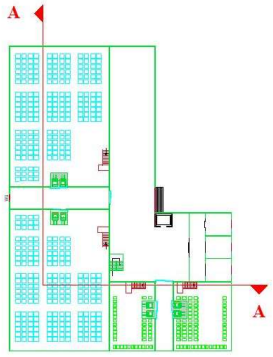
DRAWN BY : E04 | CHECKED BY :

DESIGNED BY : E04 | APPROVED BY :

DWG NO.: KIIT/INSDAG/2018-19/FGG/E04/04



SECTION A-A

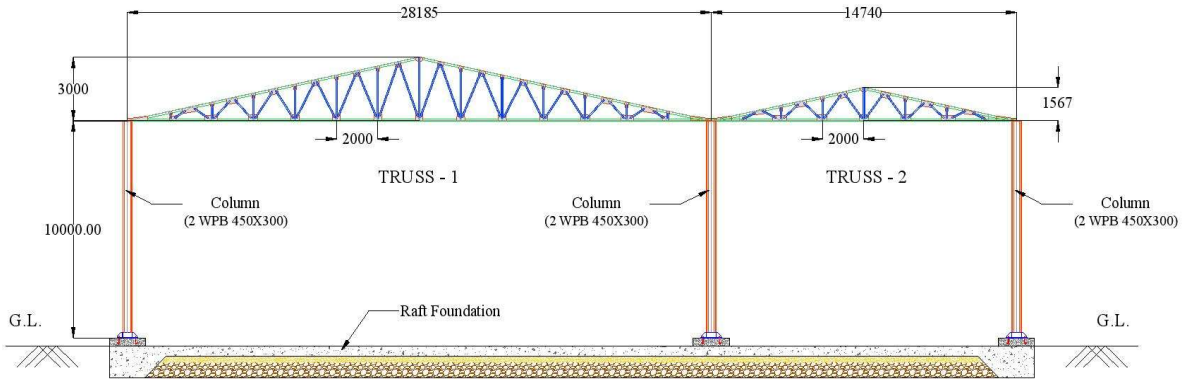


FLOOR PLAN
(Scale 1:4)

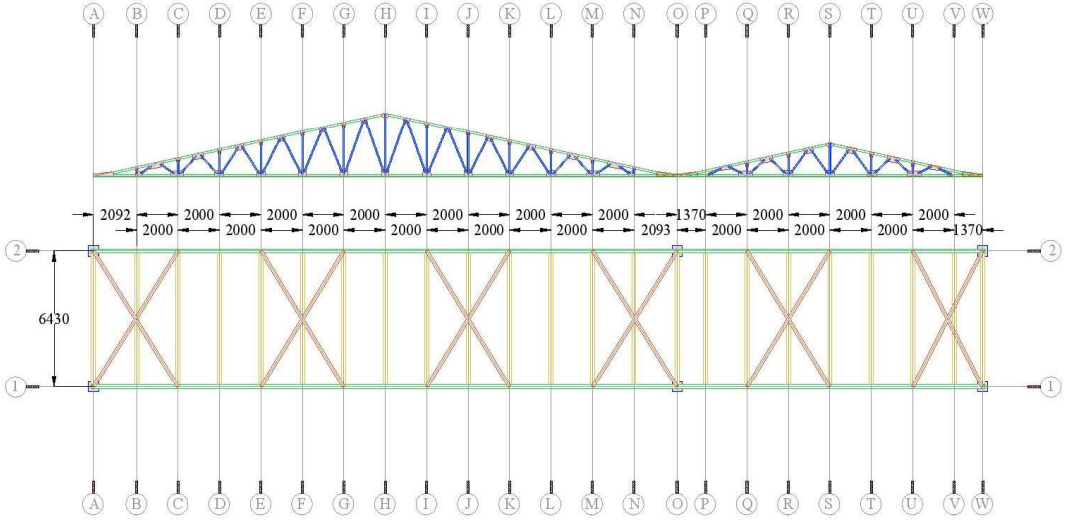
NOTE:-
1) All dimensions are in "mm". 2) SCALE 1:200
REFERENCE I.S. CODES
1. IS 800 : 2007 - Steel Structure 2. IS 2062 : 2011 - Rolled Sections & Plates 3. IS 808 : 1989 (2004) - Beam & Column Sections (MB/MC) 4. IS 12778 : 2004 - Built-up & Parallel flange sections 5. IS 808, IS 1161 : 1998 & IS 4923 : 1997 - Truss Members 6. IS 813 : 1986 - Symbols for Welding 7. IS 9595 : 1996 - Weld joint details

FOOD GRAIN GODOWN
SECTIONAL VIEW

National Award Competition for Civil/Structural Engineering Students 2018-19	
Submitted by : Group - E04 KIIT Deemed to be University Bhubaneswar	
DRAWN BY : E04	CHECKED BY :
DESIGNED BY : E04	APPROVED BY :
DWG NO.: KIIT/INSDAG/2018-19/FGG/E04/05	



SECTION X-X
ELEVATION OF TRUSS
(Front View)



TRUSS BAY & BRACINGS
(Top View)

N

SECTIONS USED		
ISMC 75 (SAIL) (SCALE - 20:1)	ISA 90X90X10 (Back to Back) (SCALE - 20:1)	2 WPB 450X300 (SAIL-Star Closure) (SCALE - 6:1)
Internal Truss Members	Top & Bottom Chord Members	Column Sections
ISMC 150 (SAIL) (SCALE - 15:1)	ISMC 200 (SAIL) (SCALE - 10:1)	
Top & Bottom Bracings	Top & Bottom Purlins	

REFERENCE I.S. CODES

1. IS 800 : 2007 - Steel Structure
2. IS 2062 : 2011 - Rolled Sections & Plates
3. IS 808 : 1989 (2004) - Beam & Column Sections (MB/MC)
4. IS 12778 : 2004 - Built-up & Parallel flange sections
5. IS 808, IS 1161 : 1998 & IS 4923 : 1997 - Truss Members
6. IS 813 : 1986 - Symbols for Welding
7. IS 9595 : 1996 - Weld joint details

NOTE:-

1) All dimensions are in "mm".
2) SCALE 1:200
3) For "Section X-X" refer to sheet no.

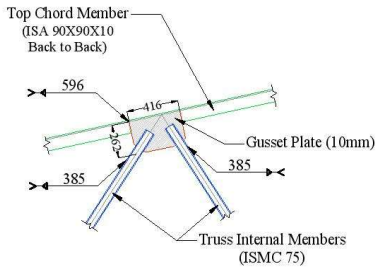
TRUSS ARRANGEMENT

National Award Competition for Civil/Structural Engineering Students 2018-19

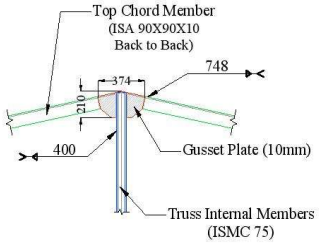
Submitted by : Group - E04
KIIT Deemed to be University
Bhubaneswar

DRAWN BY : E04	CHECKED BY :
DESIGNED BY : E04	APPROVED BY :

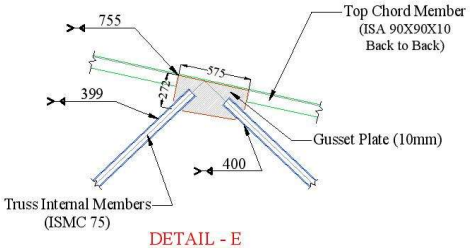
DWG NO.: KIIT/INSDAG/2018-19/FGG/E04/06



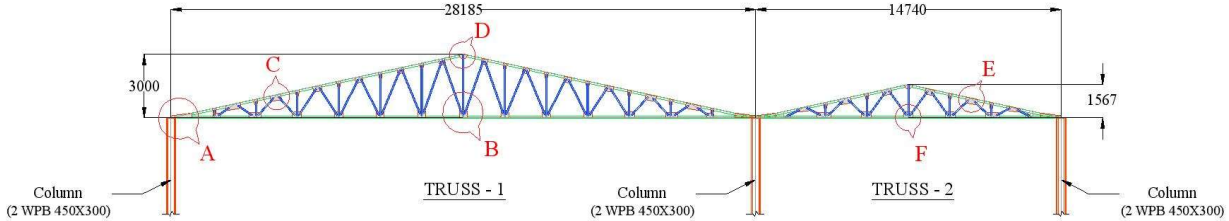
DETAIL - C
(SCALE 1:6)

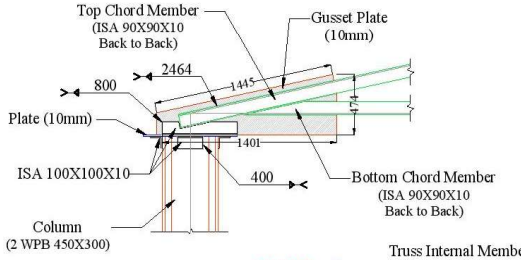


DETAIL - D
(SCALE 1:6)

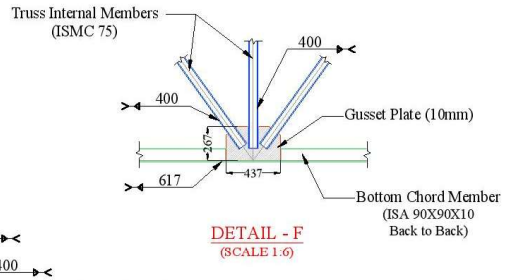


DETAIL - E
(SCALE 1:6)

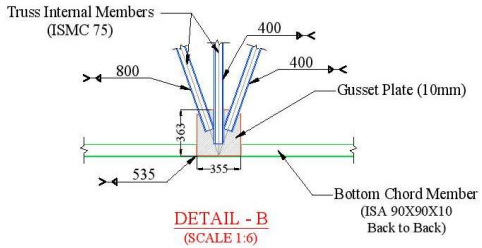




DETAIL - A
(SCALE 1:6)



DETAIL - F
(SCALE 1:6)



DETAIL - B
(SCALE 1:6)

SECTIONS USED		
ISMC 75 (SAIL) (SCALE - 10:1)	ISA 90X90X10 (Back to Back) (SCALE - 20:1)	2 WPB 450X300 (SAIL-Star Closure) (SCALE - 6:1)
Internal Truss Members	Top & Bottom Chord Members	Column Sections

REFERENCE I.S. CODES

1. IS 800 : 2007 - Steel Structure
2. IS 2062 : 2011 - Rolled Sections & Plates
3. IS 808 : 1989 (2004) - Beam & Column Sections (MB/MC)
4. IS 12778 : 2004 - Built-up & Parallel flange sections
5. IS 808, IS 1161 : 1998 & IS 4923 : 1997 - Truss Members
6. IS 813 : 1986 - Symbols for Welding
7. IS 9595 : 1996 - Weld joint details

NOTE:-

1) All dimensions are in "mm".
2) SCALE 1:200
3) Welding Throat Thickness : 6mm

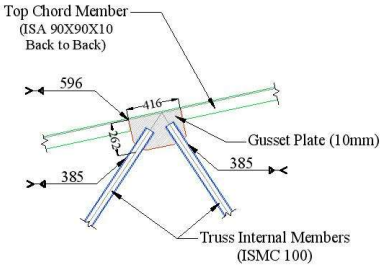
END TRUSS CONNECTION DETAILS

National Award Competition for Civil/Structural Engineering Students 2018-19

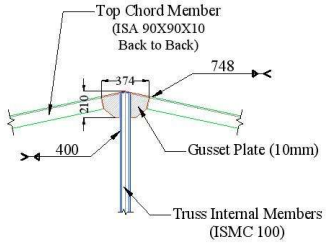
Submitted by : Group - E04
KIIT Deemed to be University
Bhubaneswar

DRAWN BY : E04	CHECKED BY :
DESIGNED BY : E04	APPROVED BY :

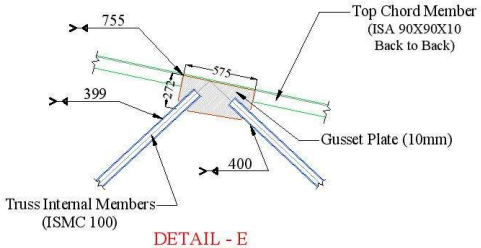
DWG NO.: KIIT/INSDAG/2018-19/FGG/E04/07



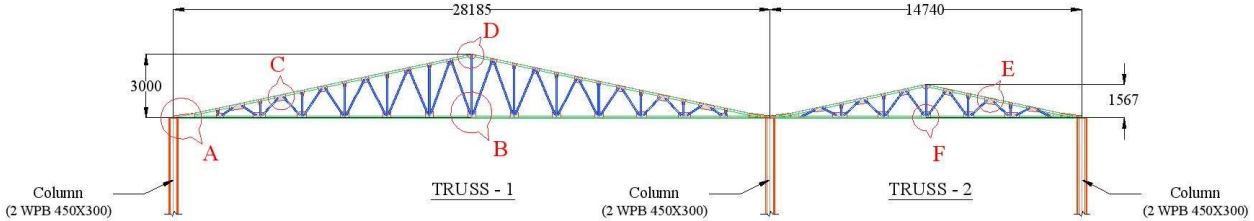
DETAIL - C
(SCALE 1:6)

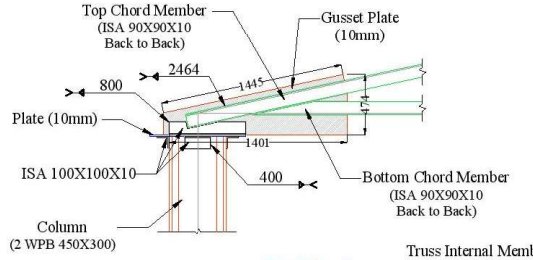


DETAIL - D
(SCALE 1:6)

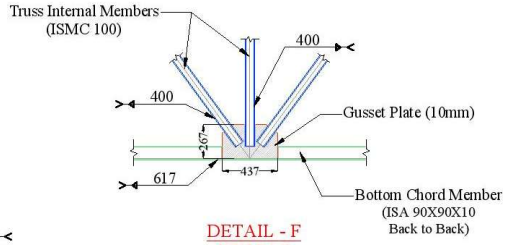


DETAIL - E
(SCALE 1:6)

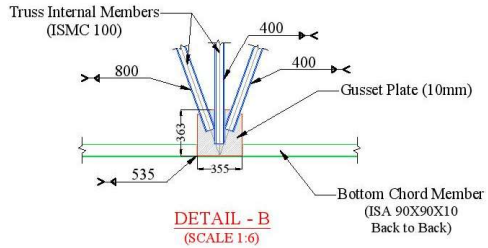




DETAIL - A
(SCALE 1:6)



DETAIL - F
(SCALE 1:6)



