

YEAR – 2019-2020

COMPETITION TOPIC:

**STEEL INTENSIVE INNOVATIVE QUARANTINE CENTRE
BUILDING FOR COVID -19**

DESIGN OPTION

BY

3RD B Prize Winner – Team E-01

from

**Kalinga Institute of Industrial Technology, KIIT University,
Bhubaneswar, Odisha**



INS DAG

CIVIL AWARD COMPETITION 2019-20



STEEL INTENSIVE QUARANTINE CENTER BUILDING FOR COVID-19

PRESENTED BY : GROUP E-01

SOHAM DE (4th YEAR B.TECH, C.E)

DEBDATTA CHAKRABORTY (4th YEAR B.TECH, C.E)

SOURAV PAUL (M.TECH 1st YEAR, S.E)

SHUBHAM SINGH (4th YEAR B.TECH, C.E)

GUIDED BY:

PROF. (DR.) PURNACHANDRA SAHA

KIIT DEEMED TO BE UNIVERSITY, BHUBANESWAR

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CONTENT

- ✓ INTRODUCTION
- ✓ PARAMETER GIVEN
- ✓ UNIQUENESS OF OUR DESIGN
- ✓ SCHEME DEVELOPED
- ✓ LOADING
- ✓ ANALYSIS
- ✓ DESIGN
- ✓ CONNECTIONS / JOINTS
- ✓ DETAILED DRAWINGS
- ✓ BILL OF QUANTITIES
- ✓ PROJECT DURATION
- ✓ SPECIAL MENTION



PARAMETERS GIVEN

- Site Location : Kolkata, West Bengal
- Area of Storage Down : 50 m × 35 m
- Roof Structure : To be covered with Color Coated Steel Sheet
- Minimum Eaves height : 7 m
- No. of Storage : 1 level
- Column/ Bay Spacing : 6 m



UNIQUENESS OF DESIGN



For Longer span **2D Curved Truss** has been selected which reduces the truss height

Uses of **PUF Panels** to cover the sides of structure

Tubular Section is used for design of Truss.



Natural Air Ventilation Technique adopted from **Ancient Technology**

Manual **MS Excel** worksheets & **Detailed Drawings** have been prepared

Parallel Flange Section (SAIL) is used for Economy & Ease of Construction

Sag rod are used to reduce the lateral bending and twisting.

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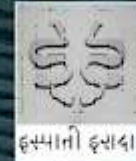
LOADING

Design loads considered with their following IS codes :

- Dead Load - As per IS: 875 Part 1-1987
- Live Load - As per IS: 875 Part 2-1987
- Wind Load - As per IS: 875 Part 3-2015
- Seismic load - As per IS: 1893 (Part 1) -2016
- A temperature variation of 15oC has been considered.
- Load Combinations considered : 12 different combinations
- DL, 1.5(DL+IL), 1.5(DL+ WL), 1.5(DL+EL), 1.5(DL+TL), 1.2(DL+IL+ WL), 1.2(DL+IL+EL), 1.2(DL+ IL+ TL), 1.2(DL+ WL+TL), 1.2(DL+EL+ TL), 1.2(DL+IL+WL+TL), 1.2(DL+IL+EL+TL)



DEAD LOAD



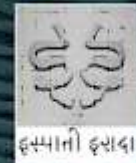
Dead load: (IS 875 Part I)

Weight of roof covering (IS 875 Part - I, Table 1, 39)
GCI Sheet – 85 N/m^2
per 1 mm thick

Weight of purlins – 0.07
to 0.15 kN/m^2 plan area

Weight of truss 0.09
to 0.15 kN/m^2 plan
Area and Weight of
purlins - 0.7 to 0.15
 kN/m^2

LIVE LOAD



Live load (IS875 Part 2)

$\theta \leq 10^\circ$
LL = 0.75 kN/m²
plan area

$\theta > 10^\circ$ The live load is reduced
by 20N/m² each one degree
above 10 degree slope
LL = 0.75 - 0.02(θ - 10) kN/m²
plan area

LL Not less than
0.4 kN/m² plan area
 θ = Slope of the truss

WIND LOAD



Wind load (IS875 Part 3)

$$p_z = 0.6 V_z^2$$

where

$$P_z = 1342.374$$

(wind pressure in N/m^2 at height z)

$V_z = 47.3$ (design wind speed in m/s at height z).

