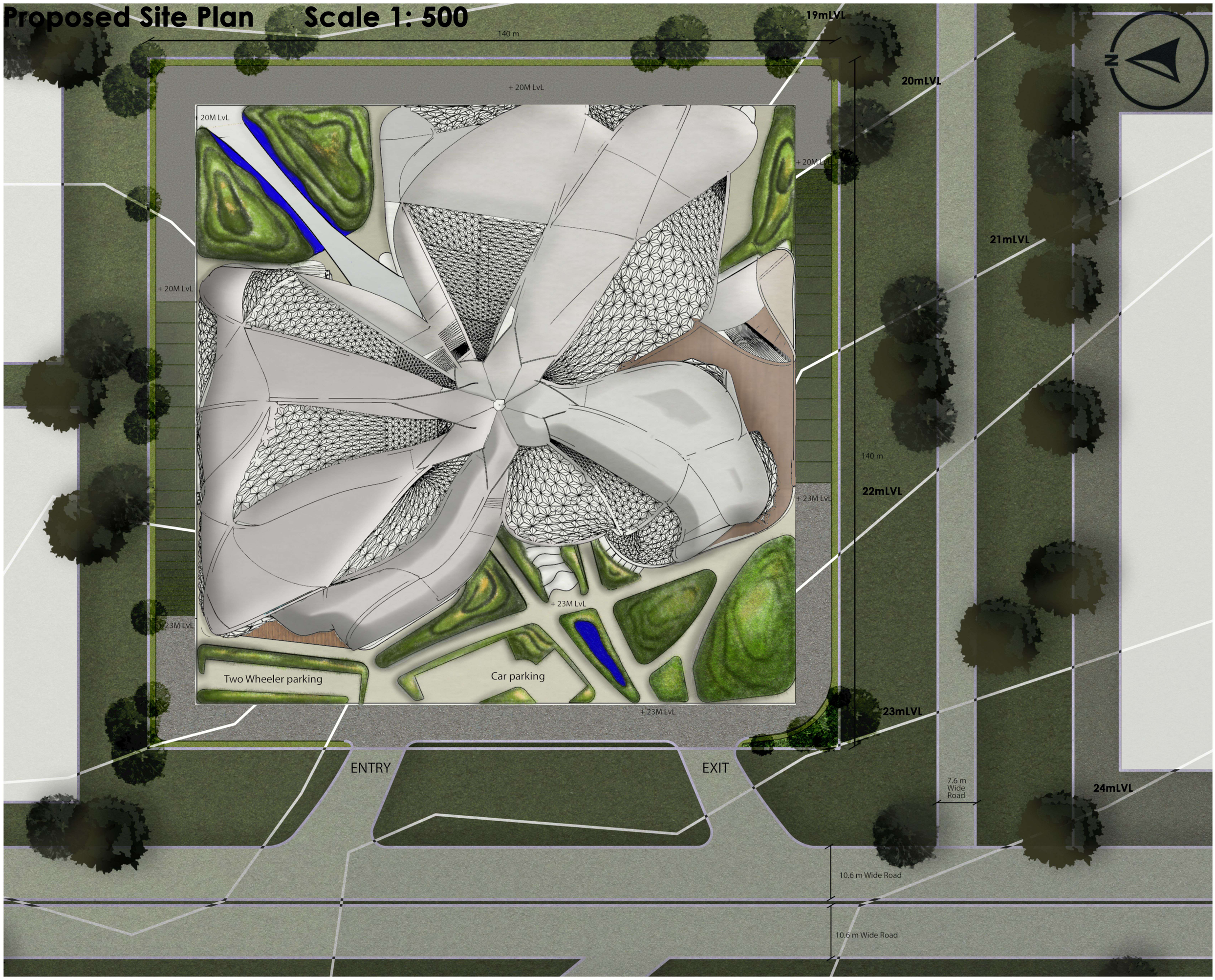
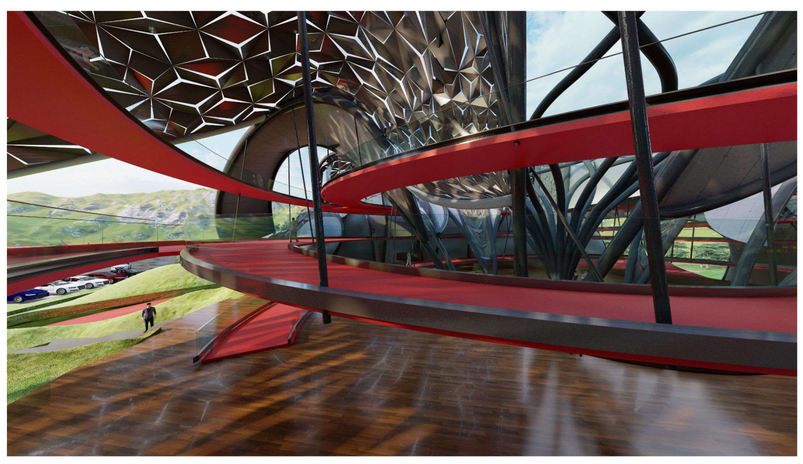
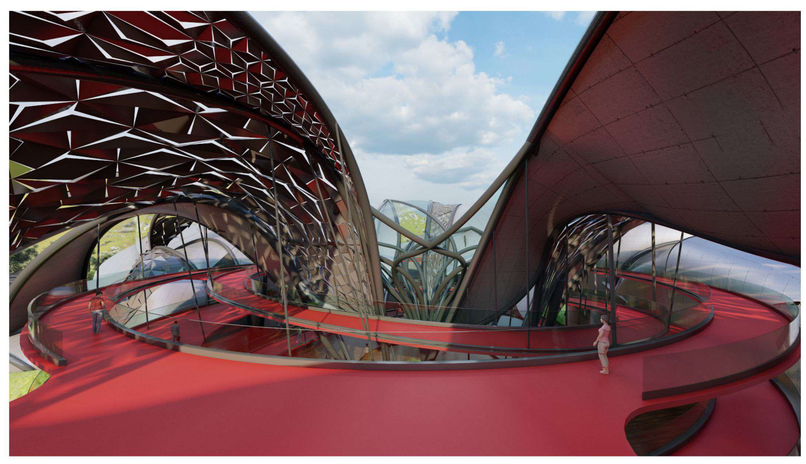
R & D CENTRE AT VISHAKHAPATNAM STEEL PLANT

