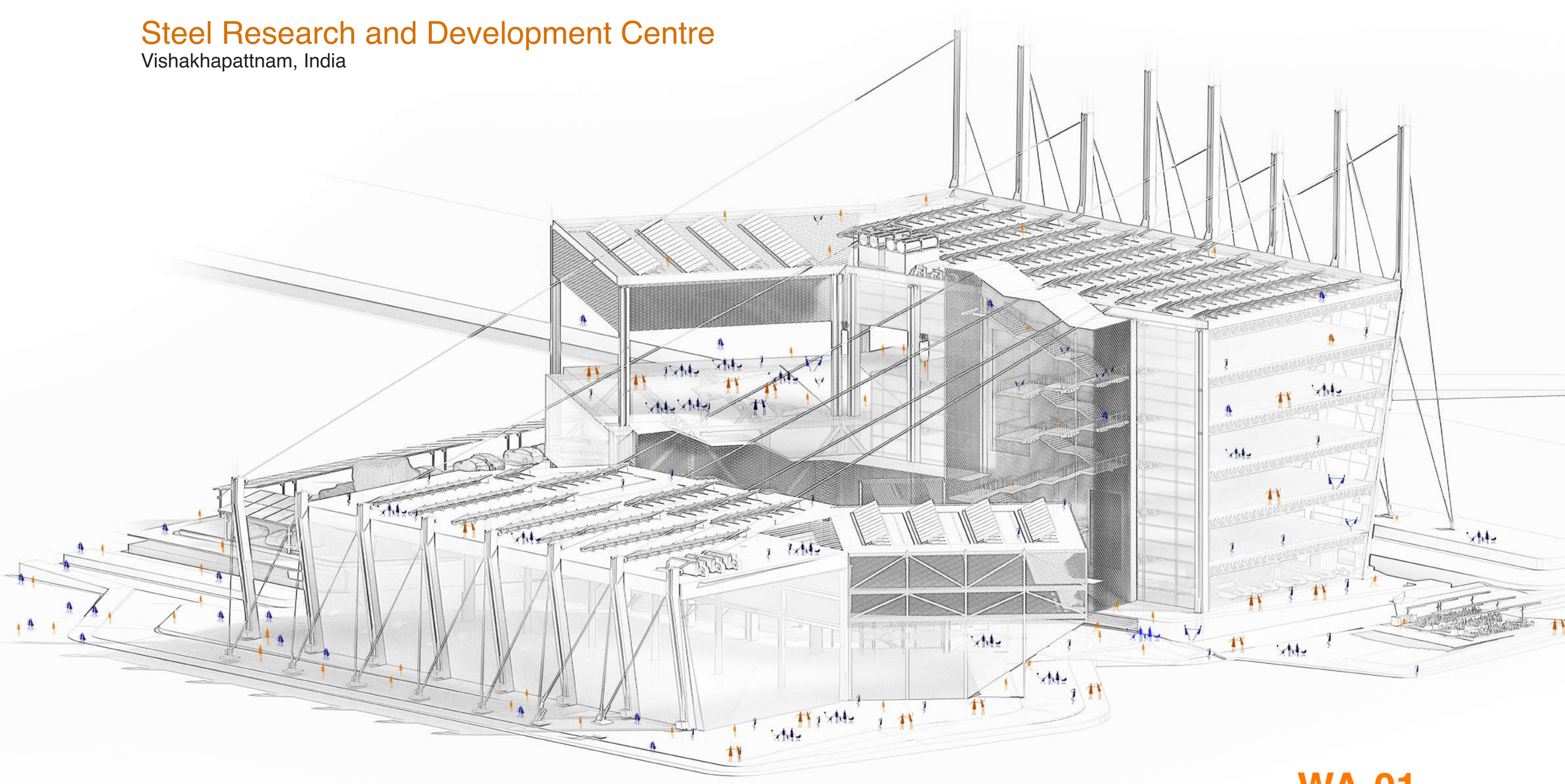
ARGO NAVIS

Steel Research and Development Centre

Vishakhapattnam, India



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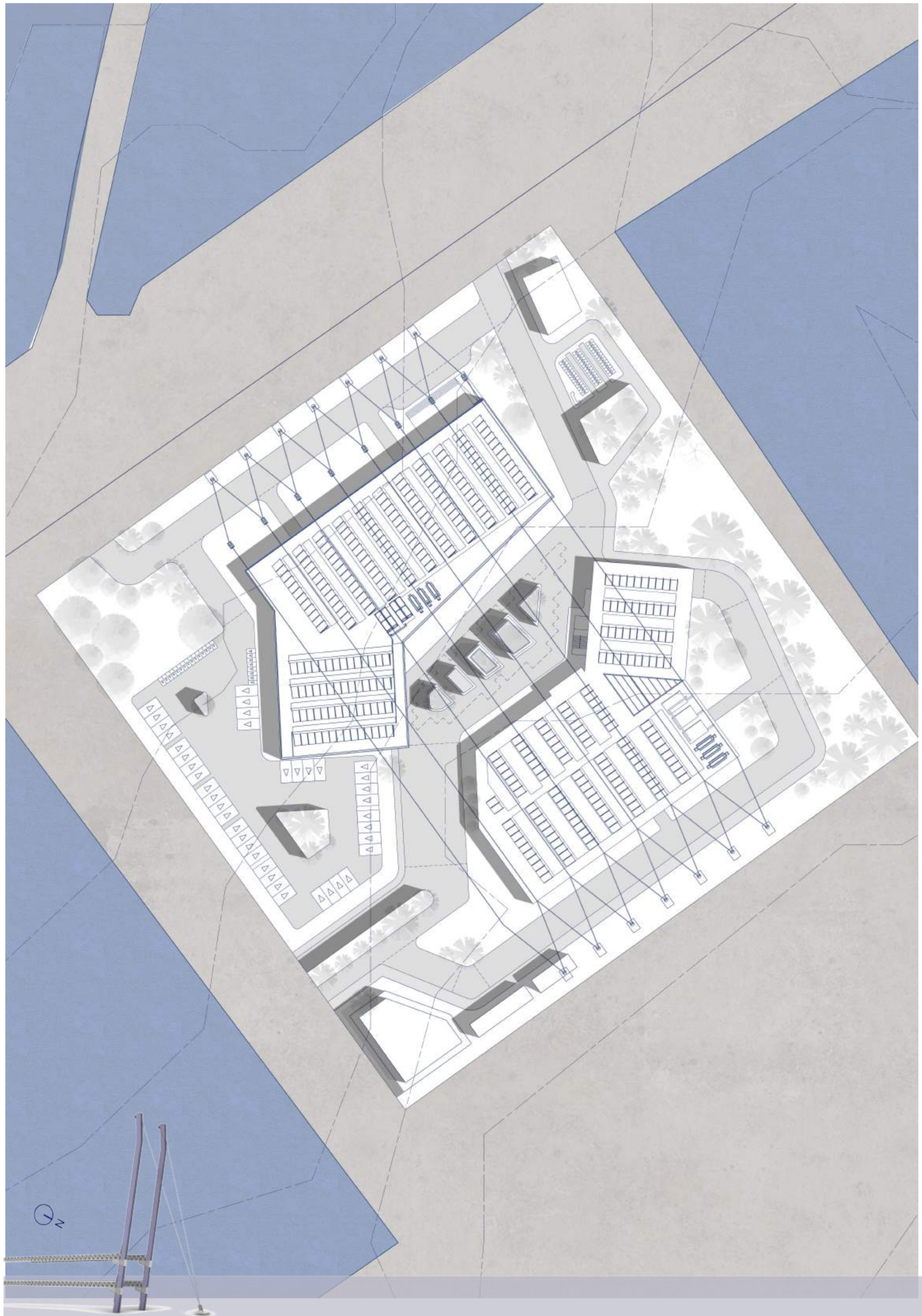


ARGO NAVIS

STEEL RESEARCH AND DEVELOPMENT CENTRE

CONCEPT SHEET

Vishkapatnam is known for its coast line and has completed 81 years of establishment.The coast has modified from a small mud dock to one of the major contributors to the vessel building domain in the country.Vizag is also known for its Steel Industries.

The structure combines both of these aspects of vizag to build a magnificien structure and to establish its own identity amongnst others!

Structure is a resemblence of a boat and a ship. The main idea behind was to narrate the history of ship building by using elements native to ship building.