The design wind pressure p_d can be obtained as,

$$p_d = 1.075 \text{ KN/m}^2 (K_d \times K_a \times K_c \times V_z)$$

Where, $K_d = 0.9$ (Wind directionality factor)

$K_a = 0.9$ (Area averaging factor)

$K_c = 1$ (Combining factor)

$$\text{Design wind speed } (V_z) = 47.3(k_1 k_2 k_3 k_4 V_b)$$

$K_1 = 1$ (Risk coefficient depends upon basic wind speed and importance of structure)

$K_2 = 0.946$ (Terrain, height, and structure size factor)

$K_3 = 1$ (Topographical factor)

$K_4 = 1$ (Importance factor for the cyclonic region)

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ANALYSIS

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ANALYSIS



STAAD.Pro V8i (SELECTseries 5) - [final model] - Rendered View

File Edit View Tools Select Geometry Commands Analyze Mode Window Help

Modelina Postprocessing Steel Design Concrete Design Foundation Design RAM Connection Bridge Deck Advanced Slab Design Fields Earthquake

Setup Job

Geometry

General

Analysis/Post

Design

For Help, press F1

Type here to search

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05-10-2021

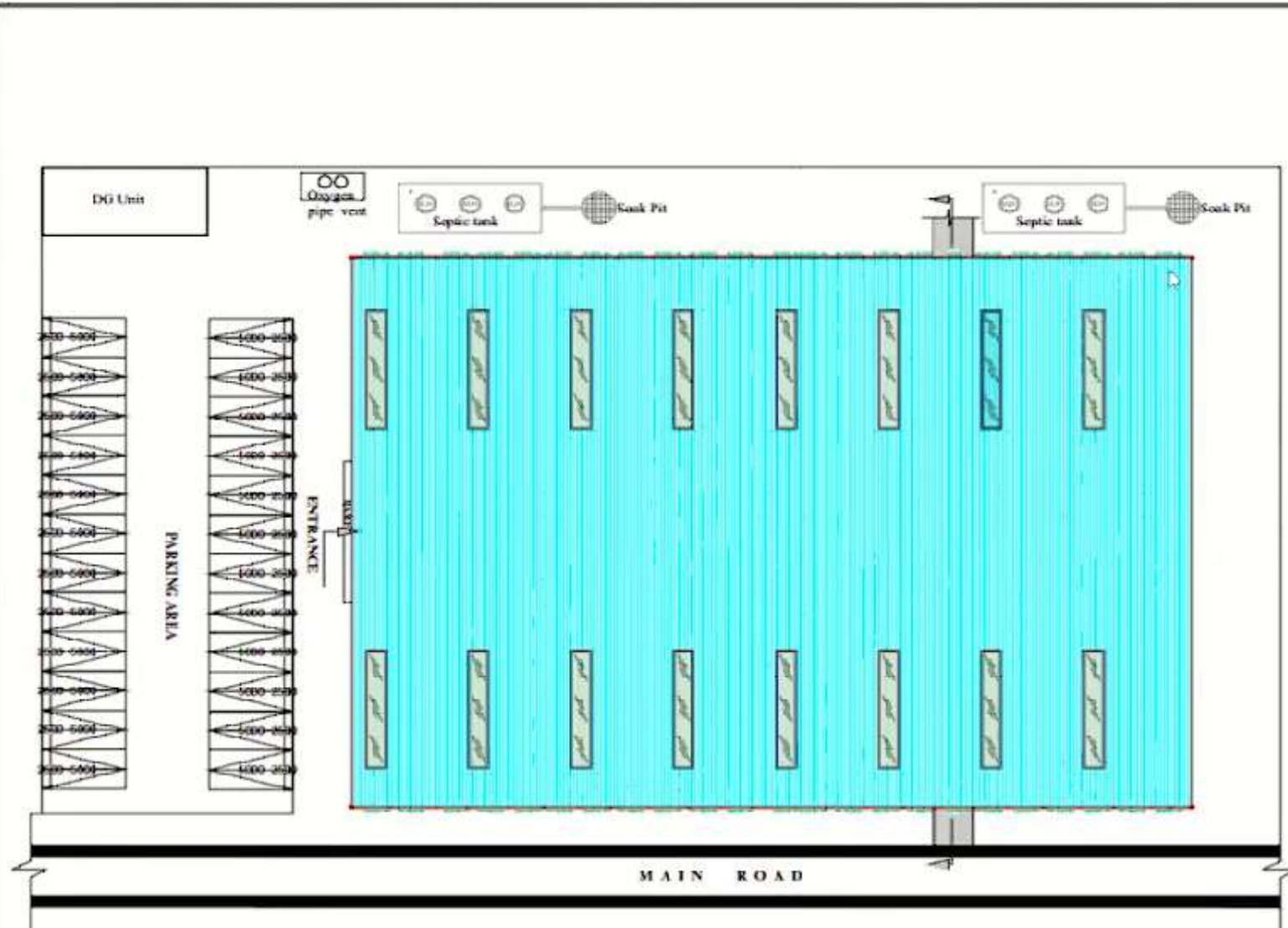
15

STRUCTURAL DESIGN



Structural design of each and every member was done manually. For the design we followed the latest IS codes.

- Steel Design - As per IS: 800-2007
- Concrete Design - As per IS: 456-2000
- Dead Load - As per IS: 875 part 1-1987
- Live Load - As per IS: 875 part 2-1987
- Wind Load - As per IS: 875 part 3-2015
- Seismic load - As per IS: 1893 part 1-2016
- Rolled sections and plates - As per IS: 2062-2011
- CHS – As per IS: 1161-1998
- Symbols for welding - As per IS: 813-1986
- Weld joint details - As per IS: 9595-1996