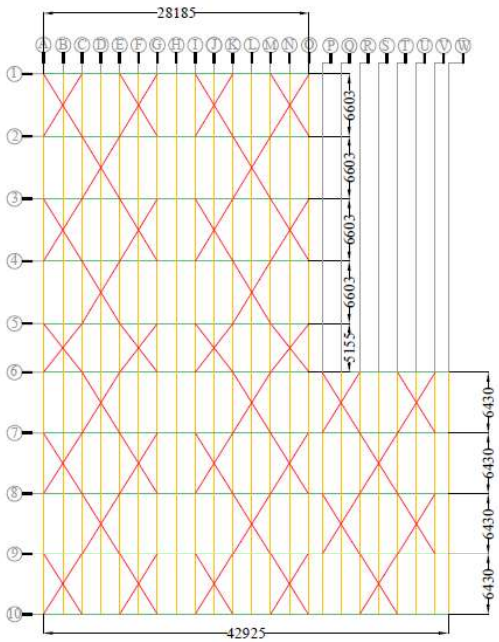
DETAIL - B
(SCALE 1:6)

SECTIONS USED		
ISMC 100 (SAIL) (SCALE - 22.5:1)	ISA 90X90X10 (Back to Back) (SCALE - 20:1)	2 WPB 450X300 (SAIL-Star Closure) (SCALE - 6:1)
Internal Truss Members	Top & Bottom Chord Members	Column Sections

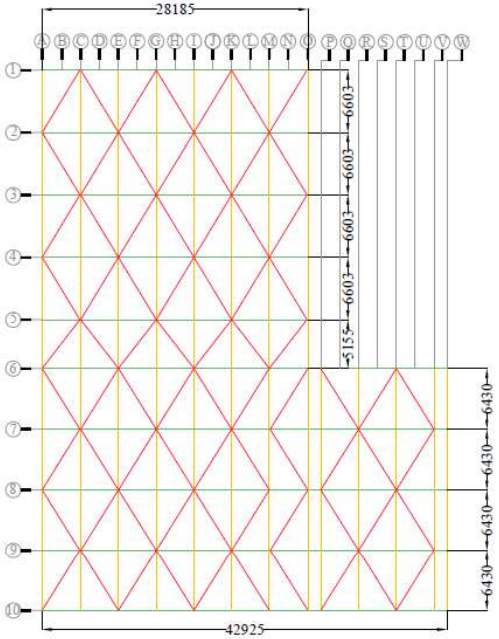
REFERENCE I.S. CODES
1. IS 800 : 2007 - Steel Structure 2. IS 2062 : 2011 - Rolled Sections & Plates 3. IS 808 : 1989 (2004) - Beam & Column Sections (MB/MC) 4. IS 12778 : 2004 - Built-up & Parallel flange sections 5. IS 808, IS 1161 : 1998 & IS 4923 : 1997 - Truss Members 6. IS 813 : 1986 - Symbols for Welding 7. IS 9595 : 1996 - Weld joint details
NOTE:-
1) All dimensions are in "mm". 2) SCALE 1:200 3) Welding Throat Thickness : 6mm

INTERMEDIATE TRUSS CONNECTION DETAILS

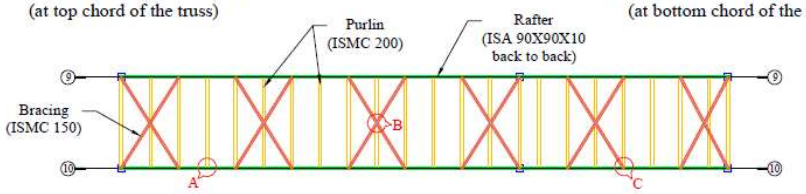
National Award Competition for Civil/Structural Engineering Students 2018-19	
Submitted by : Group - E04 KIIT Deemed to be University Bhubaneswar	
DRAWN BY : E04	CHECKED BY :
DESIGNED BY : E04	APPROVED BY :
DWG NO.: KIIT/INSDAG/2018-19/FGG/E04/08	



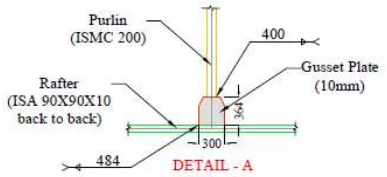
BRACINGS ARRANGEMENT
(at top chord of the truss)



BRACINGS ARRANGEMENT
(at bottom chord of the truss)

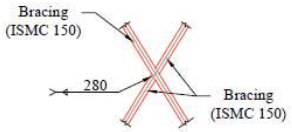


TOP BRACINGS ARRANGEMNT
(Scale 1:1.5)

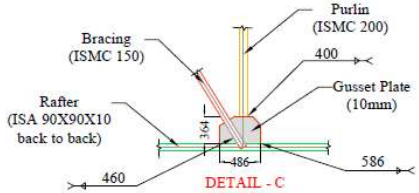


DETAIL - A
(SCALE 1:3)

PURLIN - RAFTER CONNECTION



DETAIL - B
(SCALE 1:3)



DETAIL - C
(SCALE 1:3)

BRACING - RAFTER CONNECTION

N

SECTIONS USED		
ISMC 75 (SAIL) (SCALE - 2:1)	ISA 90X90X10 (Back to Back) (SCALE - 2:1)	2 WPB 450X300 (SAIL-Star Closure) (SCALE - 1:1)
Internal Truss Members	Top & Bottom Chord Members	Column Sections
ISMC 150 (SAIL) (SCALE - 1:5)	ISMC 200 (SAIL) (SCALE - 2:1)	
Top & Bottom Bracings	Top & Bottom Purlins	

REFERENCE I.S. CODES

1. IS 800 : 2007 - Steel Structure
2. IS 875 (Part 1) : 1987 - Dead Load
3. IS 875 (Part 2) : 1987 - Live Load
4. IS 875 (Part 3) : 2015 - Wind Load
5. IS 2062 : 2011 - Rolled Sections & Plates
6. IS 808 : 1989 (2004) - Beam & Column Sections (MB/MC)
7. IS 12778 : 2004 - Built-up & Parallel flange sections
8. IS 813 : 1986 - Symbols for Welding
9. IS 9595 : 1996 - Weld joint details

NOTE:-

1) ALL DIMENSIONS ARE IN mm.
2) SCALE 1:450

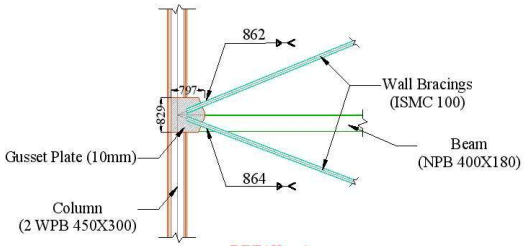
BRACINGS ARRANGEMENT & CONNECTIONS DETAIL

National Award Competition for Civil/Structural Engineering Students 2018-19

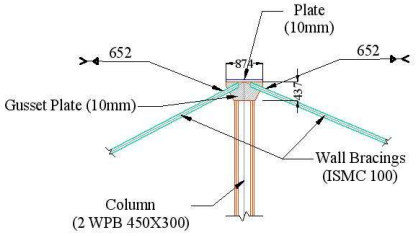
Submitted by : Group - E01
KIIT Deemed to be University
Bhubaneswar

DRAWN BY : E04	CHECKED BY :
DESIGNED BY : E04	APPROVED BY :

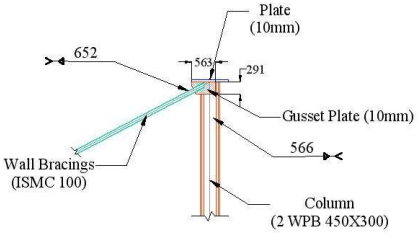
DWG NO.: KIIT/INSDAG/2018-19/FGG/E01/09



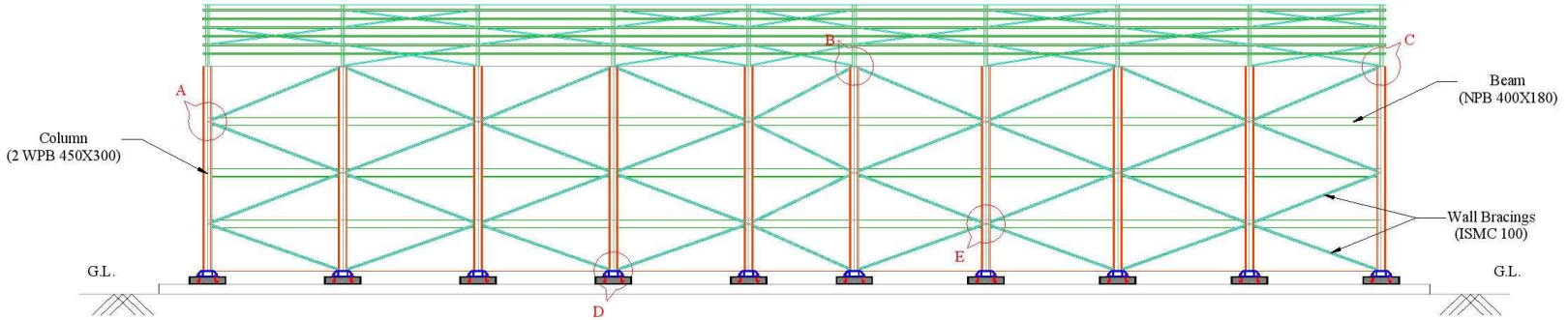
DETAIL - A
(SCALE 1:2)



DETAIL - B
(SCALE 1:2)



DETAIL - C
(SCALE 1:2)

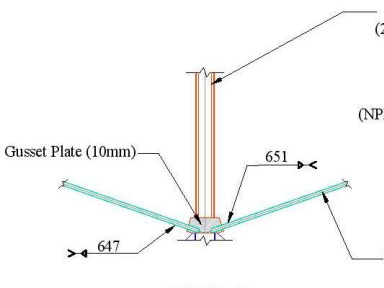


WALL BRACINGS
(REAR VIEW)

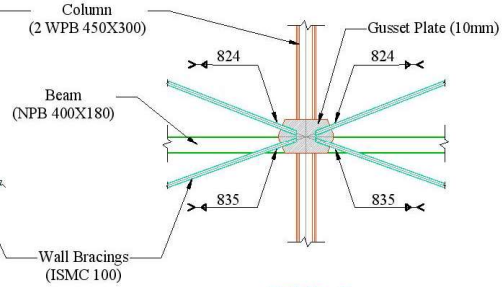
SECTIONS USED :-		
ISMC 100 (SAIL) (SCALE - 22.5:1)	NPB 400X180 (SAIL) (SCALE - 7.5:1)	2 WPB 450X300 (SAIL-Star Closure) (SCALE - 6:1)
Wall Bracing Members	Beam Sections	Column Sections

REFERENCE I.S. CODES

1. IS 800 : 2007 - Steel Structure
2. IS 2062 : 2011 - Rolled Sections & Plates
3. IS 808 : 1989 (2004) - Beam & Column Sections (MB/MC)
4. IS 12778 : 2004 - Built-up & Parallel flange sections
5. IS 808, IS 1161 : 1998 & IS 4923 : 1997 - Truss Members
6. IS 813 : 1986 - Symbols for Welding
7. IS 9595 : 1996 - Weld joint details



DETAIL - D
(SCALE 1:2)



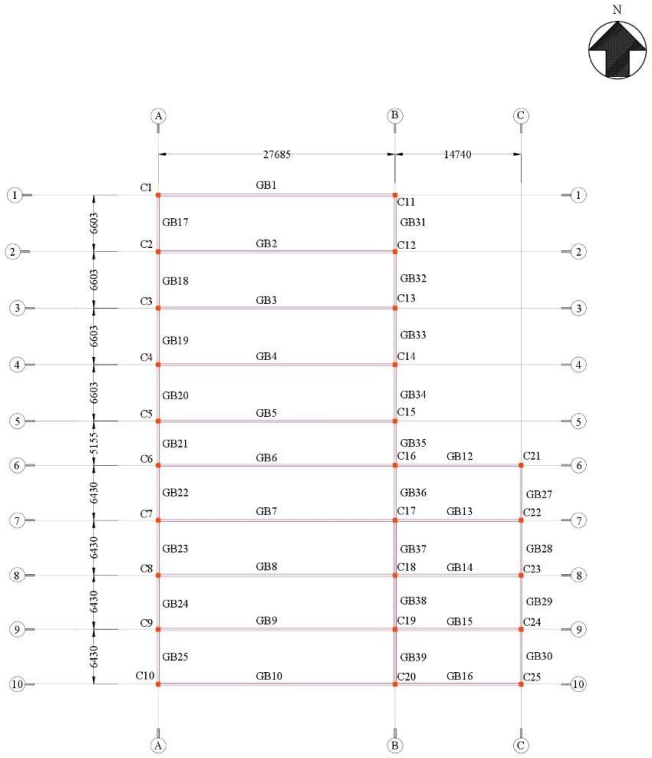
DETAIL - E
(SCALE 1:2)

NOTE:-

1) All dimensions are in "mm".
2) SCALE 1:200
3) Welding Throat Thickness : 6mm

WALL BRACING ARRANGEMENT & DETAILS

National Award Competition for Civil/Structural Engineering Students 2018-19	
Submitted by : Group - E04 KIIT Deemed to be University Bhubaneswar	
DRAWN BY : E04	CHECKED BY :
DESIGNED BY : E04	APPROVED BY :
DWG NO.: KIIT/INSDAG/2018-19/FGG/E04/10	



BEAM-COLUMN PLAN
(GROUND FLOOR)

SECTIONS USED :-	
RCC Beam (250X300) (SCALE - 20:1)	2 WPB 450X300 (SAIL-Star Closure) (SCALE - 6:1)
Plinth Beam	Column Sections

BEAM SCHEDULE :-

BEAM NO.	LENGTH (mm)	SECTION
GB1-GB10	27685	RCC 250 X 300
GB11-GB16	14740	RCC 250 X 300
GB17-GB20,GB31-GB33	6603	RCC 250 X 300
GB21,GB26,GB35	5155	RCC 250 X 300
GB22-25,GB27-30,GB36-39	6430	RCC 250 X 300

COLUMN SCHEDULE :-

COLUMN NO.	LENGTH (mm)	SECTION
C1 - C25	10000	2WPB 450X300

NOTE:-

1) All dimensions are in "mm".
2) SCALE 1:350

REFERENCE I.S. CODES

1. IS 800 : 2007 - Steel Structure
2. IS 456 : 2000 - Plain & Reinforced Concrete
3. IS 875 (Part 1) : 1987 - Dead Load
4. IS 875 (Part 2) : 1987 - Live Load
5. IS 875 (Part 3) : 2015 - Wind Load
6. IS 1893 (Part 1) : 2016 - Seismic Load
7. IS 12778 : 2004 - Built-up & Parallel flange sections

