2023 Excellence In Concrete Construction Award Winners-

Excellence in Creating an Iconic Structure

Presentation on winning (Second Place) ACI Excellence in Concrete Construction Awards for **BIO TECHNOLOGY & BIO MEDICAL ENGINEERING (BTBME) BUILDING** of Indian Institute of Technology (IIT), Hyderabad (Phase 2- Package 3A) Project in Low-Rise Structures Category for the Year 2022-23

Speaker name : **HARI SHANKAR PRASAD SHUKLA**
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L&T Construction, Buildings & Factories IC
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Email : **-hari.shukla@Lntecc.com, hspshukla7@gmail.com**

About Speaker : **Hari**
Academia : **Graduate Civil Engineer, Master of Business Administration (Operation Management) & Charted Engineer by profession.**
Work Experience: A versatile , accomplished and goal oriented professional with more than 36 years of experience (30 Years with Larsen& Toubro Ltd) in Construction Industry. Has played key role in successful completion of different type of mega projects which includes the First IT Park of India (ITPL Bangalore) & many more IT Parks in Hyderabad, Mumbai International Air Port, 72 KM long Hyderabad Metro Rail, IIT Hyderabad and many more prestigious projects of buildings & factories.
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About Larsen & Toubro Ltd: Headquartered in Mumbai, Larsen & Toubro Limited is one of the largest and most respected companies in India's private sector. With over 80 years of a strong, customer focused approach and a continuous quest for world-class quality, L&T has unmatched capabilities across Technology, Engineering, Construction, and Manufacturing, and maintains a leadership in all its major lines of business. It operates in over 50 countries worldwide.
We are engaged in core, high impact sectors (Construction, Hydrocarbon, Power, Minerals and Metals, Heavy Engineering, Defense, Ship Building, Mining, Information Technology, Financial Services, Realty, etc) of the economy and our integrated capabilities span the entire spectrum of 'Design to delivery'.

FLOW OF PRESENTATION

- Snapshot of IIT Hyderabad - BTBM Building
- Design Brief about BTBME Building
- Challenges Faced during Construction
- Rendered Vs Completed Views of BTBME Building
- Quality Assurance
- Rewards & Recognitions

SNAPSHOT OF THE IIT HYDERABAD PROJECT- PH-II (PKG-3A)

- IIT Hyderabad is a premier institutional campus built upon area of 640 acres (259 ha). The Total built-up area of the campus is 2.1 million m^2 (22.6 million ft^2).
- The campus consists of an academic area, student residential area, faculty and staff residential area, and other support facilities.
- Our scope includes construction of three academic buildings (MSME, **BTBM**, CHY), technology research park, technology incubation park, research center complex, convention center building, knowledge center, an international guest house, a huge sports and cultural complex and other infrastructure/service buildings.
- Most of the buildings have **Exposed Concrete Finishes**, which required detailed precision and quality standards.

Location

- **IITH, Hyderabad, India**

IIT HYDERABAD MASTER PLAN

BTBM BUILDING

SALIENT FEATURES OF THE BTBM BUILDING

Owner	Indian Institute of Technology Hyderabad
General Contractor	L&T Construction – Buildings & Factories IC
Concrete Contractor	L&T Construction - Buildings & Factories IC
Concrete Supplier	L&T Construction - Buildings & Factories IC
Architectural Firm	ARCOP Associate Pvt. Ltd.
Project Management Consultants	TATA Consulting Engineers Ltd.
Structural Consultant	Technical Projects Consultants (TPC) Pvt. Ltd
Project Duration	18 Months
No. of Floors	G+4

BTBME BUILDING

BTBME BUILDING

PLANNING DESIGN BRIEF:

IIT Hyderabad will be the cradle for inventions and innovations. It will be a great source of knowledge for the students to handle the challenges of the nation and the world.

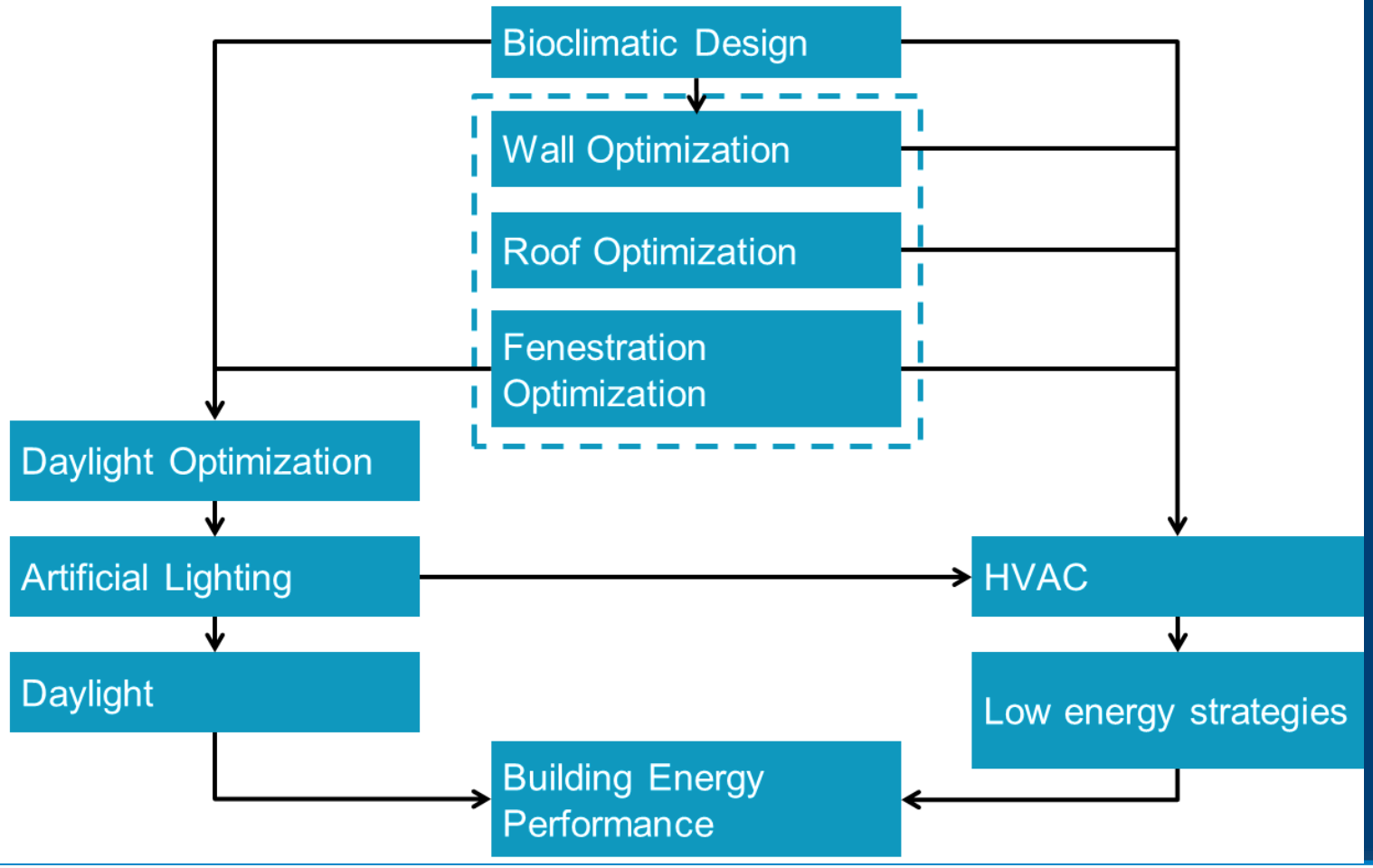
Some of the salient features of the proposed Academic Block :-

- **GRIHA (Green Rating for Integrated Habitat Assessment) PARAMETERS**
- **ENERGY AND EFFICIENCY**
- **SAFETY AND SECURITY**
- **BARRIER FREE DESIGN**

GREEN TECHNOLOGIES

Green Technologies

INTEGRATED APPROACH FOR BUILDING DESIGN



BARRIER FREE DESIGN

MAKING DESIGN ACCESSIBLE TO EVERYONE IN SOCIETY

Barrier Free Environment is one which is equitable and enables people with disabilities also to move about safely and freely and to use the facilities within the built environment.

Barrier free design standards have been incorporated in our Campus design

A. CAMPUS PLANNING LEVEL

TOLERANCE FOR ERROR

1. Ramps
   Kerb Slope will maintain 3-5% gradient.
   Tactile strips
   Minimum walkway width 1650-1800mm.

SIMPLE & INTUITIVE

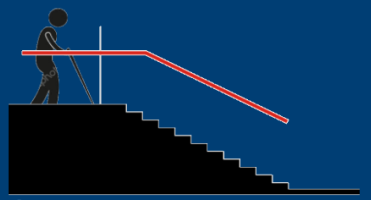
2. Surface Parking will be at a maximum distance of 30 m
   Parking bay including accessible aisle.
   Tactile strips to guide along the path.

B. BUILDING LEVEL

LOW PHYSICAL EFFORT

3. Ramp
   Lifts
   Motion Detectors

SIMPLE & INTUITIVE



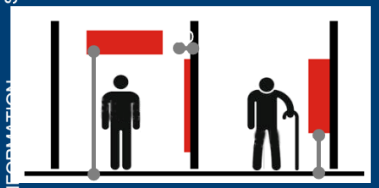
4.

C. BUILDING INTERIOR

SIZE & SPACE

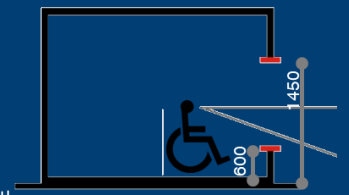
5. Minimum width of corridor.

PERCEPTION INFORMATION



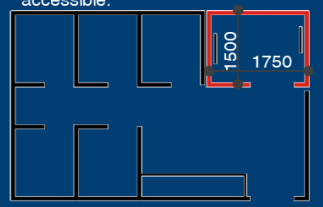
6. Objects protruding more than 100mm from surface of wall surface shall be installed at maximum height of 600mm.
   Overhead obstruction shall be at a minimum height of 2000mm.

EQUITIBLE



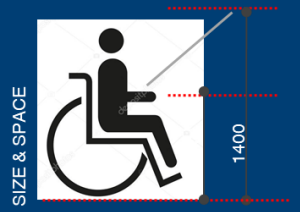
7. Unobstructed viewing zone for wheelchair users is 600-1450mm.
   Curtains & venetian blinds shall be accessible.

EQUITIBLE



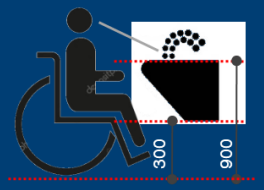
8. Toilet cubicle for handicapped shall be minimum 1500 x 1750 mm.