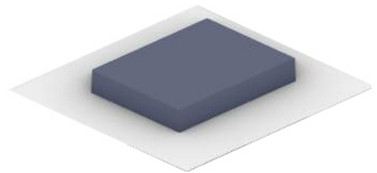
Location : Vizag,Vishakapatnam
Climate : Tropical with heavy rainfall
Stage of project : Proposed
Total Site Area : 19600 m2
Permissible built up : 9,800 m2
Permissible ground coverage : 3797 m2
Estimated Built up area: 2827 m2
Purpose : R & D Centre

AREA STATEMEMENT

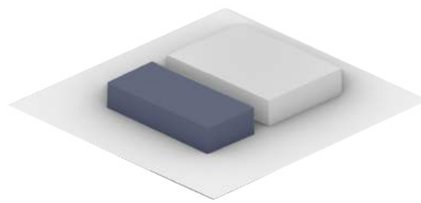
AREA STATEMENT

Sr no.	Space	Typology	Total area (SQM)
GROUND FLOOR			
1	Reception and waiting area		290
2	parking		138
FIRST FLOOR			
2	Lounge cum café		670
3	Auditorium		1490
4	Kitchen		70
5	Washrooms		85
SECOND FLOOR			
6	Reception and waiting area		150
7	Seminar Room		360
8	Workspaces		775
9	Washroom		40
10	Pantry		60
THIRD FLOOR		**ADMIN BLOCK**	
11	Reception and waiting area		140
12	Workspaces		590
13	Library		100
14	Washroom		40
15	Pantry		50
FOURTH FLOOR			
16	Reception and waiting		270
17	Board room		250
18	cabin 1		40
19	cabin 2		40
20	cabin 3		40
21	cabin 4		40
22	Small cabin 1		12
23	Small cabin 2		12
24	Small cabin 3		12
25	Pantry		60
26	washroom		30
FIFTH FLOOR			
27	Reception and waiting		130
28	Seminar 1		410
29	Seminar 2		250
30	Cabin 1		22
31	Cabin 2		22
32	Cabin 3		22
33	Storage		25
34	Pantry		60
35	Washroom		40
GROUND FLOOR			
36	Loading Unloading		100
37	Raw material Storage		200
38	Coke making		
39	Iron Agglomeration		
40	Steel Making		
41	Foundry	**PILOT BLOCK**	
42	Metal Forming		
LABS			
43	Raw material Characterization		
44	Material Characterization		
45	Advance Material Characterization		400
FIRST FLOOR			
46	Ceramics		120
47	Phase Transformation		140
48	Process Lab		150
SECOND FLOOR			
49	Microscopy Lab		100
50	Corrosion Lab		130
51	Simulation and Computer modelling		100
52	Energy nd environment lab		150

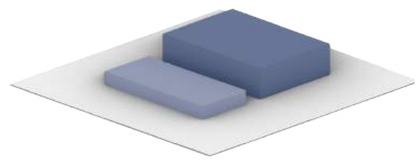
SECTIONAL ZONING



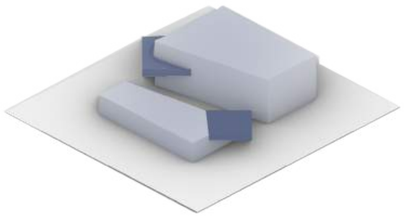
1) Placment of mass on site.
-Understanding the volume of the structure according to the



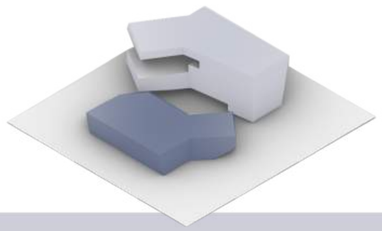
2)Creation of open spaces.
-Breaking of mass into two equal parts.
-Creation of open spaces.



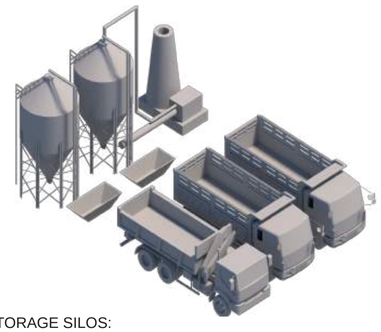
3)Further Division
-Slicing of blocks to create aerodynamic forms.



4)Epiphyte addition
-Addition of epiphytes on both structures.
-Provides shading on site

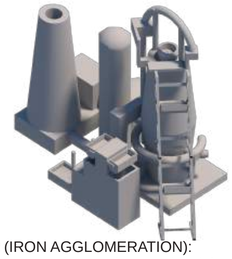


5)Final form
-North-South orientation of mass.
-Central open spaces.

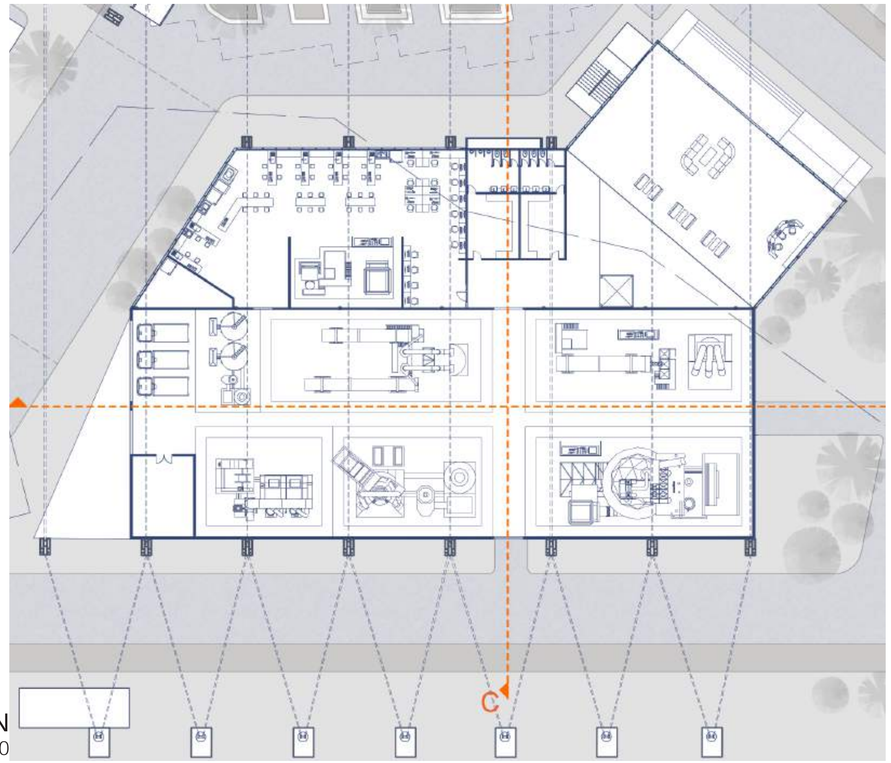


1.STORAGE SILOS:
A storage silo in a steel plant functions to store and manage raw materials (such as iron ore, coal, and limestone) and intermediate products, ensuring a steady supply for the steelmaking process, facilitating inventory management, and supporting efficient logistics.

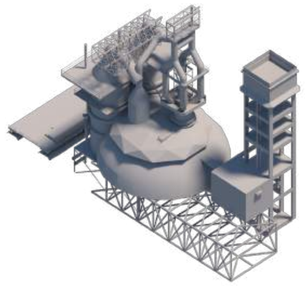
2.COKE OVEN:
A coking oven in steelmaking serves to convert coal into coke, a high-carbon fuel. Coke is a crucial material in the blast furnace process, providing heat and serving as a reducing agent to extract iron from iron ore during steel production.



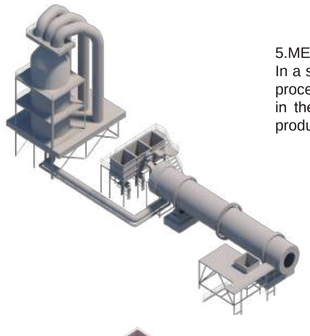
3.SINTER (IRON AGGLOMERATION):
A sinter in steelmaking enhances blast furnace efficiency by agglomerating iron ore fines, improving permeability, and aiding in the production of molten iron.