NOTE:-

1. All dimensions are in "mm"
2. Scale 1:225
3. Take A3 Print

QUARANTINE CENTRE -TOP VIEW

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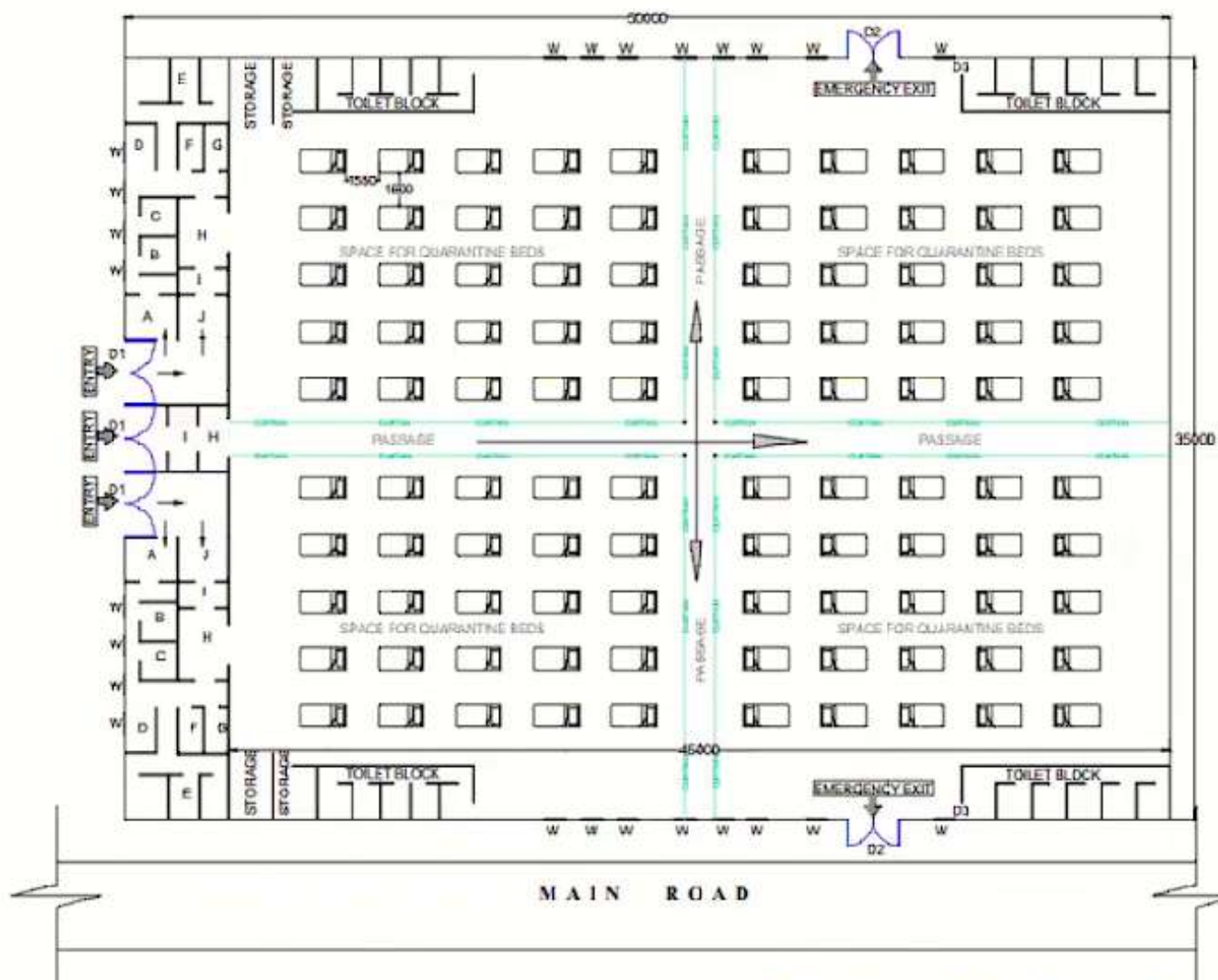
Submitted by:- Group- E 01
KIIT Deemed to be University
Bhubaneswar

DRAWN BY:- Group E-01
DESIGNED BY:- Group E-01
CHECKED BY:-

APPROVED BY:-

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DWG NO:-
INSDAG/KIITE-01/2019-20/1



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NOTE:-
 1. All dimensions are in "mm"
 2. Scale 1:180

DOOR WINDOW SCHEDULE.

Symbol	Height	Width
D1	2200	3000
D2	2200	2400
D3	2200	760
W	1200	1600

SYMBOL	REMARK
A	Doctors/Nurse Entrance & Lounge
B	Nurse Room
C	Changing Area
D	Sanitization Area
E	Toilet
F	Doctor's Chamber
G	Doctor's Chamber
H	Entrance to Hall
I	Disinfection Shower
J	Patient Entrance

QUARANTINE CENTRE - FLOOR PLAN

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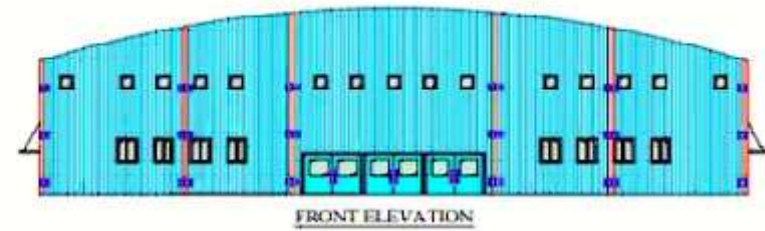
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DESIGNED BY:- Group E-01