Proposed Site Plan Scale 1: 500



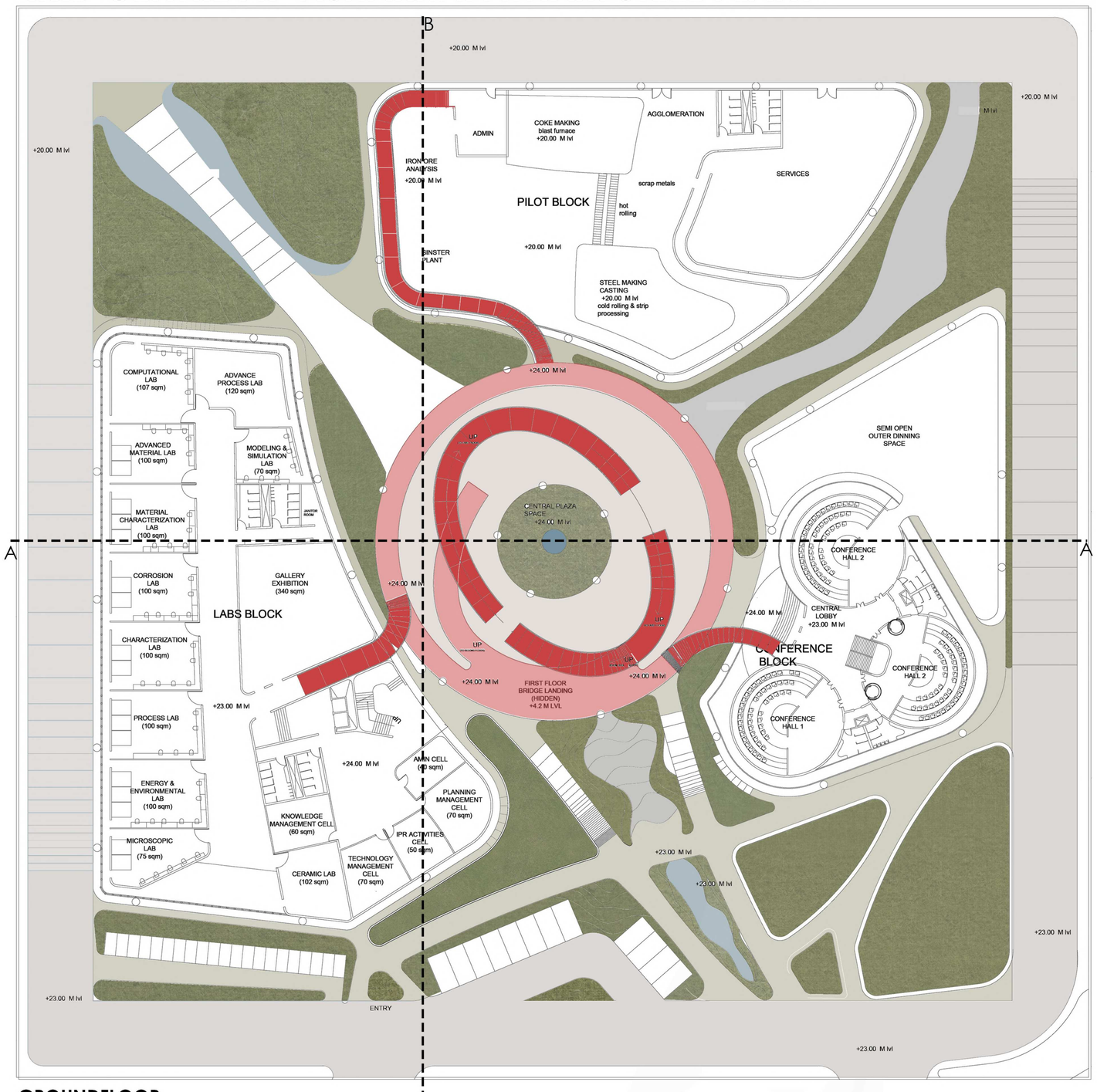
Render Views



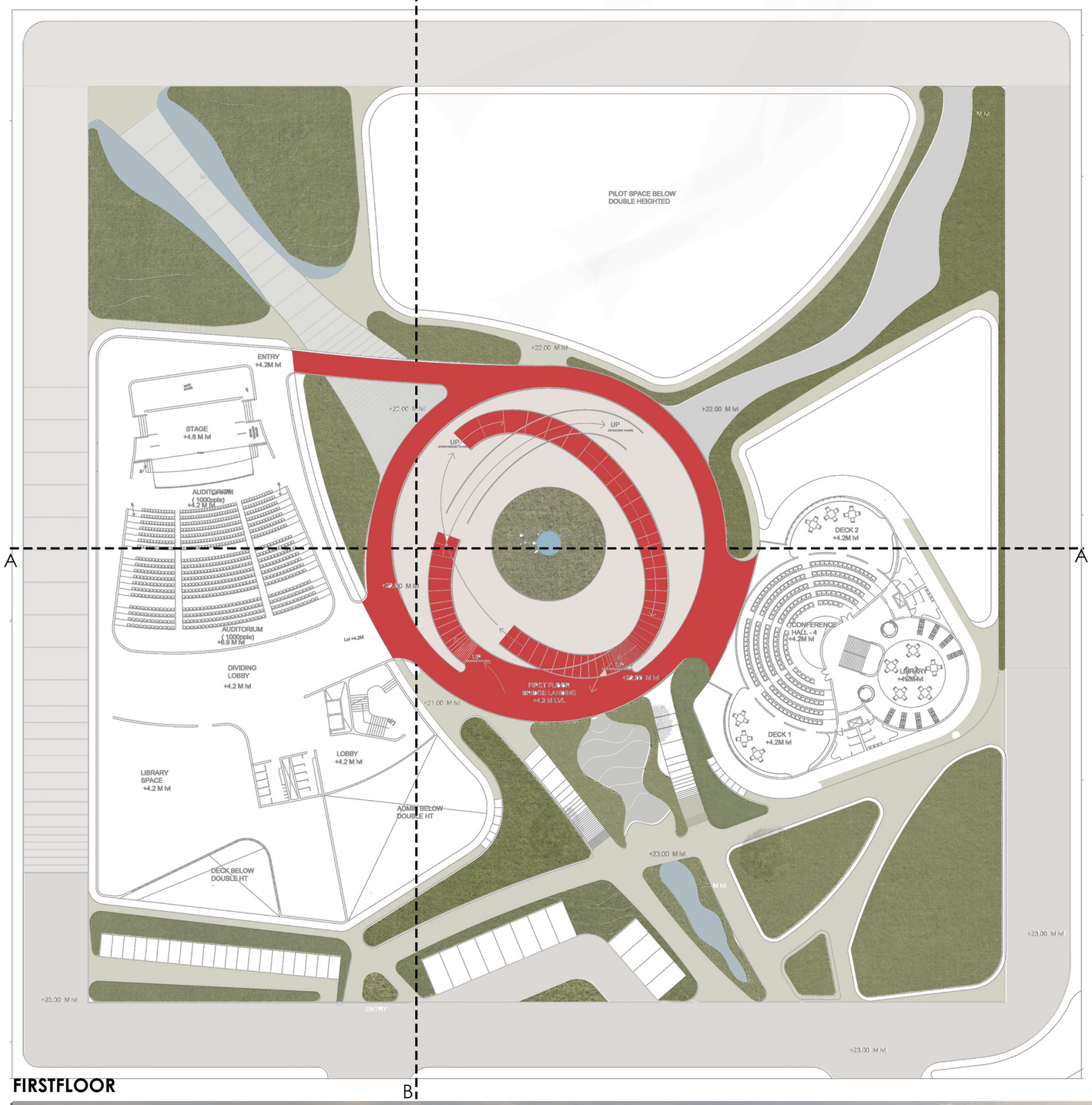


GROUP NO SA 13 : MALAVIKA .V | NAWFA .J | SHEIRIN MARY SAJU | NANCY | CRESCENT SCHOOL OF ARCHITECTURE

R&D CENTRE AT VISHAKHAPATNAM STEEL PLANT



GROUNDFLOOR

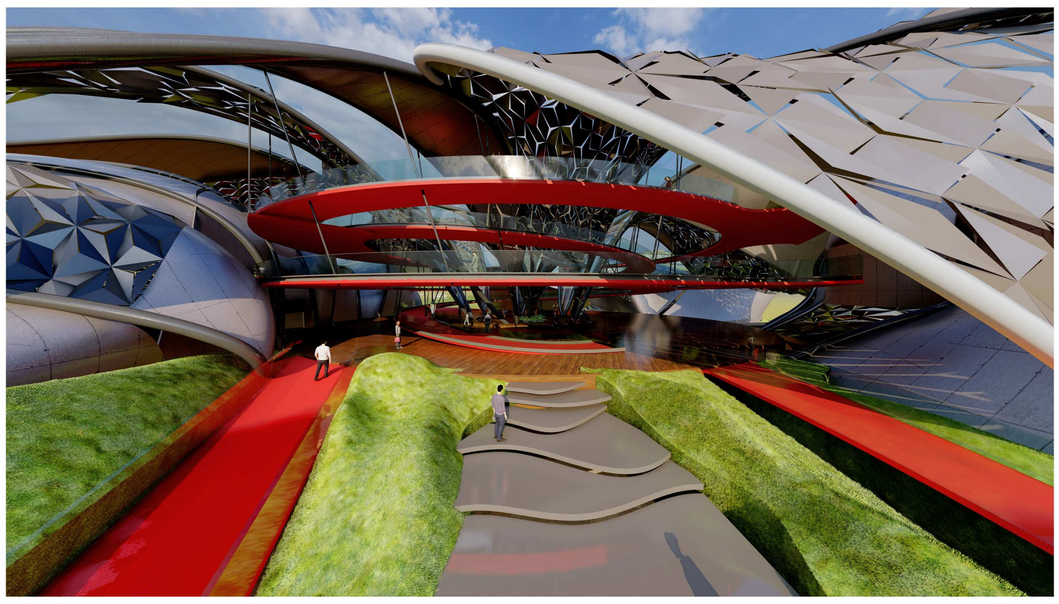


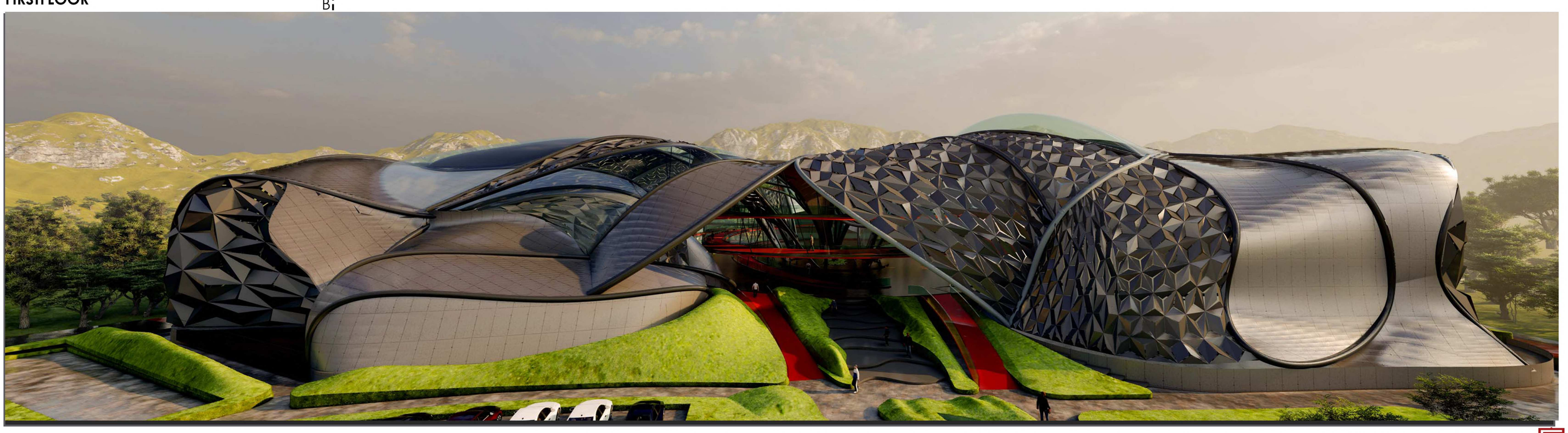
FIRSTFLOOR

FLOORPLANS

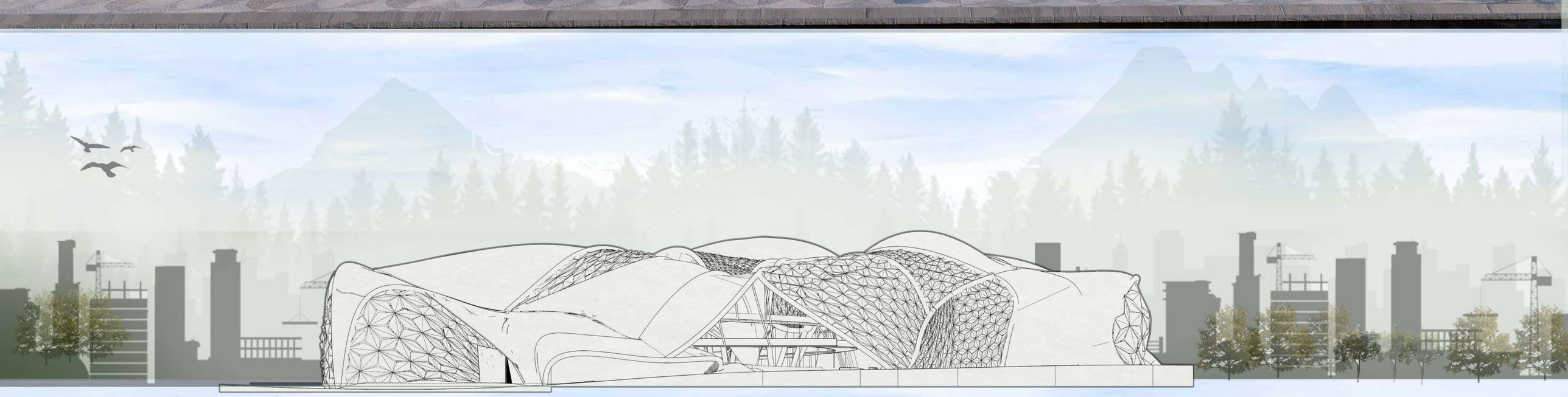
DEFORMATION & FLEXION OF PIPES

SCALE 1 :500

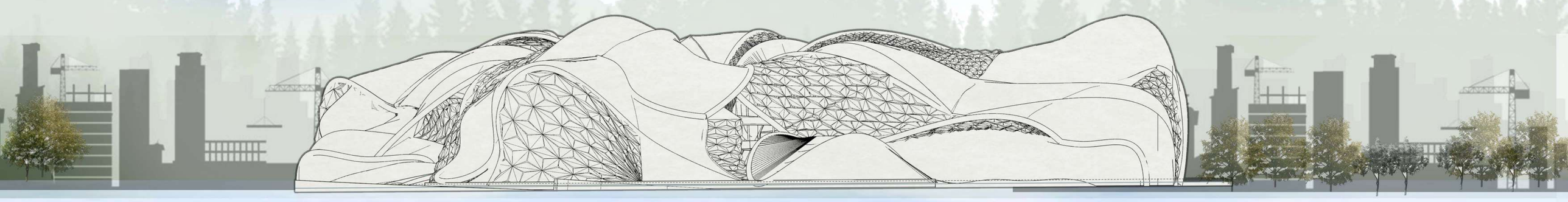




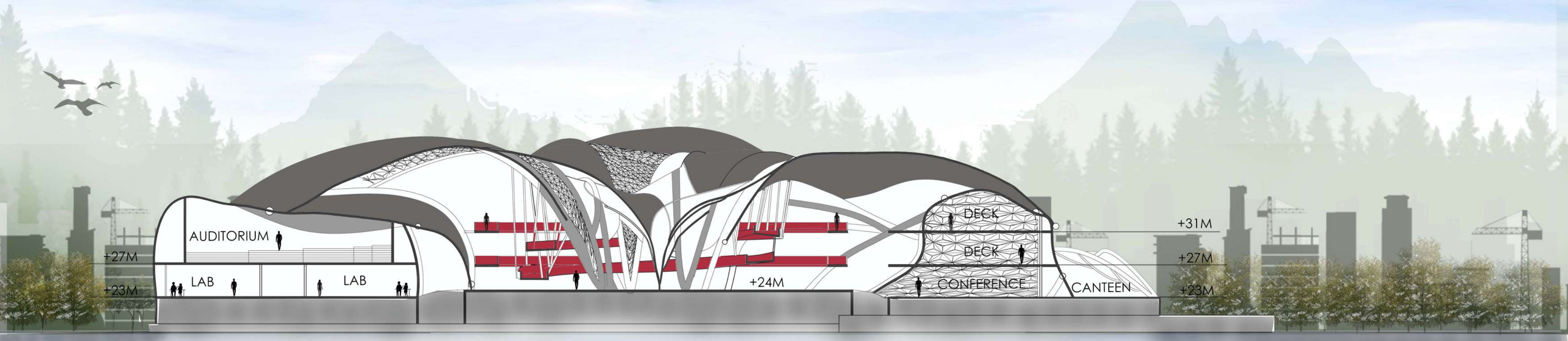
R&D CENTRE AT VISHAKHAPATNAM STEEL PLANT
SECTIONS/ ELEVATIONS



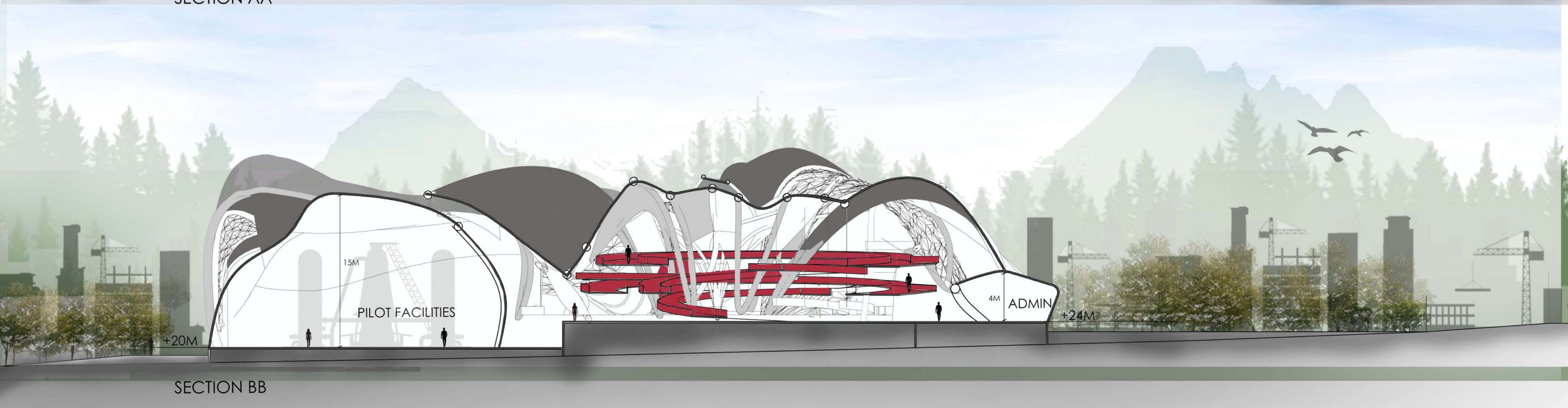
FRONT ELEVATION



RIGHTSIDE ELEVATION



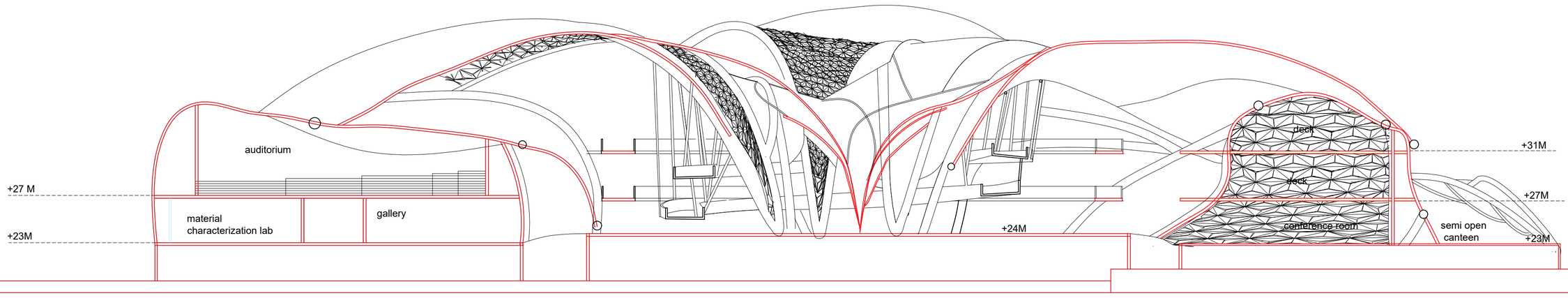
SECTION AA



SECTION BB

GROUP NO SA 13 : MALAVIKA .V I NAWFA .J I SHERIN MARY SAJU I NANCY I CRESCENT SCHOOL OF ARCHITECTURE

GROUND FLOOR PLAN



SECTION AA

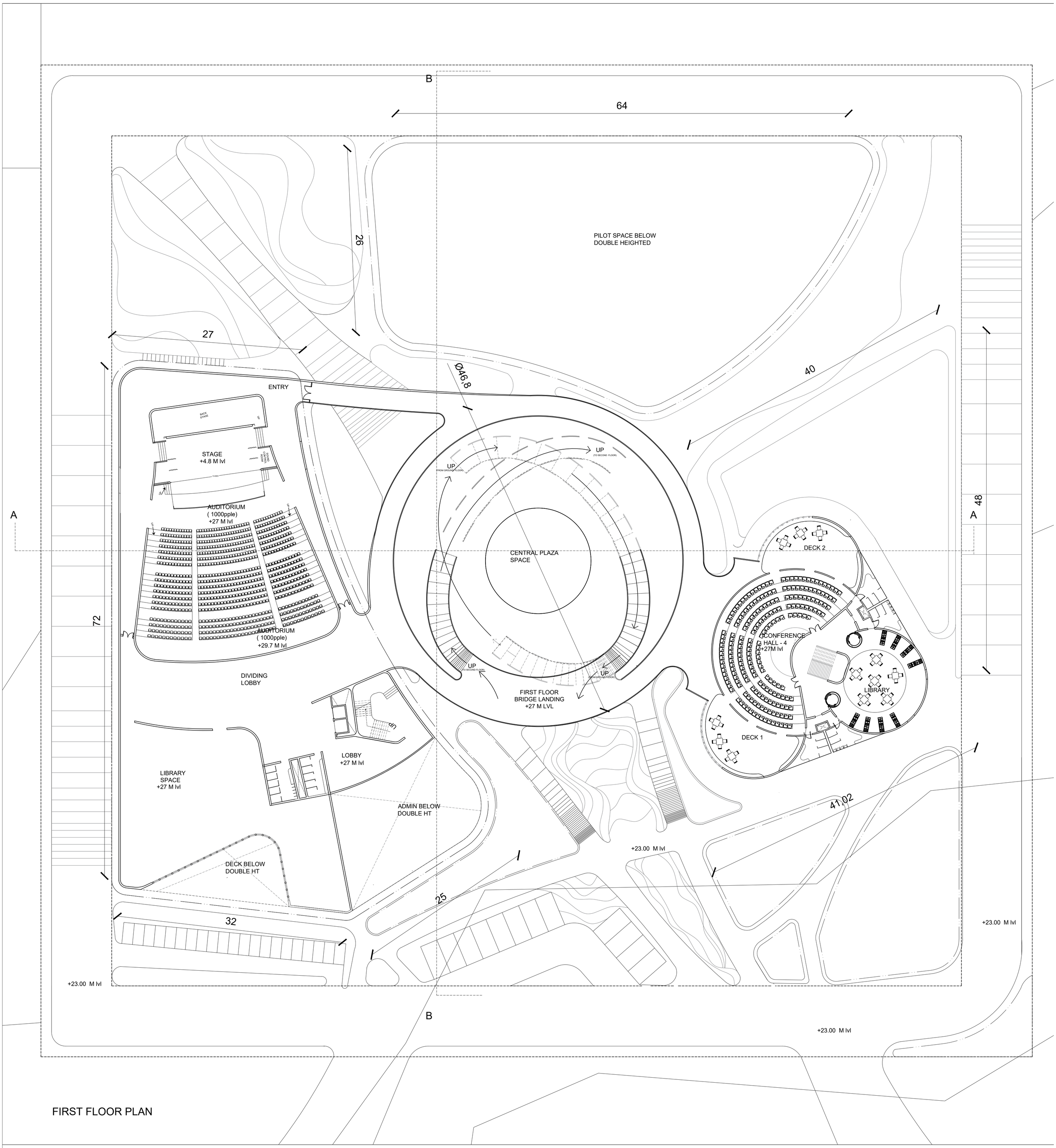
RESEARCH AND DEVELOPMENT CENTRE

GROUND FLOOR PLAN AND SECTION AA SCALE 1:250

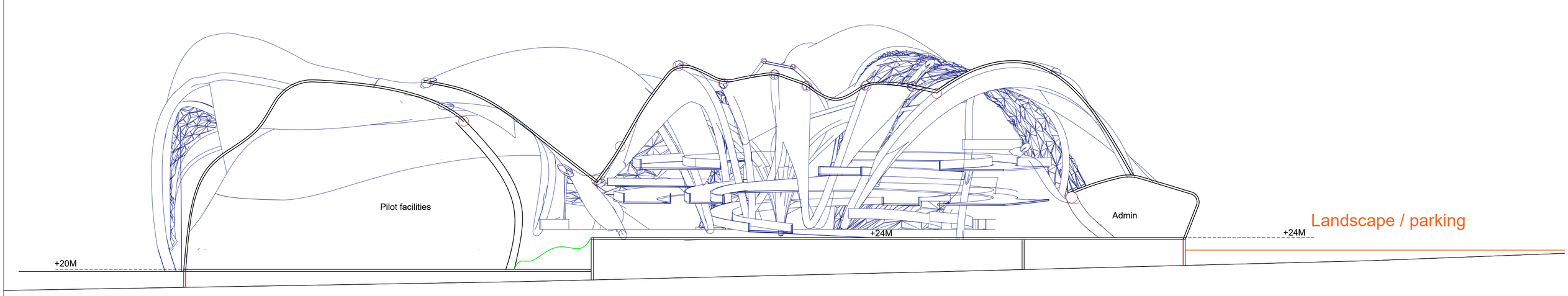
ALL DIMENSIONS ARE IN METRE

NORTH

MALAVIKA V
NAWFA
SHEIRIN MARY SAJU
NANCY



FIRST FLOOR PLAN



SECTION BB

RESEARCH AND DEVELOPMENT CENTRE

FIRST FLOOR PLAN AND SECTION BB SCALE 1:250

NORTH

MALAVIKA V
NAWFA
SHEIRIN MARY SAJU
NANCY

B

A

A

B

64

26

27

Ø46.8

40

48

72

25

32

41.02

PILOT SPACE BELOW
DOUBLE HEIGHTED

AUDITORIUM BELOW
DOUBLE HEIGHTED

SECOND FLOOR
BRIDGE LANDING
+31 M LVL

UP

UP

+31 M lvl

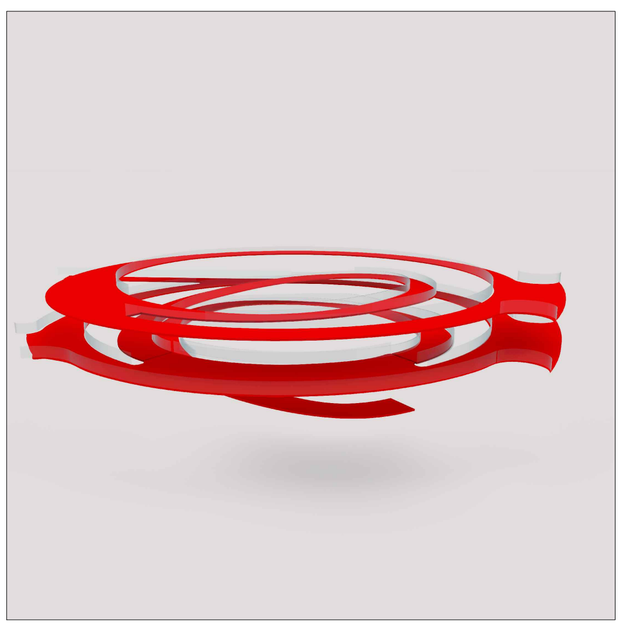
+23.00 M lvl

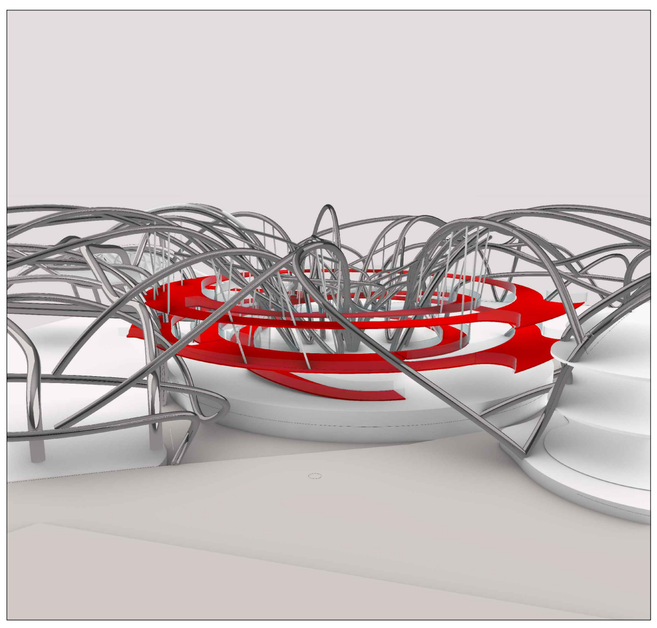
+23.00 M lvl

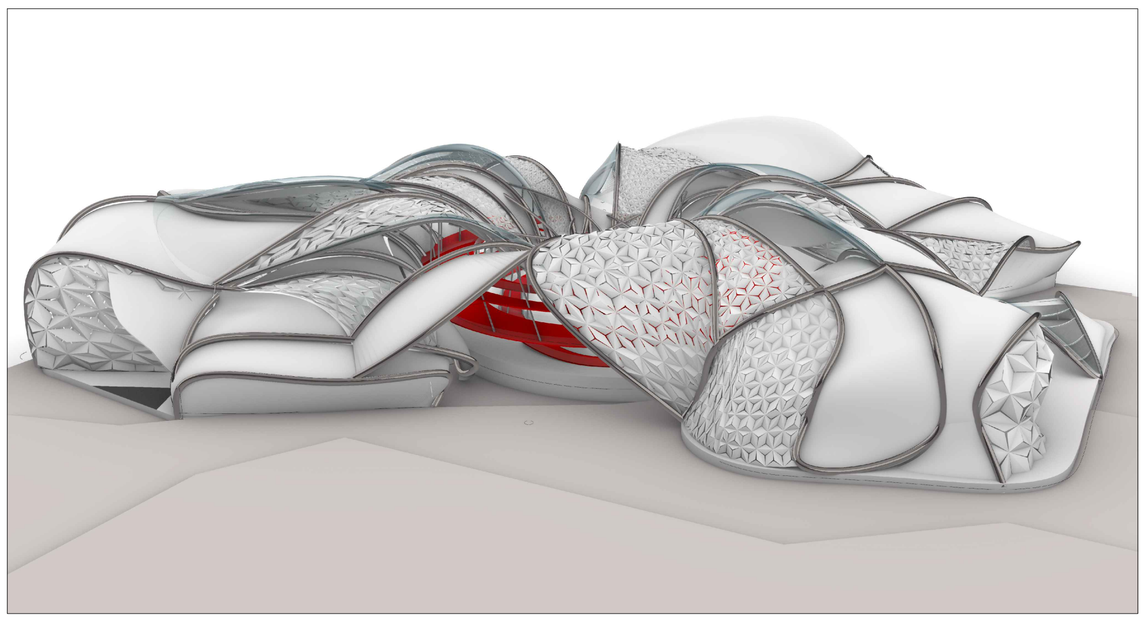
+23.00 M lvl

+23.00 M lvl

SECOND FLOOR PLAN







RESEARCH AND DEVELOPMENT CENTRE

SECOND FLOOR PLAN

SCALE 1:250

NORTH

MALAVIKA V
NAWFA
SHEIRIN MARY SAJU
NANCY

SA 13

DATA COLLECTION AND CASE STUDY

MALAVIKA V I NAWFA J I NANCY I SHERIN MARY SAJU I

DATA COLLECTION

BUILDING NORMS :

Permissible Setbacks & Height for All Types of Non-High Rise Buildings

Plot Size (in Sqm) Above – Up to	Parking provision	Height (in m) Permissible Up to	Building Line or Minimum Front Setback to be left (in m)					Minimum setbacks on remaining sides (in m)
			Abutting Road Width					
			Up to 12 m	Above 12m & up to 18m	Above 18m & up to 24 m	Above 24m & up to 30m	Above 30m	
Above 2500	Stilt + 2 or more Cellar floors	**7**	3	4	5	6	7.5	**5.0**
		15	3	4	5	6	7.5	**6.0**
		18**	3	4	5	6	7.5	**7.0**

Santitation requirements for offices

Sl.No.	Sanitary Unit	For Male Personnel	For Female Personnel
1	Water Closet (W.C.)	One for every 25 persons or part thereof	Two for every 15 persons or part thereof
2	Ablution Taps	One in each W.C.	One in each W.C.
3	Urinals	Nil upto 6 persons 1 for 7-20 persons 2 for 21-45 persons 3 for 46-70 persons 4 for 71-100 persons From 101 to 200 add @ 3%; For over 200 persons add @ 2.5%	--
4	Wash Basins	One for every 25 persons or part thereof	One for every 25 persons or part thereof
5	Drinking water fountains	One for every 100 persons with a minimum of one on each floor	One for every 100 persons with a minimum of one on each floor
6	Cleaner Sinks	One per floor minimum; preferably in or adjacent to sanitary rooms	--
7	Executive Room / Conference Halls	Toilet Suite (1WC, 1Washbasin, optional shower for 24 hr usages) Unit could be common for Male / Female or separate depending on the number of user of each facility.	

Parking Requirements in Buildings

Category of building/activity	Parking area to be provided as percentage of total built up area	
	Municipal Corporations & Selection Grade, Special Grade Municipalities	First Grade, Second Grade Municipalities, Nagar Panchayats and Gram Panchayats in Master Plan areas and in Development Authority Areas
Colleges, Godowns, Hospitals, Industrial buildings, Institutional buildings, Residential Apartment Complexes, Schools, Educational Buildings & Other Buildings	**20**	**20**

Splay required at road junctions

Sl. No.	Road Width (in m)	Splay / Offset (in m)
(A)	(B)	(C)
1	Less than 12	3 X 3
2	Above 12 up to 24	4.5 X 4.5
3	Above 24	6 X 6

Green Building and Sustainability Provisions

The institutional frameworks for green buildings in India have developed rating systems that classify green buildings according to their performance on a number of set parameters. In India, the IGBC has adapted LEED to create LEED India and is responsible for certifying buildings under this system. At present, IGBC offers two certifications for office buildings.

LEED points are awarded under five categories for a total of 100 points –

(a) Sustainable sites,
(b) Water efficiency,
(c)Energy and atmosphere,
(d) Materials and resources
(e) Indoor environmental quality.

There are 6 additional points under innovation in design and 4 for regional priority.

Buildings qualify for four levels of certification:
(a) Certified: 40-49 points,
(b) Silver: 50-59 points;
(c)Gold: 60-79 points;
(d) Platinum: 80+ points.

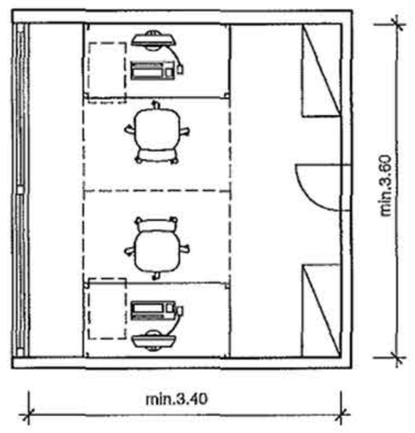
Provisions for Rainwater Harvesting by Building types

Category/Use	Area of the Plot (sq. m)	Provisions to be made	Other conditions
Industrial			
All Proposals	All Plot Sizes	(i) Construction of Rain Water Harvesting Structure. (ii) Soft landscape provisions and open spaces with percolation pits. (iii) Use of abandoned bore well for recharging of ground water. (iv) Common treatment plant to be made part of the integrated development.	(i) Should indicate the system of Storm Water Drainage, Rain Water Harvesting Structure and Recharging well. (ii) Provision should be made not to inject contaminate water into recharge structures in industrial areas and care is to be taken to keep such structures away from sewer lines, septic tanks, soak pits, land fill and other sources of contamination.