PILOT FACILITY PLAN
SCALE 1:500

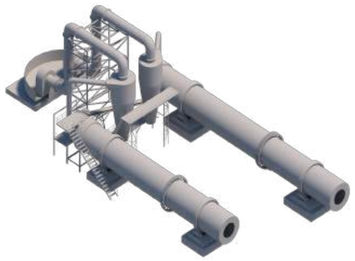


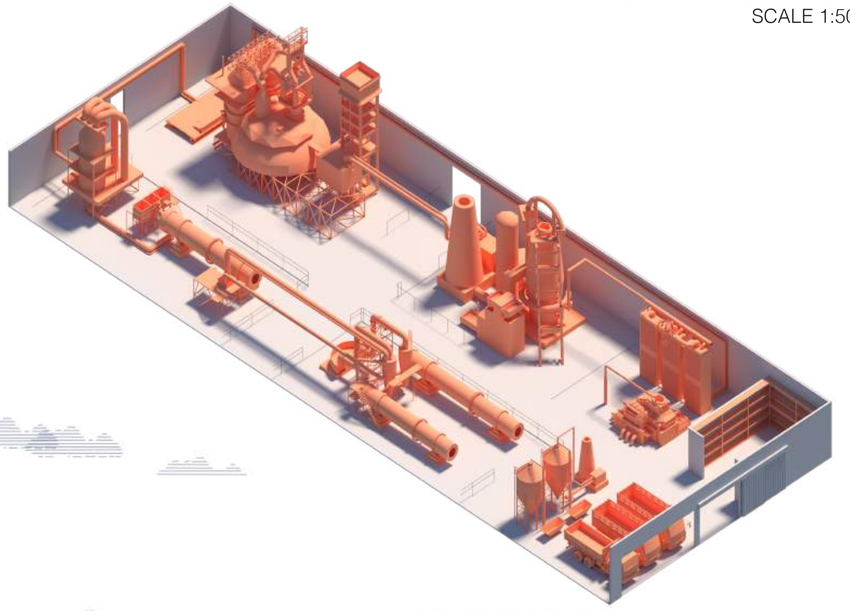
4.BASIC OXYGEN FURNACE:
The function of a basic oxygen furnace (BOF) in steelmaking is to convert liquid pig iron into steel by blowing oxygen through the molten metal. This process removes impurities and adjusts the composition, producing high-quality steel for various applications.



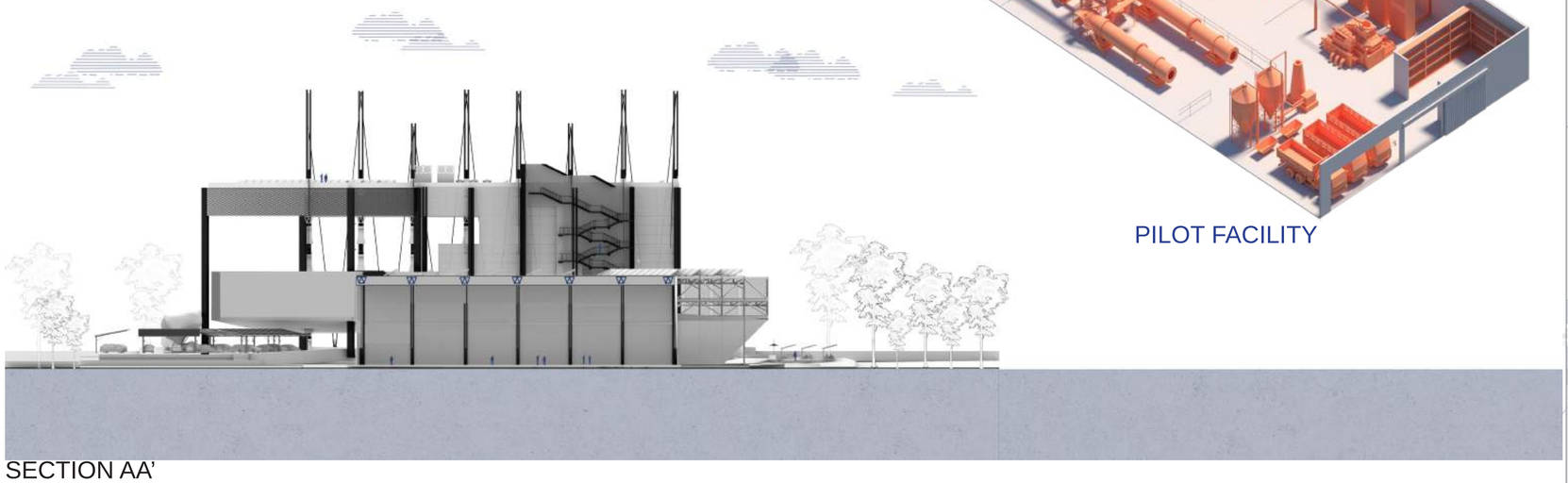
5.METAL FOUNDRY:
In a steel plant, a foundry plays a pivotal role in the production process. Its primary function is to transform raw materials, often in the form of scrap metal or alloys, into specific shapes or products through the process of casting.

6.METAL FORMING:
A metal casting machine in steelmaking serves the crucial function of shaping and forming molten metal into specific products through a casting process. The primary steps involved in this process include melting the metal, pouring it into molds, and allowing it to solidify.