SIZE & SPACE

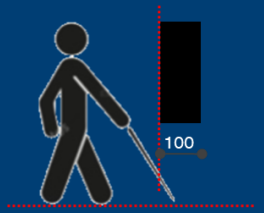


Accessible height

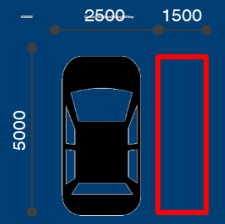
SIZE & SPACE



Drinking Water Fountain



Protruding Objects



Accessible Parking

BARRIER FREE DESIGN

BTBME BUILDING

"BTBM stands for BIO TECHNOLOGY & BIO MEDICAL"

Biotechnology is the use of an organism, or a component of an organism or other biological system, to make a product or process. Many forms of modern biotechnology rely on **DNA technology.**

Biomedical engineering includes: Bio informatics – making devices to collect, analyse, and interpret biological data, such as **DNA analysis**.

CONCEPT OF BTBME BUILDING

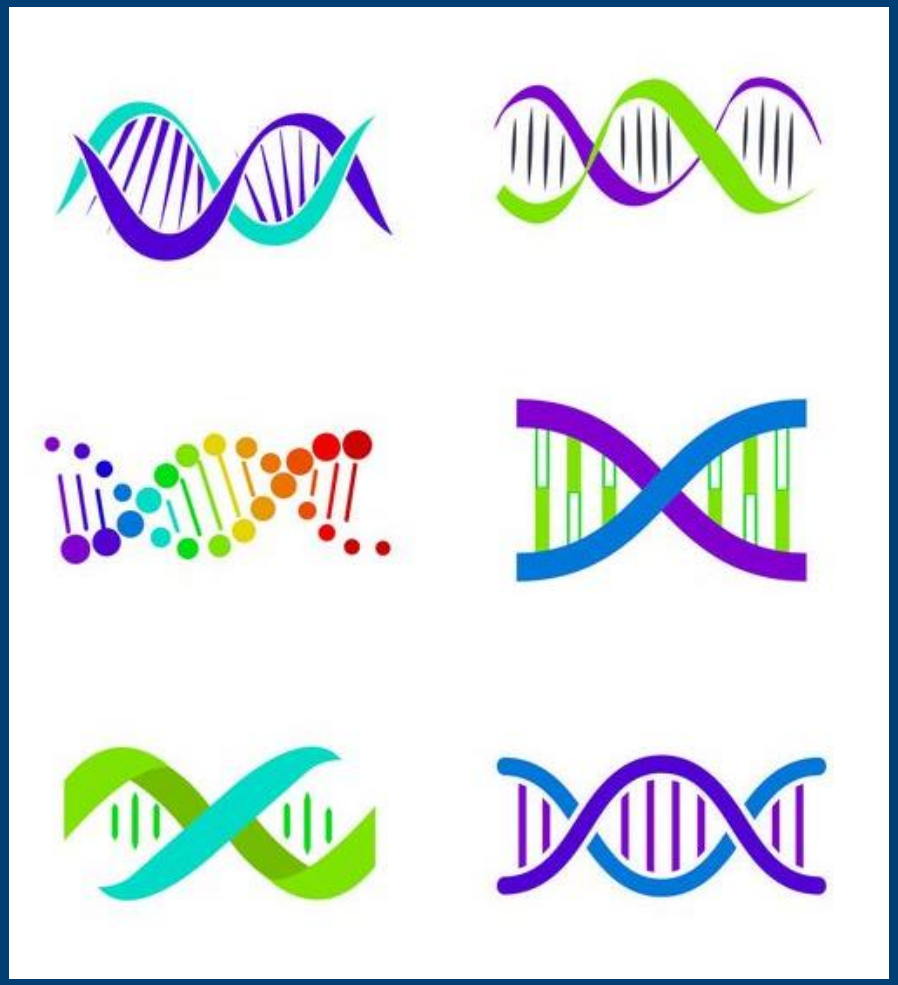
The building's concept and shape is inspired by A DNA molecule

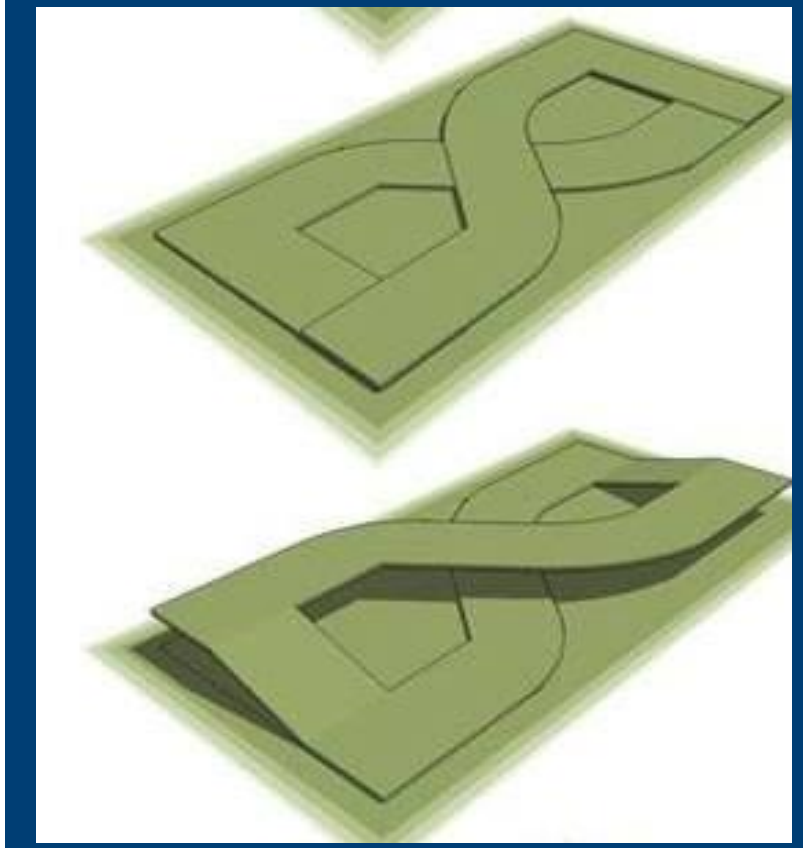
CONCEPT OF BTBME BUILDING

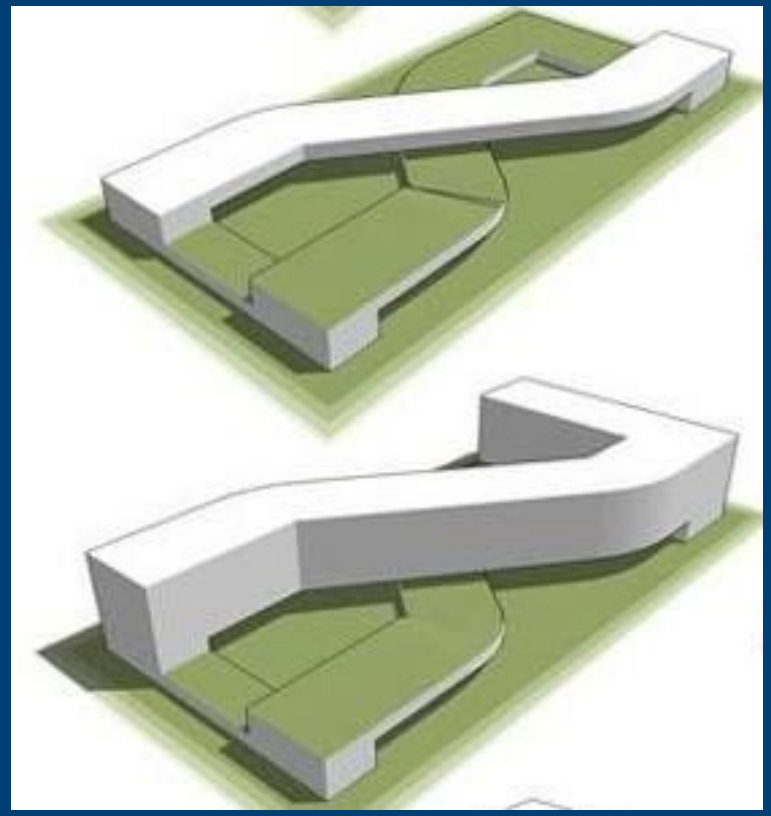
DNA molecule is made up of two linked strands that wind around each other to resemble a twisted ladder in a helix-like shape..

Each strand has a backbone made of alternating sugar and phosphate groups of double helix shape of DNA, symbolizing the interconnection between students and faculties.