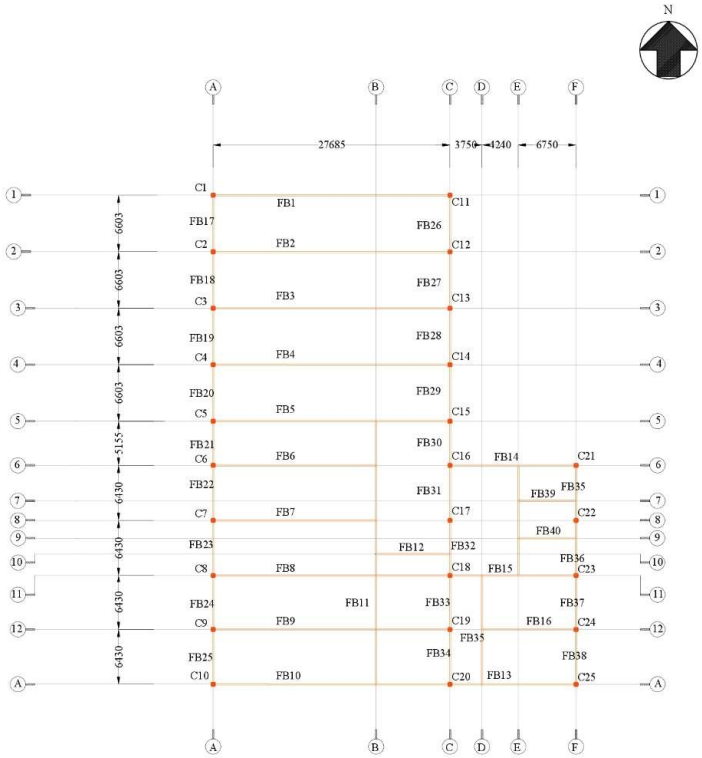
FOOD GRAIN GODOWN - GROUND FLOOR BEAM COLUMN PLAN

National Award Competition for Civil/Structural Engineering Students 2018-19

Submitted by : Group - E04
KIIT Deemed to be University
Bhubaneswar

DRAWN BY : E04	CHECKED BY :
DESIGNED BY : E04	APPROVED BY :

DWG NO: KIIT/INSDAG/2018-19/FGG/E04/11



BEAM-COLUMN PLAN
(1ST, 2ND, 3RD FLOOR)

BEAM SCHEDULE :-

BEAM NO.	LENGTH (mm)	SECTION
FB1-FB5, FB8-FB10	27685	NPB 400 X 180
FB6,FB7	19055	NPB 400 X 180
FB11	30860	NPB 400 X 180
FB12	8630	NPB 300 X 150
FB13-FB16	14740	NPB 400 X 180
FB17-FB20, FB26-FB29	6603	NPB 400 X 180
FB21, FB30	5155	NPB 300 X 150
FB22-FB24, FB31-FB33, FB35-FB37	6430	NPB 400 X 180
FB25, FB34, FB38	6415	NPB 400 X 180
FB39-FB40	6750	NPB 300 X 150

COLUMN SCHEDULE :-

COLUMN NO.	LENGTH (mm)	SECTION
C1 - C25	10000	2WPB 450X300

NOTE:-

1) All dimensions are in "mm".
2) SCALE 1:350

REFERENCE I.S. CODES

1. IS 800 : 2007 - Steel Structure
2. IS 875 (Part 1) : 1987 - Dead Load
3. IS 875 (Part 2) : 1987 - Live Load
4. IS 875 (Part 3) : 2015 - Wind Load
5. IS 1893 (Part 1) : 2016 - Seismic Load
6. IS 808 : 1989 (2004) - Beam & Column Sections
7. IS 12778 : 2004 - Built-up & Parallel flange sections

SECTIONS USED :-		
NPB 400 X 180 (SAIL) (SCALE - 10:1)	NPB 300 X 150 (SAIL) (SCALE - 10:1)	2 WPB 450X300 (SAIL-Star Closure) (SCALE - 6:1)
Internal Truss Members	Top & Bottom Chord Members	Column Sections

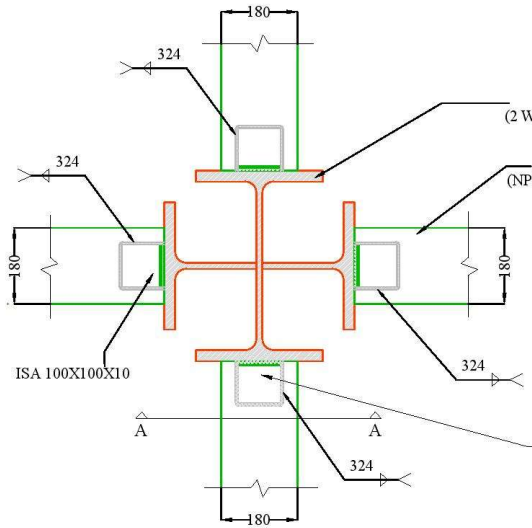
FOOD GRAIN GODOWN - 1ST, 2ND, 3RD FLOOR BEAM COLUMN PLAN

National Award Competition for Civil/Structural Engineering Students 2018-19

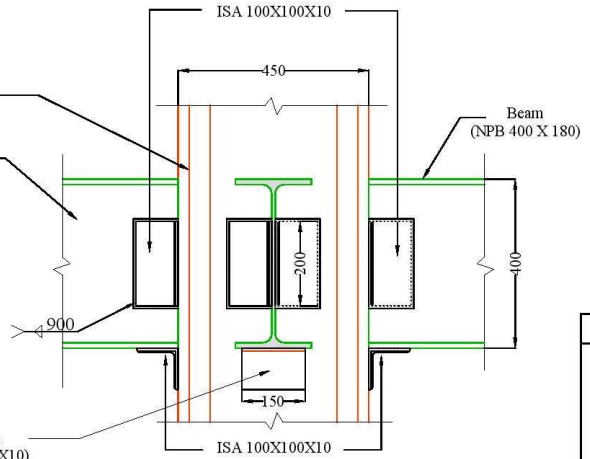
Submitted by : Group - E04
KIIT Deemed to be University
Bhubaneswar

DRAWN BY : E04	CHECKED BY :
DESIGNED BY : E04	APPROVED BY :

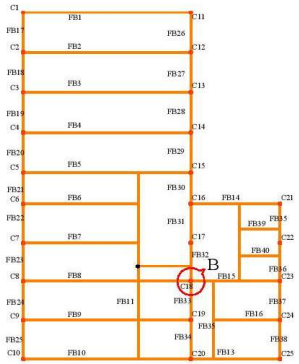
DWG NO: KIIT/INSDAG/2018-19/FGG/E04/12



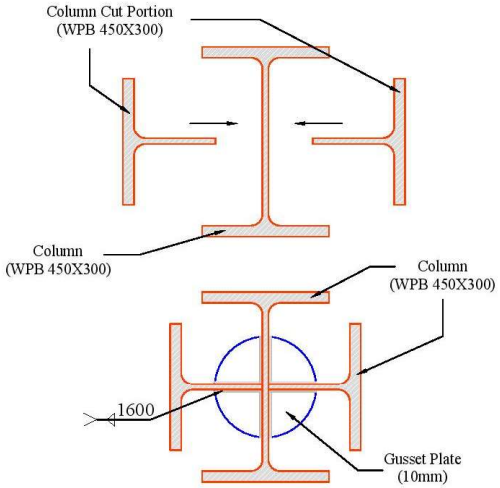
DETAIL-B
(TOP VIEW)



SECTION A-A
(SIDE VIEW)



BEAM-COLUMN PLAN
(SCALE - 70:1)



BUILT-UP COLUMN FORMATION
(2 WPB 450X300 STAR CLOSURE)

N

SECTIONS USED :-		
NPB 400 X 180 (SAIL) (SCALE- 2:1)	2 WPB 450X300 (SAIL-Star Closure) (SCALE- 2.5:1)	ISA 100X100X10 (SCALE- 2:1)
Beam Section	Column Section	Used in Beam-Column Connection Joints

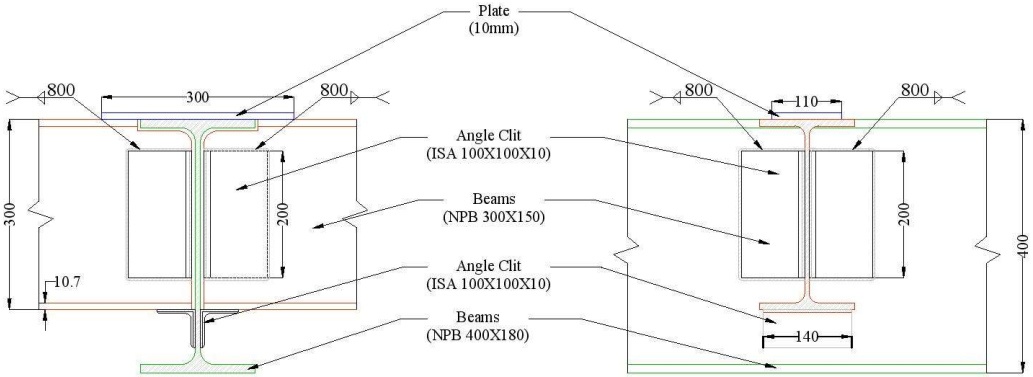
REFERENCE I S CODES
1. IS: 800-2007 - Steel Structure
2. IS: 2062 - 2011 - Rolled Sections & Plates
3. IS: 808-1989 (2004) -Beam & Column Sections(MB/MC)
4. IS: 12778-2004 - Built-up & Parallel flange sections
5. IS: 808, IS 1161-1998 & IS 4923-1997 - Truss Members
6. IS: 813 - 1986 - Symbols for Welding
7. IS: 9595 -1996 - Weld joint details

NOTE:-

1) All dimensions are in "mm".
2) SCALE 1:10
3) Welding throat thickness : 6mm

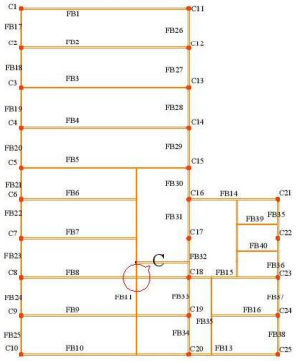
BEAM - COLUMN CONNECTION

National Award Competition for Civil/Structural Engineering Students 2018-19	
Submitted by : Group - E04 KIIT Deemed to be University Bhubaneswar	
DRAWN BY : E04	CHECKED BY :
DESIGNED BY : E04	APPROVED BY :
DWG NO.: KIIT/INSDAG/2018-19/FGG/E04/13	

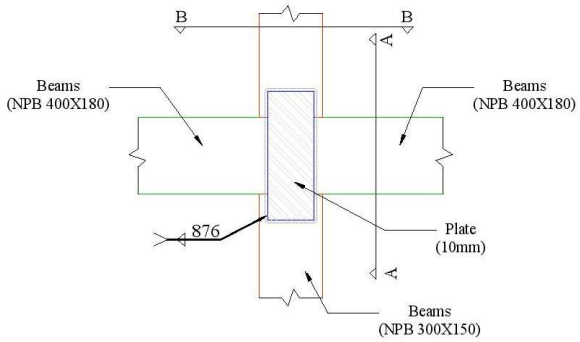


SECTION A-A
(SIDE VIEW)

SECTION B-B
(SIDE VIEW)



BEAM-COLUMN PLAN
(SCALE - 70:1)



DETAIL-C
(TOP VIEW)

N

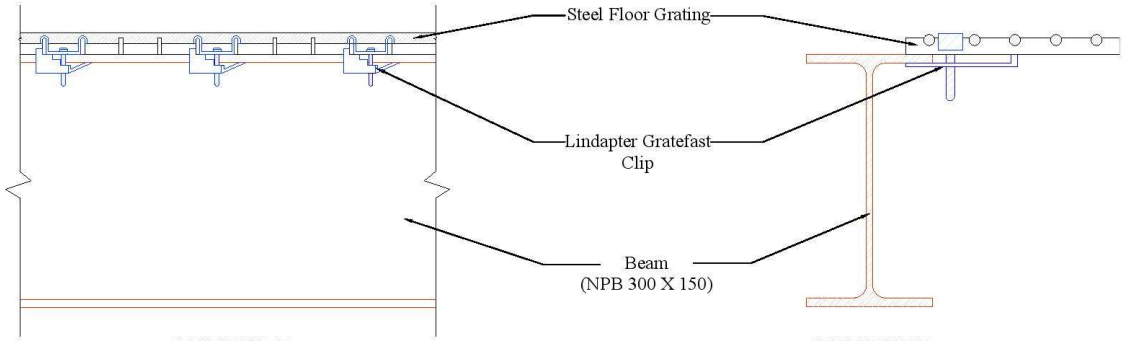
SECTIONS USED :-	
NPB 400 X 180 (66.3) (SAIL) (SCALE- 2:1)	NPB 400 X 180 (66.3) (SAIL) (SCALE- 2:1)
Primary Beam Section	Secondary Beam Section
ISA 100X100X10 (SCALE- 2:1)	ISA 60X60X10 (SCALE- 2:1)
Angle Clit used in Beam-Beam Connection Joints	Angle Clit used in Beam-Beam Connection Joints

REFERENCE I S CODES
1. IS: 800-2007 - Steel Structure
2. IS: 2062 - 2011 - Rolled Sections & Plates
3. IS: 808-1989 (2004) -Beam & Column Sections(MB/MC)
4. IS: 12778-2004 - Built-up & Parallel flange sections
5. IS: 808, IS 1161-1998 & IS 4923-1997 - Truss Members
6. IS: 813 - 1986 - Symbols for Welding
7. IS: 9595 -1996 - Weld joint details

NOTE:-
1) All dimensions are in "mm".
2) SCALE 1:10
3) Welding throat thickness : 6mm

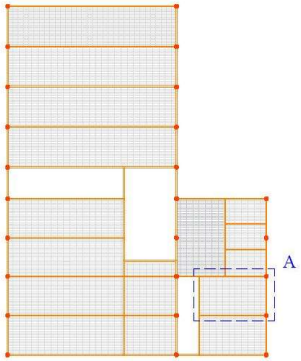
BEAM - BEAM CONNECTION

National Award Competition for Civil/Structural Engineering Students 2018-19	
Submitted by : Group - E04 KIIT Deemed to be University Bhubaneswar	
DRAWN BY : E04	CHECKED BY :
DESIGNED BY : E04	APPROVED BY :
DWG NO.: KIIT/INSDAG/2018-19/FGG/E04/14	