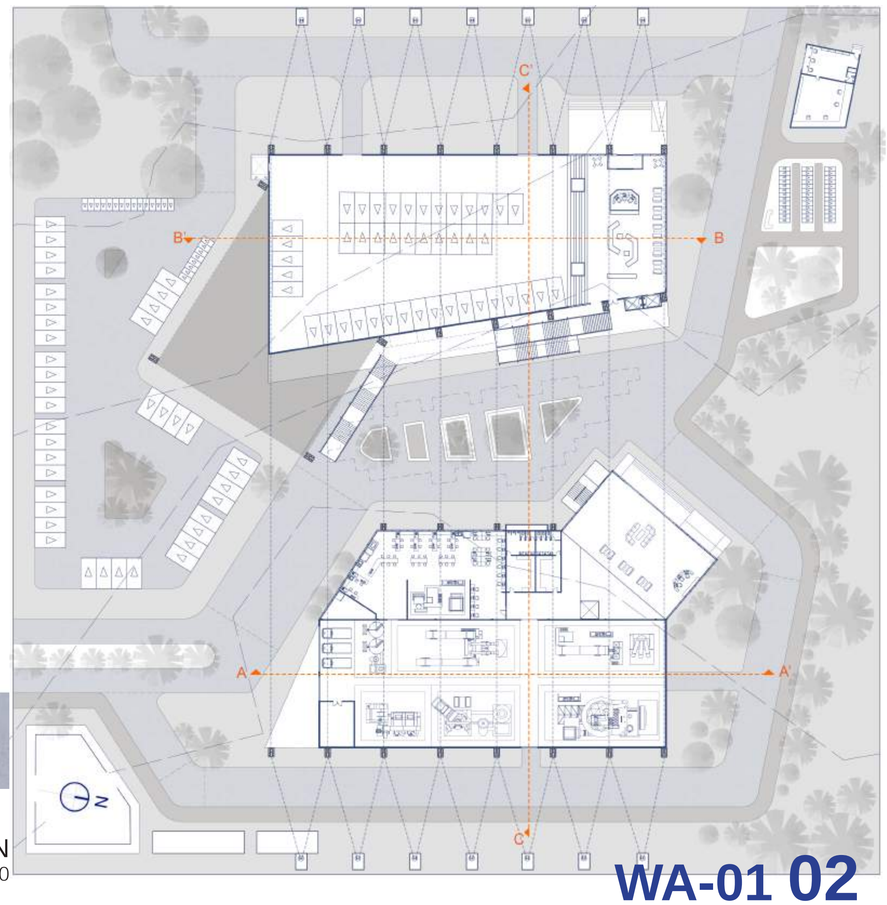




PILOT FACILITY

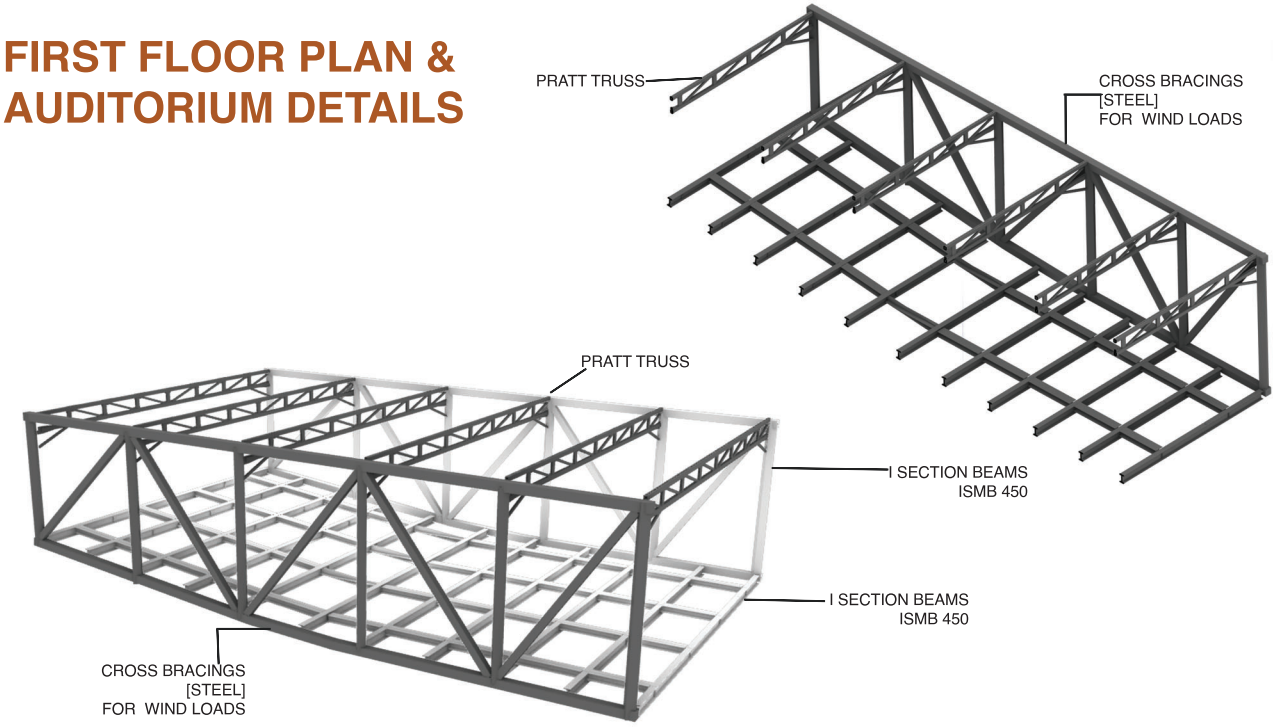


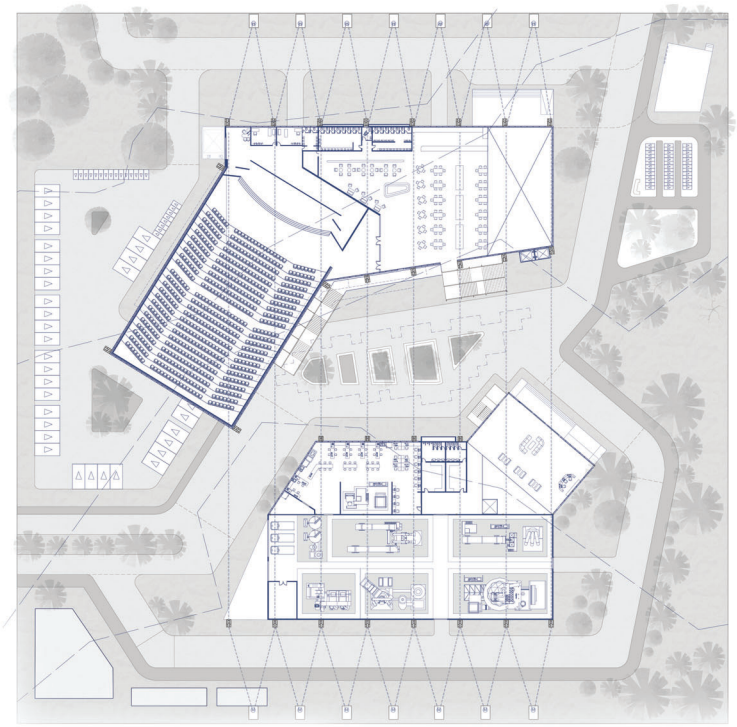
SECTION AA'
SCALE 1:500



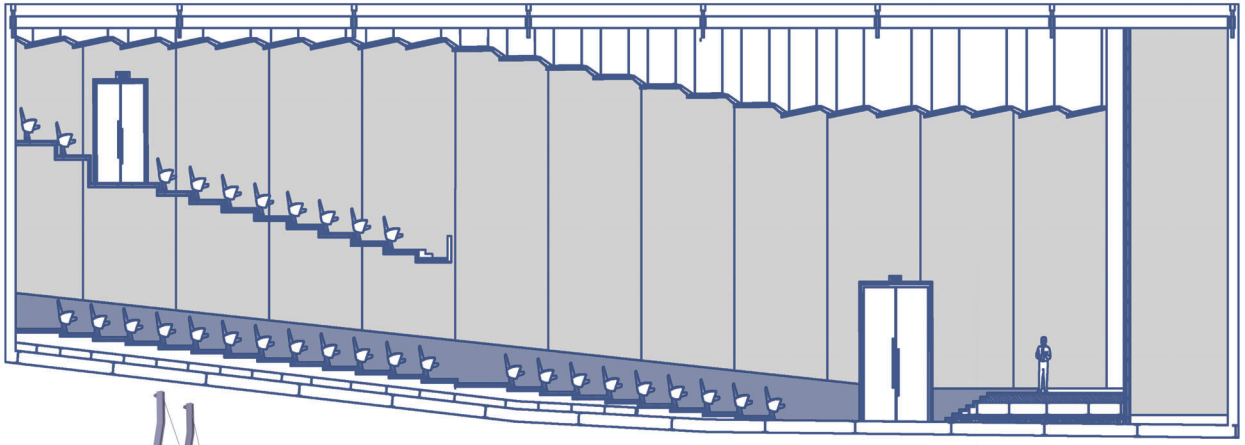
GROUND FLOOR PLAN
SCALE 1:500

FIRST FLOOR PLAN & AUDITORIUM DETAILS





FIRST FLOOR PLAN
1:500

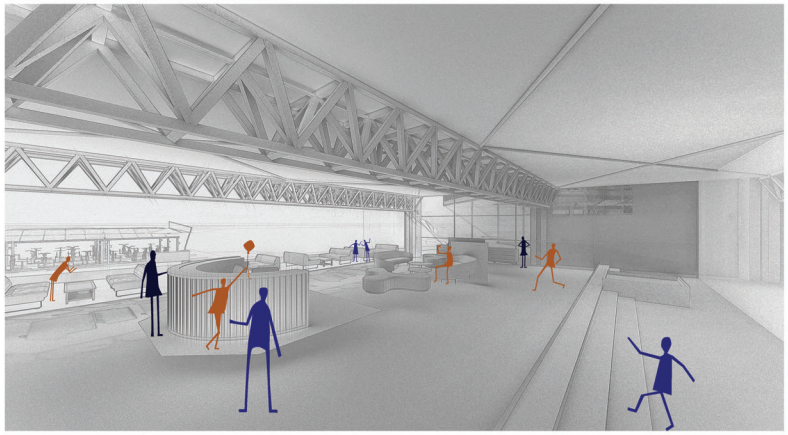


AUDITORIUM SPOT SECTION

-Section through auditorium showing all construction details.