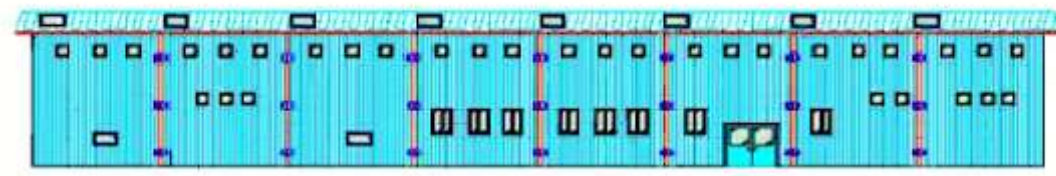
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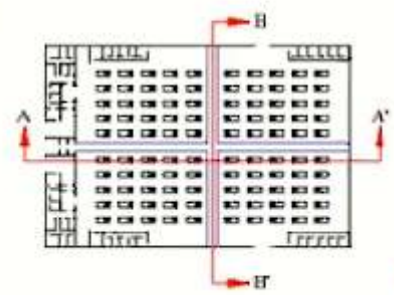
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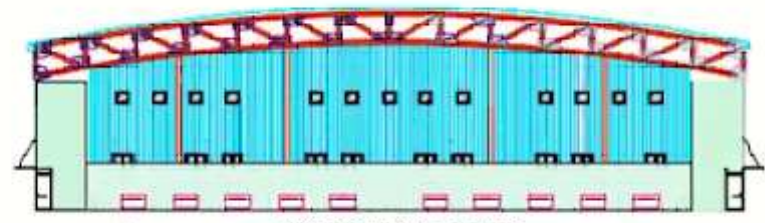
FRONT ELEVATION