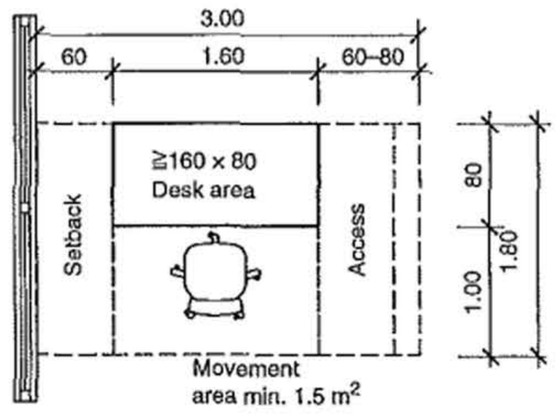
ARCHITECTURAL DESIGNING OF
R & D CENTRE FOR STEEL PLANT

STANDARDS

OFFICE SPACE

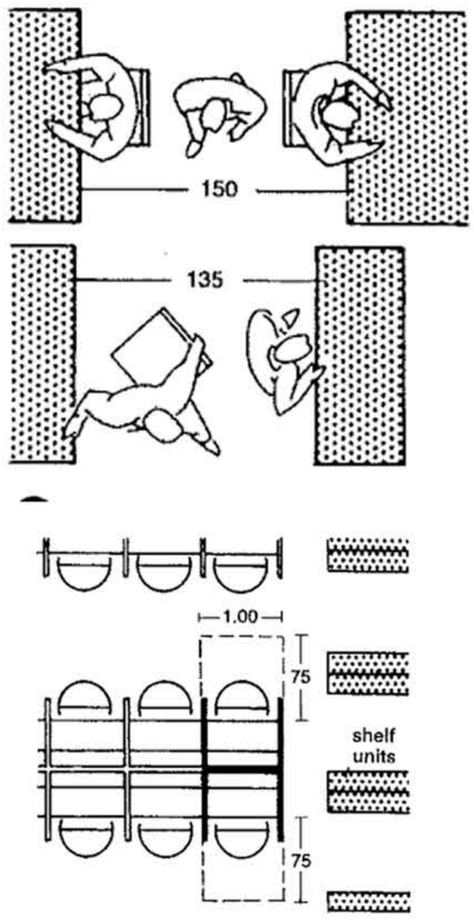


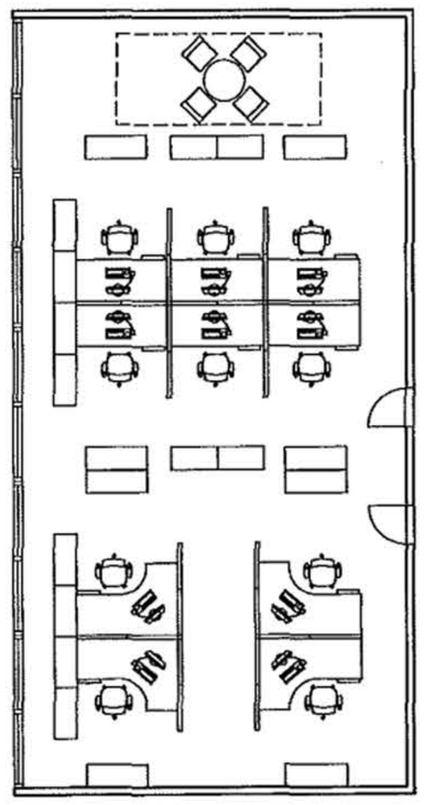
Double office with wall-oriented workstations



Single office

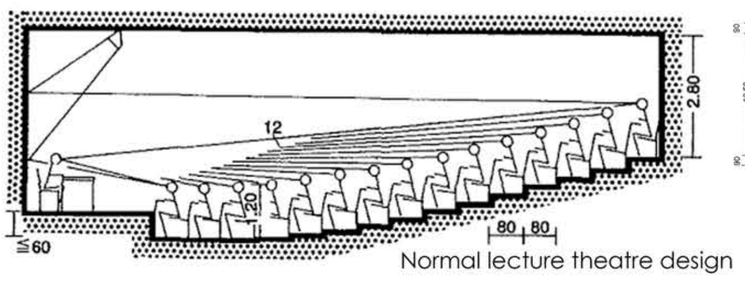
LIBRARY



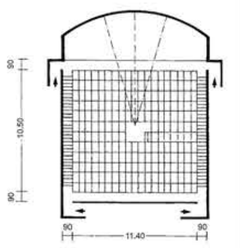


Workstation layout in a small group office

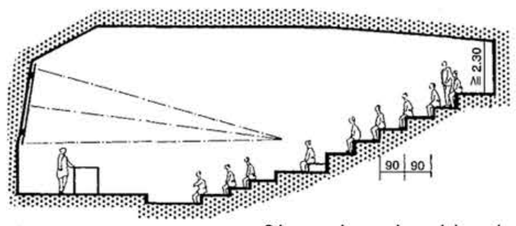
LECTURE THEATRE



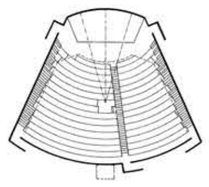
Normal lecture theatre design



Rectangular lecture theatre with 200 seats

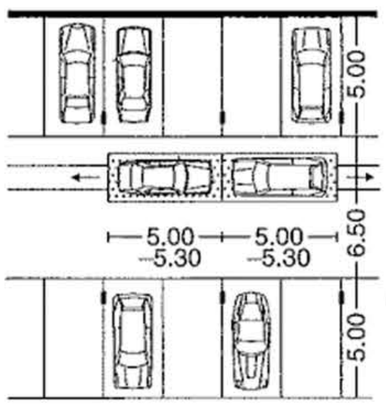


Steeply raked lecture theatre

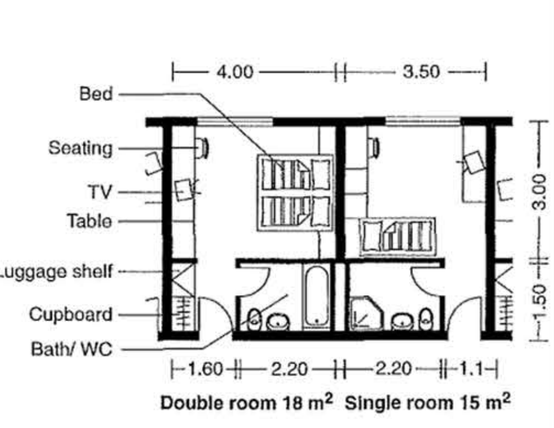


Trapezoidal lecture theatre

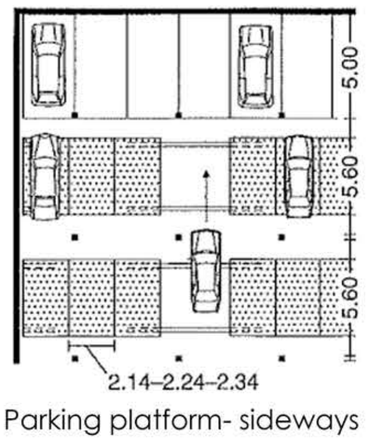
PARKING



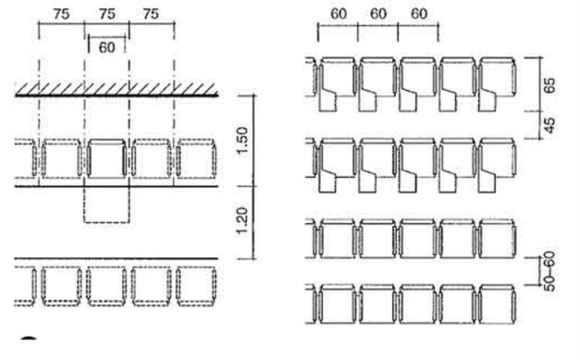
Parking platform -lengthway- movement



Double room 18 m² Single room 15 m²



Parking platform- sideways



Space requirement for seating in conference and training rooms

DATA COLLECTION

ARCHITECTURAL DESIGNING OF
R & D CENTRE FOR STEEL PLANT

An R&D (Research and Development) center is a specialized facility or organization dedicated to the creation, innovation, and improvement of products, processes, technologies, and solutions through research and development activities. These centers play a crucial role in advancing industries by conducting scientific research, technological experiments, and engineering efforts aimed at generating new knowledge, insights, and innovations

OBJECTIVES OF R &D LAB DESIGN

Flexible design that supports current and future needs and technologies

Provide sufficient circulation space to optimize accessibility and safety

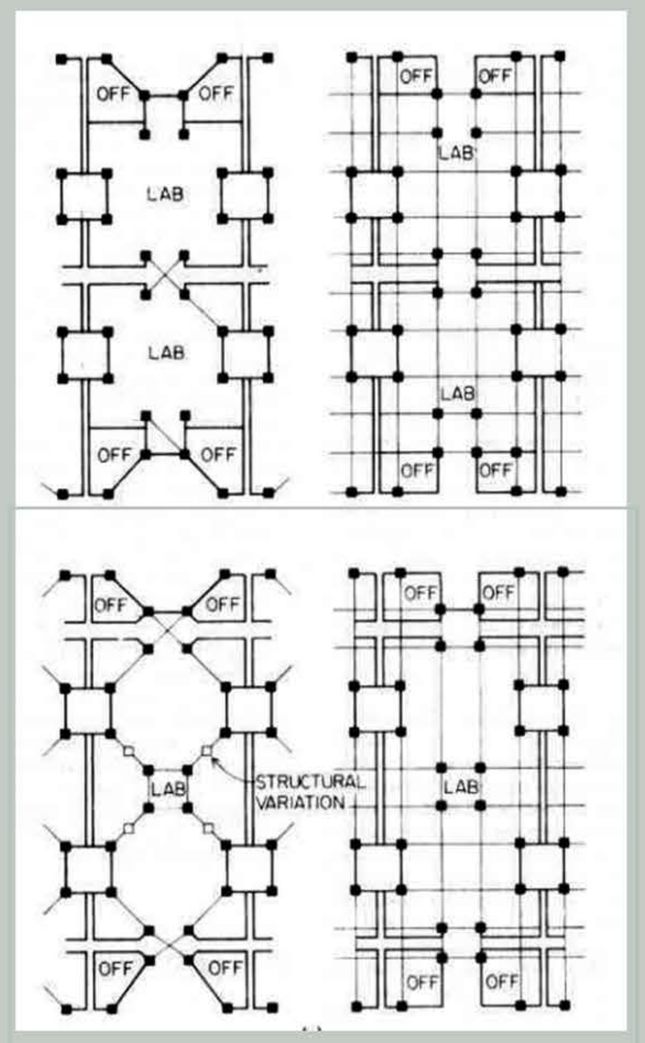
Zone lab between lab and non-lab spaces

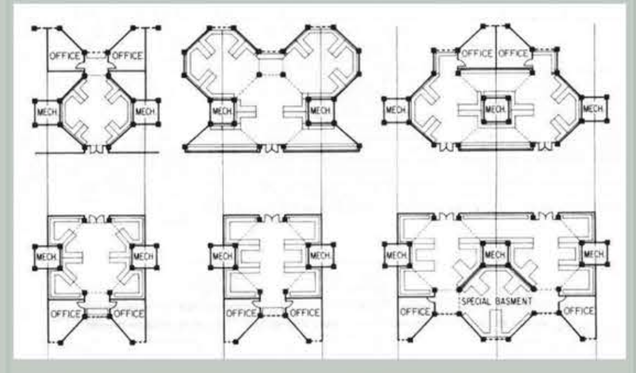
Modular or flexible casework and furnishing to allow labs to scale up or down

Protect the safety and health of researchers, scientists, and staff

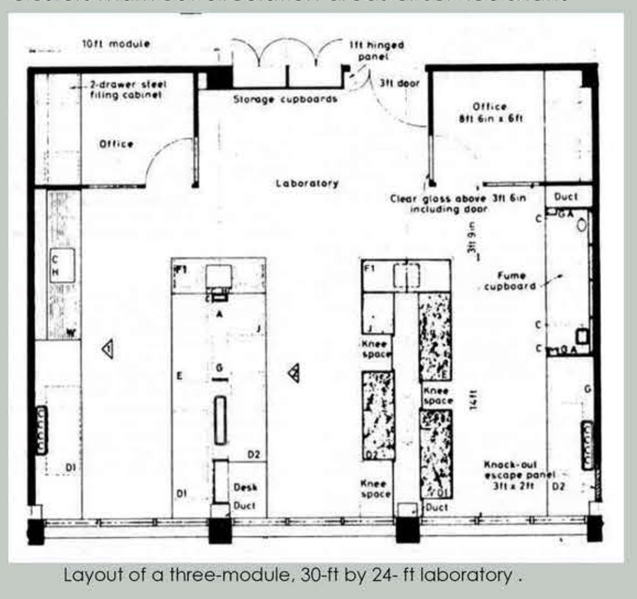
Incorporate mechanical, plumbing, and electrical systems outside the lab to maintain high levels of security for intellectual property and hazardous materials

Layout that enhances collaboration and interaction between researchers and scientists
Environmental factors that enhance learning, such as



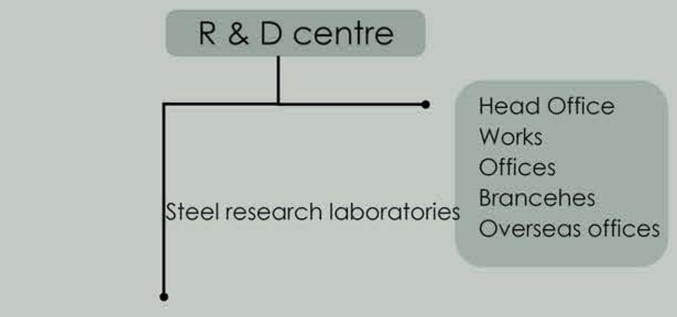


Laboratory planning grid by Skidmore, Owings and Merrill.
A system of square bays which accepts either a diagonal or a rectilinear planning grid . Column clusters mark out circulation areas or service shafts



Layout of a three-module, 30-ft by 24- ft laboratory .

Types of Systems
Utility services are usually provided within a research laboratory building by either a horizontal or vertical distribution system or a combination of the two . Five systems are gen□erally used to distribute laboratory utility
services :
The utility corridor system
The multiple interior shaft system
The multiple exterior shaft system



LABORATORIES

The laboratories are promoting a wide range of research and development, from new products that meet the needs of our customers, through to component design and solution
proposals.

Employing our phenomenon analysis, microstructure design, and advanced numerical simulation technologies, these laboratories are maximizing the functions of materials and seeking better applications.

- Steel making and steel fabrication
- Engineering and construction
- Chemical
- New materials
- System Soultions

- Microscopy Lab –
- Ceramic lab
- Process lab
- Material characterization lab
- Energy and environment lab
- Phase Transformation lab
- Computational lab
- Modelling and simulation lab
- Corrosion lab
- Advanced Process lab
- Advanced Materials Characterization lab

MICROSCOPY LAB

Setting up a microscopy lab for a steel plant involves creating a facility where various types of microstructural analysis and quality control can be performed on steel samples. This is crucial for ensuring the mechanical properties, durability, and overall quality of the steel products.

CERAMIC LAB

A ceramic lab in a steel plant is a facility dedicated to researching, developing, testing, and analyzing ceramic materials that are used in various processes within the steel production industry. Ceramics play an important role in steelmaking, ranging from refractory materials used in furnaces to insulating components and protective coatings

MODELLING AND SIMULATION LAB

A modulation and simulation lab for a steel plant involves creating a facility equipped with the necessary tools, software, and expertise to model and simulate various aspects of steel production processes. This type of lab is crucial for optimizing processes, predicting outcomes, and making informed decisions in a controlled environment before implementing changes in the actual production.

CORROSION LAB

Setting up a corrosion lab for a steel plant is a great initiative to understand and mitigate corrosion-related issues that can affect the steel production processes and equipment.

PROCESS LAB

Setting up a process lab for steel involves creating a facility where various stages of steel production and processing can be monitored, controlled, and optimized. This lab plays a critical role in ensuring the quality, efficiency, and safety of steel manufacturing processes.

MATERIAL CHARACTERISATIONA LAB

Setting up a material characterization lab for steel involves creating a facility equipped with the necessary instruments and equipment to analyze and understand the properties, composition, and behavior of steel materials.

COMPUTATIONAL LAB

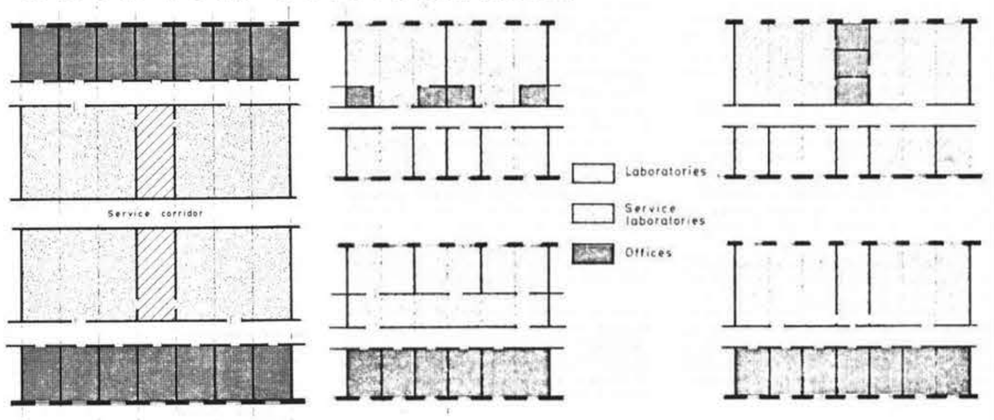
Setting up a computational lab for a steel plant involves creating a facility equipped with computer hardware, software, and expertise to perform simulations, modeling, data analysis, and optimization related to steel production processes.

ADVANCED CHARACTERISATION LAB

An advanced characterization lab for a steel plant would focus on in-depth analysis and understanding of materials used in steel production processes. This lab would employ various techniques to study the microstructure, mechanical properties, corrosion behavior, and other critical characteristics of steel and related materials.

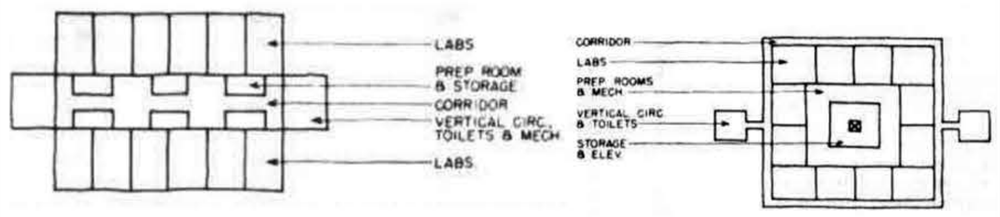
STANDARDS

LABORATORY CONFIGURATION



Double-width layout with service corridor, showing relative positions of laboratories, service laboratories, and offices .

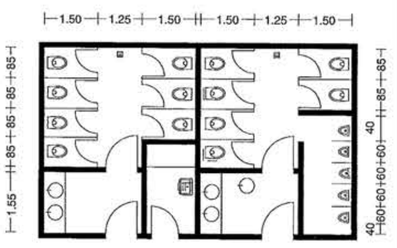
Off-center corridor layouts, showing the relative positions of laboratories, service laboratories,and offices .



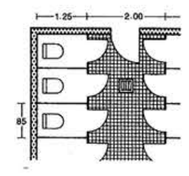
SUBSIDIARY ROOMS

Men							Women					
number of employees	flushing WCs	urinals	gutter (m)	washbasins	additional flushing WCs	additional urinals	number of employees	flushing WCs	washbasins	additional flushing WCs	waste bins	bucket sink
10	1	1	0.6	1	1	1	10	1	1	1	1	1
25	2	2	1.2	1	1	1	20	2	1	1	1	1
50	3	3	1.8	1	1	1	35	3	1	1	1	1
75	4	4	2.4	1	1	2	50	4	2	2	1	1
100	5	5	3.0	2	1	2	65	5	2	2	1	1
130	6	6	3.6	2	2	2	80	6	2	2	1	1
160	7	7	4.2	2	2	2	100	7	2	3	1	1
190	8	8	4.8	2	2	3	120	8	3	3	1	1
220	9	9	5.4	3	3	3	140	9	3	4	1	1
250	10	10	6.0	3	3	4	160	10	3	4	1	1

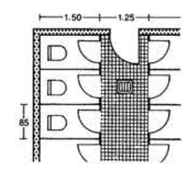
Required number of WC fittinas



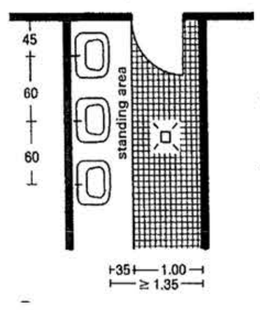
Toilet facilities for 100 women and men



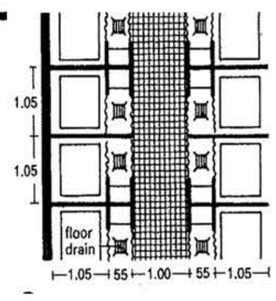
Two-row WCs, door open outward



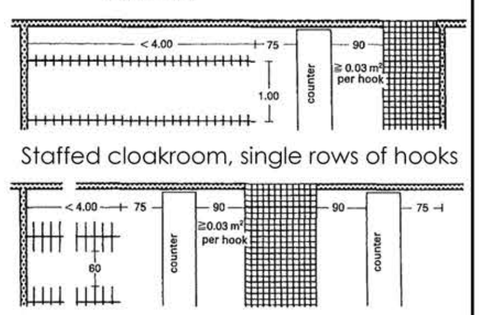
Door open outward



Washing facilities with washbasins



Open showers with drying places



Staffed cloakroom, single rows of hooks

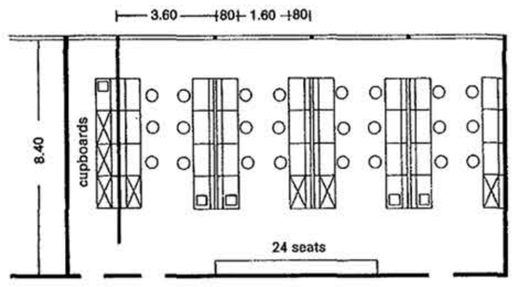
Staffed cloakroom, double rows of hooks

Changing rooms should be on the direct route between entrance
to the site and the working area. Separate washing and changing
rooms should be easily accessible from each other

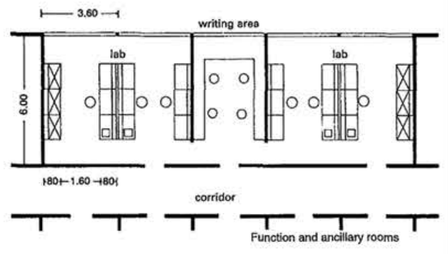
	No. people	Width a_p [1]
1	up to 5	0.88
2	up to 20	1.00
3	up to 100	1.25
4	up to 250	1.75
5	up to 400	2.25

Minimum dimensions for changing rooms Passage widths between changing rooms

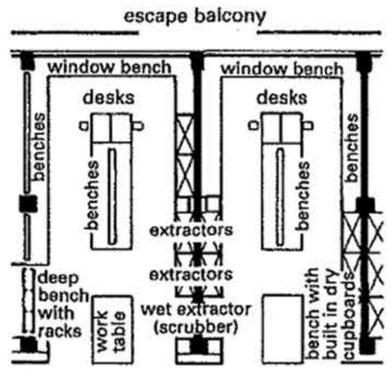
ROOMS



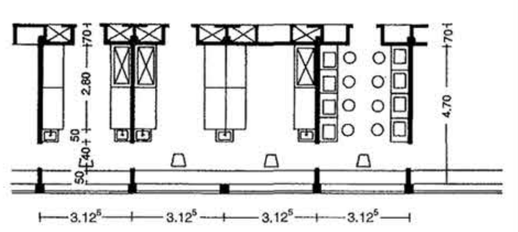
Teaching and practical laboratory



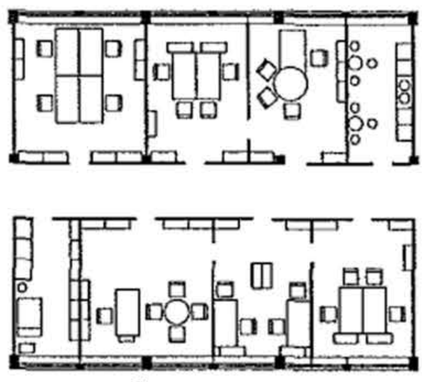
Research laboratory



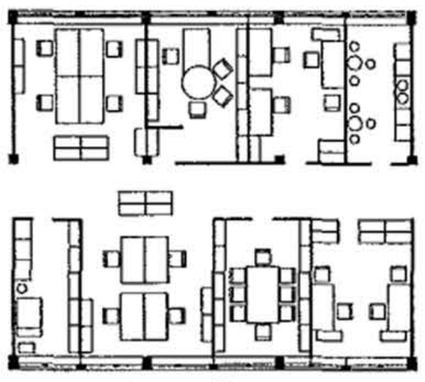
Laboratory equipment in main scientific laboratory



Room dimensions derive from size of bench (workstation). Services and cupboards are in the corridor wall.