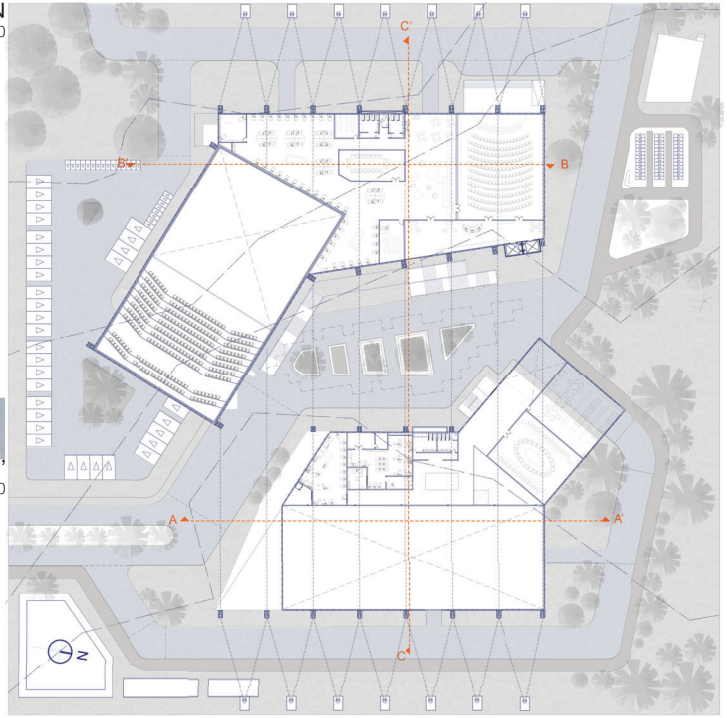
-1000 capacity seating

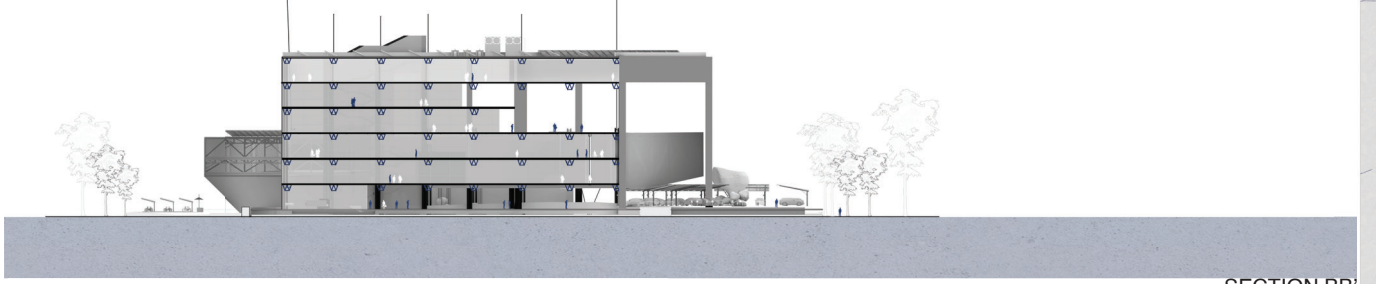
-600 one one level and 400 on another



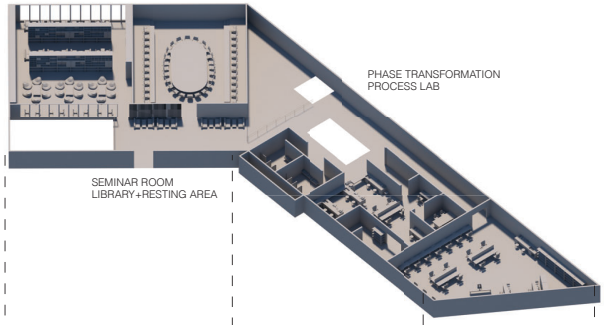
WAITING AREA

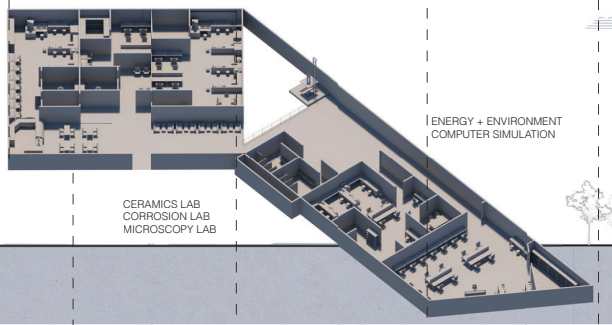
SECOND FLOOR PLAN
SCALE 1:500



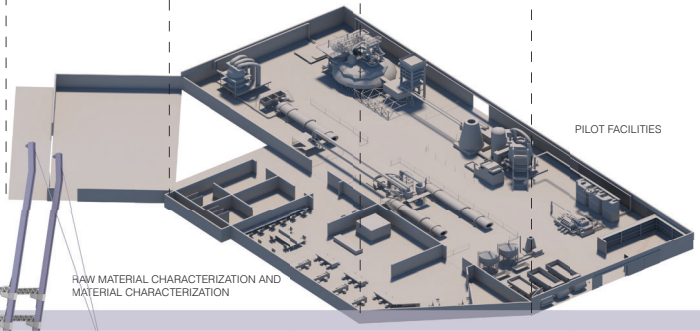


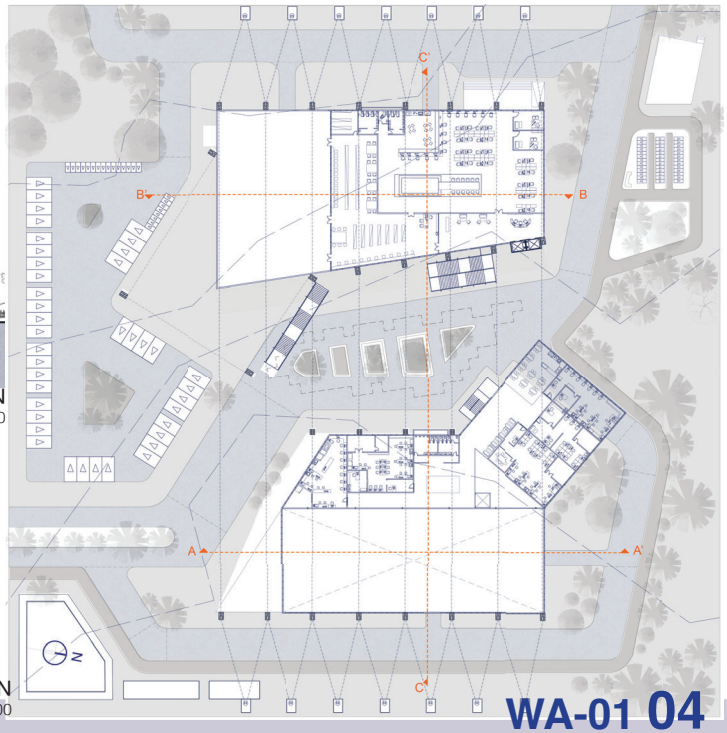
SECTION BB'
SCALE 1:500





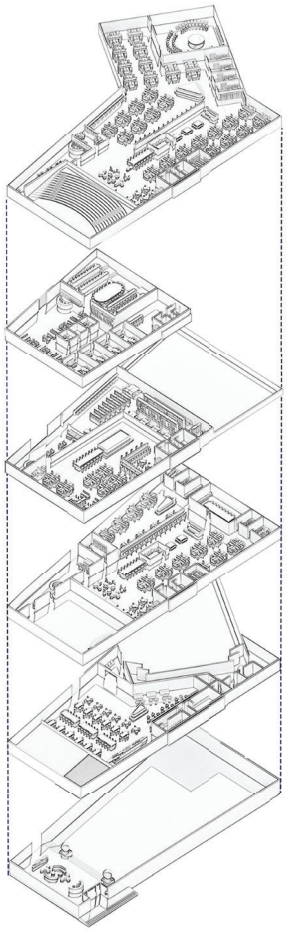
EAST ELEVATION
SCALE 1:500





THIRD FLOOR PLAN
SCALE 1:500

ZONAL AXONONOMETRIC
(ADMIN BLOCK)



FIFTH FLOOR
- IPR activity cell
Administrative cell and F&A cell
-50 people seminar room
-250 people seminar room

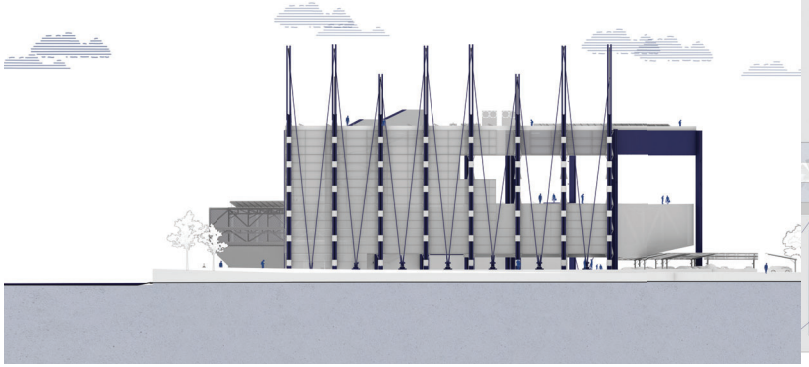
FOURTH FLOOR
- Board room
-HOD's

THIRD FLOOR
- Library
-Open space (terrace)
-Knowledge management cell

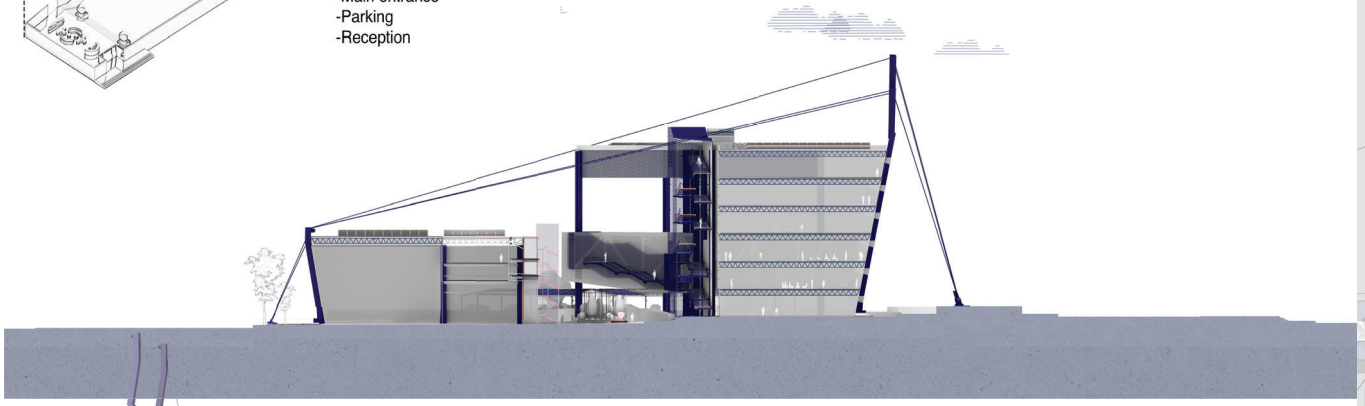
SECOND FLOOR
-250 people seminar room
-Technology management cell
-Planing and Procurement cell