EVOLUTION OF BTBM BUILDING

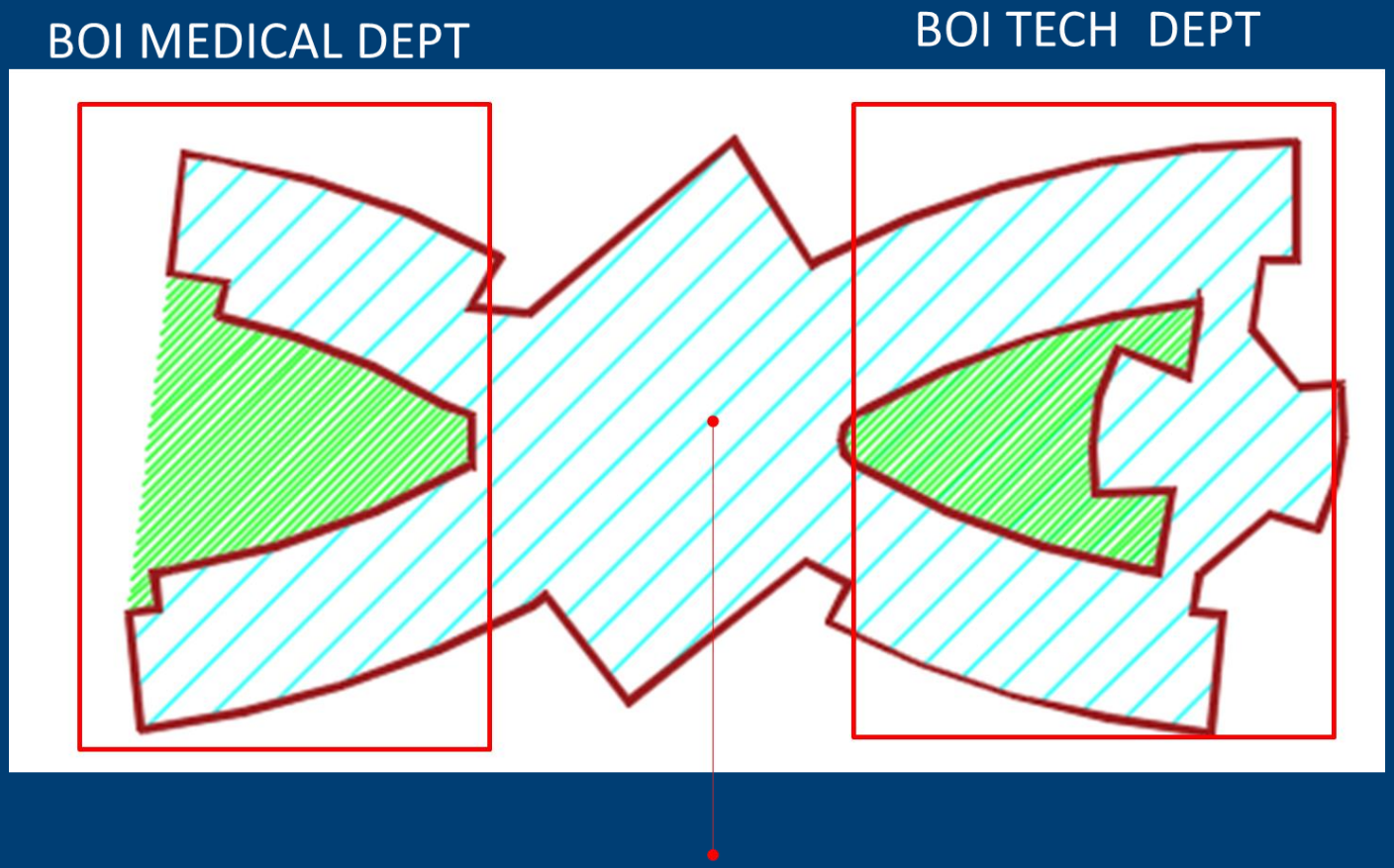






EVOLUTION OF BTBM BUILDING

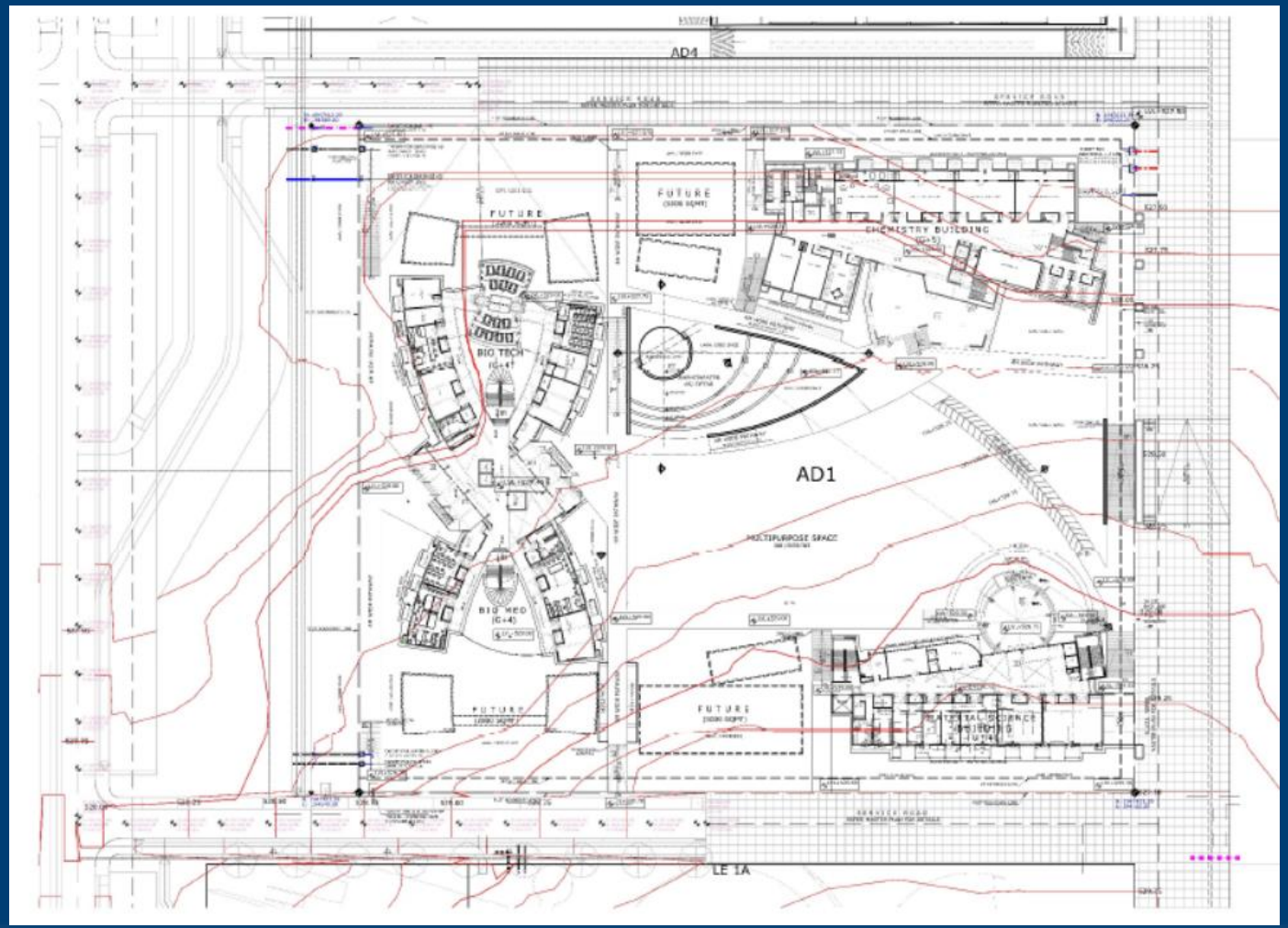
There are four wings in the building, two of which are dedicated to Biomedical on the south side of the plot and the other two to Bio-Technology on the north side of the plot.



All the wings are connected through the central core area.`

TOPOGRAPHY SURVEY

The site topography levels were considered and utilized in a way to minimize the surface treatment & maximum utilization of the natural levels



SITE PLAN AT CONCEPT LEVEL

BUILDING LOCATION:

Department of Bio-Tech & Bio-Med Engineering is located at the West side of Academic Quad. On the East side is the Quad's Green Zone which is connected to the main pedestrian Spine axis.

BTBM BUILDING

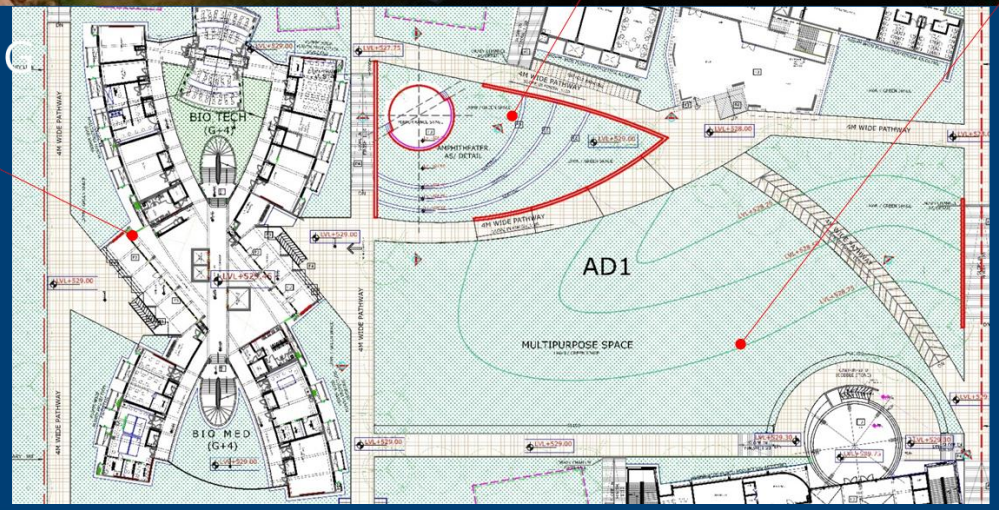
GREEN ZONE

SITE PLAN WITH IMAGES

OPEN AIR AUDITORIM

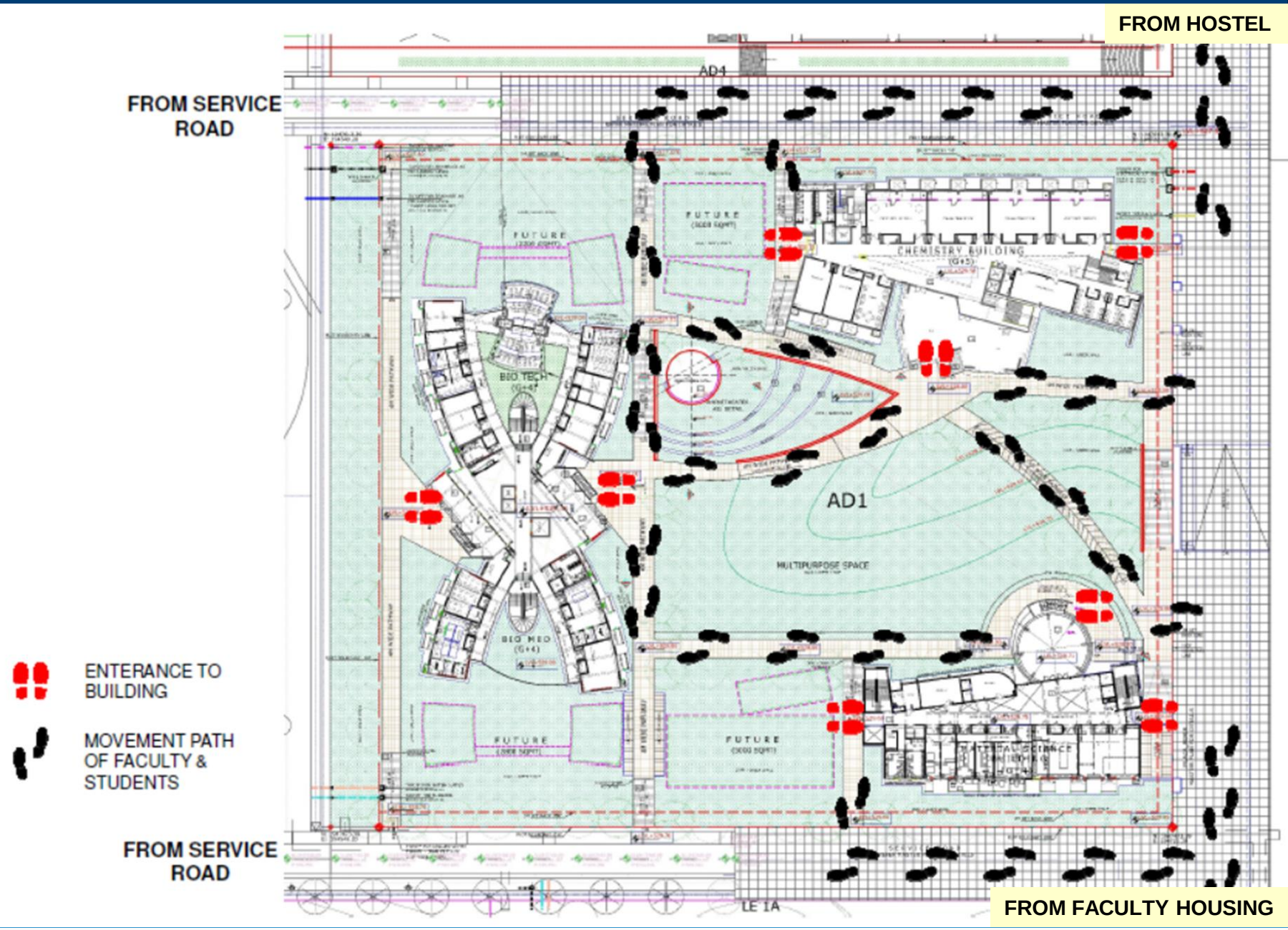
GREEN AREA

BTBM BUILDING



N

Movement pattern for students and Faculty (Pedestrian)