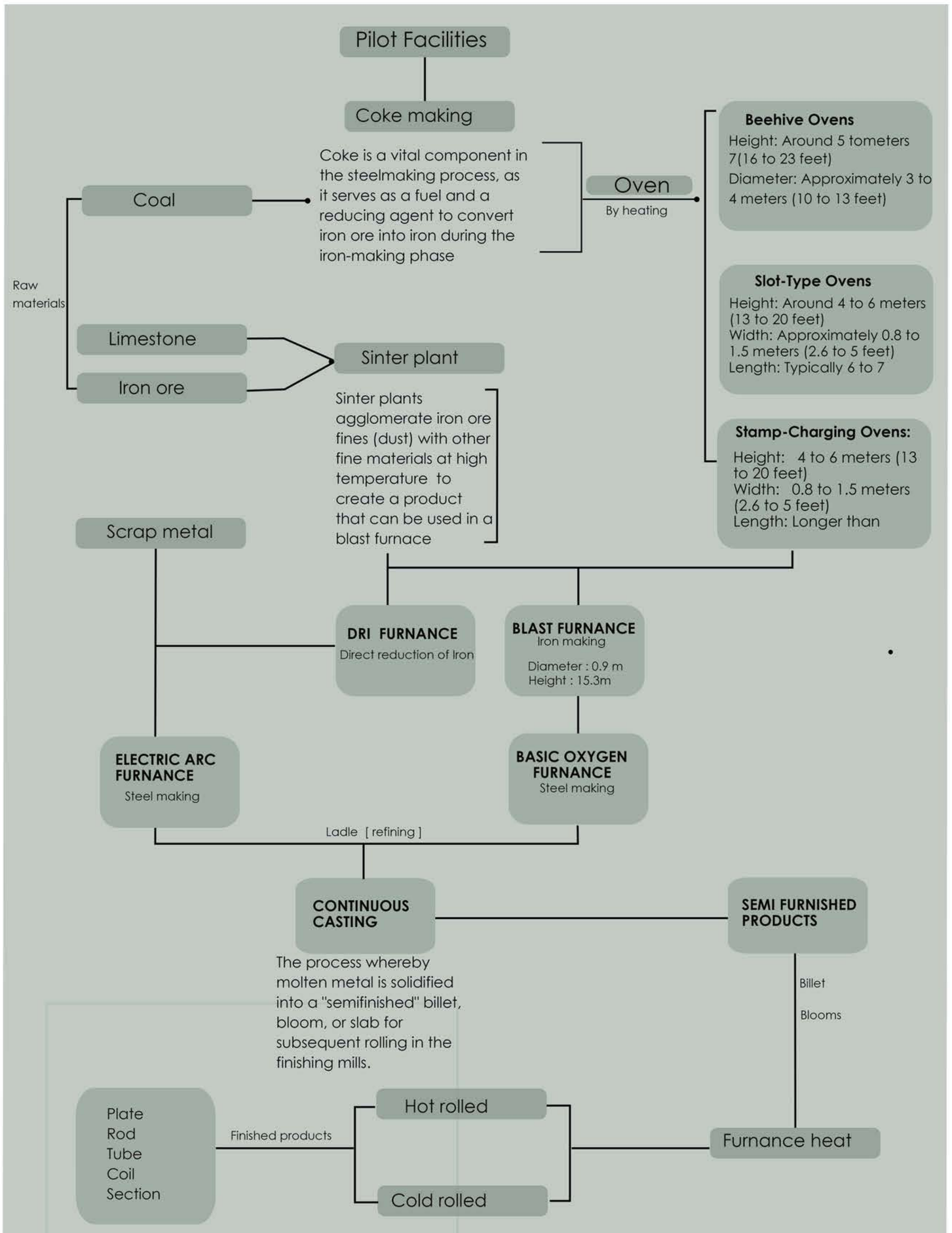


Singe room

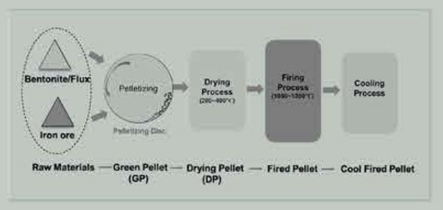


Group office

DATA COLLECTION

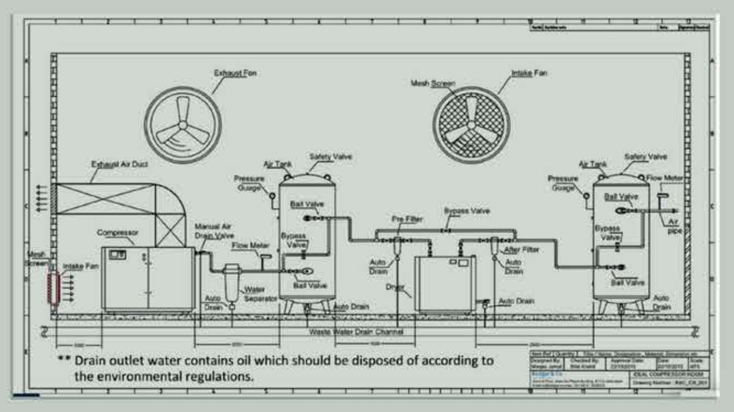


PILOT FACILITIES				
12	Coke making	1200	1	1200
13	Agglomeration and iron making		1	
14	Steel making	60-80	1	60-80
15	Raw material characterization and beneficiation	1000	1	1000
16	Metal forming	20-30	1	20-30
17	Foundary, welding	50-80	1	50-80



Iron ore fines are agglomerated into pellets and then indurated using a furnace to create iron ore pellets. These are typically fed to a blast furnace or DRI plant as part of the process to make steel.

Modern blast furnaces range in size from 20 to 110 metres (70 to 360 feet), have hearth diameters of 6 to 15 metres (20 to 50 feet), and can produce from 1,000 to about 15,000 tons of pig iron daily.



COMPRESSOR ROOM

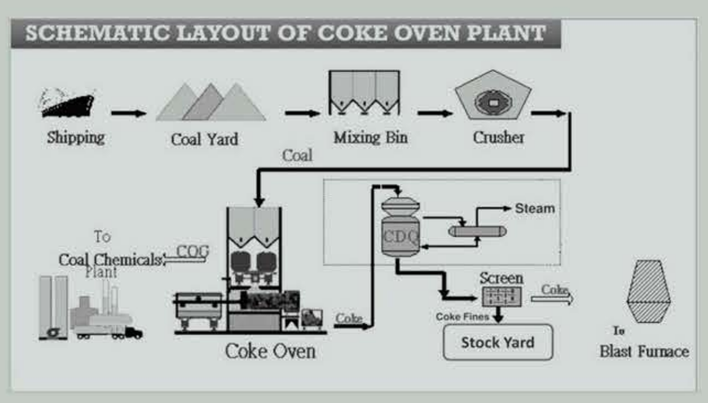
Compressors are heat generators,they operate and yield as a by protuct.This heat is then relocated all over the compressor room and results in increasing the temperature above he optimum level. So it is very imperative to make a proper design and carry out the proper ventilation of the room

PROCUREMENT CELL

Procurement cell is responsible for the availability of various items /and equipment required in each department / section in the institute .It makes assessment of the quality of different items,equipments required at specified intervals on the basis of demand given by the users

IPR CELL

Inventio patent / trademark and similar documents are to be treated and maintained confidentially by the IPR cell .The IPR cell shall help the inventor in drafting the patent application/ or any other IPR application and fillig of relevant forms



ARCHITECTURAL DESIGNING OF

R & D

CENTRE FOR STEEL PLANT

MATERIAL CHARACTERIZATION LAB

EQUIPMENTS	HEIGHT	WIDTH	DEPTH
Scanning Electron Microscope	1.5m -2m	1.5m	1m - 1.5m
Transmission Electron Microscope	2.5m - 3m	1.5m - 2m	1.5m - 2m
X-ray Diffraction Analyzer	0.5m - 1m	0.5m - 1m	0.5m - 1m
Spectometer - handheld	0.15m - 0.30m	0.15m - 0.30m	0.15m - 0.30m
Spectometer - benchtop	0.30m - 0.60m	0.30m - 0.60m	0.30m - 0.60m
Spectometer - floor standing	1.5m -2m	1.5m -2m	1.5m -2m
Differential scanning calorimeter	0.30m - 0.45m	0.30m - 0.45m	0.30m - 0.45m
Mechanical Testing instrument - Universal Testing machine	1.2m - 2m	0.6m - 1.2m	0.3m - 1.5m
Mechanical Testing instrument - Hardness tester	0.3m - 0.6m	0.3m - 0.6m	0.3m - 0.6m
Mechanical Testing instrument - Microhardness tester	0.30m - 0.45m	0.30m - 0.45m	0.30m - 0.45m
Thermal Analysis instrument - Dilatometer	0.30m - 0.45m	0.30m - 0.60m	0.40m - 0.80m
Electron Microprobe Analyzer	2m - 2.5m	1.5m - 2m	1.5m - 2m
Surface profilometers - benchtop	0.30m - 0.45m	0.30m - 0.60m	0.40m - 0.80m
Surface profilometers - portable	0.15m - 0.20m	0.15m - 0.20m	0.15m - 0.20m
Surface profilometers - floor standing	1.5m - 2m	1m - 1.5m	1m - 2m
Optical microscope - compound microscope	0.30m - 0.60m	0.15m - 0.30m	0.20m - 0.45m
Optical microscope - inverted microscope	0.40m - 0.60m	0.20m - 0.30m	0.20m - 0.45m
Optical microscope - portable microscope	0.10m - 0.30m	0.15m - 0.30m	0.20m - 0.45m
Glow Discharge Spectometer - benchtop	1.2m - 2m	0.60m - 1.2m	0.80m - 1.5m
Glow Discharge Spectometer - floor standing	2.5m - 3m	1.5m - 2.5m	1.5m - 2.5m
Corrosion Testing apparatus - salt spray chambers	1.5m - 2m	1m - 2m	1.5m - 2m
Electron Backscatter Diffraction - benchtop	1.2m - 1.8m	0.60m - 1.2m	0.60m - 1.2m
Electron Backscatter Diffraction - floor standing system	2.5m - 3m	1.5m - 2.5m	1.5m - 2.5m
High temperature Testing equipment - tube furnace	0.60m - 1.2m	0.30m - 0.60m	0.30m - 0.60m
High temperature Testing equipment - muffle furnace	0.40m - 0.80m	0.30m - 0.60m	0.30m - 0.60m
High temperature Testing equipment - ovens	0.40m - 0.80m	0.30m - 0.60m	0.30m - 0.60m
Gas Chromatography Mass Spectrometry (GC-MS) - benchtop	0.70m - 1.5m	0.60m - 1m	0.50m - 1m
Gas Chromatography Mass Spectrometry (GC-MS) - compact	0.40m - 0.80m	0.30m - 0.60m	0.30m - 0.60m
Gas Chromatography Mass Spectrometry (GC-MS) - floor standing	1.5m - 2m	1.5m - 2m	1m - 1.5m

PROCESS LAB

EQUIPMENTS	HEIGHT	WIDTH	DEPTH
Scanning Electron microscope - benchtop	1.2m - 1.5m	0.80m - 1.2m	0.60m - 0.90m
Scanning Electron microscope - standard	1.5m - 2m	1.2m - 1.5m	1.2m - 1.8m
Scanning Electron microscope - floor standing	2m - 3m	1.5m - 2m	2m - 3m
Transmission Electron Microscope	2.5m - 3m	1.5m - 2m	1.5m - 2m
X-ray Diffraction Analyzer	0.5m - 1m	0.5m - 1m	0.5m - 1m
Spectometer - handheld	0.15m - 0.30m	0.15m - 0.30m	0.15m - 0.30m
Spectometer - benchtop	0.30m - 0.60m	0.30m - 0.60m	0.30m - 0.60m
Spectometer - floor standing	1.5m -2m	1.5m -2m	1.5m -2m
Thermomechanical simulator - benchtop	1.5m - 2m	1m - 1.5m	1m - 1.5m
Tensile testing machine	1.2m - 1.8m	0.60m - 1.2m	0.60m - 1.2m
Hardness tester	0.3m - 0.6m	0.3m - 0.6m	0.3m - 0.6m
Microscopy tools	0.30m - 0.45m	0.30m - 0.60m	0.20m - 0.45m
Gas analyzers - portable	0.1m - 0.20m	0.15m - 0.30m	0.15m - 0.30m
Gas analyzers - benchtop	0.20m - 0.45m	0.30m - 0.60m	0.40m - 0.80m
High- temperature furnces - benchtop	0.45m - 0.90m	0.30m - 0.60m	0.30m - 0.60m
High- temperature furnces - floor standing	1.5m - 2.5m	1m - 2m	1m - 2m
Quenching and cooling equipment - benchtop	0.30m - 0.45m	0.30m - 0.60m	0.30m - 0.60m
Quenching and cooling equipment - floor standing	1m - 2m	1m - 2m	1m - 2m
Corrosion Testing apparatus - salt spray chambers	1.5m - 2m	1m - 2m	1.5m - 2m
Rolling and Forming Equipment - benchtop	0.60m - 1.2m	0.60m - 1.2m	0.40m - 0.80m
Rolling and Forming Equipment - floor standing	1.5m - 2.5m	1.5m - 3m	1m - 2m
High-speed cameras - compact	0.1 - 0.15m	0.1m - 0.2m	0.1m - 0.2m
High-speed cameras - benchtop	0.2m - 0.3m	0.2m - 0.4m	0.2m - 0.4m
High-speed cameras - floor mounted	0.4m - 0.6m	0.4m - 0.8m	0.4m - 0.8m

ENERGY AND ENVIRONMENT LAB

EQUIPMENTS	HEIGHT	WIDTH	DEPTH
Gas chromotographer -mass spectrometer	0.6m	0.40m	0.5m
Particle analyser	0.3m-0.5m	0.4m-0.6m	0.3m-0.6m
Thermal imaging camera	0.15m-0.2m	0.1m-0.15m	0.05m-0.1
Green gas analyser	0.3m-0.6m	0.3m-0.6m	0.2m-0.4m
Catalytic converter	1m-3m	0.3m-1.5m	0.3m-1.5m
Scrubbers	1.5m-6m	0.6m-3m	0.6m-3m
Waste compactor	2m-4m	1.5m-3m	1m-1.5m
Shredder	1.5m -3.5m	1m-2.5m	1m-2m
Incinerator	2.5m-6m	1.5m-4m	2m-4m
Carbor capture unit	3m-6m	1.5m-4m	2m-4m

ADVANCE PROCESS LAB

EQUIPMENTS	HEIGHT	WIDTH	DEPTH
Scanning Electron microscope	1.5m-2m	1.5m-2m	1m-1.5m
X-ray diffractor	1.5m-1.8m	0.6m-1.2m	1.2m - 1.8m
Transmission electron microscope	1m-1.5m	1.5m - 2m	1m-1.5m
Atomic force microscope	0.2m-0.4m	0.3m-0.6m	0.3m-0.6m
Nuclear magnetic resonance spectrometer	1.5m-1.8m	1m-1.8m	1.2m-1.8m
High performance liquid chromotograph	0.4m-0.8m	0.3m-0.6m	0.3m-0.6m
Gas chromotographer	0.2m-0.4m	0.3m-0.6m	0.3m-0.6m
Spectometer	0.2m-0.4m	0.3m-0.6m	0.3m-0.6m
Differential scanning calorimeter	0.3m-0.6m	0.6m-0.8m	0.4m-0.6m
Thermo gravimetric analyser	0.4m-0.8m	0.3m-0.6m	0.3m-0.6m
Rhetometer	0.2m-0.4m	0.3m - 0.6m	0.3m - 0.6m
Optical emission spectrometer	1.2m-1.8m	0.6m-1.2m	0.6m-1.2m
High- temperature furnces	0.45m - 0.9m	0.3m - 0.6m	0.3m - 0.6m
Universal testing machine	1.5m-2.5m	0.6m-1.2m	1m-1.5m
Impact testing machine	1.5m-1.8m	0.3m-0.6m	0.6m-1m
Hardness tester	0.6m	0.3m	0.6m
Torsion Testing machine	1.5m-1.2m	0.6m-1.2m	1m-1.5m
Compression testing machine	1.5m-2.5m	0.6m-1.2m	1m-1.5m

ADVANCE MATERIAL CHARACTERISTIC LAB

EQUIPMENTS	HEIGHT	WIDTH	DEPTH
Scanning Electron microscope	1.5m-2m	1.5m-2m	1m-1.5m
X-ray diffractor	1.5m-1.8m	0.6m-1.2m	1.2m - 1.8m
Transmission electron microscope	1m-1.5m	1.5m - 2m	1m-1.5m
Atomic force microscope	0.2m-0.4m	0.3m-0.6m	0.3m-0.6m
Nuclear magnetic resonance spectrometer	1.5m-1.8m	1m-1.8m	1.2m-1.8m
High resolution optical microscope	1.5m-1.8m	0.6m-0.9m	0.6m-0.9m
Raman spectrometer	0.3m-0.6m	0.3m-0.6m	0.3m-0.6m
Thermo gravimetric analyser	0.4m-0.8m	0.3m-0.6m	0.3m-0.6m
Universal testing machine	1.5m-2.5m	0.6m-1.2m	1m-1.5m
Impact testing machine	1.5m-1.8m	0.3m-0.6m	0.6m-1m
Hardness tester	0.6m	0.3m	0.6m
Torsion Testing machine	1.5m-1.2m	0.6m-1.2m	1m-1.5m
Compression testing machine	1.5m-2.5m	0.6m-1.2m	1m-1.5m

LAB DIMENSIONS : 120 SQM

SOURCES :
Snider ,Park system ,Anton Park ,Atria Innovation
Xytelcort ,Sjz Teneng,Heinkel,Jeol

SA NO 13 GROUP : MALAVIKA .V I NAWFA J I SHERIN MARY SAJU | NANCY

LEED RATING SYSTEM

LEED (Leadership in Energy and Environmental Design) is the world's most widely used green building rating system in the world.

LEED certification provides a framework for healthy, highly efficient, and cost-saving green buildings, which offer environmental, social and governance benefits.

LEED certification is a globally recognized symbol of sustainability achievement, and it is backed by an entire industry of committed organizations and individuals paving the way for market transformation.

How LEED works

To achieve LEED certification, a project earns points by adhering to prerequisites and credits that address carbon, energy, water, waste, transportation, materials, health and indoor environmental quality.

Projects go through a verification and review process by GBCI and are awarded points that correspond to a level of LEED certification

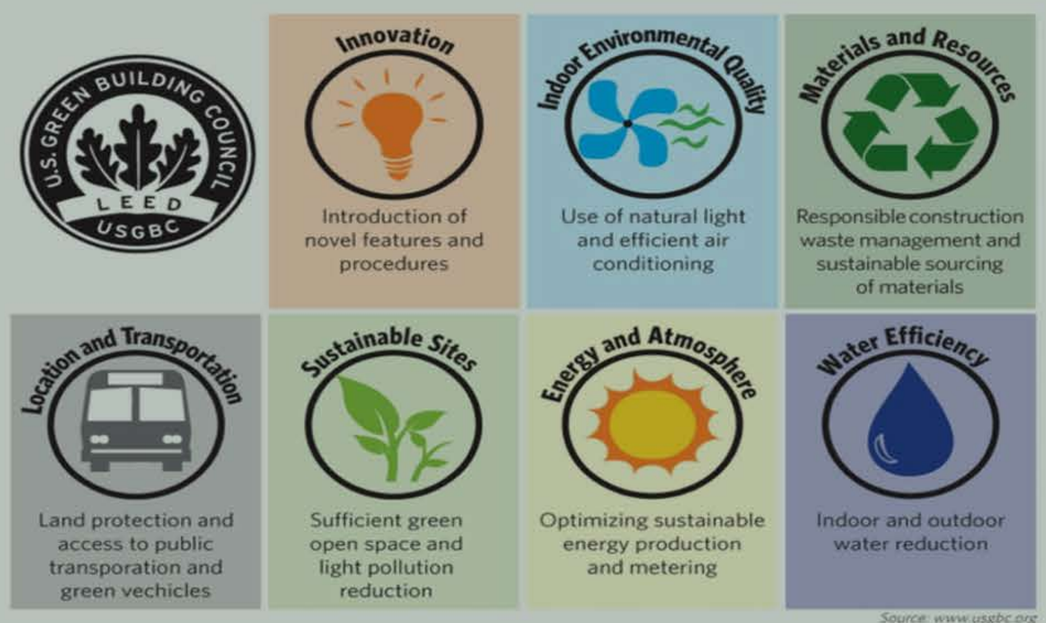
valuable Platinum 80+ points earned

sustainable Gold 60-79 points earned

flexible Silver 50-59 points earned

Certified 40-49 points earned

LEED is backed by USGBC—the developers of LEED—and an entire industry of committed organizations and individuals who are paving the way for market transformation.