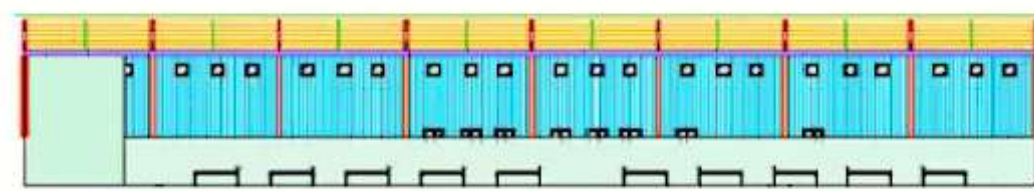
SOUTH SIDE ELEVATION



SECTION PLANE



SECTION ALONG BB' AXIS



SECTION ALONG AA' AXIS

NOTE:-
1. All dimensions are in "mm"
2. Scale 1:225

ELEVATION & SECTION

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DRAWN BY:- Group E-01

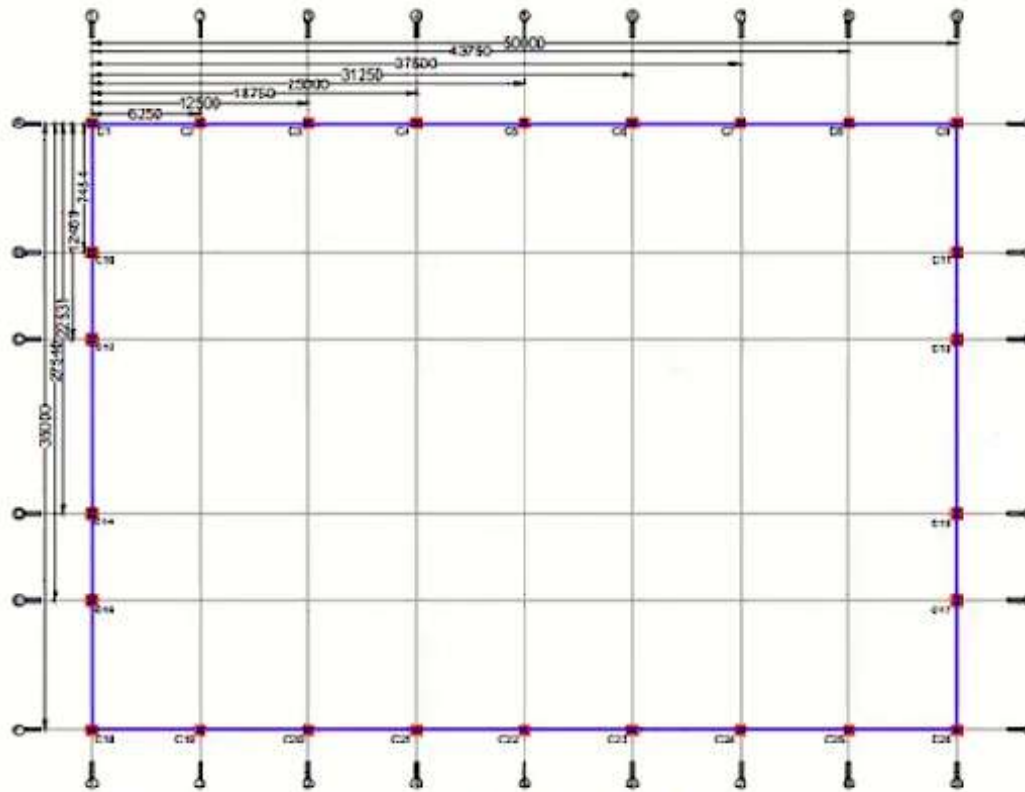
DESIGNED BY:- Group E-01

CHECKED BY:-

APPROVED BY:-

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BEAM COLUMN PLAN (Scale- 1:250)



NOTE:-

1. All dimensions are in "mm"

2. Scale 1:200