Movement Plan for Bicycle

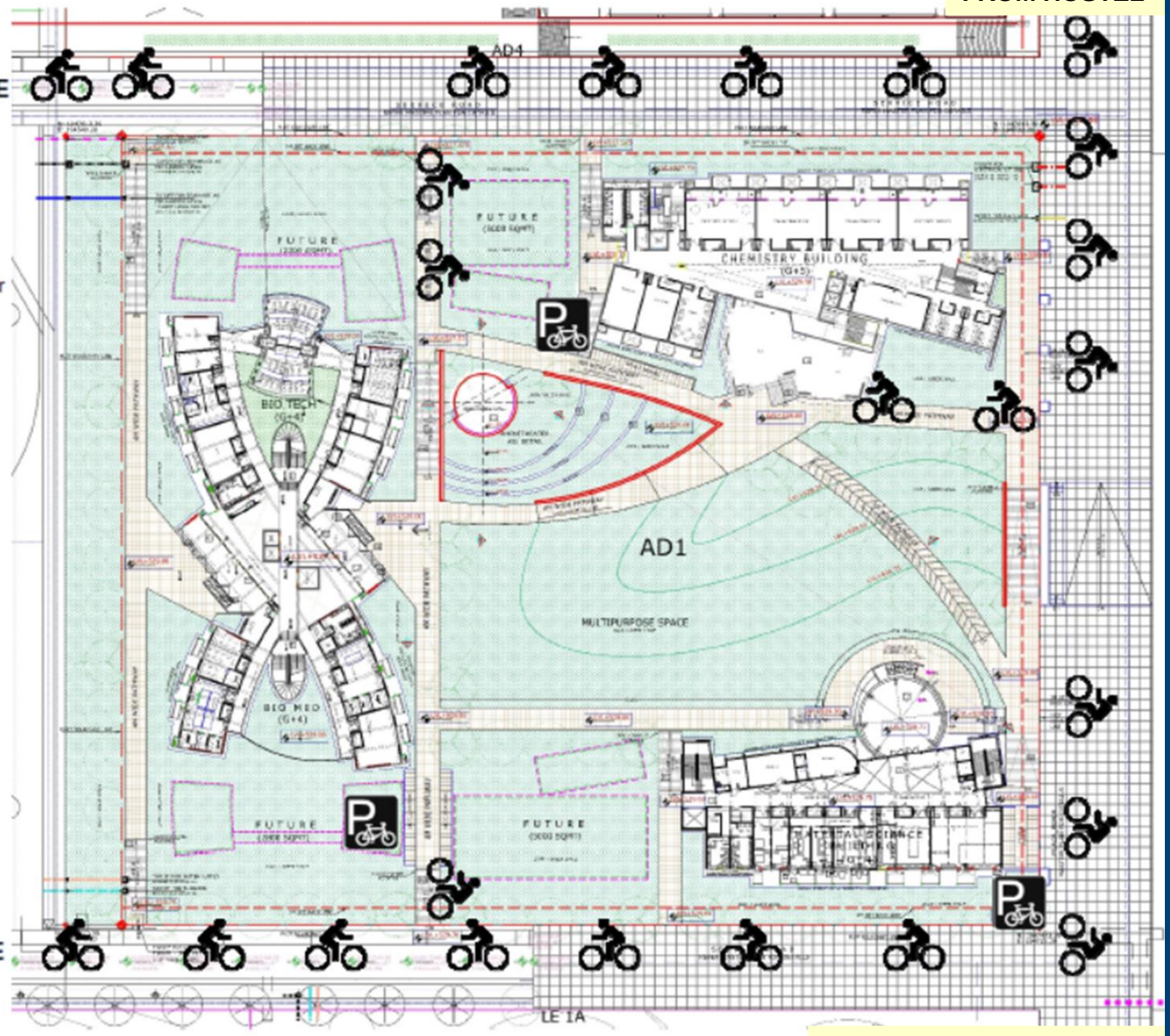
FROM HOSTEL

FROM SERVICE ROAD

Parking Strategies:

Vehicular Parking : The Master Plan Scheme to be followed , common parking lots will serve for AD1

Bicycle Parking : Individual Parking lots are located near entrance of each building. Number of bicycle parks can be increased based on the future pattern of campus.



BICYCLE PARKING

MOVEMENT PATH OF FACULTY & STUDENTS

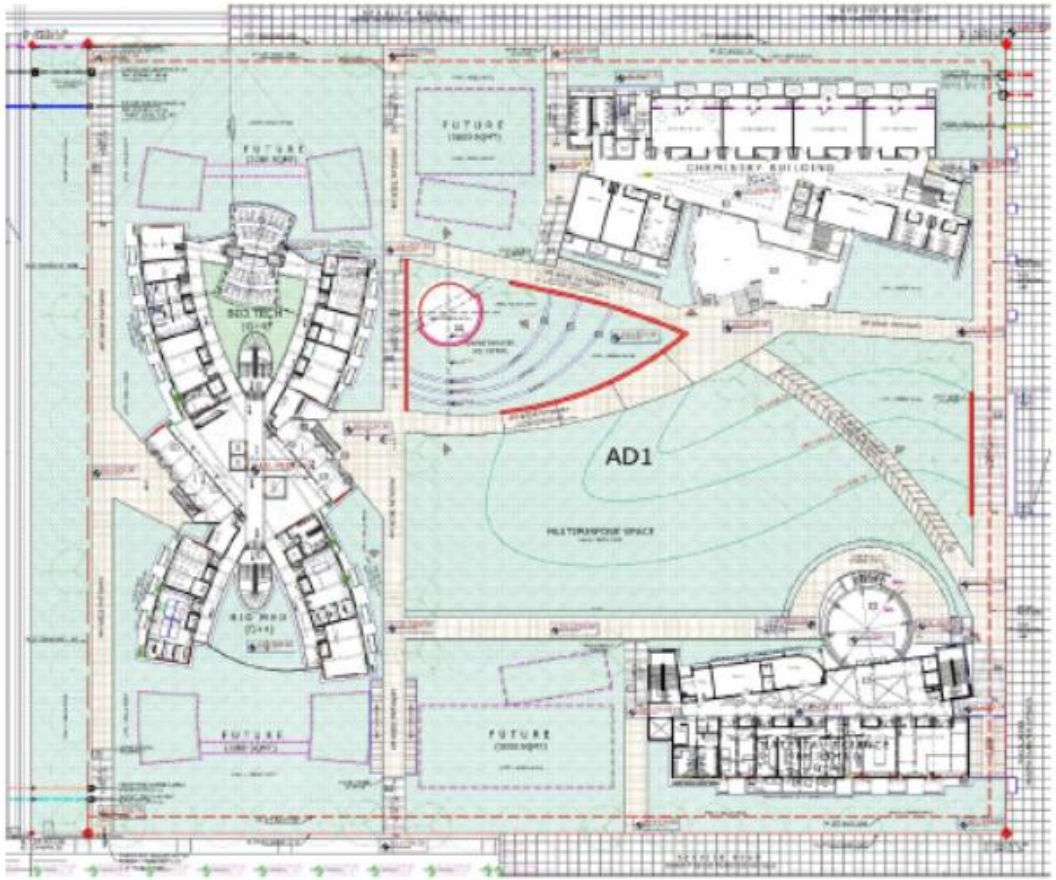
FROM SERVICE ROAD

FROM FACULTY HOUSING

LANDSCAPING PLAN

Salient Features:

- **Optimum Greenspace as a visual soother for user** As/ per requirement from Client more importance is given to soft scape as all the faculty offices faces the Plaza.
- **Interactive Space:** Informal gathering space i.e amphitheater for exchanging ideas ,group discussions etc
- **Organic Planning** PathwaysLandscape planning is a mix of horticulture , walkways for building access based on user experience & complements the Building as an extension to building form.