LEED system goals

LEED-certified buildings are critical to addressing climate change and meeting ESG goals, enhancing resilience, and supporting more equitable communities

The goal of LEED is to create better buildings that:

- Reduce contribution to global climate change

- Enhance individual human health

- Protect and restore water resources

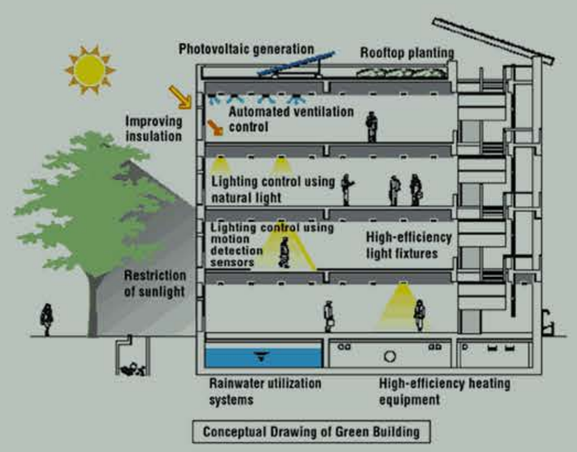
- Protect and enhance biodiversity and ecosystem services

- Promote sustainable and regenerative material cycles

- Enhance community quality of life

Of all LEED credits,

35% relate to climate change,
20% directly impact human health,
15% impact water resources,
10% affect biodiversity,
10% relate to the green economy,
5% impact community and natural resources.



Conceptual Drawing of Green Building

Integrative Process

•Project teams have greater flexibility to tell the story of their integrative process and earn more points for exemplary performance for new areas of interdisciplinary analysis at the frontier of green building, including social equity and public health. Projects can also demonstrate their thoughtful site selection decisions.

Location and Transportation

• Reduced Parking Footprint recognizes variations in consumer behavior; three new credit options are added that reward projects for no off-street parking, providing carshare parking, or unbundling parking.
• Green Vehicles is renamed Electric Vehicles; electric vehicle infrastructure.
• Bicycle Facilities requirements better accommodate diverse project-types;

Sustainable Sites

• Protect or Restore Habitat is more accessible for projects with a reduced restoration threshold, new soil and vegetation guidance, and lowered financial requirements.
• Rainwater Management requirements are more applicable and achievable; storm events andmoreguidance
• Site Assessment is more relevant to international project teams;

Water Efficiency

• Cooling Tower and Process Water Use requirements are adjusted to be more relevant and achievable for projects; the use of alternative recycled water to meet process water demand.
• Core and Shell only: Points are re-allocated from Indoor Water Use Reduction to Outdoor Water Use Reduction and Cooling Tower and Process Water Use to better align with Core and Shell scope of work.

Energy and Atmosphere

• The referenced standard for energy performance is updated to ASHRAE 90.1-2016; projects are now required to demonstrate performance against two metrics: cost and greenhouse gas emissions.
• Optimize Energy Performance includes a new prescriptive option for individual systems optimization in BD+C.
• Renewable Energy, to better address diverse methods of renewables procurement and evolving global renewables markets.
• Response is updated to Grid Harmonization to recognize role of buildings in supporting grid-scale de-carbonization; strategies for building load flexibility and management.

Materials and Resources

• To encourage greater uptake of all Materials and Resources credits, additional credits are provided
•These updates include revised thresholds for number of products, cost and manufacturers in BPDO credits for smaller and/or less material intensive projects and project types such as Warehouses and Core and Shell to make credits more achievable.
• The Construction and Demolition Waste credit is revised for challenging project sites and features updated total waste reduction thresholds.
• Greater emphasis and weighting is given to embodied carbon reductions through building reuse, salvage, whole building LCA, and EPDs.

Indoor Environmental Quality

The air quality testing option for Indoor Air Quality Assessment has been revised with two testing pathways and a small list of required contaminants.
• The entry points for both the Daylight and Acoustic Performance credits are lowered to encourage more projects to consider daylight and acoustic performance during design.

DATA COLLECTION - ON STEEL STRUCTURES & NEW INNOVATIONS

R&D ARCHITECTURAL DESIGNING OF CENTRE FOR STEEL PLANT

STEEL ELEMENTS

1. Rolled Angle Sections

Angle sections are manufactured in "L" shape. It contains two legs. Angle sections are widely used for **roof truss constructions and for filler joist floors.**

DIMENSIONS : Equal angle sections are available from 20 mm x 20 mm x 3 mm to 200 mm x 200mm x 25 mm with their corresponding weights as 9 N and 736 N per meter length respectively. Unequal angle sections are available from 30 mm x 20 mm x 3 mm to 200mm x 150mm x 18mm.



2. Rolled Channel Sections

The channel section or C- section consists two equal flanges connected to web at both ends. Channel sections are extensively used in **steel framed structures.**

DIMENSIONS : They are available in various sizes ranging from 100 mm x 45 mm to 400mm x 100 mm.


3. Rolled T- Sections

T section consists of flange and web arranged in "T" shape. They are used in **steel roof trusses to form built up sections.**

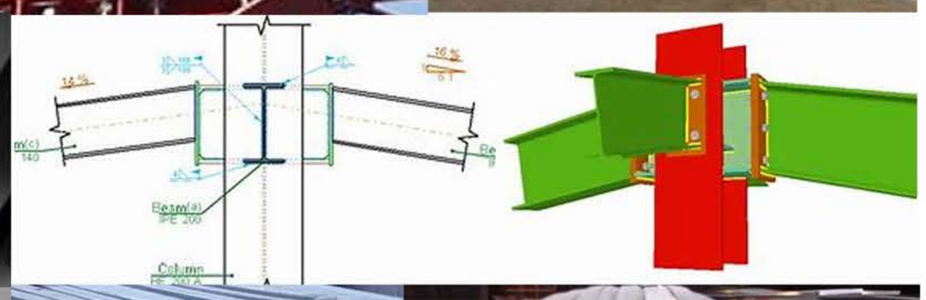
DIMENSIONS :Rolled T sections size varies from 20 mm x 20 mm x 3 mm to 150 mm x 150mm x 10 mm.



4. Rolled I - Sections

I sections which are also called as steel beams or rolled steel joist are extensively used as **beams, lintels, columns etc.**

DIMENSIONS : These are available in various sizes ranges from 75 mm x 50 mm

5. Rolled Round Bars

Round bars contain circular cross sections and these are used as reinforcement in concrete and steel grill work etc. Round bars are available in various diameters varies from 5 mm to 250 mm.

6. Rolled Square Bars

Square bars contain square cross sections and these are widely used for gates, windows, grill works etc. the sides of square cross section ranges from 5 mm to 250 mm.



7. Rolled Flat Bars

Flat bars are also used for gates, windows, grill works etc. Flat bars are designated with width of the bar which varies from 10 mm to 400 mm. thickness of flat bars will be from 3 mm to 40 mm.

8. Corrugated Sheets

Plain steel sheets are passed through machines which produce bends by pressing them called corrugations. These sheets are used for roof coverings


9. Rolled Steel Plates

Steel plates are well used items in steel structures. They are used for connecting steel beams, tensional member in roof truss etc. They are designated with their thickness which is varying from 5 mm to 50 mm.

10. Ribbed Bars (HYSD)

Ribbed HYSD bars are made of high yield strength steel. Ribs are nothing but projections produced on bars by cold twisting of bar in hot rolled condition & they are extensively used as main reinforcement materials in all concrete works like bridges, buildings, precast concrete works, foundations, roads.

11. Rolled Thermo-Mechanically Treated (TMT) Bars

Thermo-mechanically treated bars or TMT bars are manufactured by a special technique in which the red-hot steel bars are suddenly quenched by spraying water on it. **Copper, phosphorus and chromium** are added in manufacturing process of TMT bars which improves its corrosion resistance.




12. Welded Wire Fabrics

They are a series of mild steel bars which are arranged perpendicular to each other and welded at all intersection. These are used as reinforcement for floor slabs, small canal linings, pavement's.

12. Wire Ropes

Wire rope is several strands of metal wire twisted into a helix forming a composite rope, in a pattern known as laid rope.

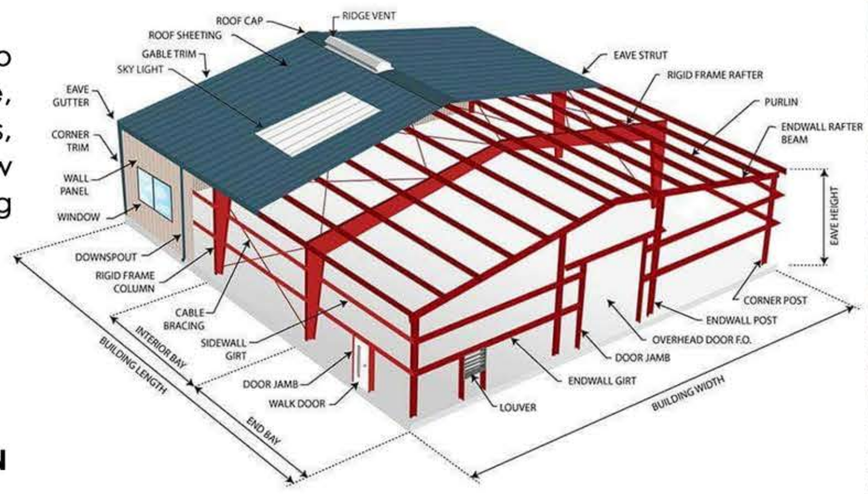


12. Weather Resistant Steel

is a group of steel alloys which were developed to eliminate the need for painting, and form a stable rust-like appearance after several years' exposure to weather.

DESIGN METHODS FOR STEEL STRUCTURES

There are three main design approaches to steel structure creation called simple, continuous, and semi-continuous, respectively. These designs showcase how various types of structures are created using several different design approaches.




1. SIMPLE STEEL STRUCTURE DESIGN

2. CONTINUOUS STEEL STRUCTURE DESIGN

3. SEMI-CONTINUOUS STEEL STRUCTURE DESIGN

The type of steel building structures is the portal

SA NO 13 GROUP : MALAVIKA .V I NAWFA J I NANCY I SHEIRIN MARY SAJU

DATA COLLECTION - ON STEEL & IT'S COMPONENTS

R& D ARCHITECTURAL DESIGNING OF CENTRE FOR STEEL PLANT

WHAT IS STEEL ?

STEEL is an alloy of iron & carbon that is widely used in construction and other applications because of it's hardness & tensile strength. It's a malleable alloy of Iron & Carbon (not over 2%) with substantial quantities of Manganese. The steel becomes harder and tougher as its carbon content goes on increasing. Steel is suitable for all construction purposes in general it can take both compressive and tensile stresses.

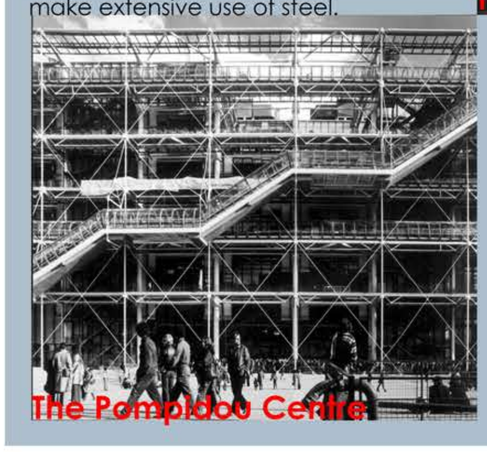
HISTORY OF STEEL

During the **1850s**, due to the manufacturing processes being developed in Britain by Sir Henry Bessemer

Pioneering bridges - The Brooklyn Bridge in New York was completed in 1883 to the designs of architect and engineer John Augustus Roebling. For 20 years Brooklyn Bridge was - at 486m - the longest suspension bridge in the world, and was the first bridge to make extensive use of steel.


The Brooklyn Bridge in New York

In 1930 the 50,000 tons of steel forming the structure of the 85-storey, 378m-high **Empire State Building** in New York (designed by Shieve, Lamb and Harmon) were erected in only six months. By 1928, the **Chrysler Building** was competing with 40 Wall Street and the Empire State Building to become the world's tallest building. Today, the Chrysler Building remains the **world's tallest steel-supported brick building.**

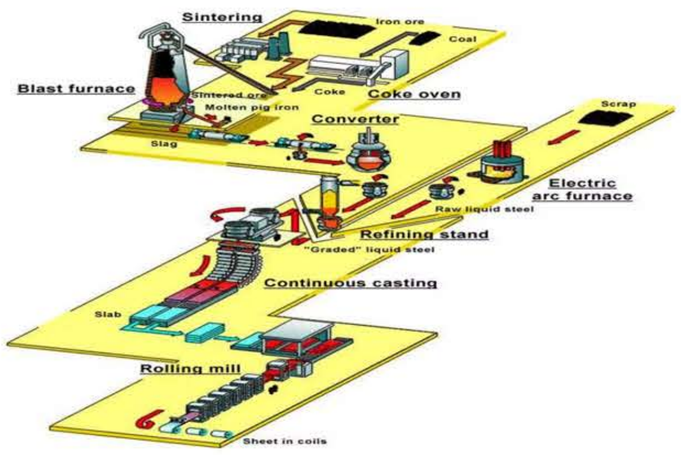

The Pompidou Centre

1780-1840	Cast Iron Arched shaped bridges up to 30 m span
1840-1890	Wrought Iron Span up to 100 m
1870-1920	Bessemer Converter Intro. Carbon Steel
1920- To Date	Third most popular material after Concrete and Timber


Chrysler Building

MANUFACTURING OF STEEL

In Metalworking, ROLLING is a metal forming process in which metal stock is passed through one or more pairs of rolls to reduce the thickness & to make the thickness uniform. Rolling is classified according to the temperature of the metal rolled.



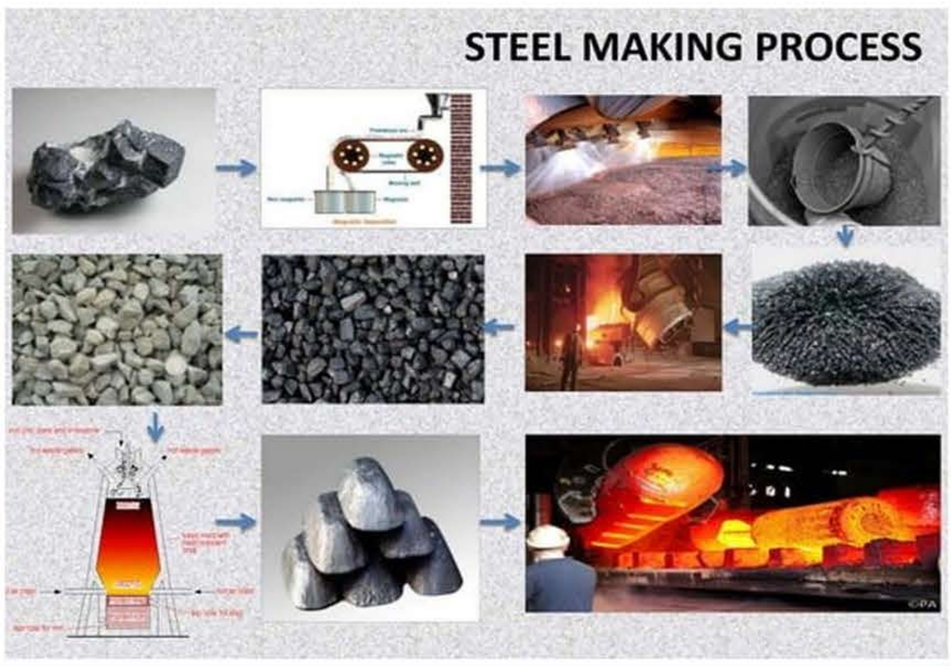
HOT ROLLING If the temperature of the metal is above it's recrystallization temperature, then the process is termed as hot rooling. It is mainly used to produce sheet metal or simple cross sections such as rail tracks.

COLD ROLLING If the temperature of the metal is below it's recrystallization temperature then its called cold rolling (MILD STEEL)

PRESSED STEEL Steel sheets made into curved sections by press is often used for construction of the frame & forks

MANUFACTURING PROCESSES OF STEEL

BESSEMER PROCESS
OPEN HEARTH PROCESS
CEMENTATION PROCESS
CRUCIBLE PROCESS
DUPLEX PROCESS
ELECTRICAL PROCESS



PROPERTIES OF STEEL AS A STRUCTURAL DESIGN MATERIAL

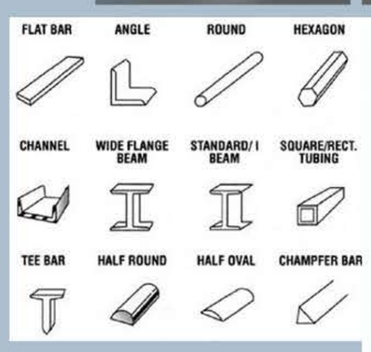
HIGH STRENGTH/WEIGHT RATIO
The dead weight of steel structures is relatively small.
DUCTILITY
SPEED OF ERECTION
QUALITY OF CONSTRUCTION
ADAPTATION OF PREFABRICATION
REPETITIVE USAGE
EXPANDING EXISTING STRUCTURES

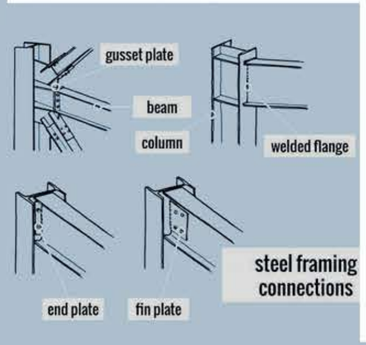
TYPES OF STEEL

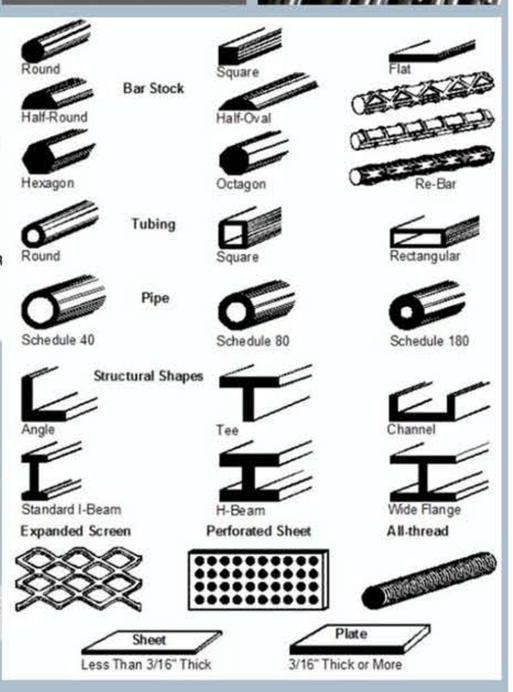
- High Carbon Steel - contains more carbon% than iron, making it softer, used for wood cutting tools as they can be sharpened.
- Mild Steel - composes of iron & low content of carbon , used to make sheet metal for roofs.
- Medium Carbon Steel - composes normal amount of carbon, mostly used for tool frames or springs.
- Stainless Steel - most resistant, composes of corbon & 11% of chromium, resistant to rust and corrision.

TYPES OF STEEL SECTIONS

- Angle – a cross-section shaped like a letter "L"
- Sheet – a thin, flat piece of metal, usually 6 mm thick or less
- Plate – a thicker variation of a sheet, thicker than one-fourth of an inch
- HSS/SHS – Hollow Structural Section, or Structural Hollow Section, is a shape that includes circular, rectangular, elliptical, and square sections
- I-beam – a cross-section shaped like a letter "I".
- Structural channel – C cross-sections/C-beams
- Rod – a long and relatively thin steel piece
- Z-shape – half a flange in different directions, closely resembles letter "Z" with its composure
- Tee – a cross-section shaped like a letter "T"



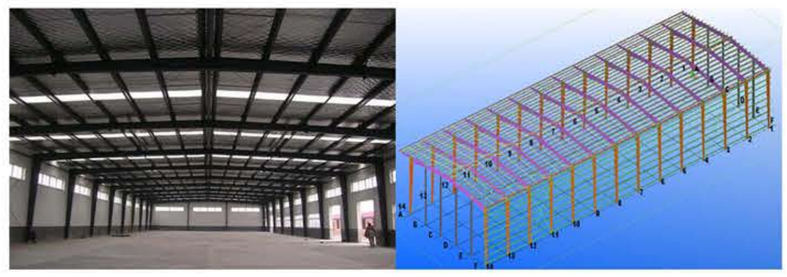




TYPES OF STEEL SECTIONS & CONNECTIONS

TYPES OF STRUCTURES IN THE FORM OF BUILDINGS

Portal frame - The most common type of light steel structure, a portal frame is a widely popular type of steel structure that relies only on section steel, steel pipes, and C/Z steel to withstand the force of the entire structure. It is often used for many different building types, be it industrial, agricultural, institutional, or commercial – although, the most popular example might just be the regular warehouse-hangar that is a common occurrence for many different countries all over the world.