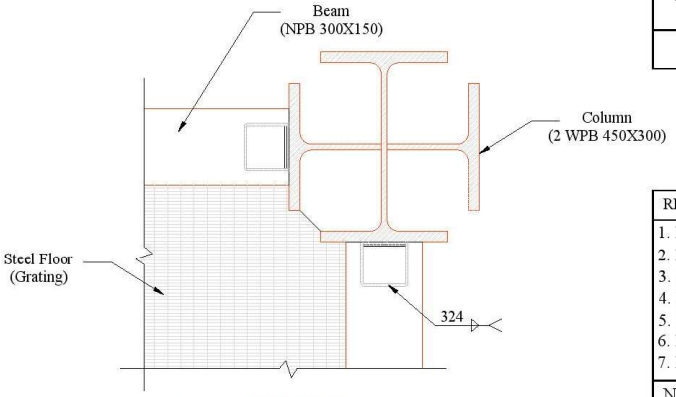


SECTION B-B
(SIDE VIEW)

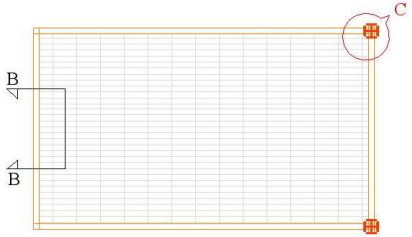
SECTION B-B
(FRONT VIEW)



BEAM-COLUMN PLAN
(SCALE-70:1)



DETAIL-C



DETAIL-A

N

SECTIONS USED		
Grating Symbol 38-W-2 (SCALE- 1:1)	NPB 300 X 150 (SAIL) (SCALE- 2:1)	Lindapter Grate fast clip (SCALE- 3:1)
Steel Flooring	Beam Section	Used in Beam-Grating Connections

REFERENCE I.S. CODES

1. IS: 800-2007 - Steel Structure
2. IS: 2062 - 2011 - Rolled Sections & Plates
3. IS: 808-1989 (2004) -Beam & Column Sections(MB/MC)
4. IS: 12778-2004 - Built-up & Parallel flange sections
5. IS: 808, IS 1161-1998 & IS 4923-1997 - Truss Members
6. IS: 813 - 1986 - Symbols for Welding
7. IS: 9595 -1996 - Weld joint details

NOTE:-

1) All dimensions are in "mm".
2) SCALE 1:10

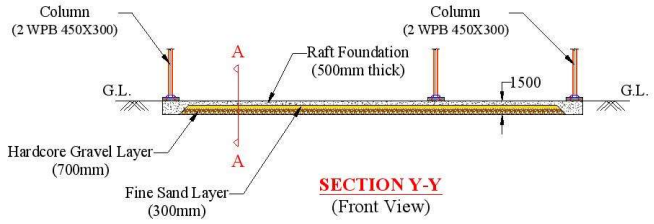
BEAM - GRATING CONNECTION

National Award Competition for Civil/Structural Engineering Students 2018-19

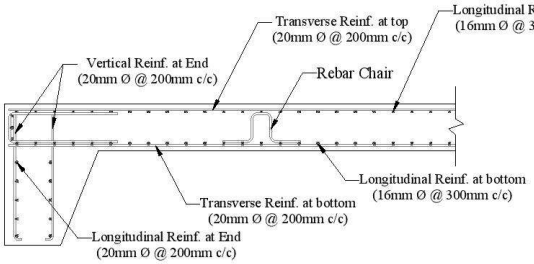
Submitted by : Group - E04
KIIT Deemed to be University
Bhubaneswar

DRAWN BY : E04	CHECKED BY :
DESIGNED BY : E04	APPROVED BY :

DWG NO.: KIIT/INSDAG/2018-19/FGG/E04/15

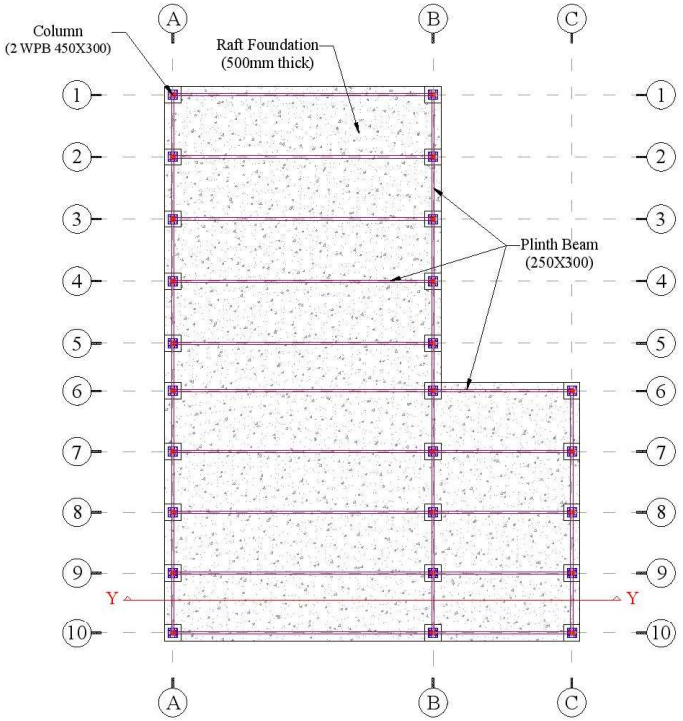


SECTION Y-Y
(Front View)

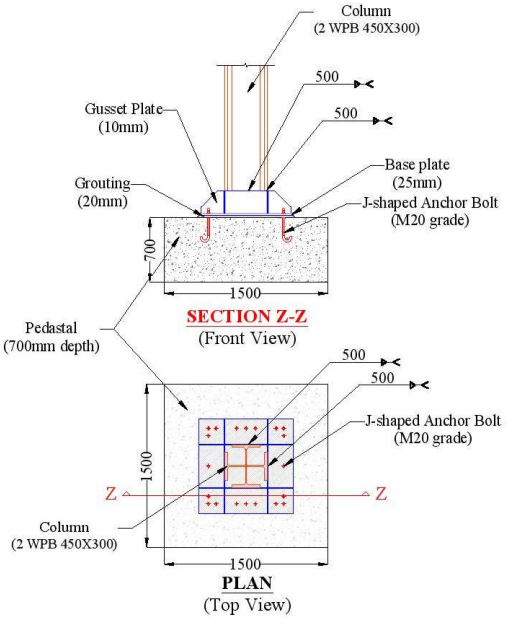


SECTION A-A

RAFT REINFORCEMENTDETAILS
(Scale 10:1)



FOUNDATION LAYOUT
(Top View)



SECTION Z-Z
(Front View)

PLAN
(Top View)

COLUMN - BASE PLATE CONNECTION DETAILS
(Scale 10:1)

N

SECTIONS USED		
RCC Beam (250X300) (SCALE - 20:1)	J-shaped Anchor bolt (M20 grade) (SCALE - 2:1)	2 WPB 450X300 (SAIL-Star Closure) (SCALE - 0:1)
Plinth Beam	Column Base-Pedastal Connections	Column Sections

REFERENCE I.S. CODES

1. IS 800 : 2007 - Steel Structure
2. IS 2062 : 2011 - Rolled Sections & Plates
3. IS 808 : 1989 (2004) - Beam & Column Sections (MB/MC)
4. IS 12778 : 2004 - Built-up & Parallel flange sections
5. IS 5624 : 1993 - Anchor Bolts
6. IS 813 : 1986 - Symbols for Welding
7. IS 9595 : 1996 - Weld joint details

NOTE:-

1) All dimensions are in "mm".
2) SCALE 1:450
3) Welding throat thickness : 8mm

FOUNDATION LAYOUT & DETAILS

National Award Competition for Civil/Structural Engineering Students 2018-19

Submitted by : Group - E04
KIIT Deemed to be University
Bhubaneswar

DRAWN BY : E04	CHECKED BY :
DESIGNED BY : E04	APPROVED BY :

DWG NO.: KIIT/INSDAG/2018-19/FGG/E04/16

BOQ IN EXCEL

TOTAL STEEL				
Member	Total Weight (kg)	Rate/kg (INR)	Total Cost (INR)	Extra 3%
Purlin	14916.1355	65	969548.8075	998635.2717
Top Chord Rafter	1788.622	65	116260.43	119748.2429
Bottom Chord Rafter	3717.944	65	241666.36	248916.3508
Bracing 1	5463.22	65	355109.3	365762.579
Bracing 2	5750.67	65	373793.55	385007.3565
Bracing for wall	2500.192	65	162512.48	167387.8544
End Strut	34986.56	65	2274126.4	2342350.192
Intermediate Strut	4012.996	65	260844.74	268670.0822
Column	58180.8	65	3781752	3895204.56
Tie Beam Steel	4526.1	65	294196.5	303022.395
Beam	58469.27	65	3800502.55	3914517.627
Gusset Plate	9488.95	65	616781.75	635285.2025
Stirrups	11986.33	65	779111.45	802484.7935
Plate Base	1334.5	65	86742.5	89344.775
GRAND TOTAL	**217122.289**		**14112948.82**	**14536337.28**

TOTAL CONCRETE				
Member	Total Weight (m^3)	Rate/m^3 (INR)	Total Cost (INR)	Extra 3%
PCC	37.03	5850	216625.5	223124.265
Pedastal Concrete	13.388	6250	83675	86185.25
Concrete Foundation	616.63	5500	3391465	3493208.95
Tie Beam Concrete	27.911	5500	153510.5	158115.815
GRAND TOTAL	**694.959**		**3845276**	**3960634.28**

TOTAL FIBRE GLASS				
Member	Total Weight (kg)	Rate/kg (INR)	Total Cost (INR)	Extra 3%
Fibre Glass	37.56	160	6009.6	6189.888
GRAND TOTAL	**37.56**		**6009.6**	**6189.888**

CHEQUERED PLATE			
Member	Area	Cost/m^2	Cost (Rs)
Passage1	124.58	2150	267847
Passage2	44.926	2150	96590.9
		Total	**364437.9**

TOTAL GI SHEET				
Member	Total Weight (kg)	Rate/kg (INR)	Total Cost (INR)	Extra 3%
Sheet 1	1725.286	110	189781.46	195474.9038
Sheet 2	1725.286	110	189781.46	195474.9038
Sheet 3	676.4	110	74404	76636.12
Sheet 4	676.4	110	74404	76636.12
GRAND TOTAL	**4803.372**		**528370.92**	**544222.0476**

GRATING			
Members	Area (m^2)	cost/m^2	Cost (Rs)
Grating2	711.78	2150	1530327
Grating3	379.17	2150	815215.5
		Total	**2345542.5**

GRAND TOTAL (Rs)	21757363.9
	Two Crore Seventeen lakhs Fifty Seven Thousand Three Hundred Sixty Three Rupees And Nine Paise

UPGRADED STRUCTURE- BOQ IN EXCEL

(IF EXTENDED IN FUTURE)

TOTAL STEEL				
Member	Total Weight (kg)	Rate/kg (INR)	Total Cost (INR)	Extra 3%
Purlin	23750.9595	65	1543812.368	1590126.739
Top Rafter	4287.884	65	278712.46	287073.8338
Bottom Rafter	4195.372	65	272699.18	280880.1554
Bracing 1	8575.92	65	557434.8	574157.844
Bracing 2	8863.37	65	576119.05	593402.6215
Bracing for wall	4531.552	65	294550.88	303387.4064
End Strut	1375.98	65	89438.7	92121.861
Intermediate Strut	6245.67	65	405968.55	418147.6065
Column	85560	65	5561400	5728242
Tie Beam Steel	6049.41	65	393211.65	405007.9995
Beam	86625.18	65	5630636.7	5799555.801
Gusset Plate	12315.44	65	800503.6	824518.708
Stirrups	16602.22	65	1079144.3	1111518.629
Plate Base	1962.5	65	127562.5	131389.375
GRAND TOTAL			**17611194.74**	**18139530.58**

GRATING			
Members	Area (m^2)	cost/m^2	Cost (Rs)
Grating2	711.78	2150	1530327
Grating3	379.17	2150	815215.5
		Total	**2345542.5**

TOTAL CONCRETE				
Member	Total Weight (m^3)	Rate/m^3 (INR)	Total Cost (INR)	Extra 3%
PCC	72.56	5850	424476	437210.28
Pedastal Concrete	19.6875	6250	123046.875	126738.2813
Concrete Foundation	982.23	5500	5402265	5564332.95
Tie Beam Concrete	36.0427	5500	198234.85	204181.8955
GRAND TOTAL	**1110.5202**		**6148022.725**	**6332463.407**

TOTAL GI SHEET				
Member	Total Weight (kg)	Rate/kg (INR)	Total Cost (INR)	Extra 3%
Sheet 1	3231.74	110	355491.4	366156.142
Sheet 2	3231.74	110	355491.4	366156.142
Sheet 3	676.4	110	74404	76636.12
Sheet 4	676.4	110	74404	76636.12
GRAND TOTAL	**7816.28**		**859790.8**	**885584.524**

TOTAL FIBRE GLASS				
Member	Total Weight (kg)	Rate/kg (INR)	Total Cost (INR)	Extra 3%
Fibre Glass	50.0864	160	8013.824	8254.23872
GRAND TOTAL	**50.0864**		**8013.824**	**8254.23872**

CHEQUERED PLATE			
Member	Area	Cost/m^2	Cost (Rs)
Passage1	124.58	2150	267847
Passage2	44.926	2150	96590.9
		Total	**364437.9**

GRAND TOTAL (Rs)	29647807.15
	Two Crore Eighty Two lakhs Twenty Four Thousand Eight Hundred Seventy And Six Seven Paise

YEAR – 2018-2019

COMPETITION TOPIC:

STEEL INTENSIVE INNOVATIVE FOOD GRAIN GODOWN

DESIGN OPTION

BY

2ND B Prize Winner – Team S-01

from
Coimbatore Institute of Technology, Coimbatore, Tamil Nadu

STEEL INTENSIVE INNOVATIVE FOOD GRAIN GODOWN

PROJECT MEMBERS:

JANANIE V P 1601073

KIRUTHIKA C 1601077

SHIVAANI R 1601100

SUBASHINI D K 1701228

GUIDED BY:

Mr.JAGADESH P

ASSISTANT PROFESSOR

DEPARTMENT OF CIVIL ENGINEERING

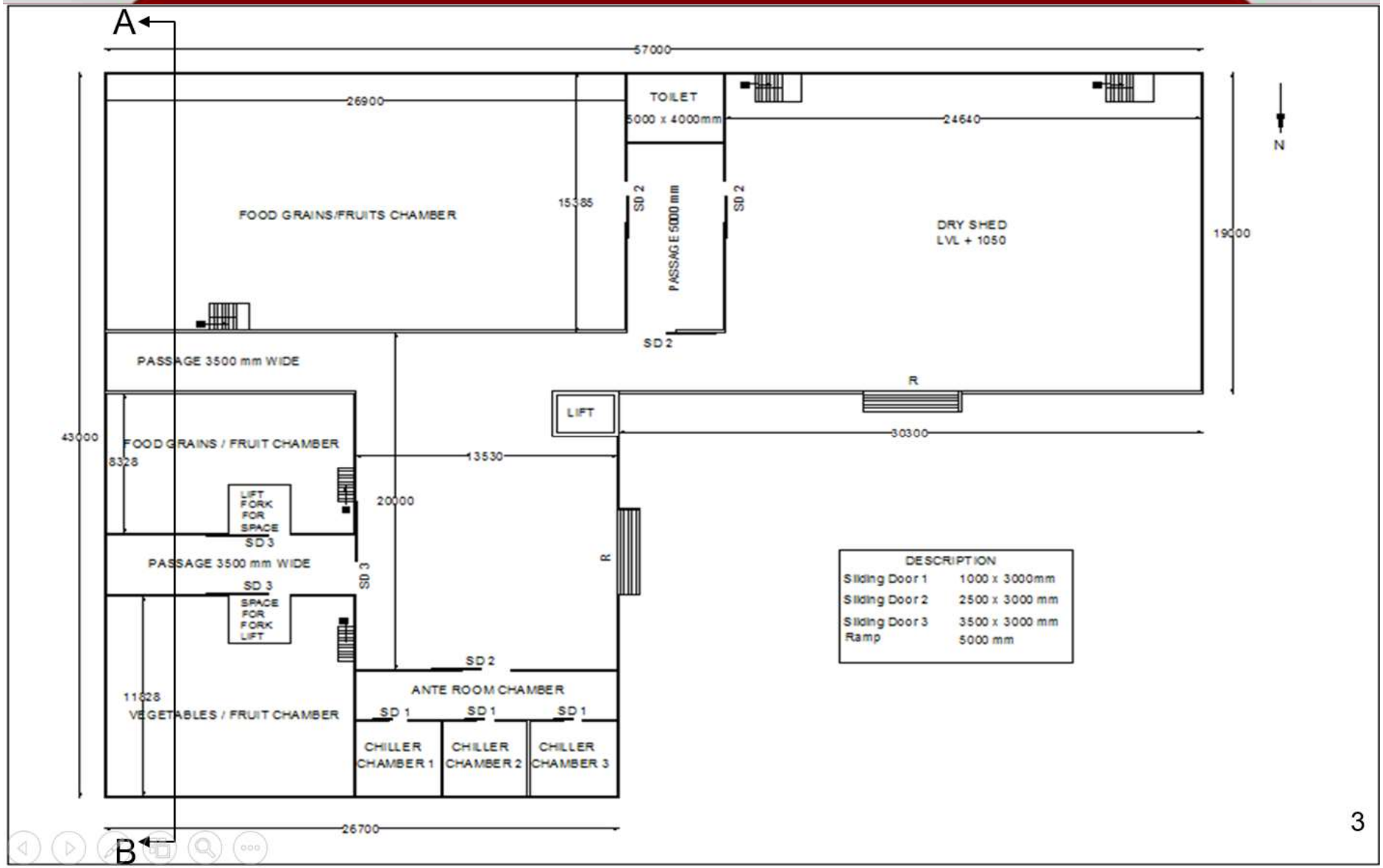
COIMBATORE INSTITUTE OF TECHNOLOGY

COIMBATORE,TAMILNADU

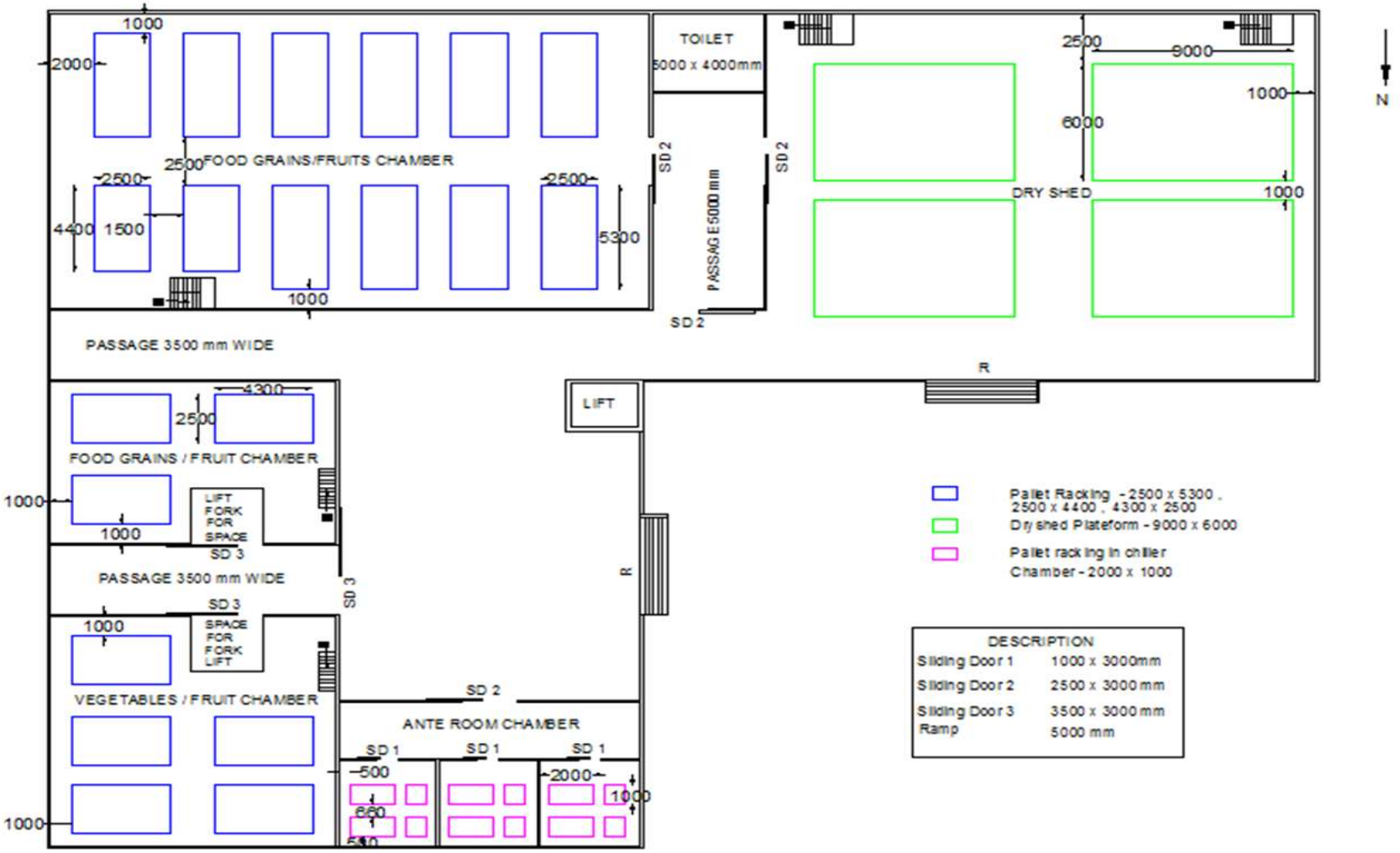
PARAMETERS GIVEN

SITE LOCATION	**JALPAIGURI, WEST BENGAL**
AREA OF STORAGE GODOWN	57.6 m x 19 m / 26.7 m x 24 m
FFL TO BOTTOM CHORD OF TRUSS	9.5 m
ROOF STRUCTURE	COLOUR COATED STEEL SHEET
MAXMIMUM HEIGHT OF THE BUILDING	13 m
NO. OF STORAGE LEVELS	4
MATERIALS FOR CONSTRUCTION	
FOUNDATION SYSTEM	R.C.C OF MINIMUM GRADE M25
STRUCTURAL MEMBERS	STRUCTURAL STEEL OF MILD STEEL (GRADE E250) OR 310/355 or HIGH TENSILE STEEL (GRADE E350/E410)
ROOF & CLADDING	STANDARD COLOUR COATED STEEL SHEET(GALVALUME)
WALLS	PUFF PANEL
FLOORING	GRATING FOR STORAGE AREA/CHEQURED PLATE FOR PASSAGE

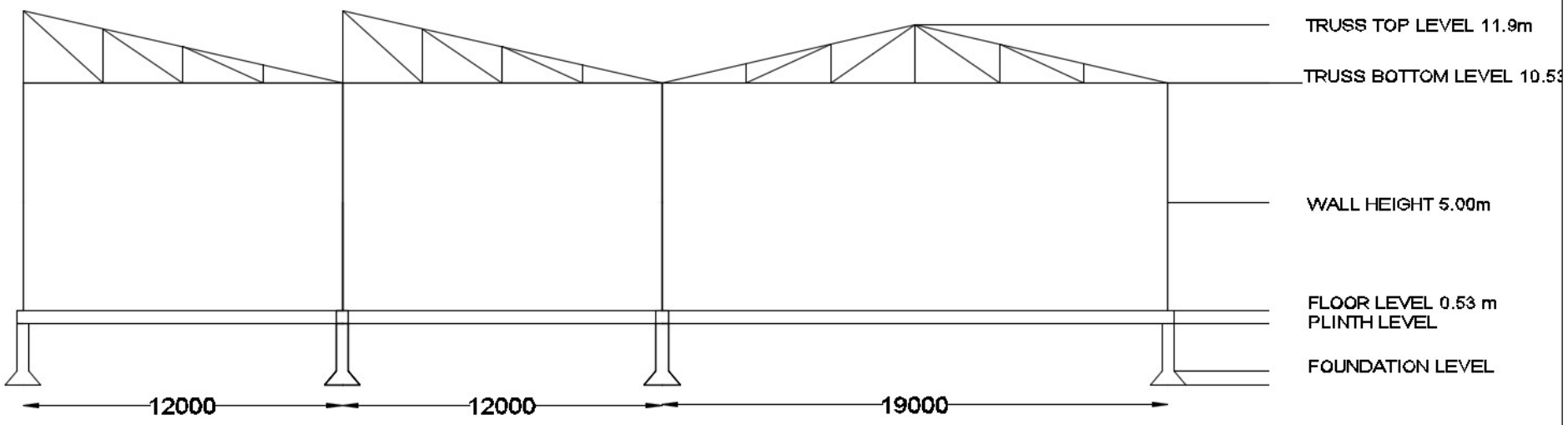
PLAN


A
B
57000
26900
TOILET
5000 x 4000mm
24640
N
FOOD GRAINS/FRUITS CHAMBER
15385
SD 2
PASSAGE 5000 mm
SD 2
DRY SHED
LVL + 1050
19000
SD 2
PASSAGE 3500 mm WIDE
R
LIFT
30300
43000
FOOD GRAINS / FRUIT CHAMBER
8328
13530
20000
LIFT FORK FOR SPACE
SD 3
PASSAGE 3500 mm WIDE
SD 3
SD 3
R
SD 3
SPACE FOR FORK LIFT
SD 2
ANTE ROOM CHAMBER
11628
VEGETABLES / FRUIT CHAMBER
SD 1
SD 1
SD 1
CHILLER CHAMBER 1
CHILLER CHAMBER 2
CHILLER CHAMBER 3
26700
DESCRIPTION
Sliding Door 1 1000 x 3000mm
Sliding Door 2 2500 x 3000 mm
Sliding Door 3 3500 x 3000 mm
Ramp 5000 mm