Site Plan –AD1


FIG.01- Organic Walkways

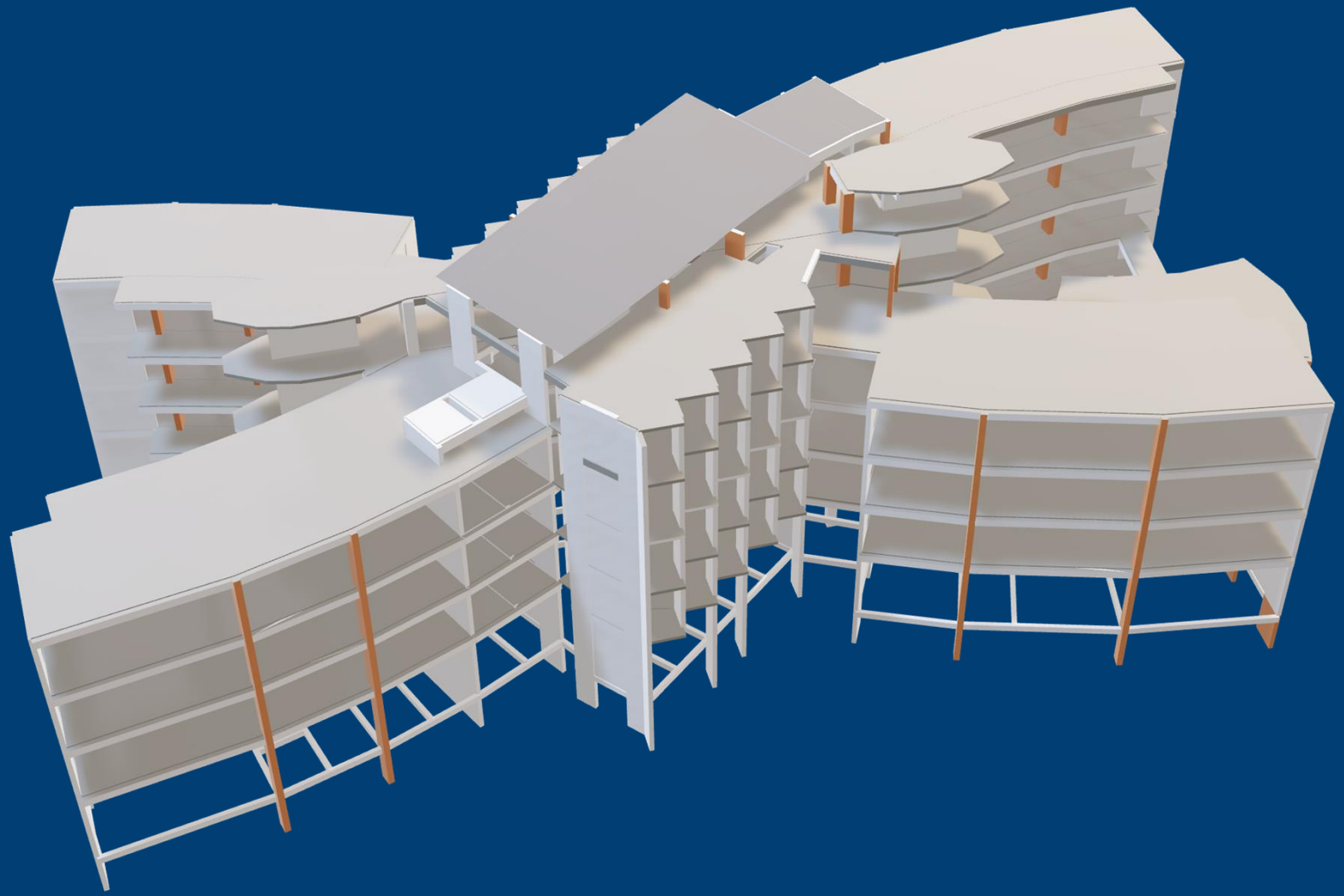

FIG.02- Integrated Bicycle Parking


FIG.05 –Nature of Amphitheater

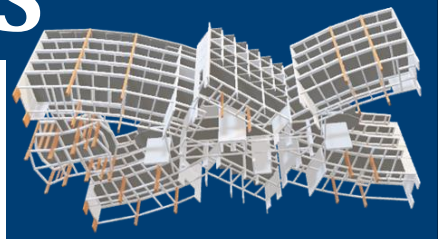

FIG.04 -All green Chunks will be informal interaction

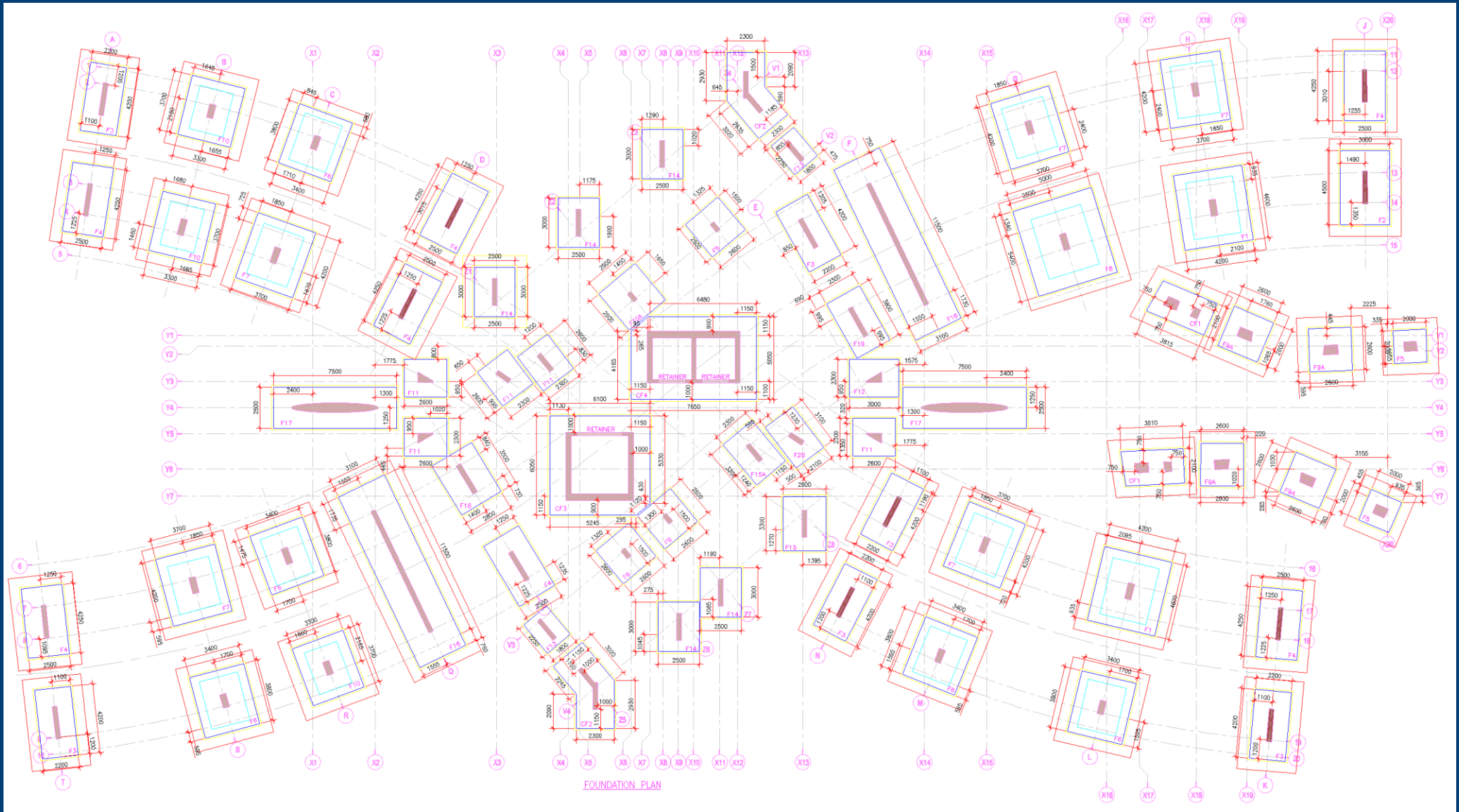

FIG.03- Site Topography has been utilised

BTBM BUILDING

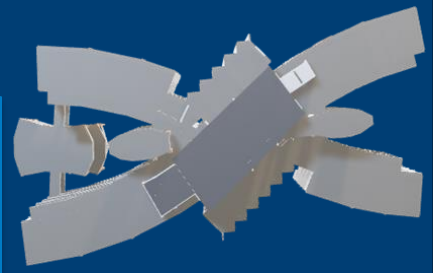