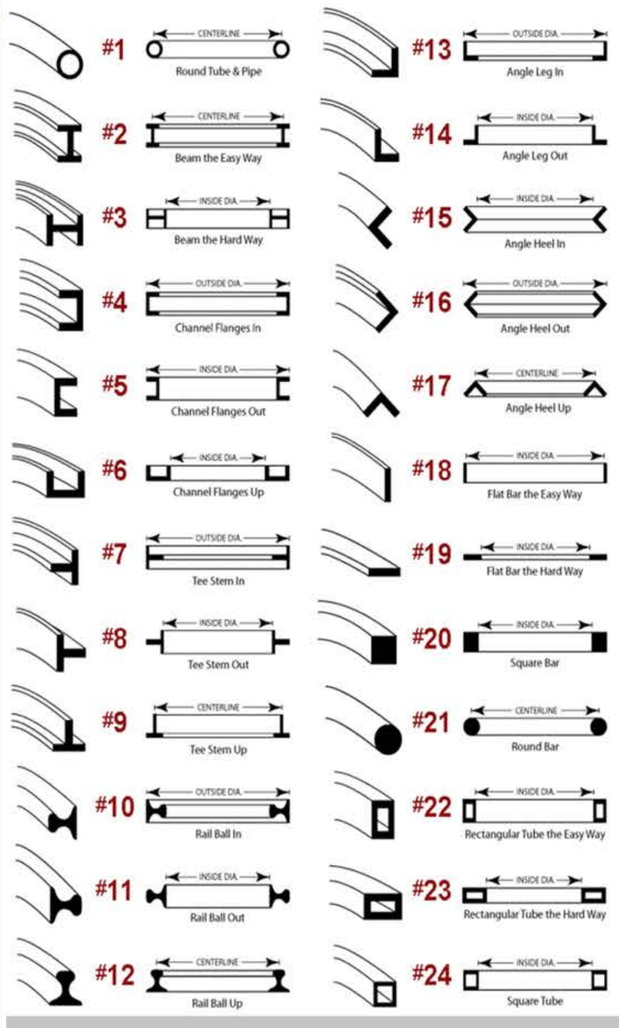


Steel Grid - Generally speaking, a grid is a spatial structure that is comprised of multiple rods connected to each other in a specific form. There are many grid types out there, and many different standards for them, as well. They are highly rigid and provide extensive seismic resistance, which makes them perfect for hangars, exhibition halls, gymnasiums

Steel Building frame - Another popular structure type that is mostly used for various multi-story buildings is the steel building frame, which consists of columns and beams that form structures capable of withstanding both vertical and horizontal pressure. A common choice for high-rise buildings, commercial offices, conference buildings

Steel Truss - The truss structure is made of multiple rods that are hinged at each end of a rod. It requires less steel than regular steel structures, weighs less, and can withstand more force – which is why it's often used for bridges, roofs, tower corridors, TV towers, oil platforms

Steel Cable Structure - Steel cables are either spiral strand, where circular rods are twisted together and "glued" using a polymer, or locked coil strand, where individual interlocking steel strands form the cable (often with a spiral strand core).



Steel is the world's most important engineering and construction material. It is used in every aspect of our lives; in cars and construction products, refrigerators and washing machines, cargo ships and surgical scalpels. It can be recycled over and over again without loss of property.

ADVANTAGES OF STEEL

1. Steel has high strength
2. Gas & Air Tight due to high density
3. Can be easily fabricated on site
4. Great Durability
5. Can be disassembled/replaced
6. Can be strengthened by connecting additional sections/plates.

DISADVANTAGES OF STEEL

1. Steel is prone to CORROSION.
2. Needs painting.
3. Low fire resistant.
4. Can deform at high temperature.
5. Steel structures are often more expensive.

SA NO 13 GROUP : MALAVIKA .V I NAWFA J I NANCY I SHEIRIN MARY SAJU

WAVE ONE RESEARCH CENTER/ FAAB

ARCHITECTURAL DESIGNING OF

R &

D CENTRE FOR STEEL PLANT

WAVE ONE, OF THE EUROPEAN CENTER FOR FAMILIES, IS LOCATED 400 METERS FROM THE BALTIC SEA IN WHAT IS HISTORICALLY KNOWN AS A HEALTH RESORT TOWN. THE CONCEPT IS DERIVED FROM THE COMPLEXITY OF SEA WAVES AND THE LOCAL VERNACULAR OF CARVED ORNAMENTAL DETAILING ON FACADE ELEMENTS. DRAWING UPON THIS, THE ARCHITECTS CREATED A SITE CONCEPT COMPOSED OF FIVE INTER-RELATED BUILDINGS, REMINISCENT OF WAVES. WAVE ONE, THE FIRST TO BE BUILT AFTER A LENGTHY DESIGN AND CONSTRUCTION PROCESS, ENCOMPASSES SPECIALIZED MEDICAL LABORATORIES, INCLUDING SARS-COV-2 TESTING LABS, A RESEARCH & DEVELOPMENT CENTER, AND ADMINISTRATION SPACES.

FUNCTION PER FLOOR

BELOW GROUND: COLD AND REAGENT STORES, SERVER, AND TECHNICAL ROOMS.

GROUND FLOOR: LOBBY, COLLECTION POINT, MEDICAL ANALYTICAL LABORATORY WITH FULLY AUTOMATED MEDICAL LABORATORY EQUIPMENT BASED ON ROBOTIC SORTING LINES.

FIRST FLOOR: MOLECULAR BIOLOGY LABORATORY CARRYING OUT RESEARCH IN THE FIELD OF GENETICS. CYTOLOGY, CYTOGENETICS, AND VIROLOGICAL LABORATORY IS ADJACENT.

SECOND FLOOR: RESEARCH AND DEVELOPMENT CENTER. THIS CENTER ALSO CREATES SPECIALIZED SOFTWARE TO STREAMLINE IMPLEMENTATION AND INCREASE ACCESSIBILITY OF MEDICAL PROCEDURES. THE SOFTWARE IS BASED ON ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING TECHNOLOGIES.

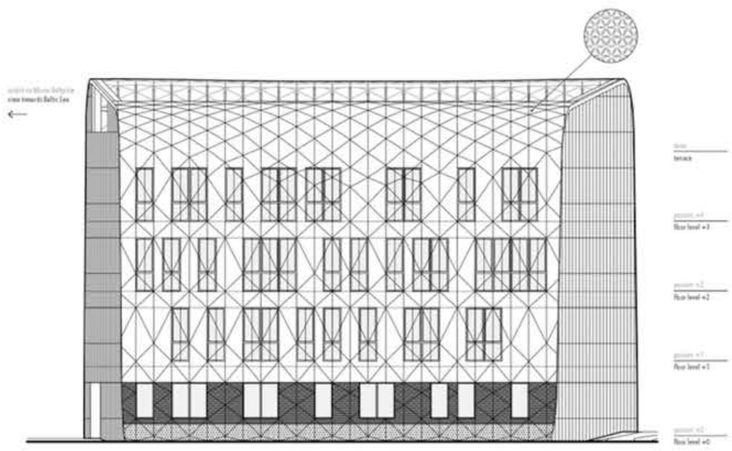
THIRD FLOOR: INVESTOR HEADQUARTERS AND OFFICES INTENDED FOR THE DEVELOPMENT OF RESEARCH PROJECTS.

TERRACE: DIVIDED INTO TECHNICAL AND RECREATIONAL SPACES BY AN ACOUSTICALLY INSULATING WALL. THE RECREATIONAL TERRACE IS AVAILABLE TO ALL EMPLOYEES AND PROVIDES WORK PLACE WELL-BEING AND A VISUAL CONNECTION TO THE BALTIC SEA.

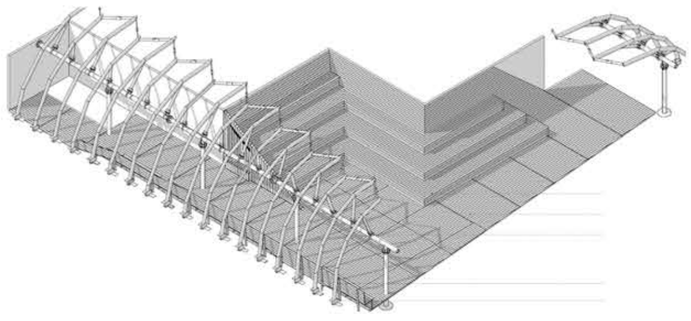
ARCHITECTS: FAAB

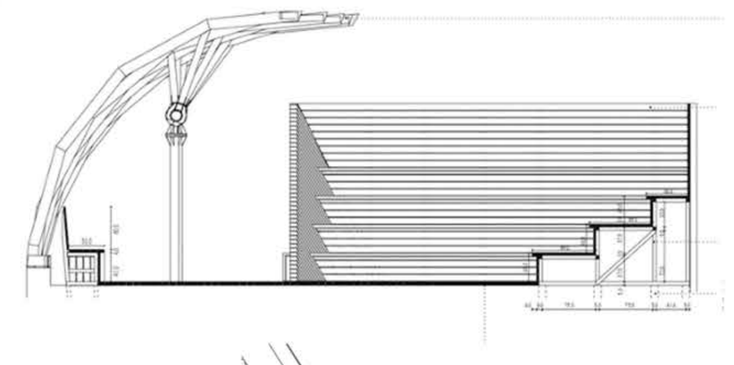
AREA: 3160 M²

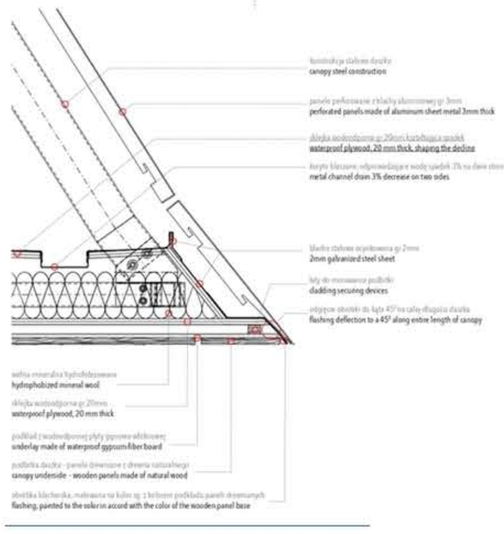
SECTION

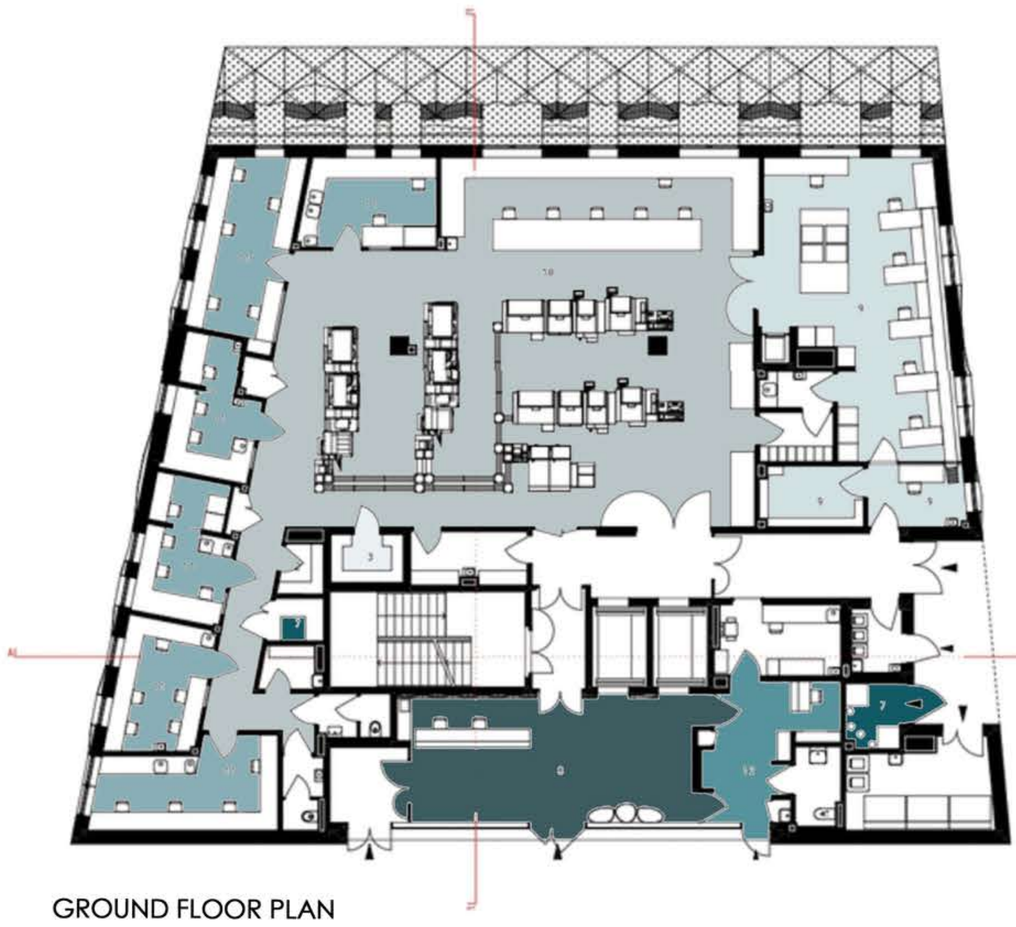


ELEVATION



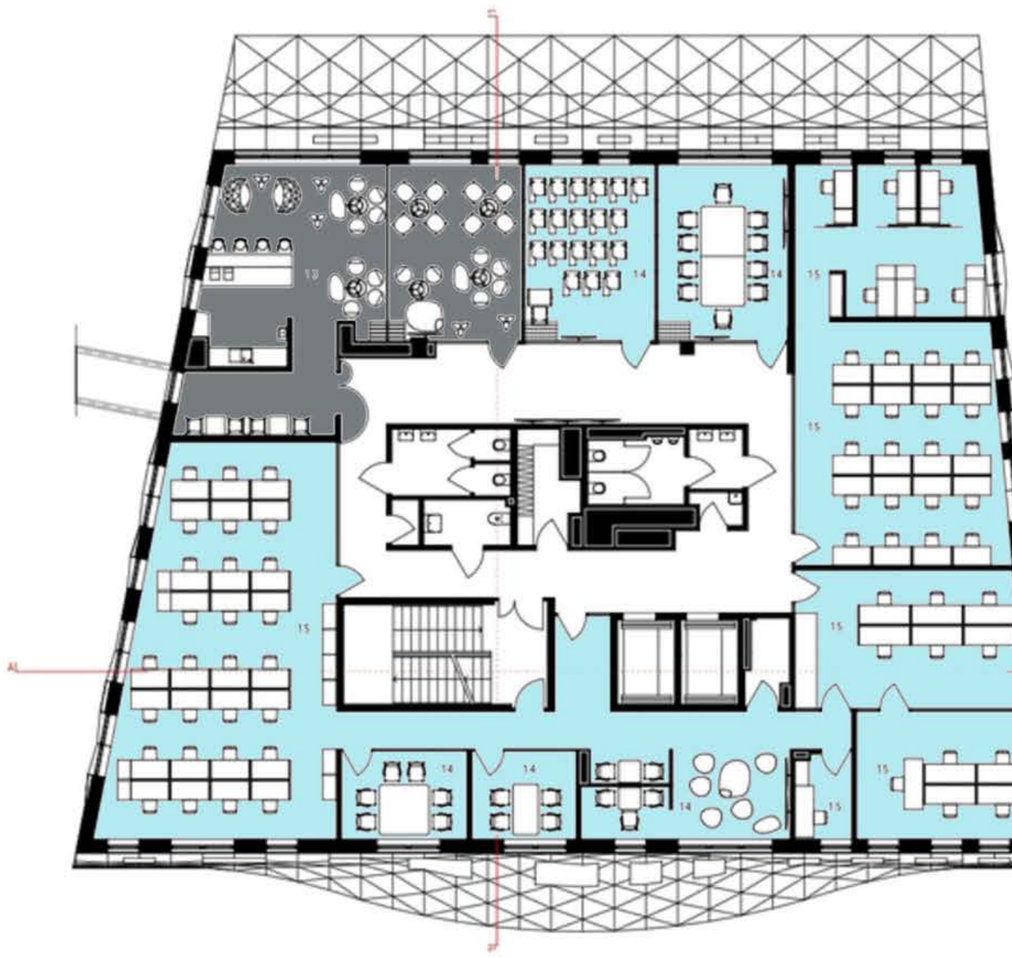






GROUND FLOOR PLAN

- CAFETERIA
- LABAROTARY INDIVIDUAL ROOM
- LABAROTARY LOGISTIC ROOM
- LABAROTARY MAIN ROOM
- ENTRANCE HALL
- COLLECTION POINT
- COOL STORAGE MEDICAL
- OFFICE AND CONFERENCE ROOM



LEVEL 2 PLAN

THE WHITE PERFORATED FACADE, ENFOLDING WAVE ONE, WAS PARTLY INSPIRED BY A SERIES OF PHOTOGRAPHS BY PIERRE CARREAU, TITLED AQUAVIVA. THE ARCHITECTS ANALYZED THE GEOMETRIC COMPLEXITY OF THE SEA WAVES, CAPTURED BY THE PHOTOGRAPHER. THE ARCHED 3D FORMS, FROZEN IN TIME, WERE TRANSLATED INTO AN ARCHITECTURAL LANGUAGE THAT SHAPED THE BUILDING'S FINAL FORM. WITH 1,362 PERFORATED TRIANGULAR PANELS, THE FACADE, JUST LIKE A WAVE, BEND AT ITS CREST, THE TOP OF THE BUILDING.

ARCELORMITTAL R&D HEADQUARTERS

ARCHITECTURAL DESIGNING OF

R & D CENTRE FOR STEEL PLANT

The origin of the project was the need expressed by ArcelorMittal's Global R&D Centre at Aviles, located in this building, to have more workspace. An existing building, rational, symmetric, with a heavy architecture, heavy concrete walls and brick facades, that have been already extended in the 70´s.

The inside-out sushi roll, also known as Uramaki, has the peculiarity that the rice is on the outside and the nori (seaweed) is on the inside, surrounding the filling. This is why it is referred to as an inside-out roll. In this project, the vision was to play with these concepts with reference to the inside and outside of the building, the city and the materials.

Endeavouring both to connect ArcelorMittal's Global R&D Centre to the city of Aviles and, simultaneously, displaying the steel, a material that is produced in the plant (in the city) and that was not apparent in the refurbished centre

The metal parts can be 100% reused and 70% of them came from recycled steel. The project has two fundamental lines of action: firstly, the restoration of spaces, facades and functionalities in the existing building and secondly, the construction of two new buildings.