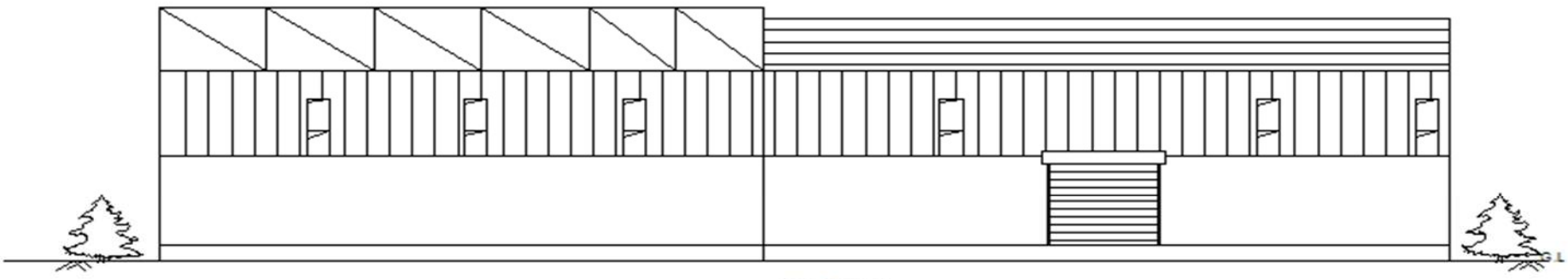
ARCHITECTURAL PLAN



SECTIONAL VIEW



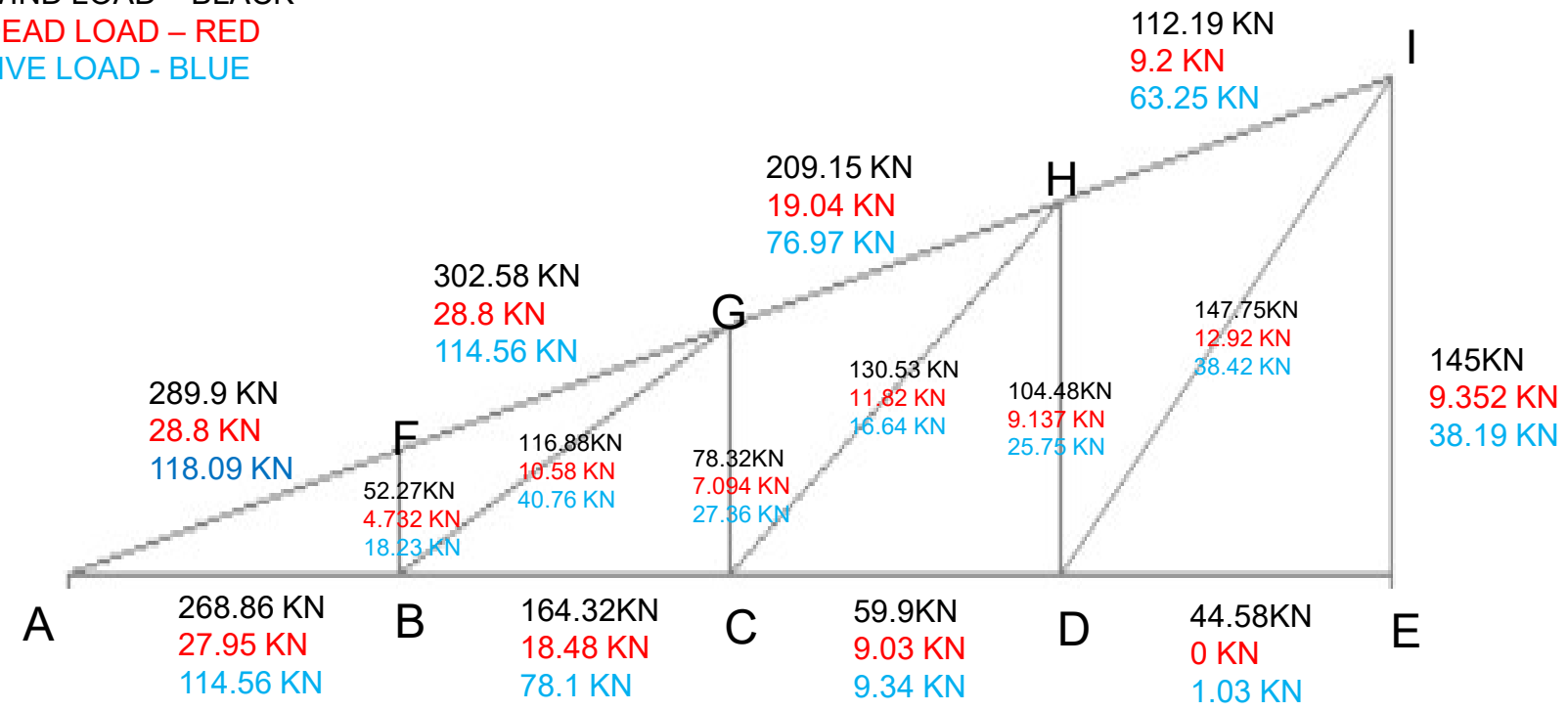
ELEVATION



Front Elevation

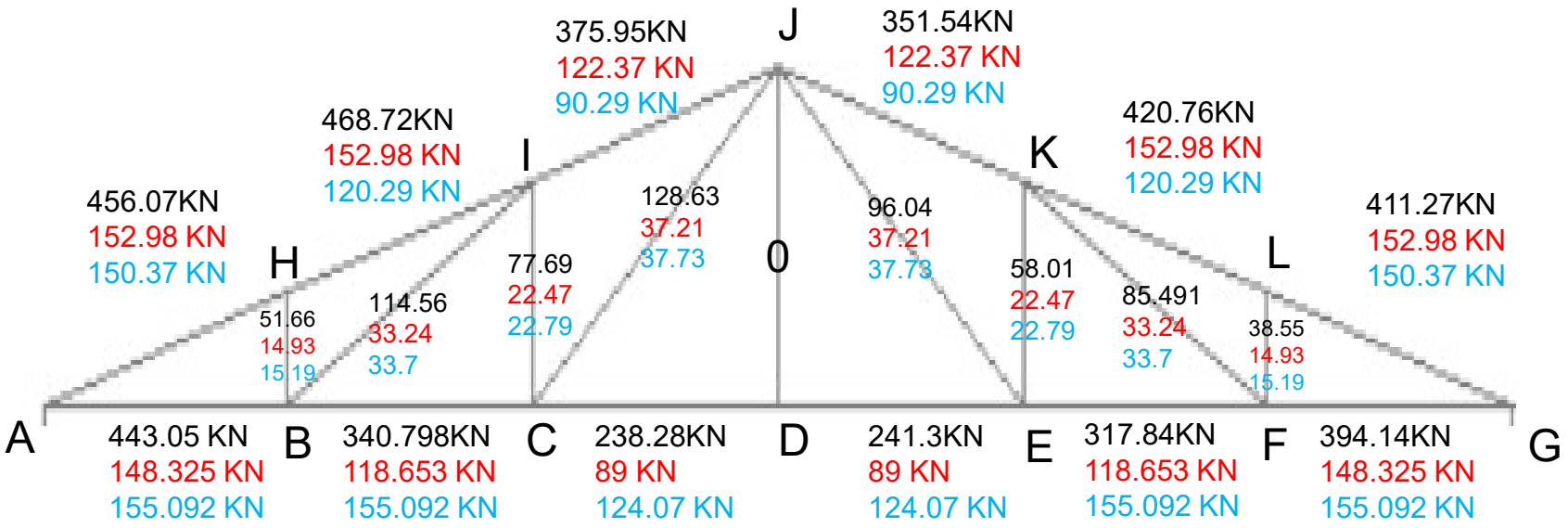
NORTH LIGHT TRUSS

WIND LOAD – BLACK
DEAD LOAD – RED
LIVE LOAD - BLUE

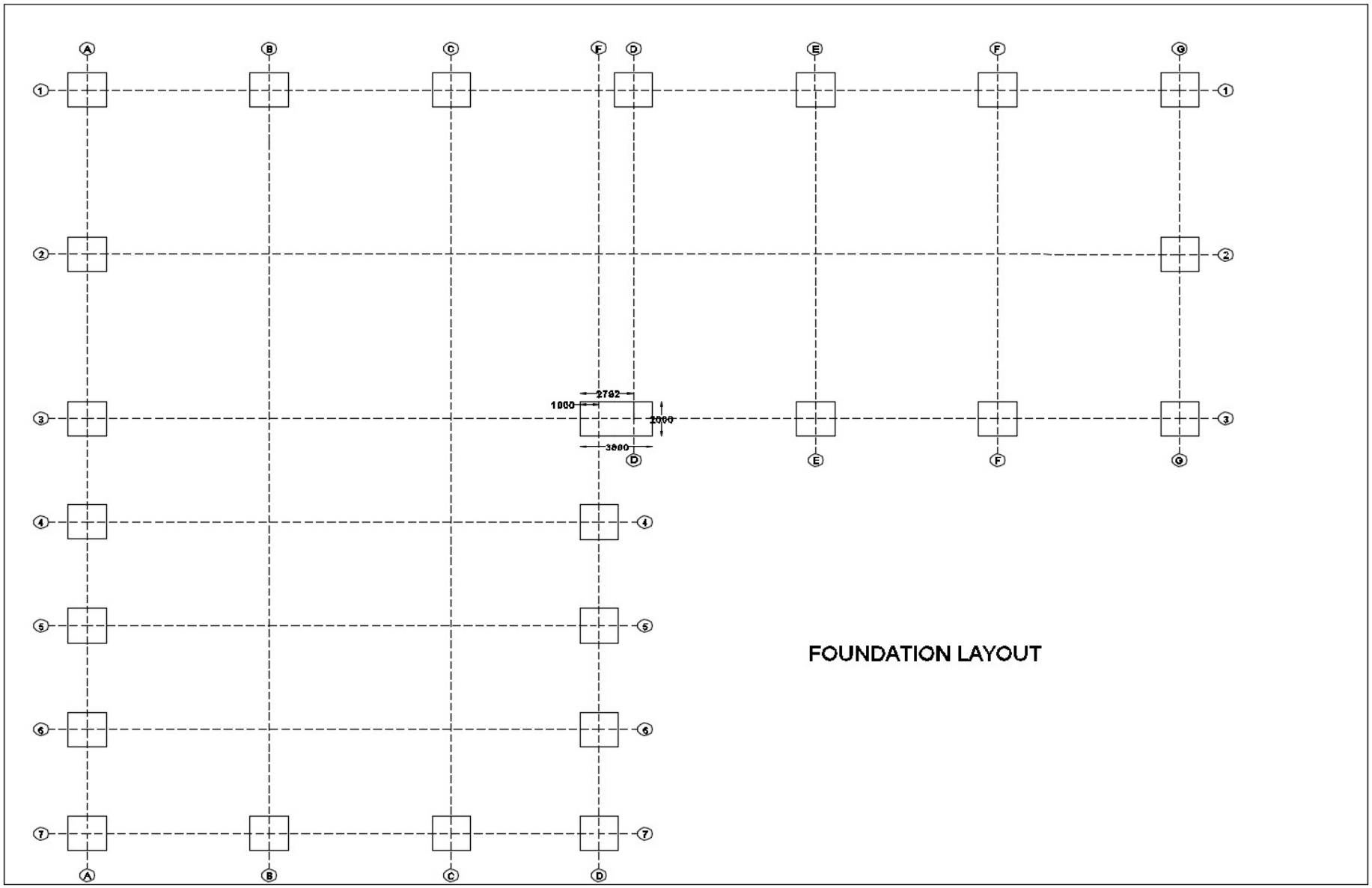


HOWE TRUSS

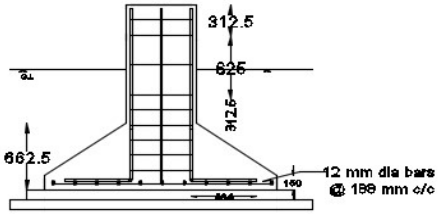
WIND LOAD – BLACK
DEAD LOAD – RED
LIVE LOAD - BLUE