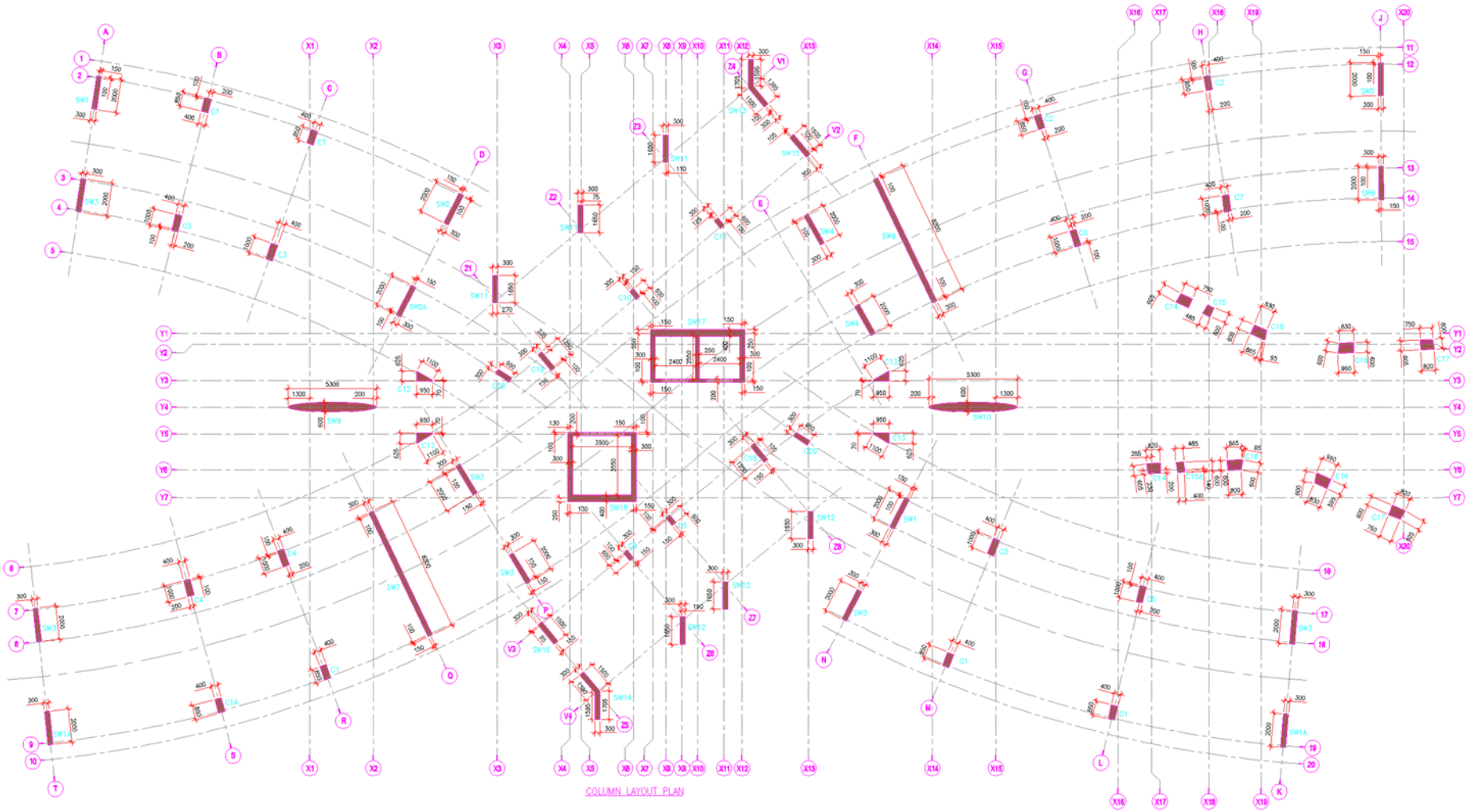
BTBM BUILDING- FOUNDATION DETAILS



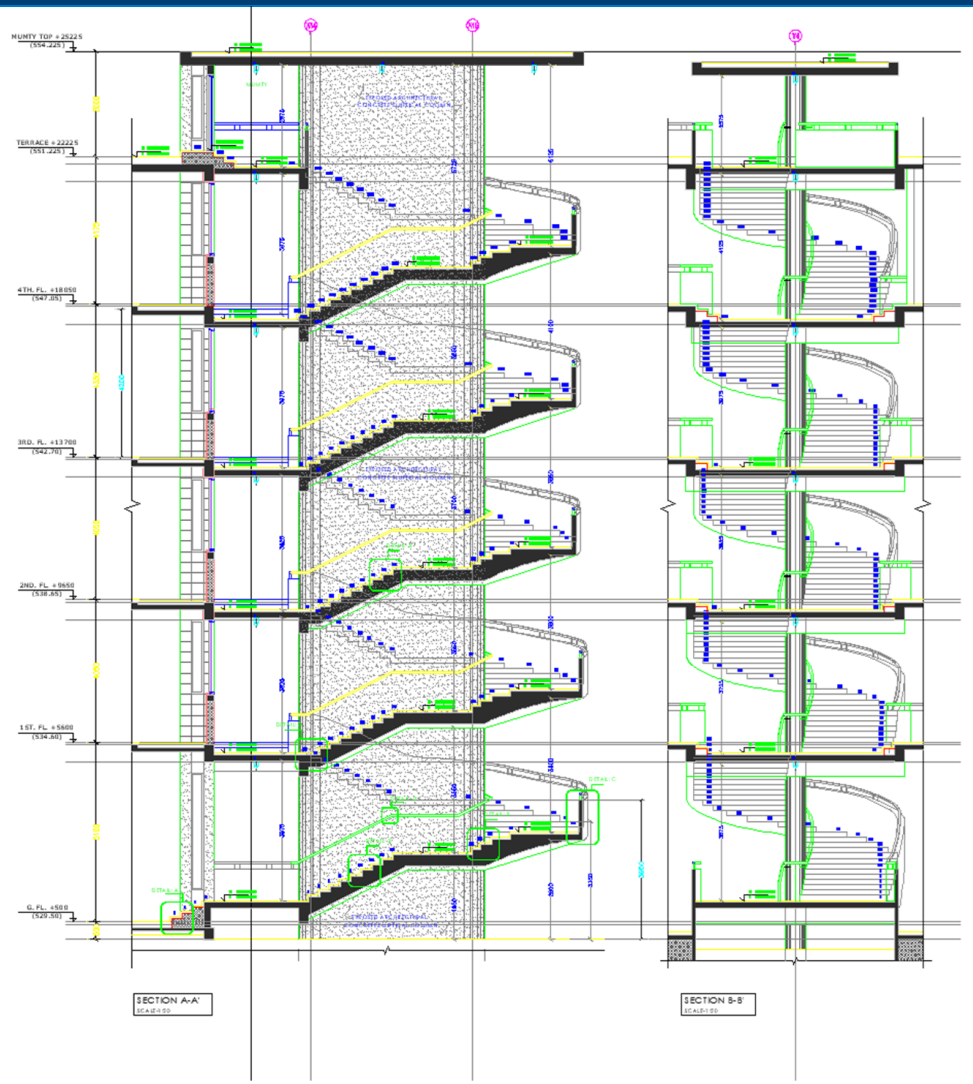


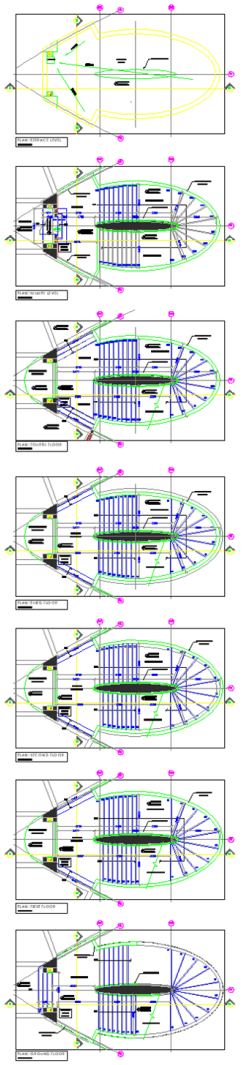
BTBM BUILDING- COLUMN DETAILS

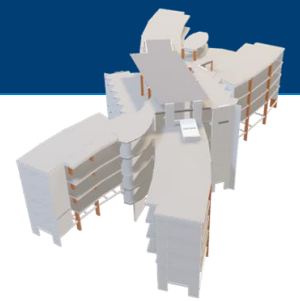


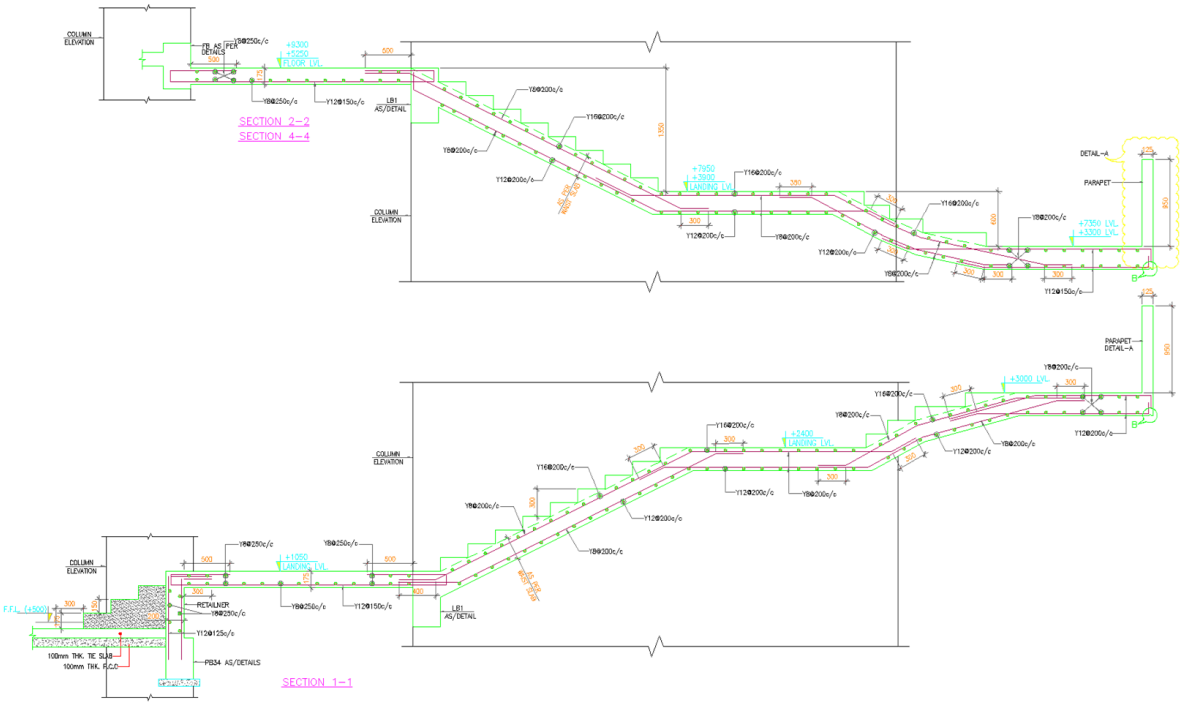


BTBM BUILDING- STAIRCASE

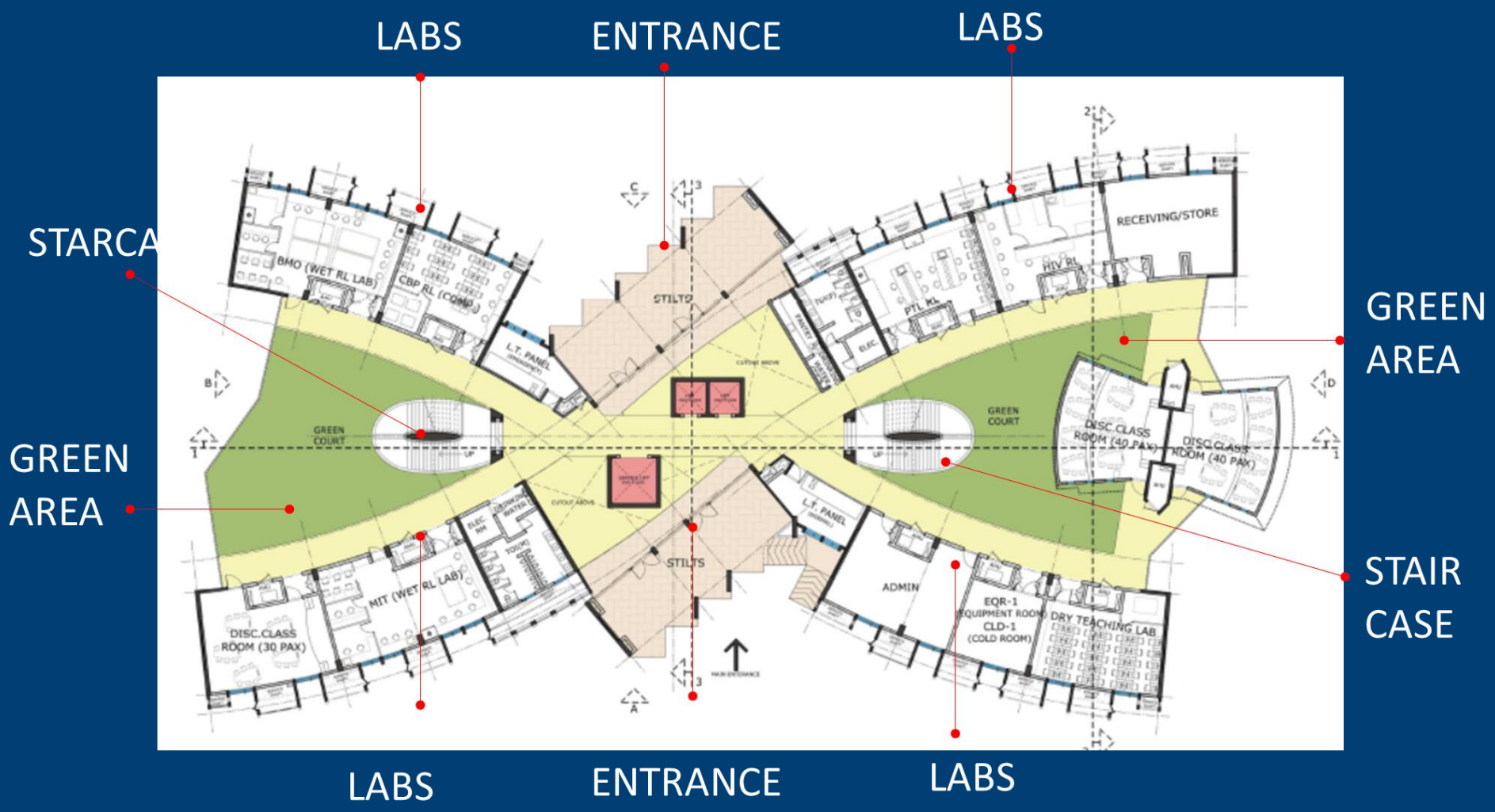






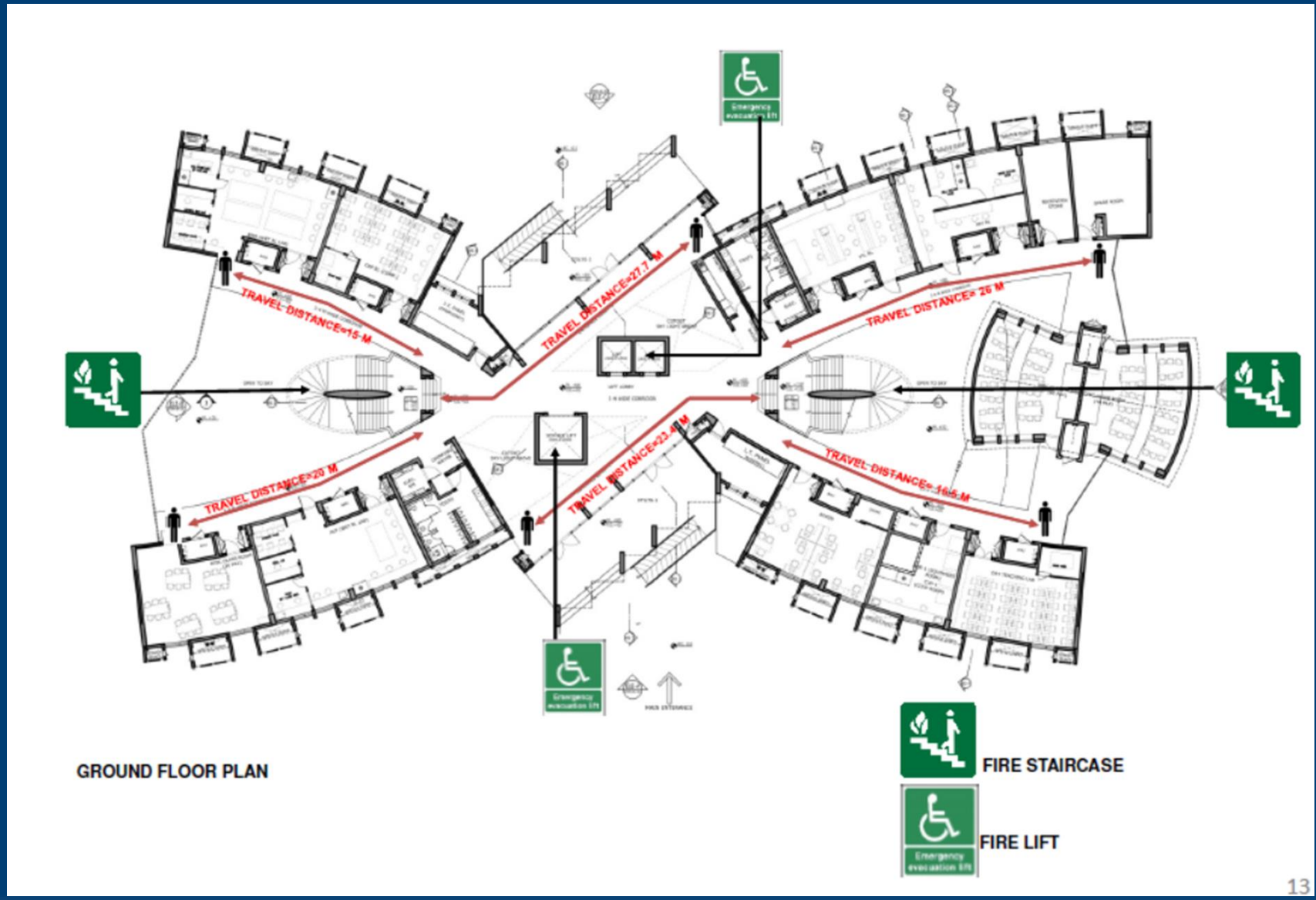


GROUND FLOOR PLAN