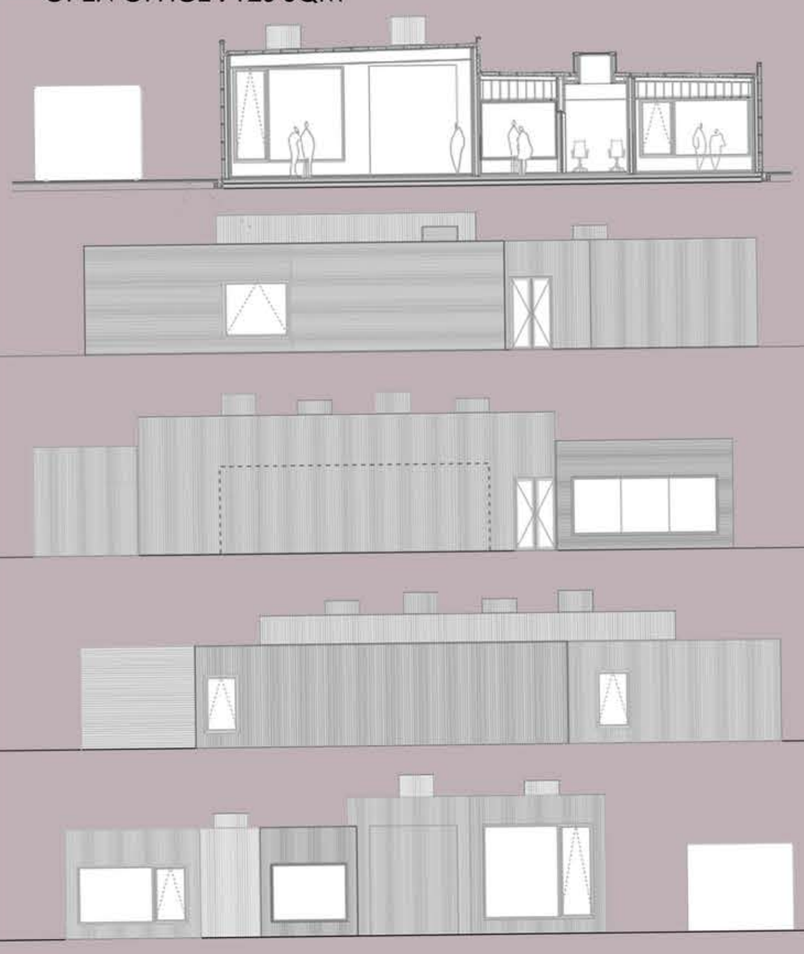
ARCHITECT : SERGIO BARAGAÑO

SITE AREA : 21433 SQM

EXISTING BUILDING : 1575 SQM

FINGER LAB: 323 SQM

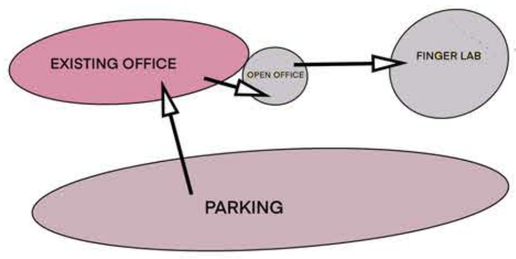
OPEN OFFICE : 120 SQM



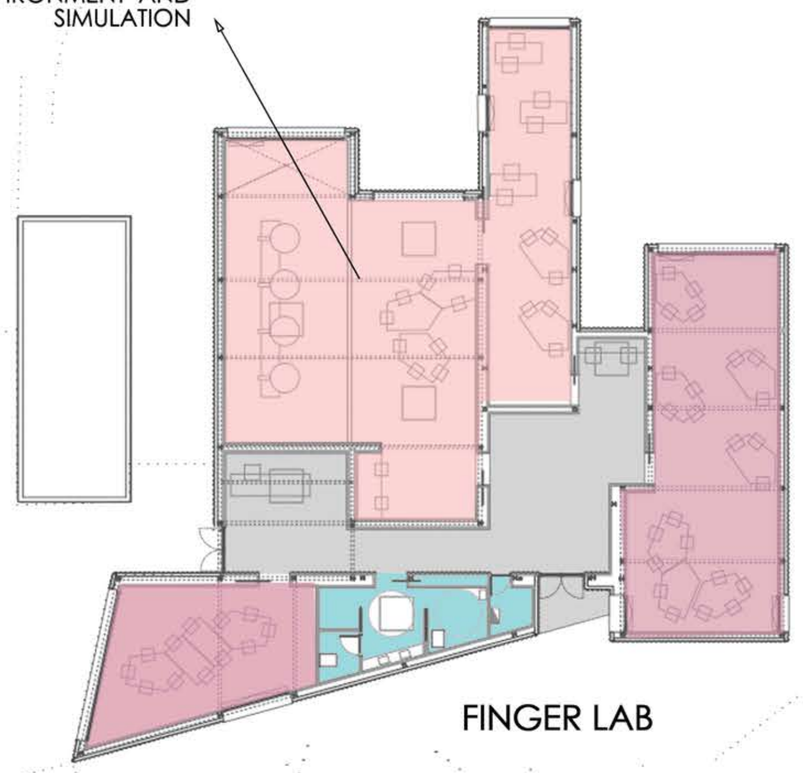
FINGER LAB ELEVATIONS AND SECTION

BEFORE RENOVATION

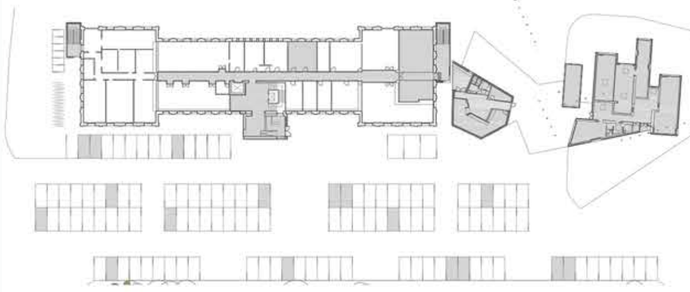
AFTER RENOVATION



ENERGY ENVIRONMENT AND PROCESS SIMULATION LABROTARY



ZONING



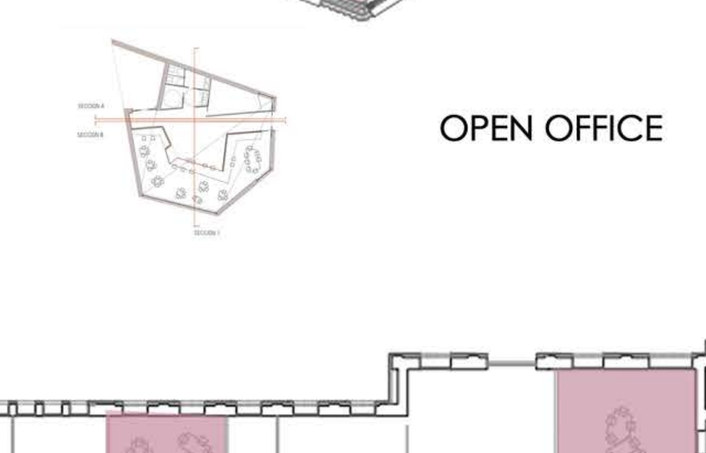
MASTER PLAN

FINGER LAB

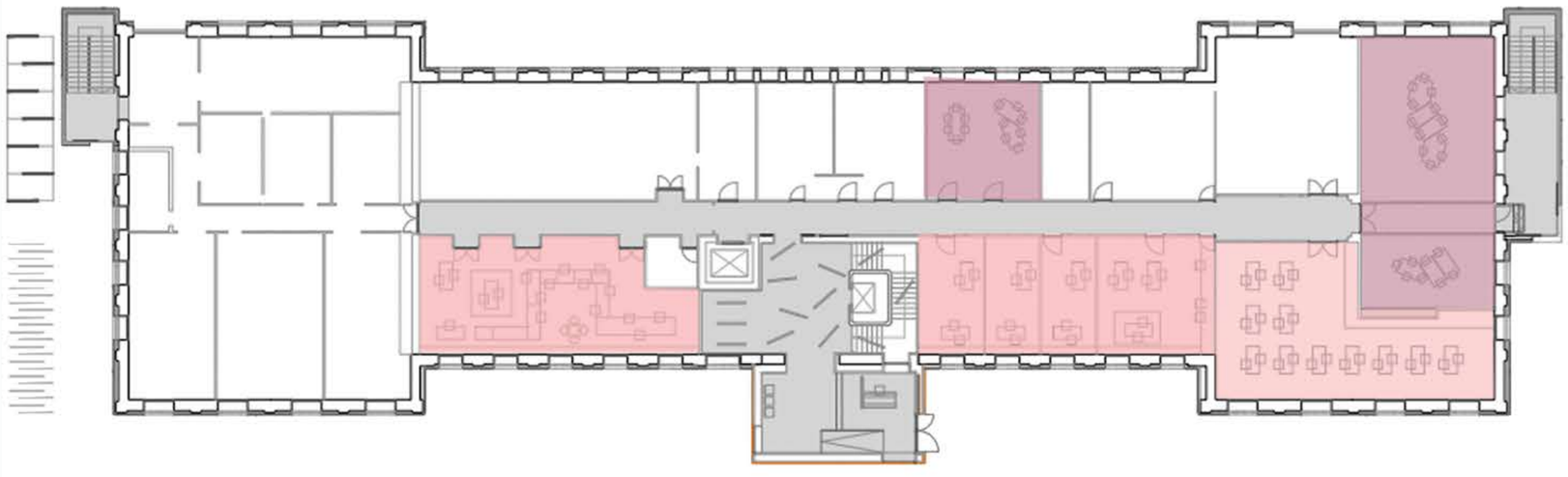
MEETING ROOMS

LABS

TOILETS



OPEN OFFICE

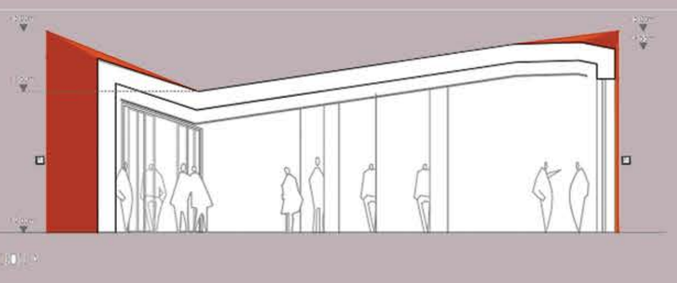


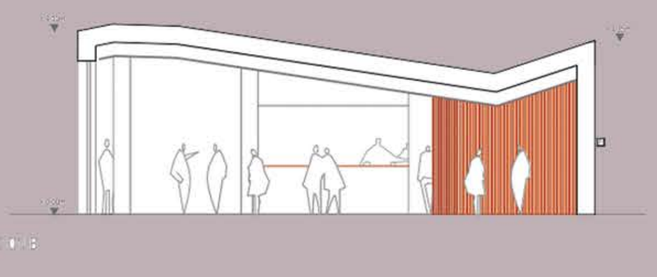
EXISTING BUILDING

Construction of two low-rise buildings alongside the Technology Development Centre.

The first one, named Open Office contains two meeting rooms, toilets and a rest area. Its structure consists of rolled sections, primarily IPE220 and HEA 120 in grade S275. Chantilly sheet painted in orange was also used.

The second one is the Finger Lab, has an energy, environment and process simulation laboratory, as well as meeting rooms. Its structure consists of rolled sections, primarily IPE220 and HEA 120 in grade S275. Hacierba liner trays and Chantilly sheet painted in Anthracite were also used.





OPEN OFFICE SECTION

SA NO 13 GROUP : MALAVIKA .V I NAWFA J I NANCY I SHERIN MARY SAJU

CASE STUDY - STEEL

NOW 26 / ARCHITECTKIDD

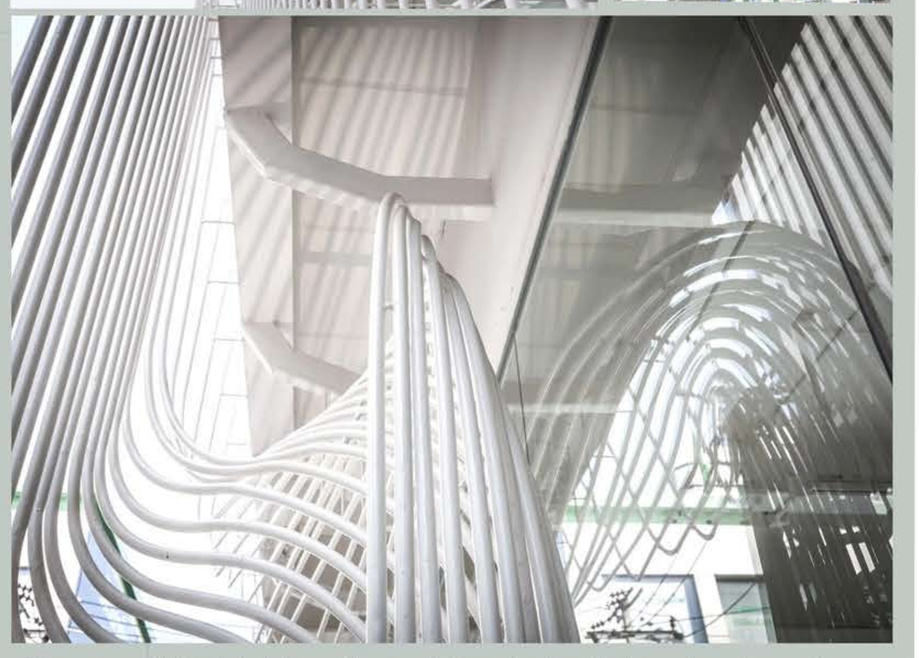
Architect : ARCHITECTKIDD
Location :Bangkok.Thailand
Project year : 2016
Category : Office

During the initial stage of the project, the removal of the old cladding exposed the existing steel structure along with the electrical and services installation.

19mm steel hollow tubes were selected as an economic and utilitarian material to compliment the structure and systems remaining in place after the renovation.

The metal strips forming this cladding are welded to stainless steel plaques that crisscross and jet out of the building structure in the form of stainless steel tubes to create a winding functional construct.

Large windows can be glimpsed through the slats in the cladding that allow light to flow inside.

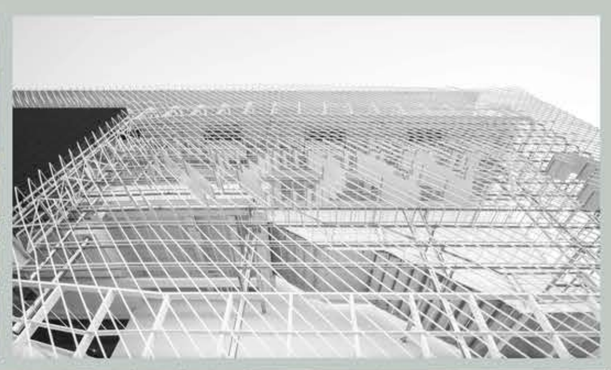


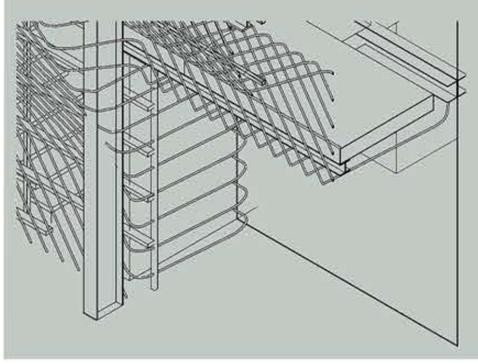
Bending and curving the steel tubes were achieved by construction workers and tools typically used for installing electrical conduits in buildings.

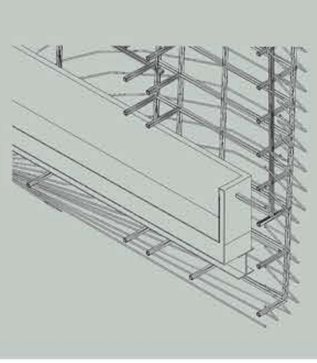
From a distance the building seems opaque, with the exterior rendering an effect of a solid surface composed of diagonals and contours. Up close, the exterior appears more transparent, like a wire frame that wraps around and into the interior space.

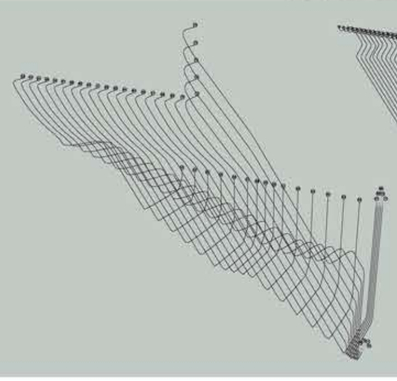
The use of steel tubing allowed the design to be developed 'inside-out'. The tubes were used throughout the interior spaces as well as furniture installations.

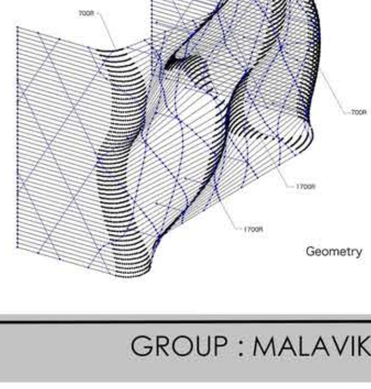
By varying the density and patterning, the steel tubes extended out towards the exterior and were attached on to the existing structural frame











ARCHITECTURAL DESIGNING OF R & D CENTRE FOR STEEL PLANT

A6K WORKSPACE

Architect : Traumnovelle
Location Charleroi,Belgium
Project year : 2018
Area : 5000 m2

The project takes place within the complex structure of an existing building. Grafted to its circulation system, it aims at making the existing spatial structures and uses more legible.

The studio created a layout based on a city grid to design autonomous work spaces that frame a central public space dedicated to the communal activities of this industrial ecosystem.

The central shared spaces, emphasized by a colored-steel framework, allow the workers to come together through federative collective activities, similarly to the exercise ground.

On the other hand, the studio creates a striking contrast in material approach. While glazed volumes provides a high degree of visibility, the dominancy of steel structure on the ceiling tries to make the building playful and relaxing.

The interior spaces are designed as new workspaces for high-tech companies and startups,including meeting spaces, educational spaces and community areas.

DEAR JINGUMAE BUILDING

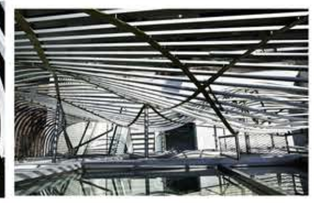
Architects: Amaro desin office

Material: Stainless steel pipes and plates

The metal strips forming this cladding are welded to stainless steel plaques that crisscross and jet out of the building structure in the form of stainless steel tubes to create a winding functional construct. Large windows can be glimpsed through the slats in the cladding that allow light to flow inside.

An outside staircase leads up from street level to just below the first floor facade, where it connects to an internal staircase joining the three above-ground floors to the two underground levels. At night-time the interiors are lit up by a system of fluorescent lighting tubes set out randomly, which add character to the otherwise basic interior finishes. the neighborhood a sense of identity.

The louvers give a soft expression by connecting three-dimensionally misaligned radiuses. The louver components are welded to crossed SUS plates and protrude from the building frame by SUS pipes, resulting in a streamlined workability

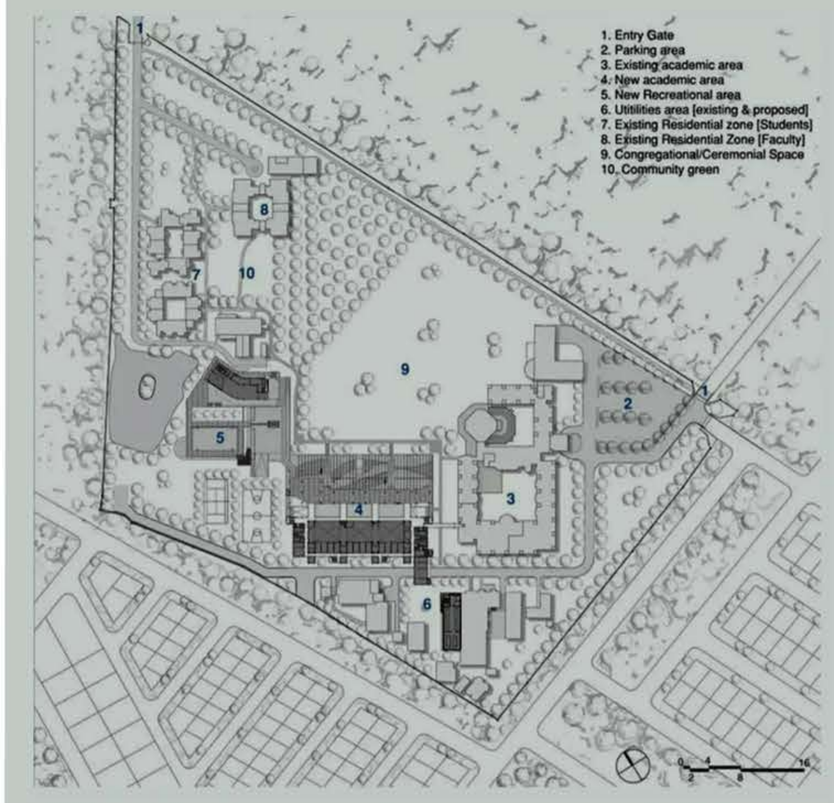


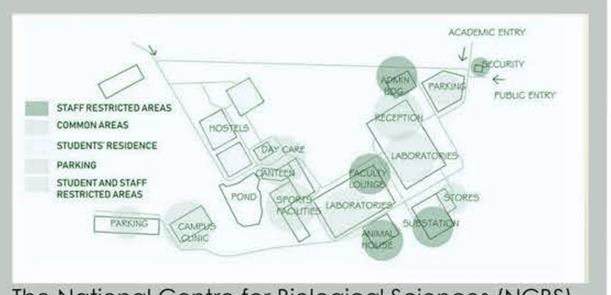
Geometry

CASE STUDY

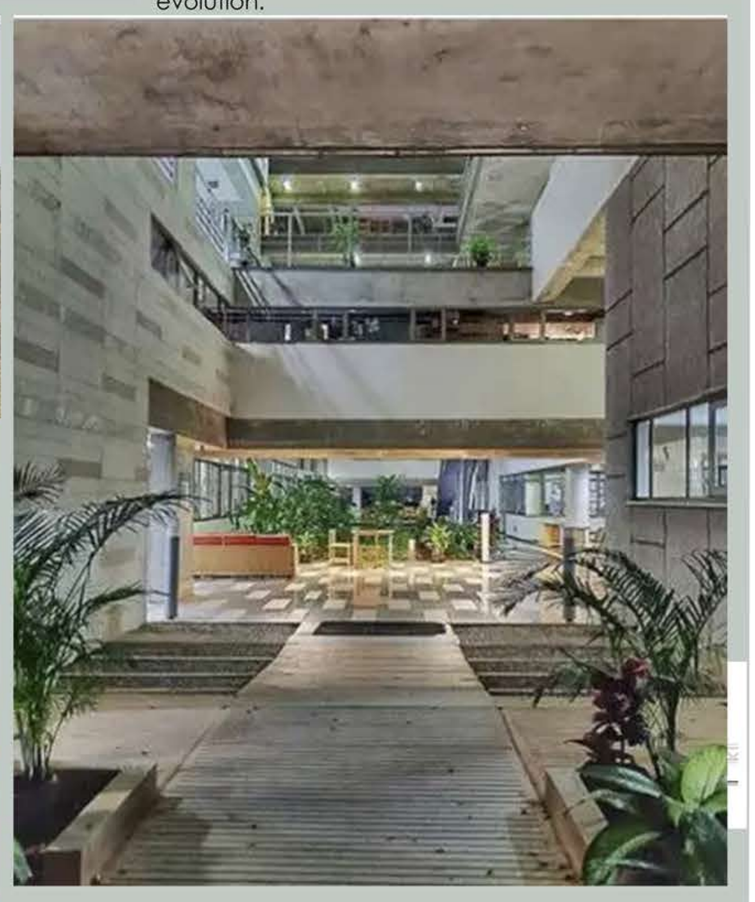
NATIONAL CENTRE FOR BIOLOGICAL SCIENCE

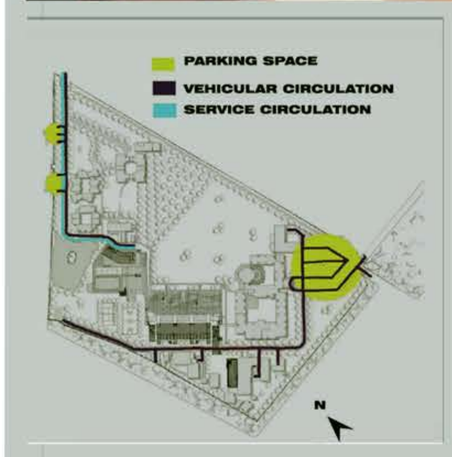
Architect :Raj Rewal , ABRD Architects,Sanjay Kanvinde
Location : Banglore , India
Project year : Phase I -1992, Phase - 2014



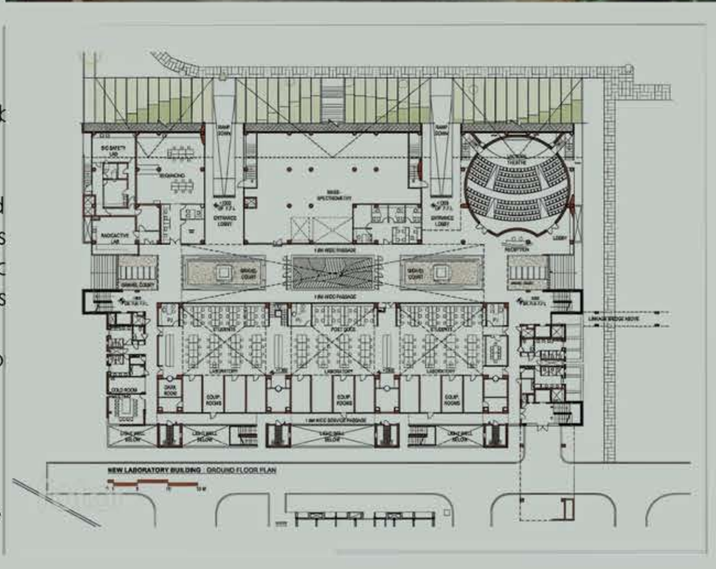


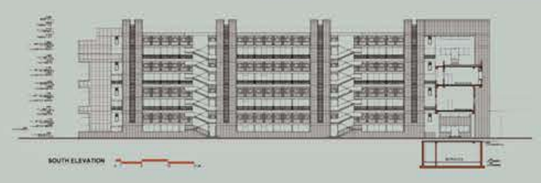
The National Centre for Biological Sciences (NCBS), located in Bangalore is a part of Tata Institute of Fundamental Research, under the Department of Atomic Energy. The institute's research focus is the frontier areas of biology. Their research areas range from the study of single molecules to ecology and evolution.