BEAM COLUMN SCHEDULE

COLUMN C1-C26	ଫ୍ୟାମିଲି ଫ୍ରେମି
BEAM A-A, F-F	ISMC 175
BEAM 1-1, 9-9	ISMC 250

SECTIONS USED:-



WPB 260X260 (SAIL)
Scale-1:16



ISMC 175 (Standard)
Scale-1:10



ISMC 250 (Standard)
Scale-1:10

BEAM COLUMN PLAN & BEAM COLUMN CONNECTION DETAILS

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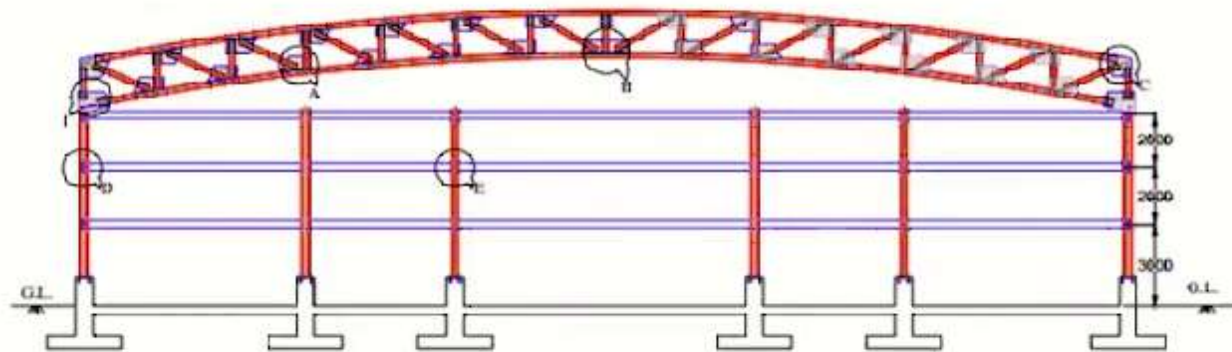
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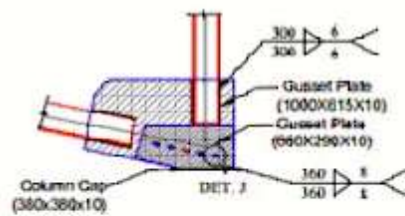
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TRUSS ARRANGEMENT