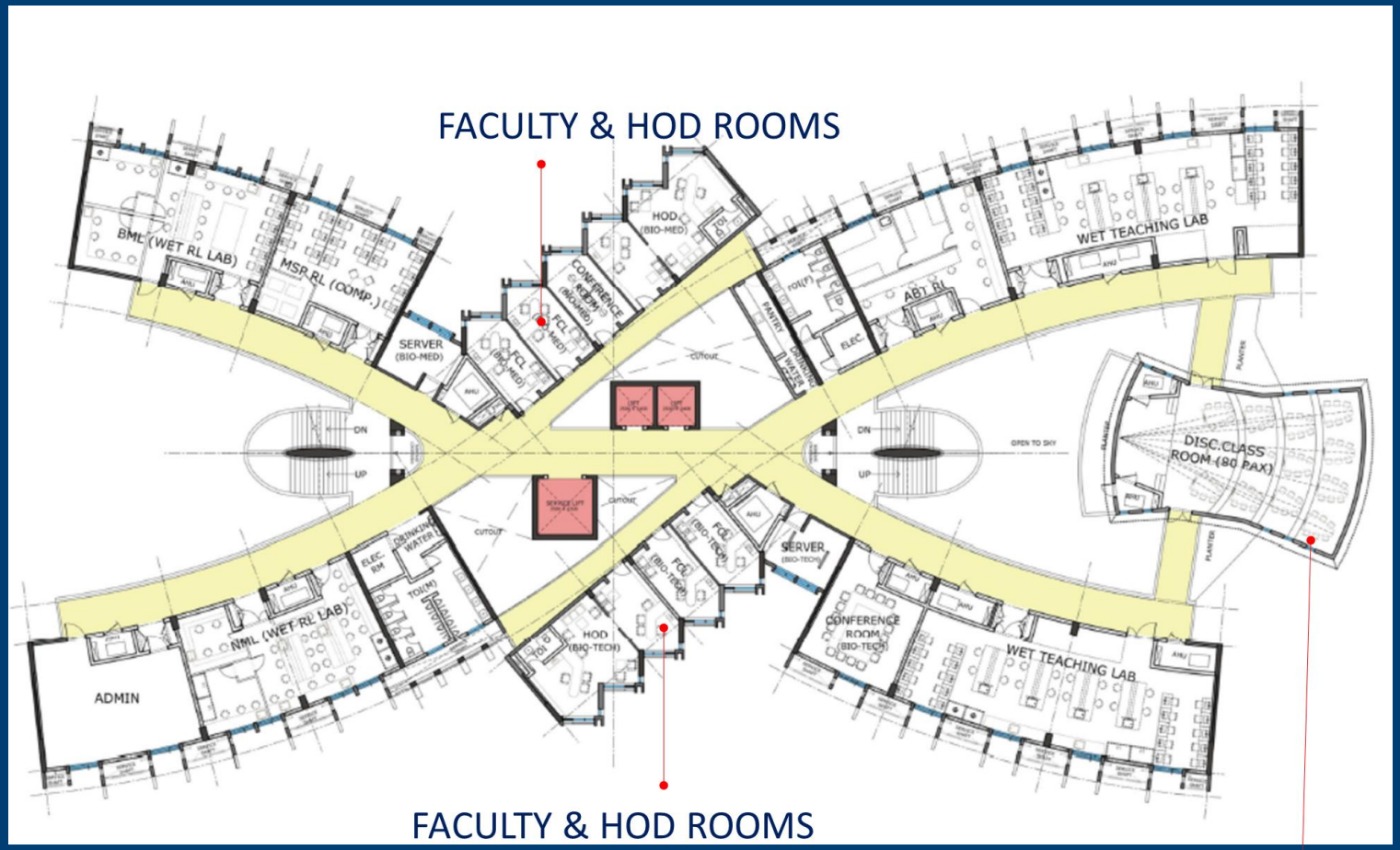
We have created a green space between the wings to provide a relaxing atmosphere for students.

FIRE EXITS AND TRAVEL DISTANCE



FIRST FLOOR PLAN

The HOD chambers and Faculties rooms are centrally located for easy access to classrooms and labs.



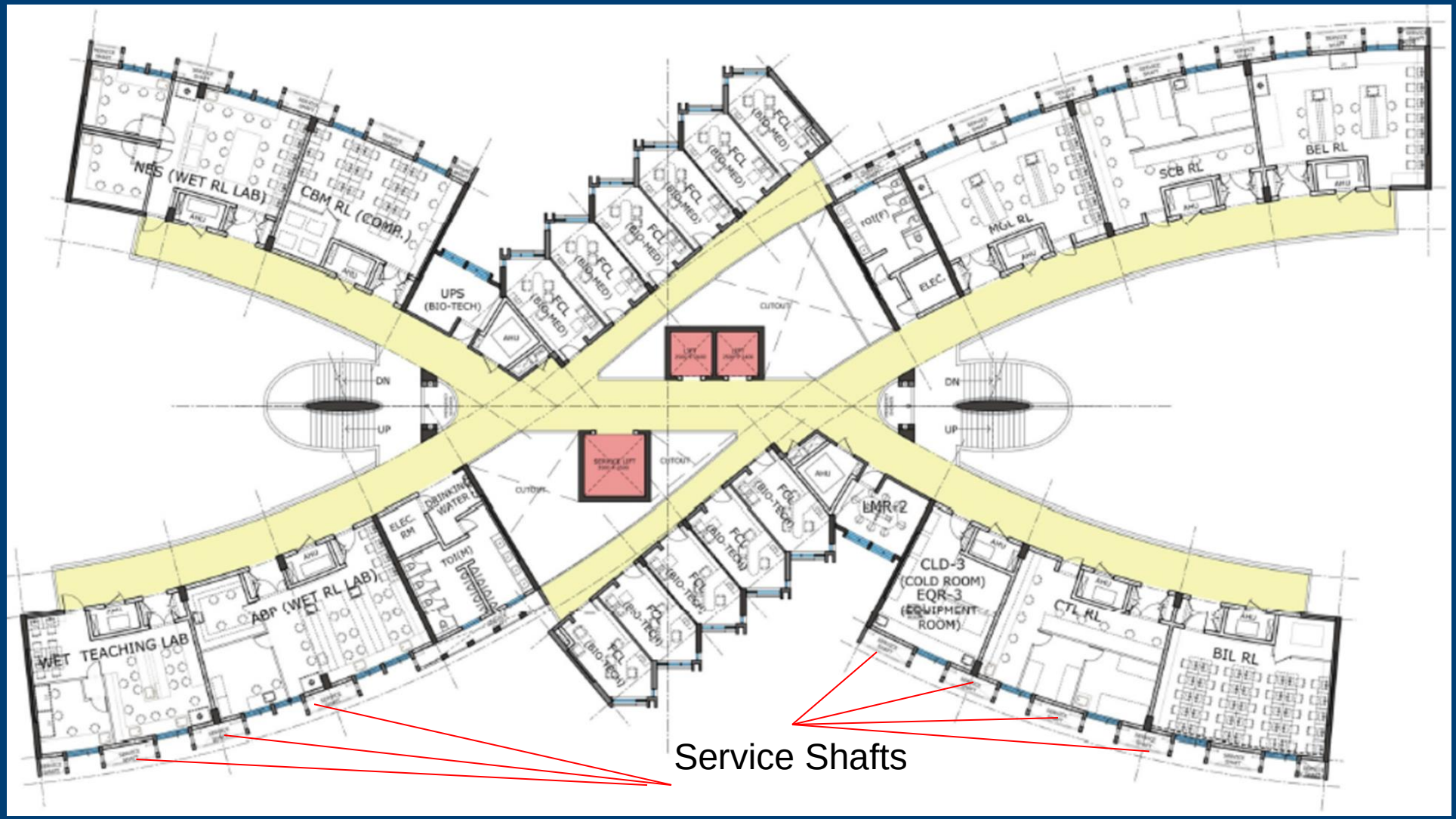
Separate block of bio-tech classrooms are connected by bridge .