FIRST FLOOR
-Auditorium entrance
-Cafeteria
-Auditorium Pre-function

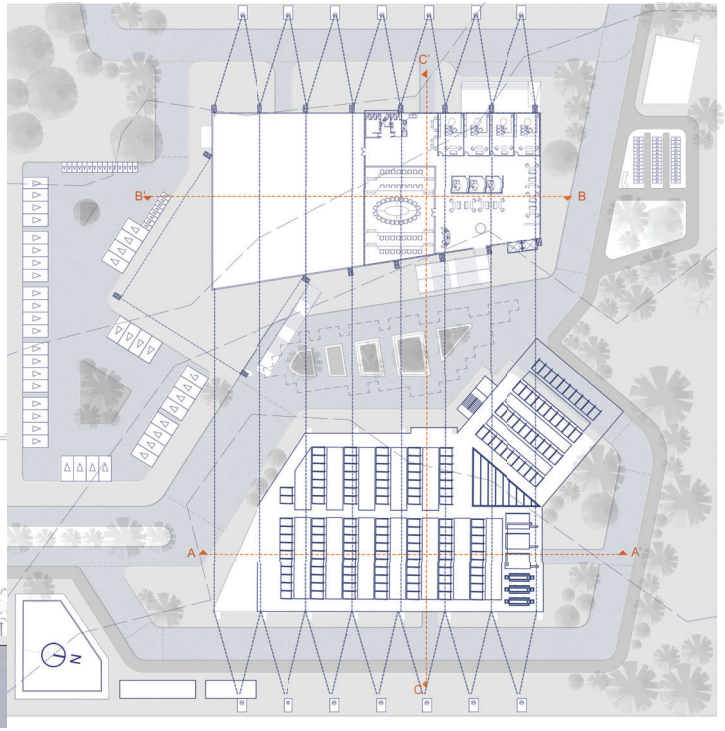
GROUND FLOOR
-Main entrance
-Parking
-Reception

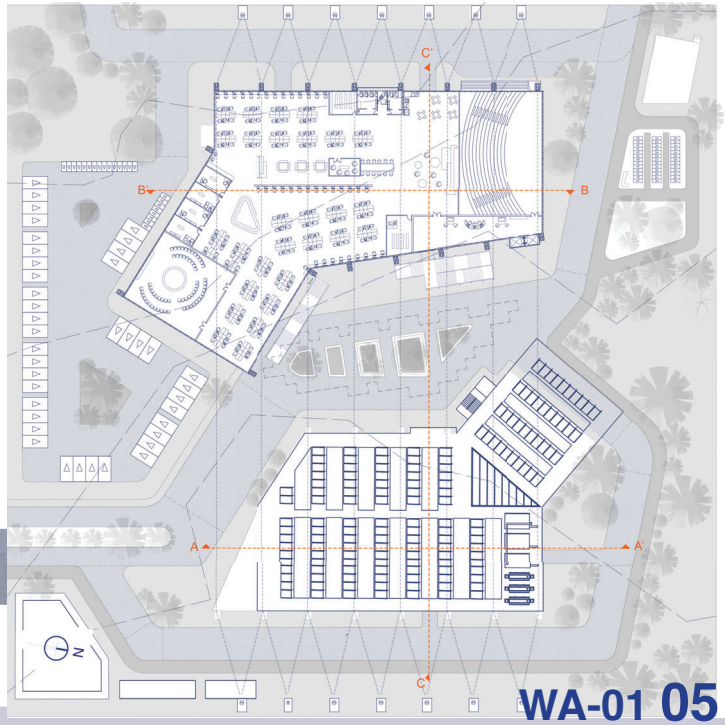


WEST ELEVATION
SCALE 1:500

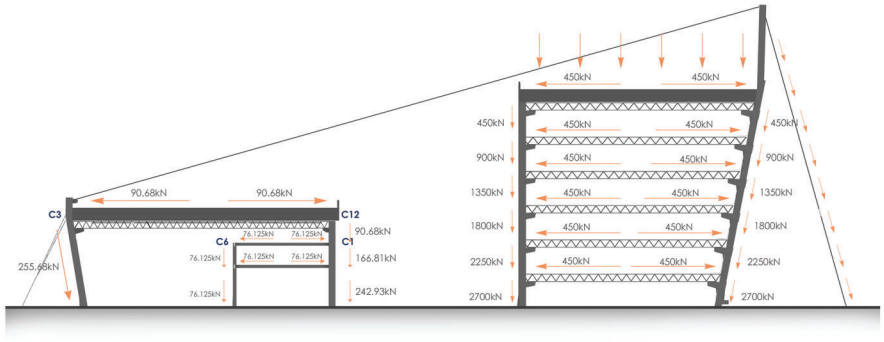


SECTION BB'
SCALE 1:500





STRUCTURAL DETAILS



Total slabs= 6
Total trusses= 48
22x5= 110
110x8= 880 steel rods in one slab

a2= b2+c2
h2= (0.4)2+12
h2= 0.16+1
h = 1.07

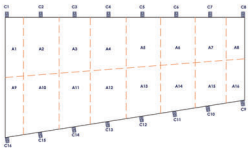
7850 kg/m3 x volume of one rod
=7850 x (0.1 x 0.1 x 1.07)
=83.9 or 84 kg or 840 N

840 x 880 = 739200N= Dead load of steel in 1 slab

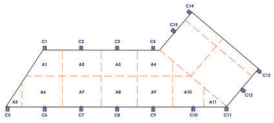
Vinyl= 2100 kg/m3
Area of one slab = 1792.38 m3
Volume = 1792.38x0.012 m = 45168 kg = 451680 N
Dead load + floor finish load= 739 + 452 = 1191 kN

Live load= 488 kg/m2 = 4880 N/m2 = 4.8 kN/m2
= 4.8 x 1792.38 = 8603 kN
Dead load for steel in one slab = 739 kN
Floor finish in one slab = 452 kN
Live load on one slab = 8603 kN

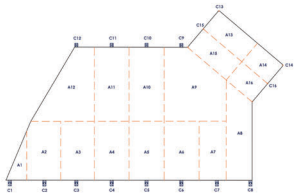
C height 40m – self weight = 440 kN
44m – self weight = 484 kN



Load for main roof slab
C1 = A1 = 146.85 m2 = A8 = C16 = 2.75 x 146.85 + 46.2 = 450 kN
C2 = A2 = 139.84 m2 = A9 = C15 = 431 kN
C3 = A3 = 132.94 m2 = A10 = C14 = 412 kN
C4 = A4 = 126.5 m2 = A11 = C13 = 394 kN
C5 = A5 = 120.06 m2 = A12 = C12 = 376 kN
C6 = A6 = 113.16 m2 = A13 = C11 = 357 kN
C7 = A8 = A7 = 106.26 m2 = A14 = C10 = C9 = 338 kN



For 1st and 2nd floor slab
C1-4 – C6-10 = 157.5 X 0.25 = 39.375 + 36.75 = 76.125 kN
C5 – C11 = 3.93 X 0.25 = 0.98 + 36.75 = 37.93 kN
C13-14 = 68.75 x 0.25 = 17.18 + 36.75 = 53.93 kN
C = 137.5 x 0.25 = 34.375 + 36.75 = 71.125 kN
Self-weight of outer columns of height 15 = 11 x 15 = 165 kN
Self-weight of outer columns of height 13 = 11 x 13 = 143 kN
Self-weight of inner columns = 7850 x 0.004755 = 373 N = 0.373 kN x 3 m = 1.119 kN