DETAIL - I
(Scale 1:30)



DETAIL - J



NOTE:-

1. All dimensions are in "mm"
2. Scale 1:150

TRUSS ARRANGEMENT

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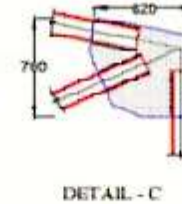
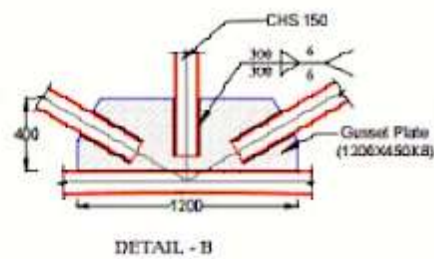
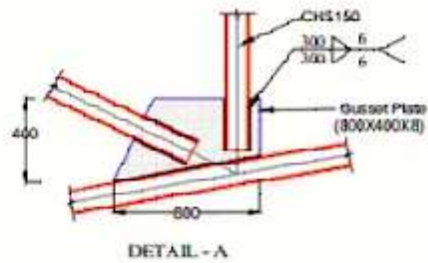
DRAWN BY:- Group E-01

DESIGNED BY:- Group E-01

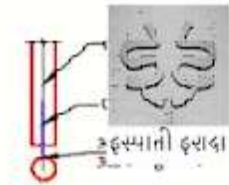
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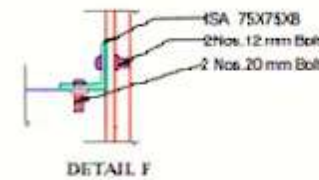
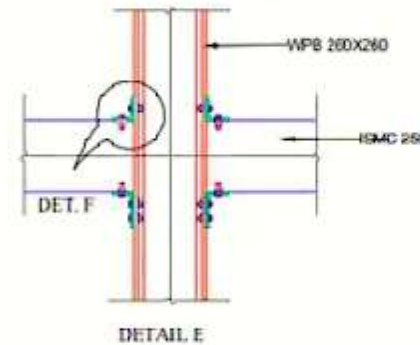
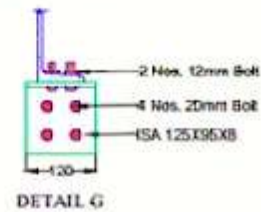
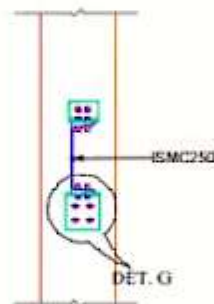
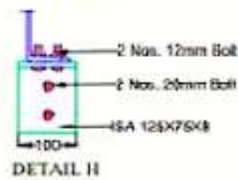
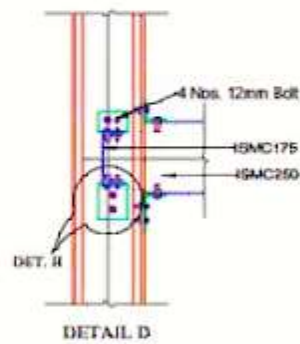
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TRUSS CONNECTION DETAILS (Scale- 1:30)



INDIVIDUAL TRUSS MEMBER AND GUSSET PLATE CONNECTION (Scale- 1:15)



BEAM COLUMN CONNECTION DETAILS *National Student Competition on Steel Design*

NOTE:-

1. All dimensions are in "mm"
2. Scale 1:150

MISCELLANEOUS CONNECTION DETAILS

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