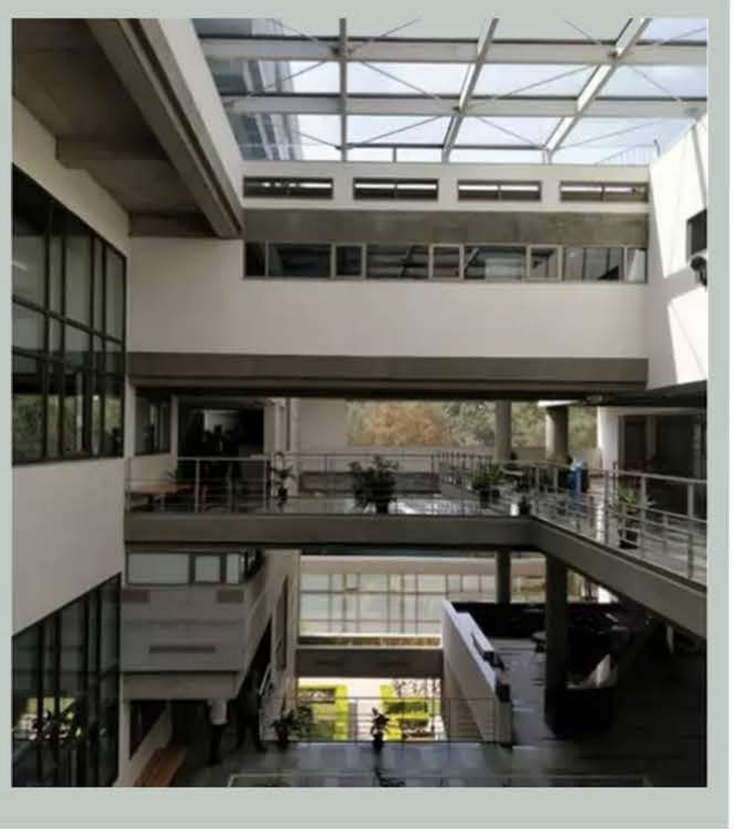


he open laboratories are located on the south side separated b a large atrium. The support facilities and services risers surro und the labs on three s des connected by a servic corridor which ens ures unhindered and undisturbed access fo maintenance and servicing of labs.

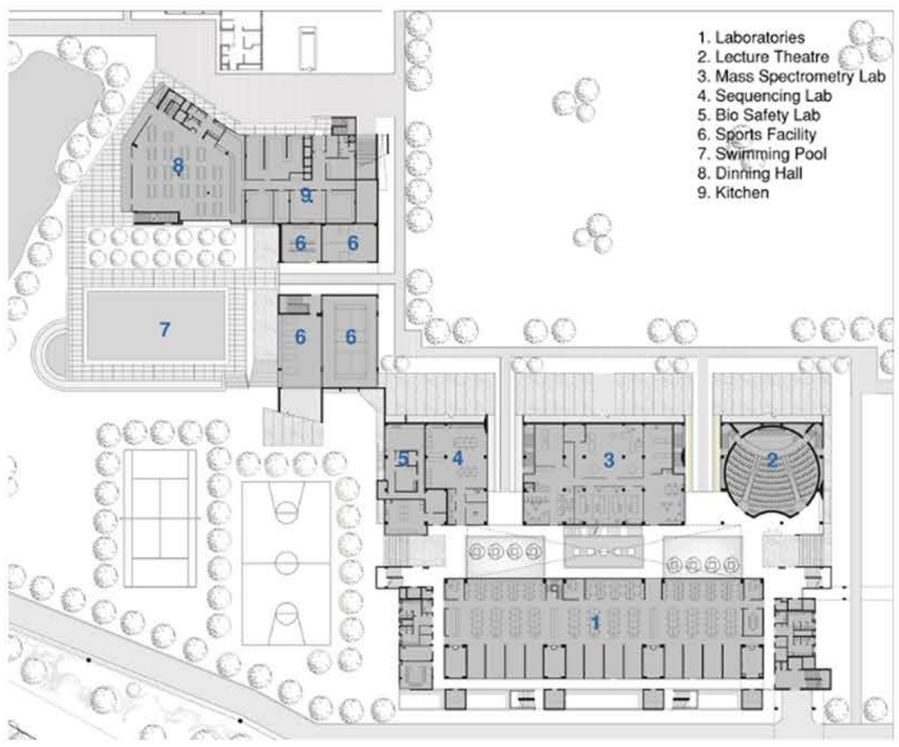




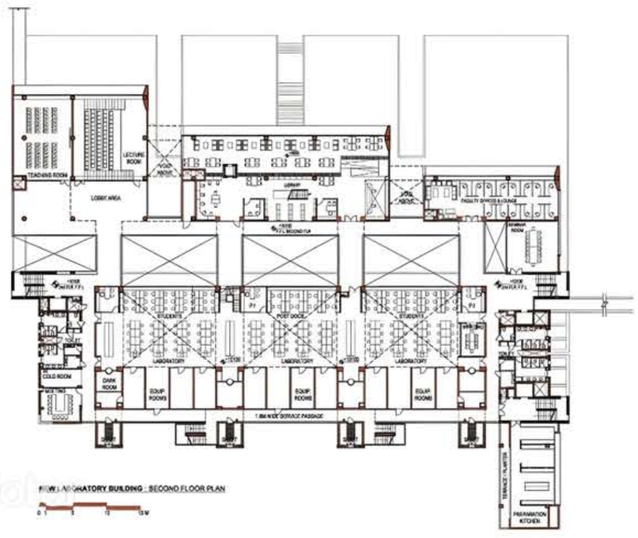
Each Laboratory space is double height and consists of the work stations for students overlooking the atrium, Lab benches in the middle and equipment rooms on the rear south side. This ensures a easy work flow from lab bench to work stations or lab bench to equipment rooms.



ARCHITECTURAL DESIGNING OF R & D CENTRE FOR STEEL PLANT

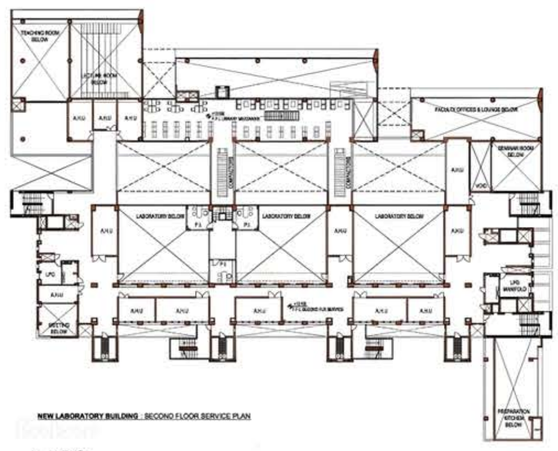


Laboratory building has been conceived as an open building where "research happens in laboratories but science happens in the corridors". In other words scientific exchange and dialogue permeates the proposed building complex.

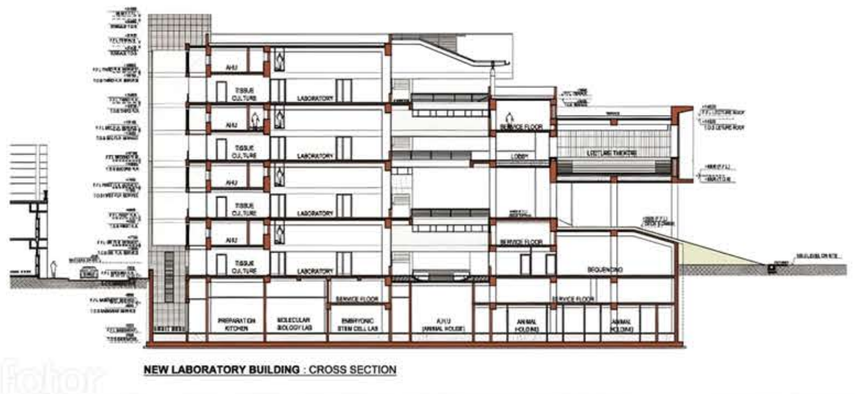


Proposed New Development at NCBS has been envisioned as an environment to foster research and interaction amongst the scientific community. Laboratory building has been conceived as an open building where "research happens in laboratories but science happens in the corridors". In other words scientific exchange and dialogue permeates the proposed building complex.

LABS



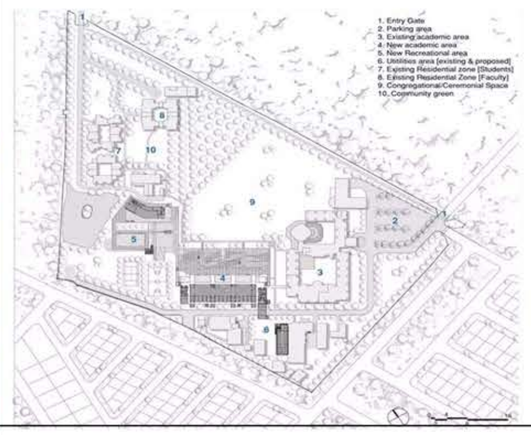
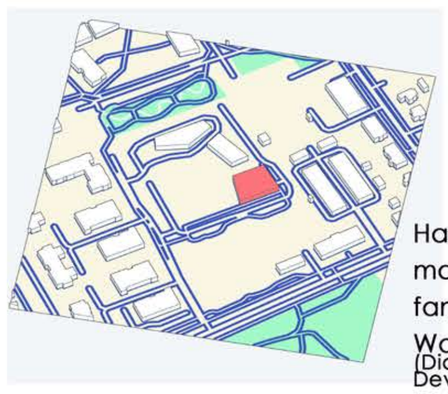
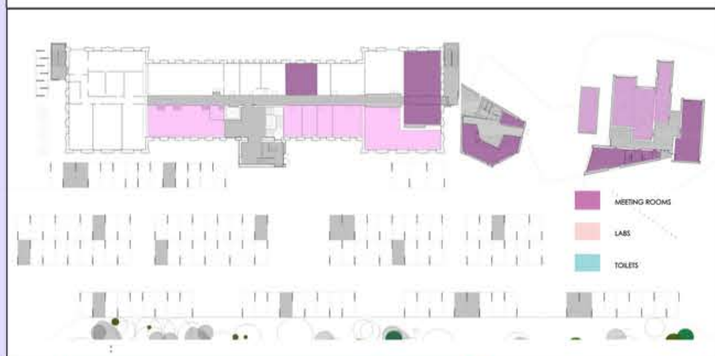
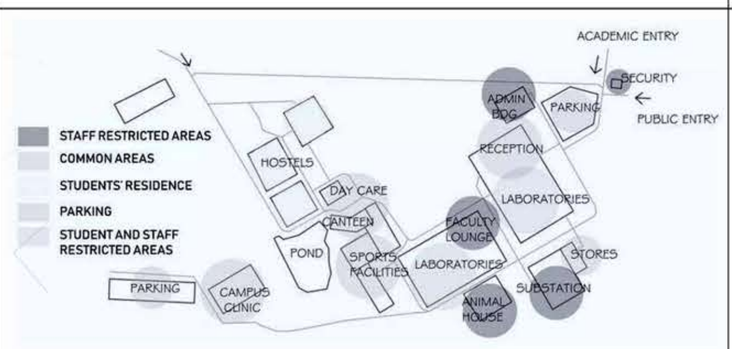
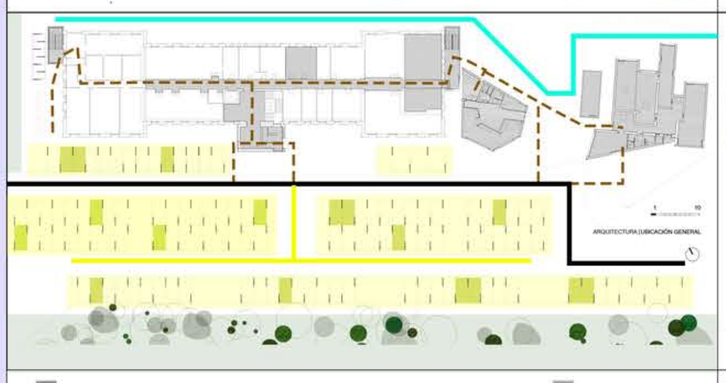
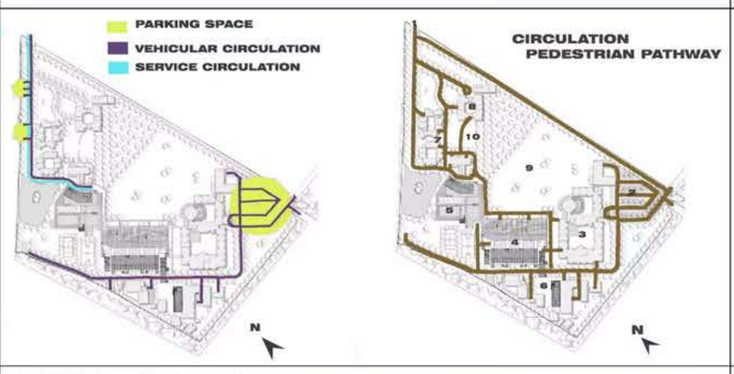
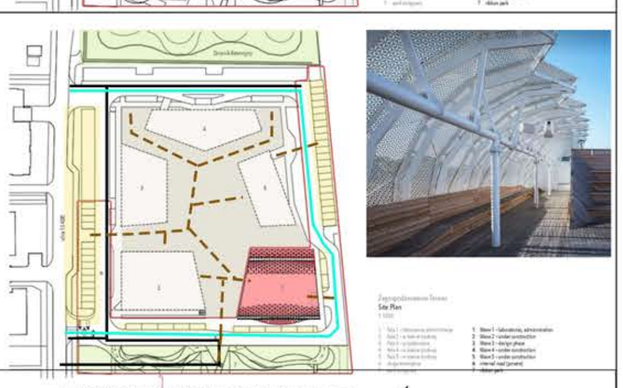
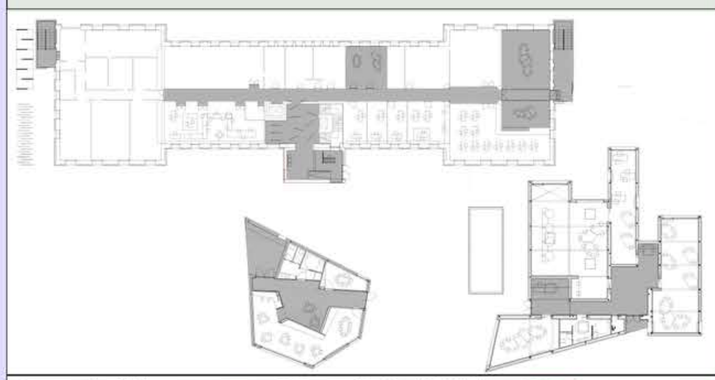
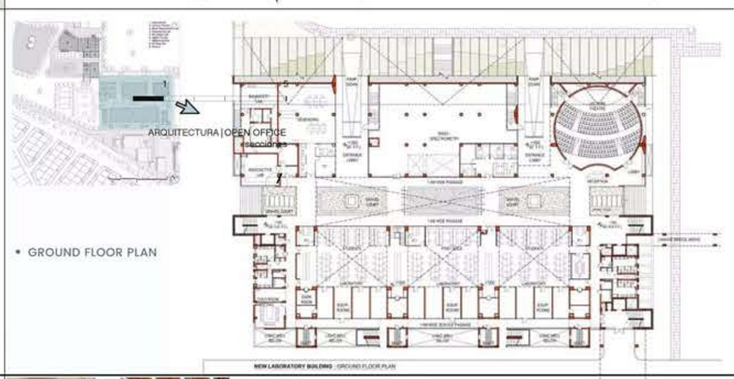
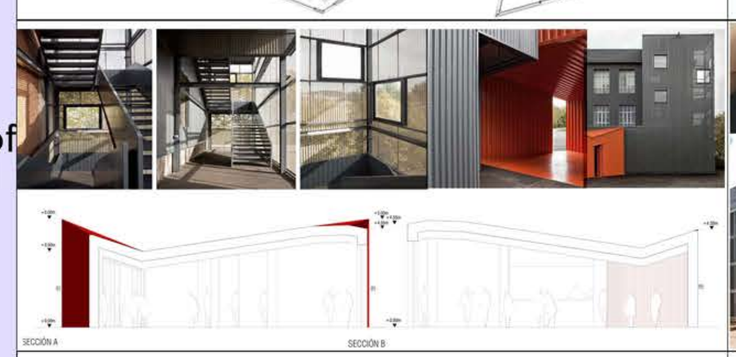
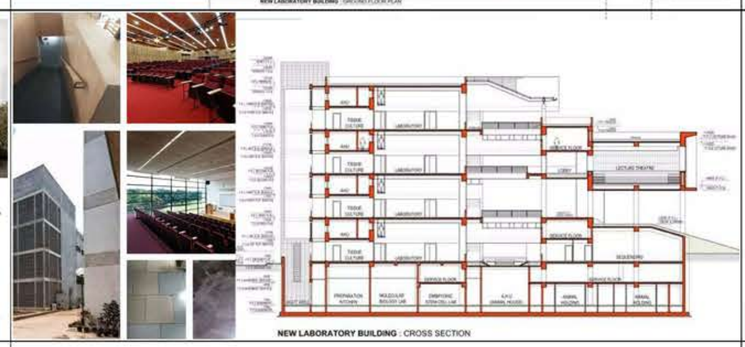
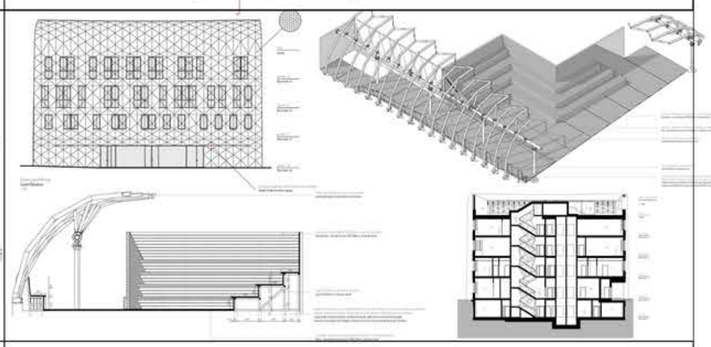
LABS



GROUP : MALAVIKA .V I NAWFA J I NANCY I SHERIN MARY SAJU

Comparative Analysis - R & D Center Case Studies

R& D ARCHITECTURAL DESIGNING OF CENTRE FOR STEEL PLANT

Case Studies	R & D Arcellor Mittal	National Centre For Biological Science	Wave One Research Centre
Photos/Veiws of the Project			
Location	Aviles, Spain (2012)	Bangalore, India Phase 1 - 1992, Phase 2 - 2014	Sopot, Poland (2022), Located 400 m from the Baltic Sea.
Total Area	Site Area - 21433 Sqm, Existing Building - 1575 Sqm Finger Lab - 323 Sqm Open office - 120 Sqm	Site Area : 20 Acres Campus Area : 4 Acres Lab Zone Area : 5000 Sqm	Site Area : 3160 Sqm Part of 5 interlinked Buildings of the European Centre.
Architect	Architect - Sergio Baragano Client - Arcelor Mittal	Phase 1 - Raj Rewal Phase 2 - Anupam Bansal, Rajesh Dongre	Architect - FAAB Client - Invicta Clinics and Medical Laboratories
Site Plan / Master Plan	The origin of the project was the need expressed by ArcelorMittal's Global R&D Centre at Aviles, located in this building, to have more workspace. 	 Has 3 Blocks - Eastern (Admin) - Southern (Labs) - Instem (Open Labs, Exhibition)	 Has 5 Block which makes the ECR for families. Wave 1 - 1st Block (Diagnostic,Research & Development Center)
No of Floors	Existing Blk - G+2, Finger Lab - G, Open Office - G	Eastern Blk - G, Southern Blk - G+4, Instem Blk - G +3	Wave 1 - B, G+3 Floors
About this Site	1 Main Entry - Workers , Officials Entry The Buildings has parking spaces for the workers. The site also has Arcelor Mittal's Global R & D Center and a Technology Development Center. Located next to the Aviles River.	2 Main Entry - Academic & Housing entry The entire Campus has a Gradual Slope - 20M (Drainage & Natural Catchment Areas) Oriented N-S Axis (Ample openings on N -Max Natual Lighting)	1 Main Entry - Workers , Officials Entry, Paitents Entry. Buildings are interlinked. The architects analyzed the geometric complexity of the sea wave to design the building.
Zoning within the Site			
Circulation within the Site			
Plans of the Labs Placed - Grd Floor Plan			
Section & Views of the Labs Placed - Cross Section			
Reason for this Study	International Study on R&D Center of Steel focusing on the Circulation of Departments,Labs, Usage of steel & Services	National Study on a Reasearch Center focusing on the Circulation of Labs, Usage of Steel & Services	International Study on R&D Center of Steel focusing on the Circulation of Departments,Labs, Usage of steel
Materials Used & Prominent Feature of this Site	The building's steel structure consists of European H & I sections with Corrugated Steel Sheet. The flooring system is realised with the composite flooring system Cofraplus. Interiors - full of light, contrasting its dark Exteriors. All of this has provided the complex with a clear continuity. The metal parts can be 100% reused and 70% of them came from recycled steel.	The Open Labs - South side - separated by a large Atrium. The Support Facilities & Service Risers surround the Labs on 3 sides connected by a Service Corridor - Undisturbed. Service Floors Ht - 2.3 m with clearance Ht - 1.7m, 6 Staircases, 3 independant Centralized Chillers Plants & Air handling Units Exposed Concrete. Stone, Glass, Wood. INTERIORS - Glass Fenestrations, Wood (Acoustic) EXTERIORS - Stone, Concrete, Glass & Steel Frames	With 1,362 perforated triangular panels, the facade, just like a wave, bend at its crest, the top of the building.The East/west elevations take on 3D form with triangular panels of sintered white ceramics, skewing and reflecting sunlight onto the pavement. They create a transient detail, enlivening the immediate surroundings of the building.The Panels bring airiness and dissipation of the building in space.