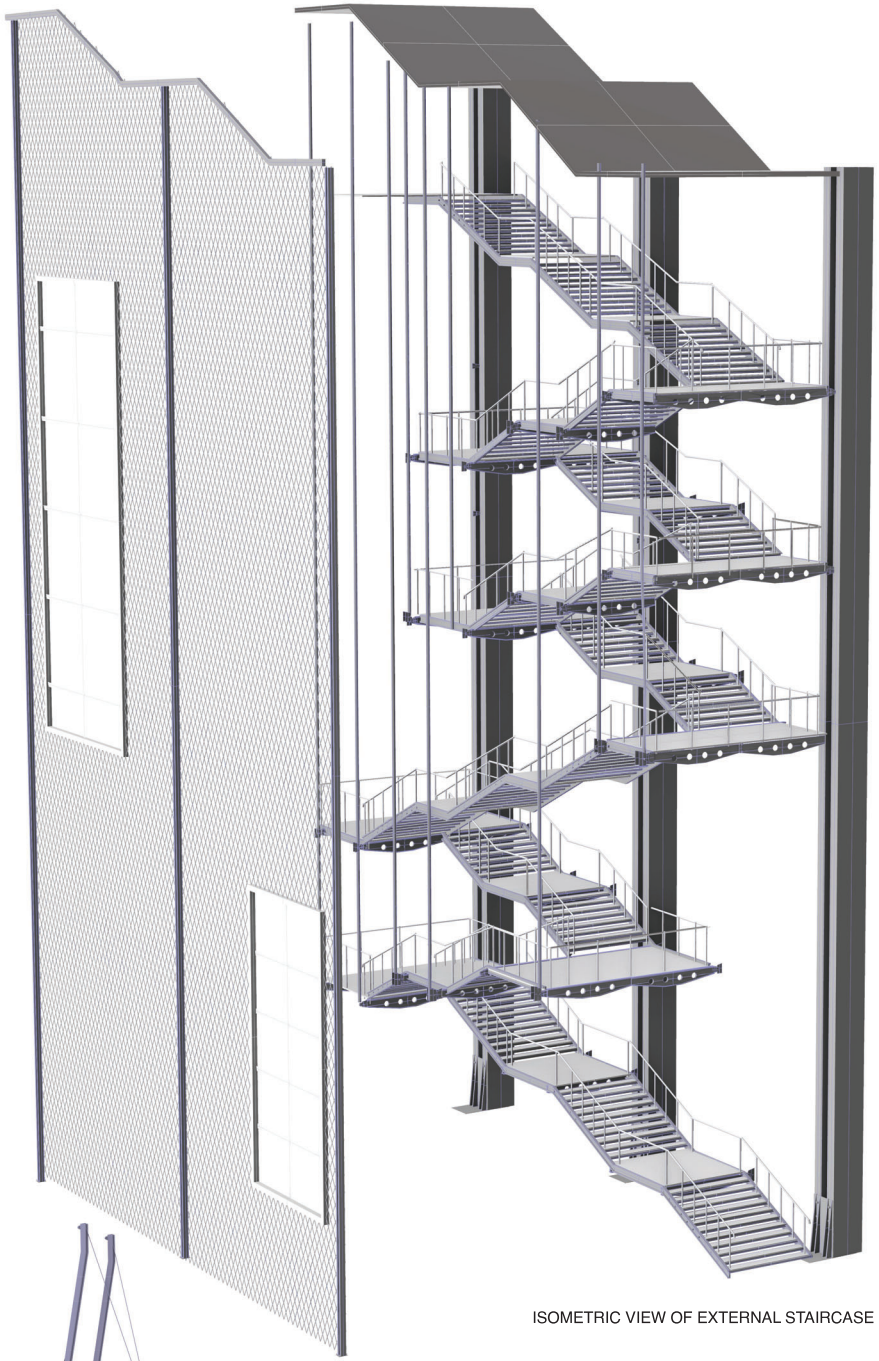
Load for roof slab
C1 = floor finish = 0.25 x 45 = 11.25 kN +73.5 kN = 84.75 kN
C2 – C12 = 0.25 x 180 = 45 kN + 73.5 kN = 118.5 kN
C13 – C14 = 0.25 x 68.75 = 17.18 kN + 73.5 kN = 90.68 kN
C15 – C16 = 0.25 x 137.5 = 34.375 kN + 73.5 kN = 107.875 kN

C1 = A1 = 12 x 4.5 x 20 = 45 m2
C2 = A2 = 9 x 20 = 180 m2
A3, A4, A5, A6, A7 = 180 m2
C3, C4, C5, C6, C7 =
C8 = A8 = 180 m2
C9 = A9 = 180 m2
C10, C11, C12 = A10, A11, A12 = 180 m2
C13 = A13 = 11 x 6.25 = 68.75 m2
C14 = A14 = 68.75 m2
C15 = A15 = 137.5 m2
C16 = A16 = 137.5 m2