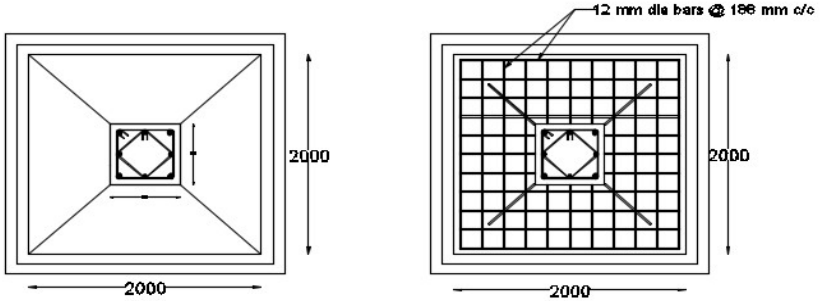
FOUNDATION LAYOUT

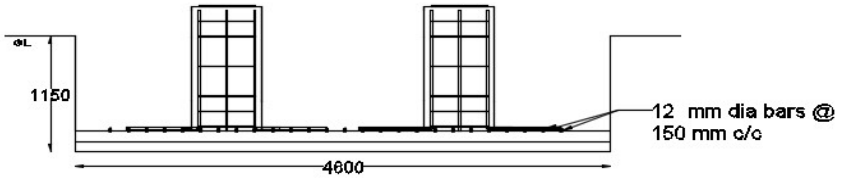


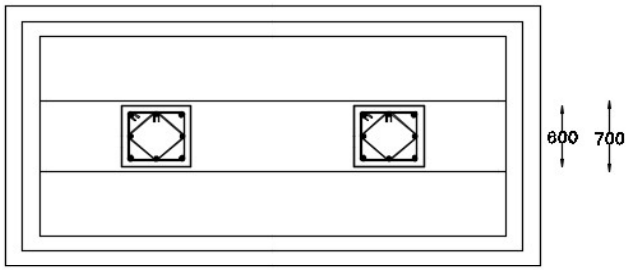
FOUNDATION DETAIL

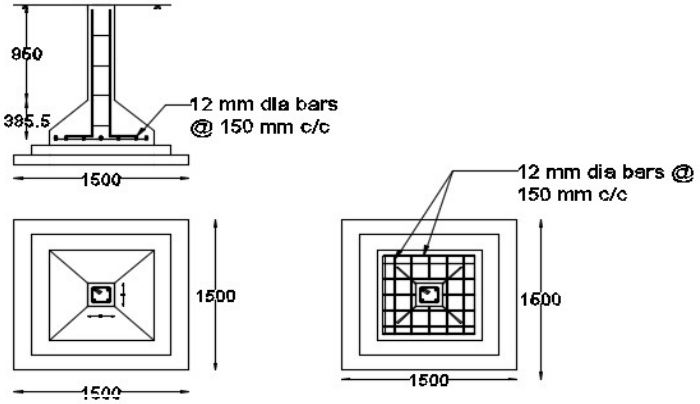


Foundation
A1,B1,C1,D1,E1,F1,G1,H1

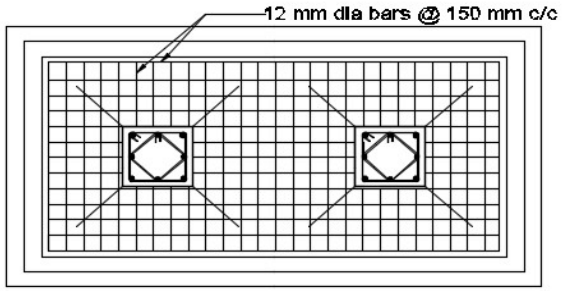






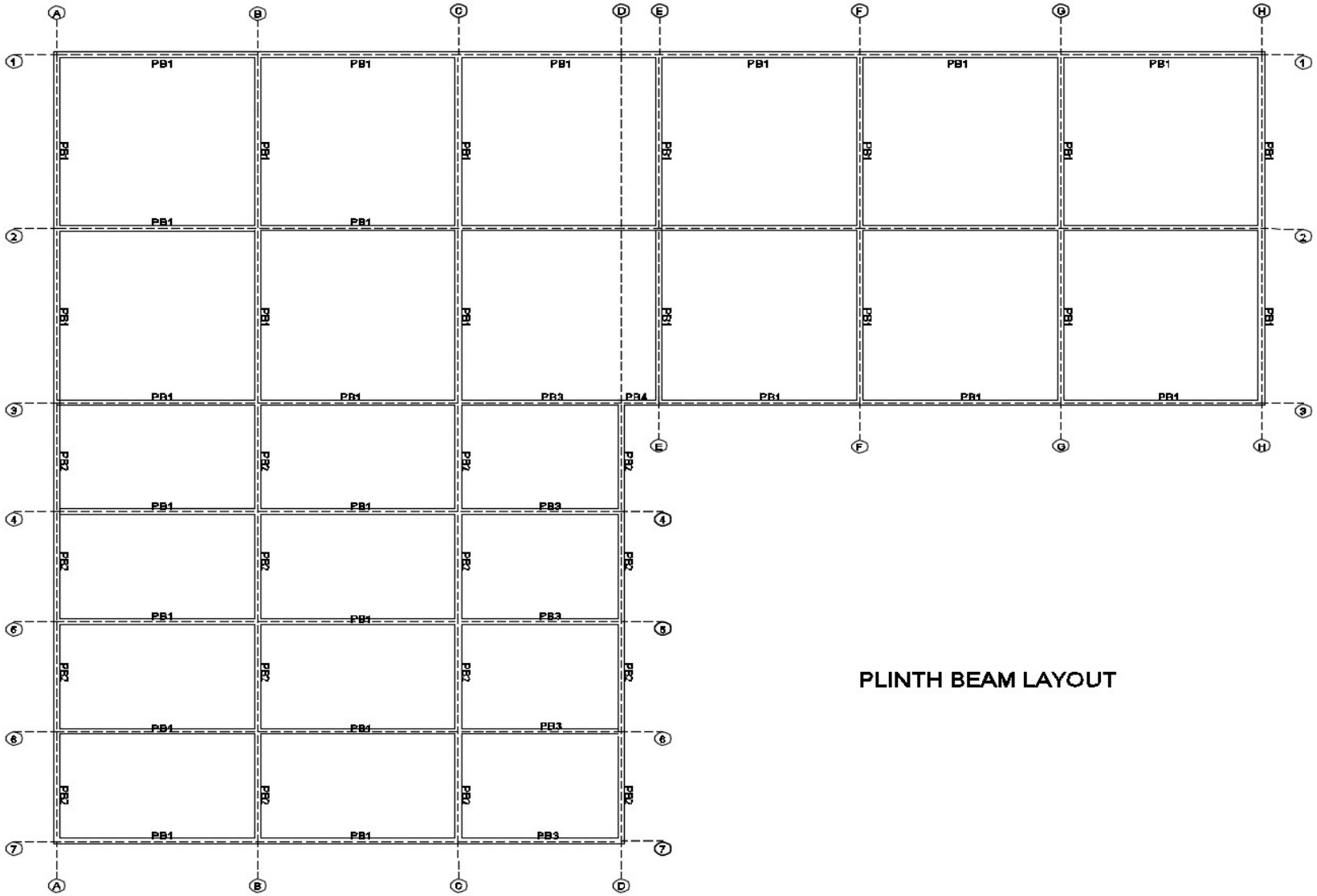


Foundation
A2,B2,C2,D2,E2,F2,G2,H2



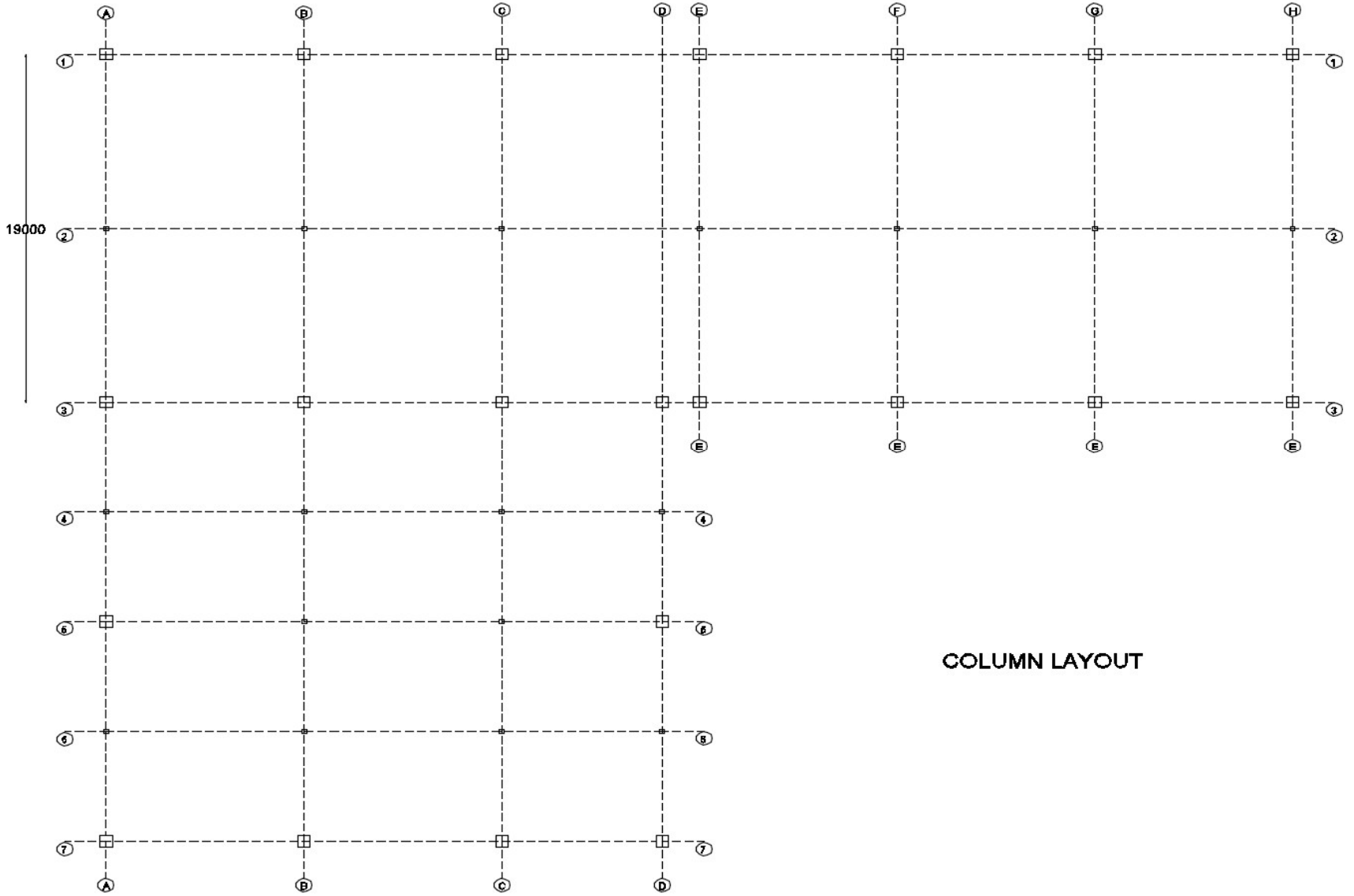
Foundation D3,E3

PLINTH BEAM LAYOUT

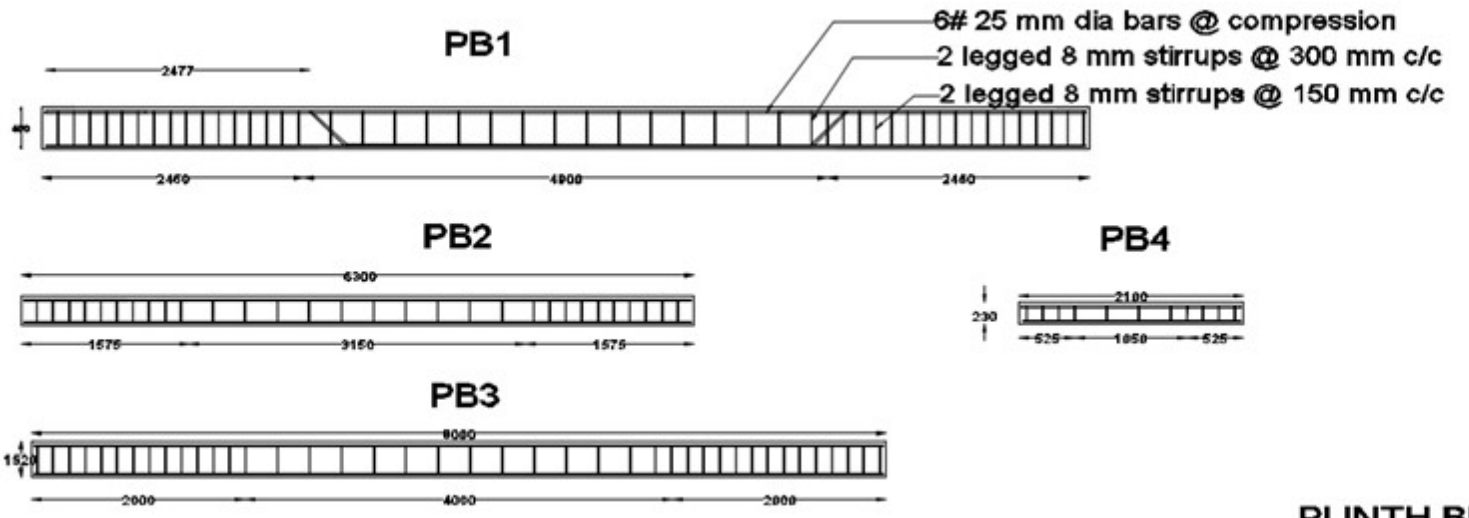


PLINTH BEAM LAYOUT

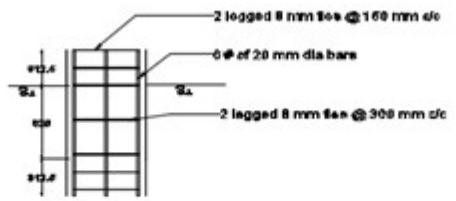
COLUMN LAYOUT

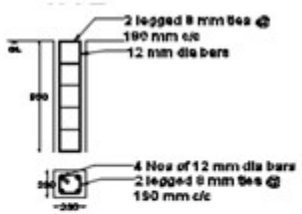


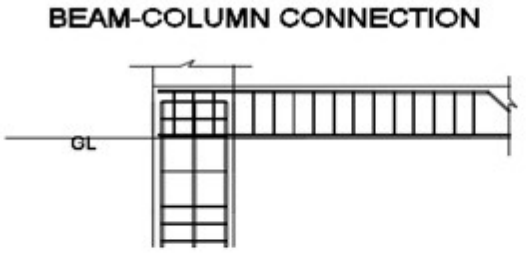
PLINTH AND COLUMN DETAILING

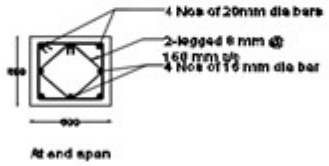


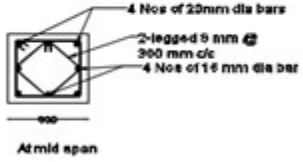
PLINTH BEAM DETAILS











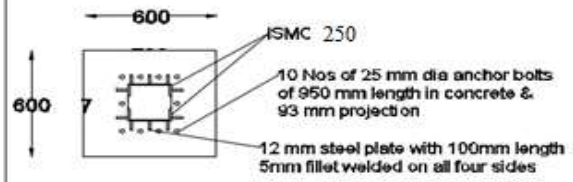
COLUMN DETAILS

RCC COLUMN CONNECTION

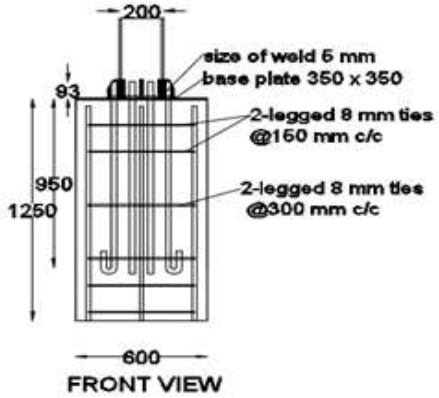
STEEL PLATE AND RCC COLUMN CONNECTIONS

Column C-1 connection at
0.3 m height from ground level

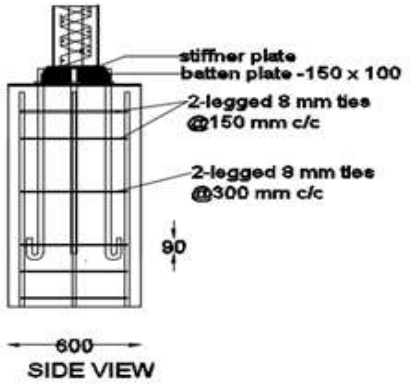
Plan view of connection



Cross section of connections from flanges sides of ISMC 250



Cross section of connections from web sides of ISMC 250

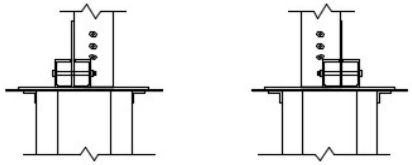


* stiffner steel plate of 12 mm thickness are used
* column steel - ISMC 250
* stiffner steel plates are attached to the flanges of ISMC 250 parallel and perpendicular fillet weld of 5 mm thickness are used for the attachment of stiffner steel plate
* both parallel and perpendicular plates should be fillet weld on all sides and attach with both ISMC 250 section and 12 mm thickness gusset plate
* ISMC 250 web section both sides should be fillet welded with 6 mm thickness
* J (HSFG) bolt of length 950 mm should be anchored in concrete column and minimum 93 mm projection should be given
* The edge distance for the 25 mm dia anchor bolt is 50 mm.
* 5 numbers of stiffner steel plate (3 as perpendicular and 2 as parallel) are used