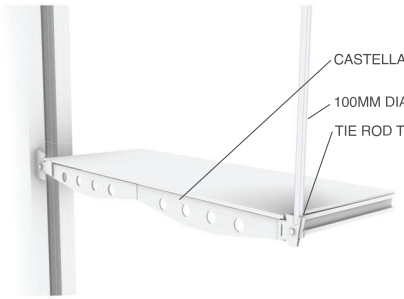
TENSION ROD TO FOUNDATION

EXPLODED AXONOMETRIC SHOWING STRUCTURAL DETAILS

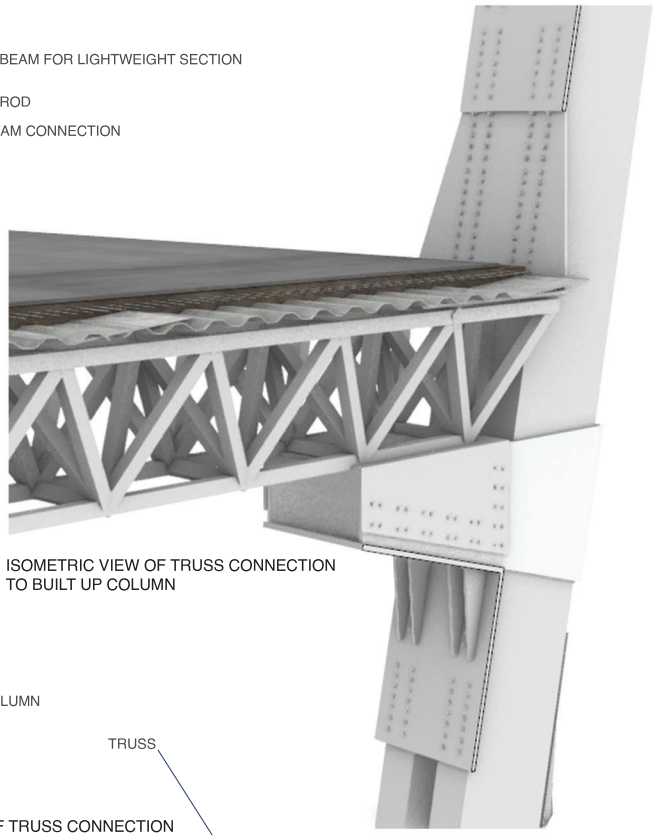
STRUCTURAL DETAILS



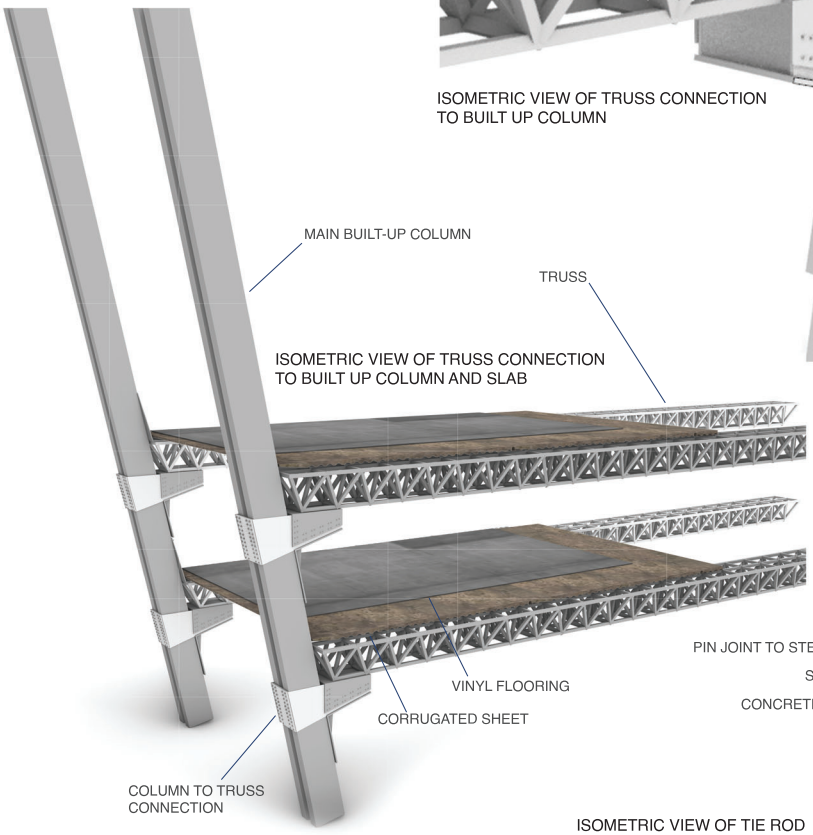
ISOMETRIC VIEW OF EXTERNAL STAIRCASE



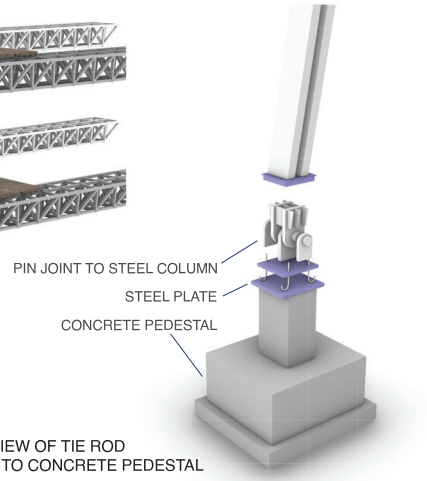
ISOMETRIC VIEW OF STAIRCASE MIDLANDING CONNECTION



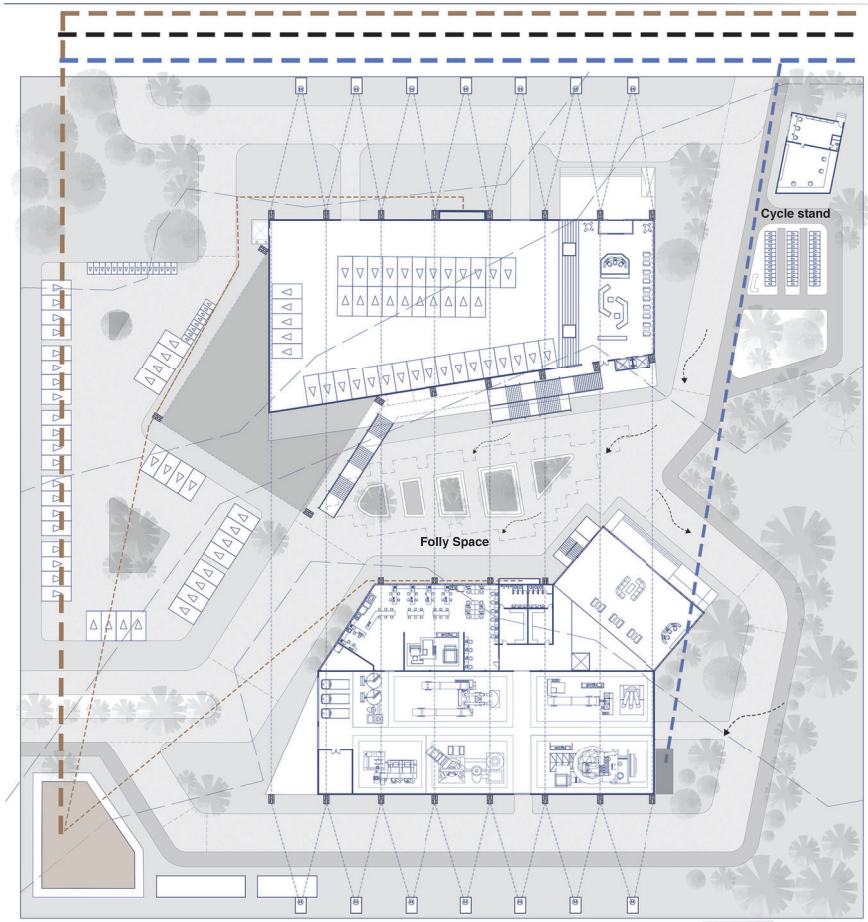
ISOMETRIC VIEW OF TRUSS CONNECTION TO BUILT UP COLUMN



ISOMETRIC VIEW OF TRUSS CONNECTION TO BUILT UP COLUMN AND SLAB



ISOMETRIC VIEW OF TIE ROD CONNECTED TO CONCRETE PEDESTAL



LEGEND

MAIN SEWAGE LINE

MUNICIPALITY WATER LINE

WATER LINE

SERVICES ON SITE

- Plan shows the connection for sewage treatment plant from the main connection to the STP on site.

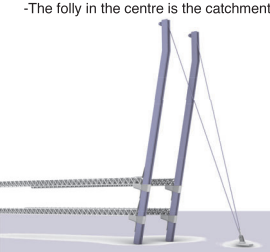
- The site has installed sewage treatment plant for the waste generated on site.

-Plan also shows the waterline connection ofrom the main line to the OHT.

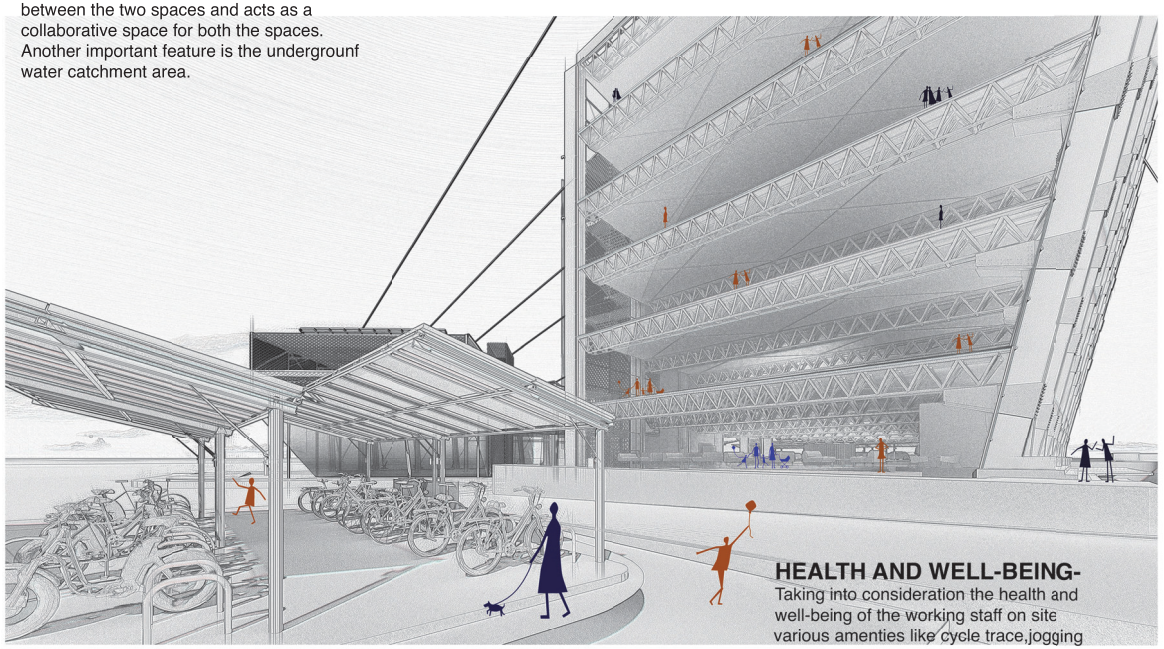
-During rainy season water collected from borewell is pumped and then supplied through the oht.

- Using the natural levels of the site, water is collected in the cathment area and from there the ground water level is recharged and water is supplied to the borewell.

-The folly in the centre is the catchment area because of the contour.



CENTRAL FOLLY SPACE- The central folly space is the binding element between the two spaces and acts as a collaborative space for both the spaces. Another important feature is the undergrounf water catchment area.



HEALTH AND WELL-BEING-
Taking into consideration the health and well-being of the working staff on site various amenties like cycle trace,jogging track, open spaces have been in-corporated on site.
The roof of the cycle park has solar roots harnessing the strong south heat and