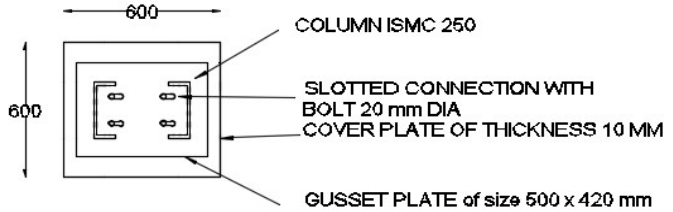
COLUMN CAP CONNECTION

SLOTTED BOLT CONNECTION

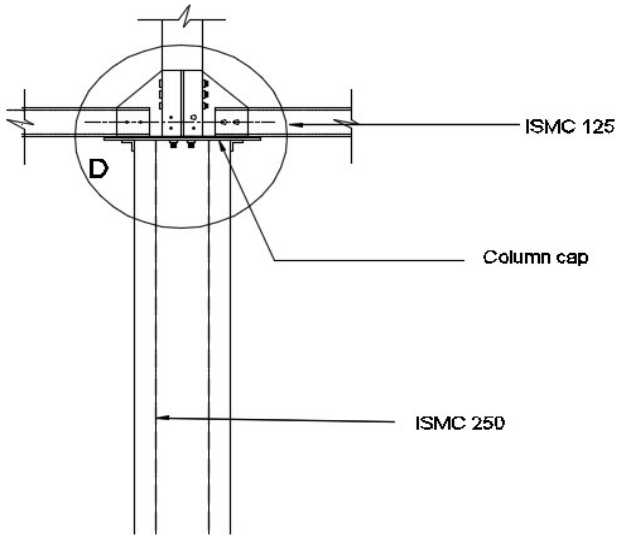
SIDE VIEW



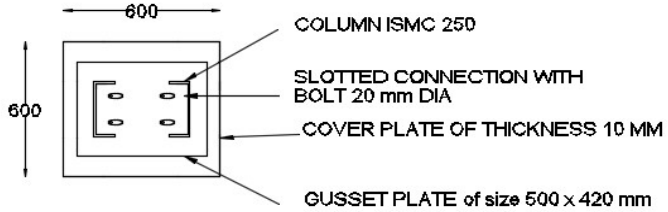
TOP VIEW

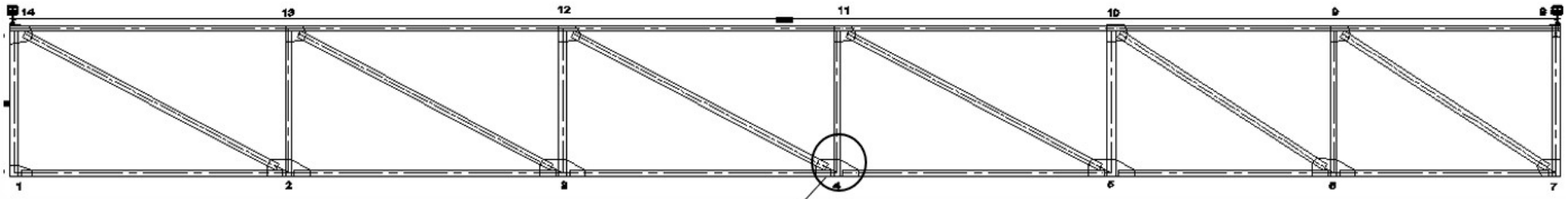


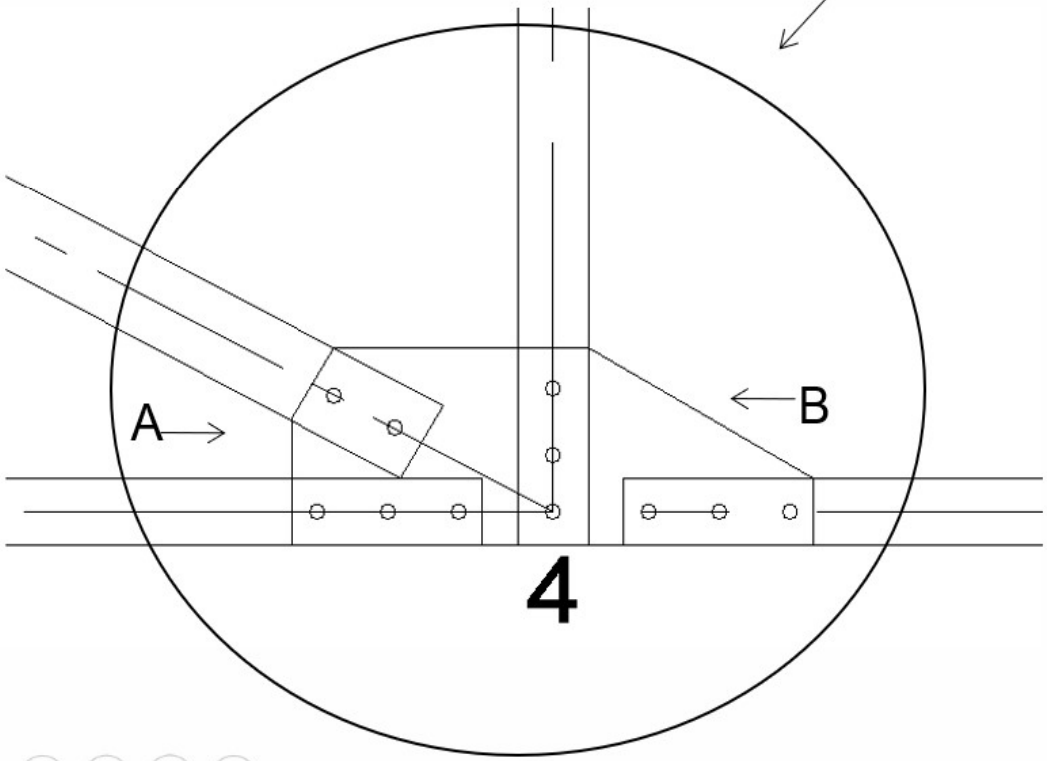
COLUMN CAP CONNECTION

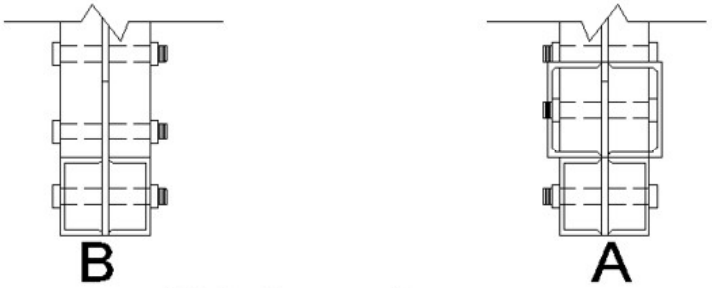


BOTTOM VIEW

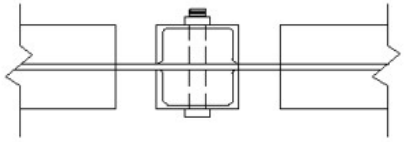




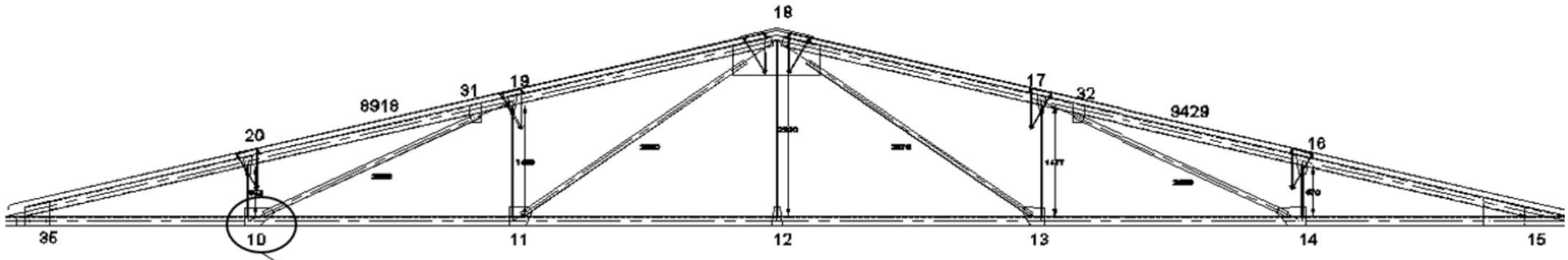


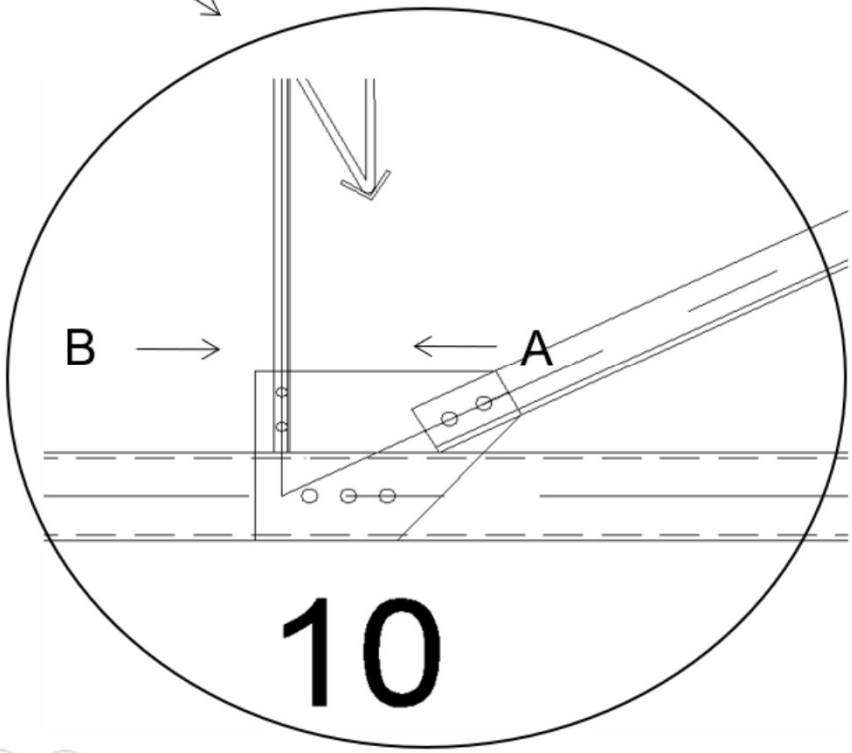


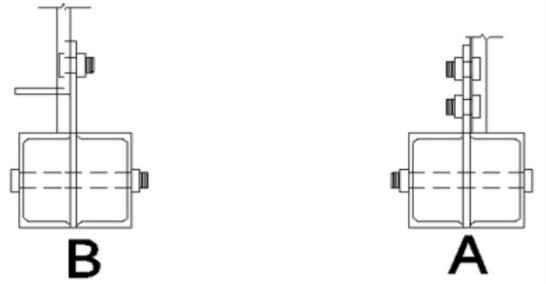
Side view



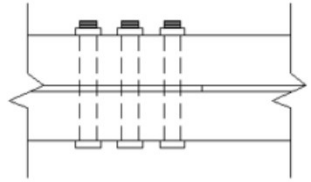
Top view



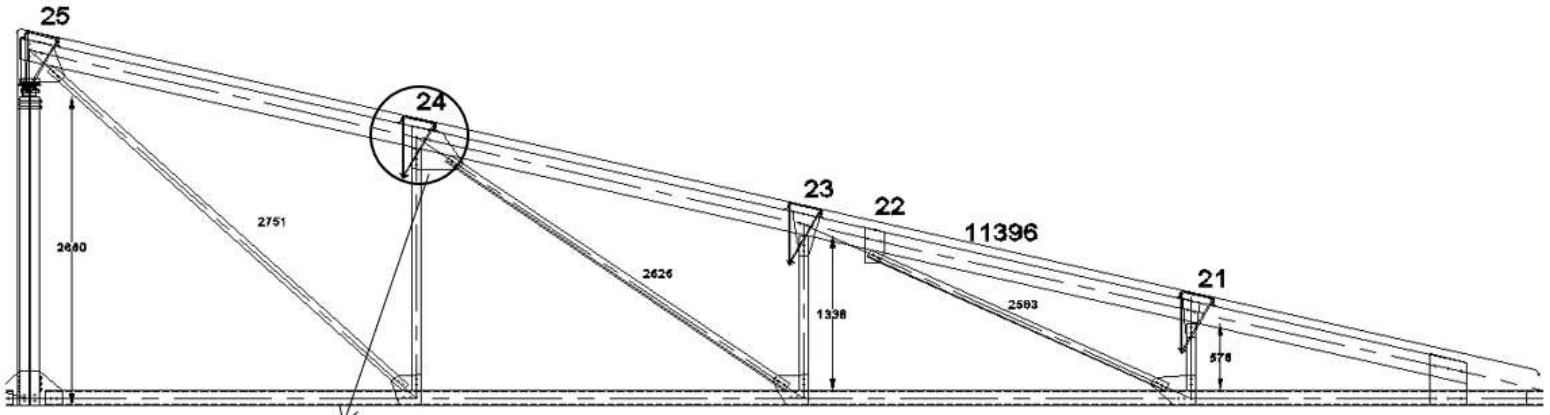


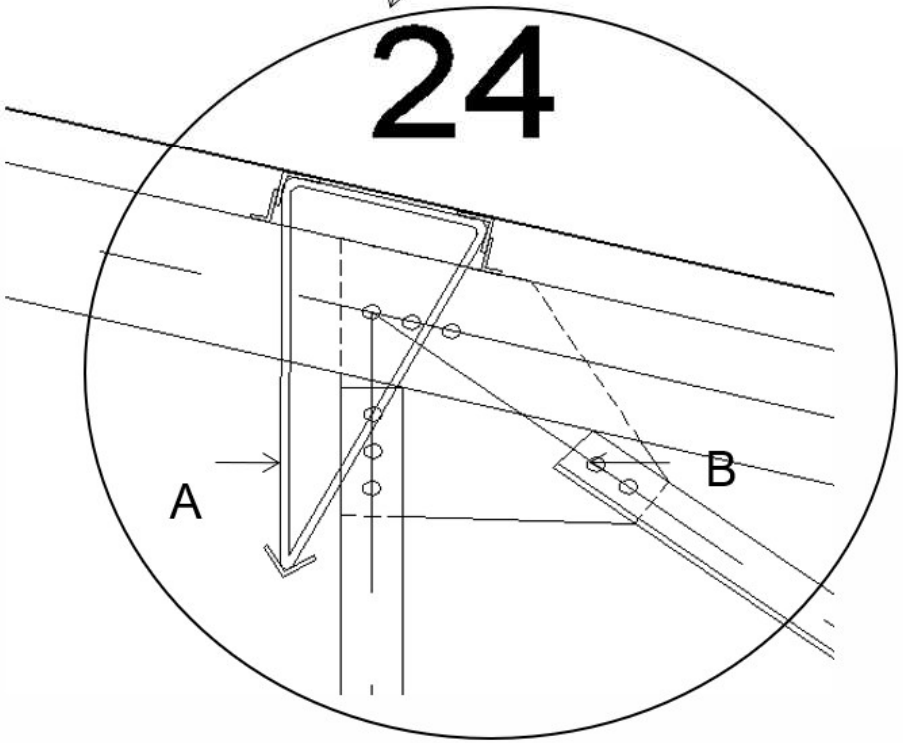


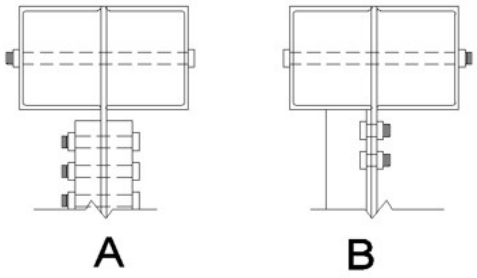
Side view



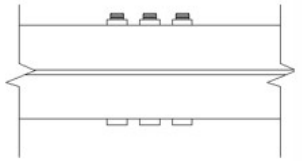
Bottom view







Side view



Top view

BILL OF QUANTITIES

SECTIONS	TOTAL WEIGHT	RATE /Kg	TOTAL RATE
ISMC 75	690.3	50	34515
ISMC 100	1134.912	50	56745.6
ISMC 125	2767.04	50	138352
ISMC 150	523.488	50	26174.4
ISMC 175	881.76	50	44088
ISMC 250	9857.7	50	492885
ISA 20 X 20 X6	12.256	40	490.24
ISA 70 X 70 X8	854.26	40	34170.4
PURLIN	6522	50	326100
J BOLT	318.62	45	14337.9
ANCHOR BOLTS	897	60	53820
STIFFENER PLATE	89.7	50	4485
GUSSET PLATE (COLUMN CAP AND BASE)	404.964	50	20248.2
LACING FLAT	2239.224	50	111961.2
TIE PLATE	908.932	50	45446.6
BOLTS IN COLUMN	927.912	45	41756.04
COLUMN CAP	824	50	41200
BOLT IN BASE PLATE	928.832	45	41797.44
FOUNDATION	1122.844	48	53896.512
PLINTH BEAM	10079.08	48	483795.84
RCC COLUMN	738.53	48	35449.44
PLATE IN TRUSSES	326.7	48	15681.6
BOLT IN TRUSSES	171.56	48	8234.88
OTHERS	8644.3228	50	432216.14