SECOND FLOOR PLAN

The terrace of classroom's is designed to resemble an amphitheatre and is connected by a bridge.

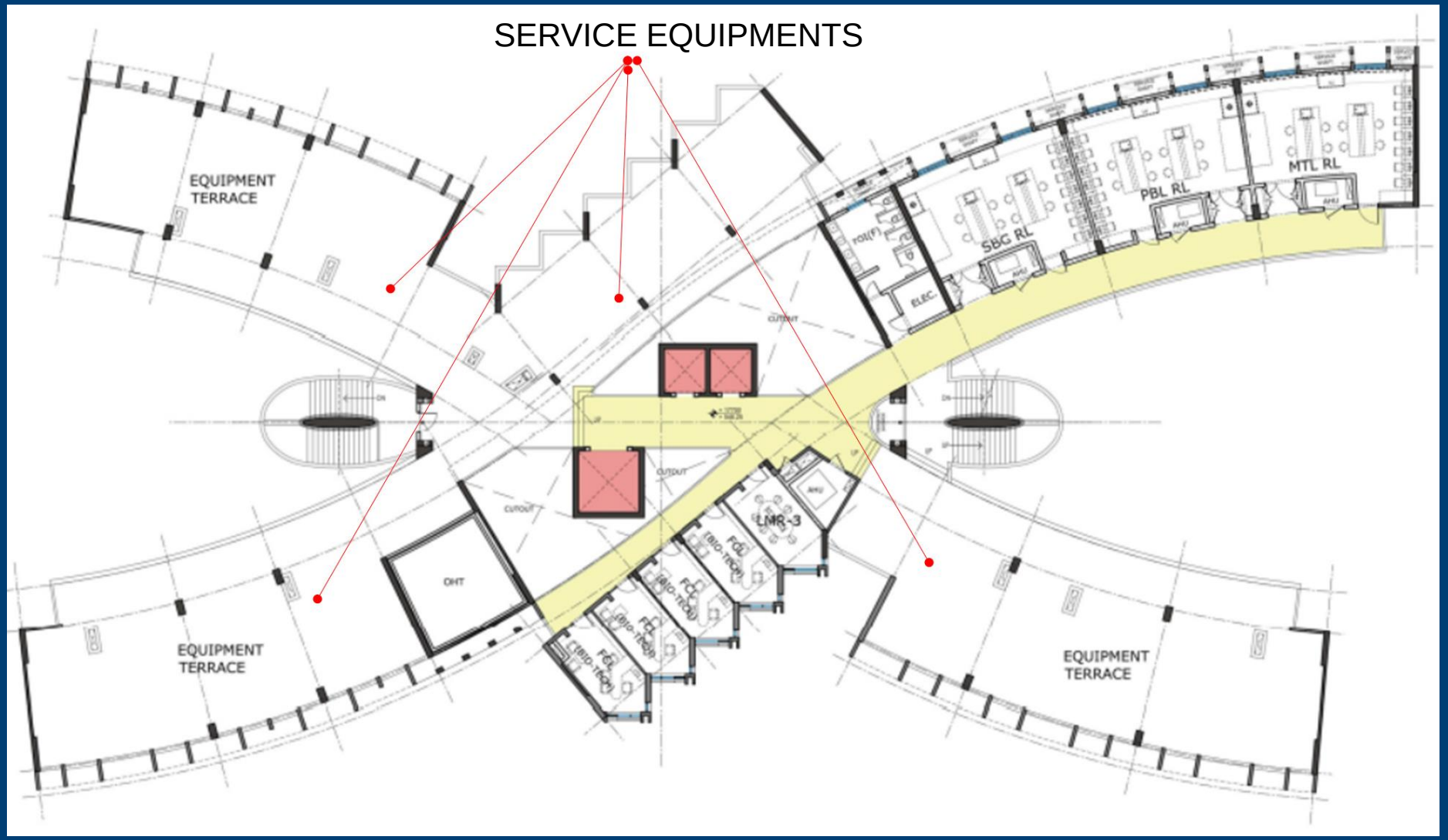
AMPHITHEATRE

THIRD FLOOR PLAN



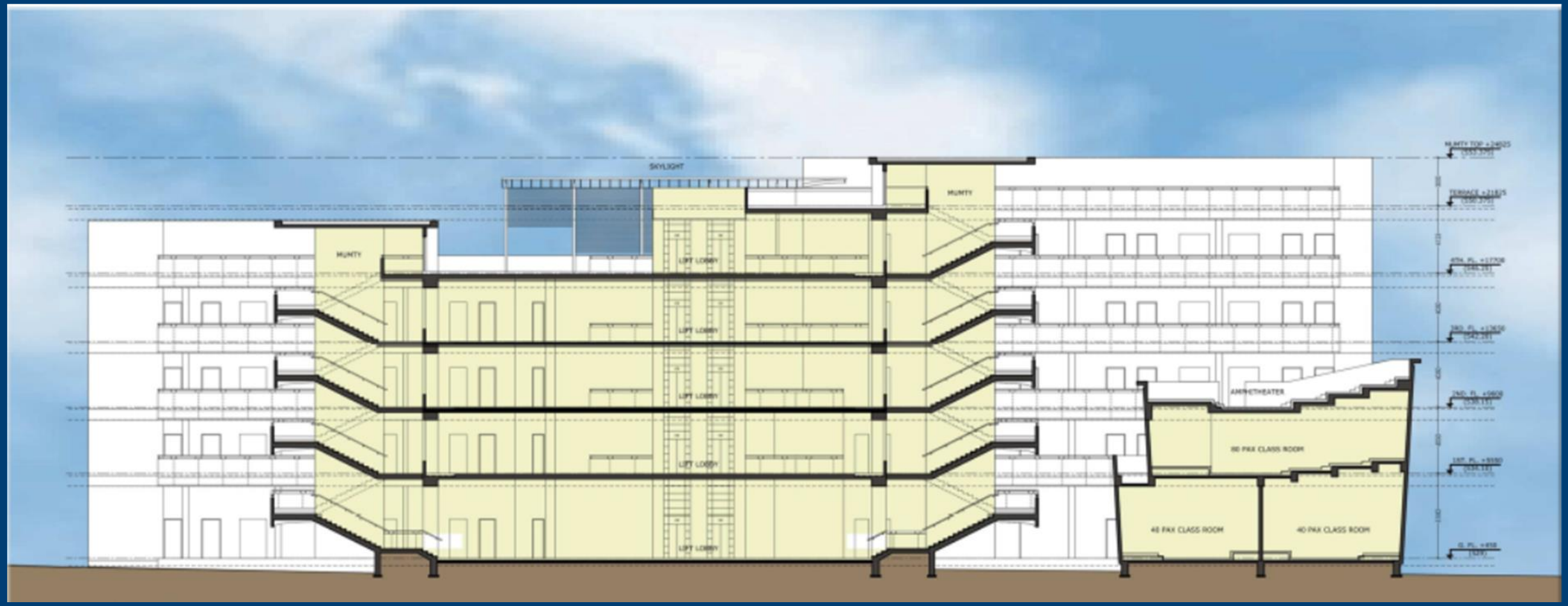
Each Module / Laboratory unit has a service shaft connection to take care of intensive services.

FOURTH FLOOR PLAN



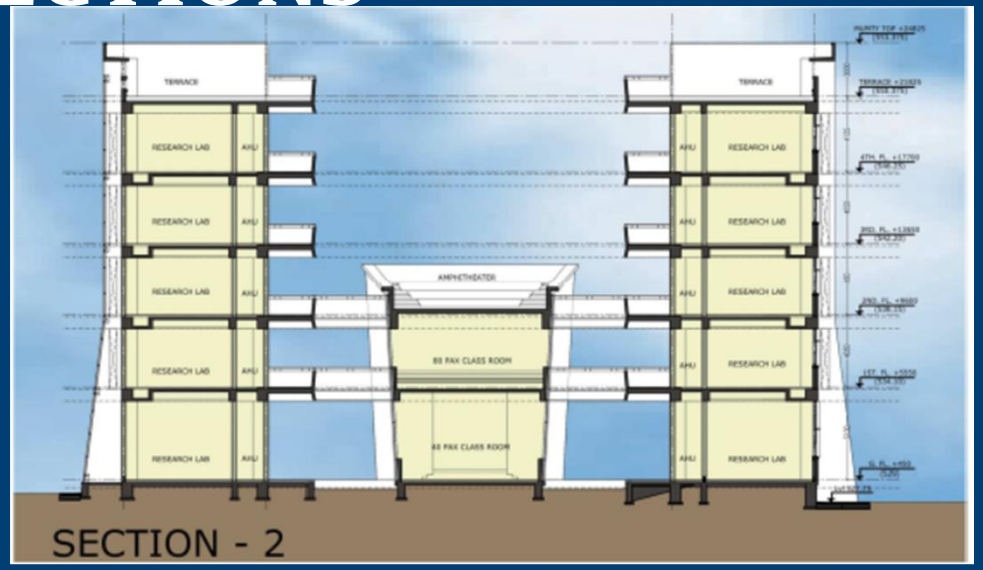
All equipment service types are located at the terrace level and concealed by our elevation.

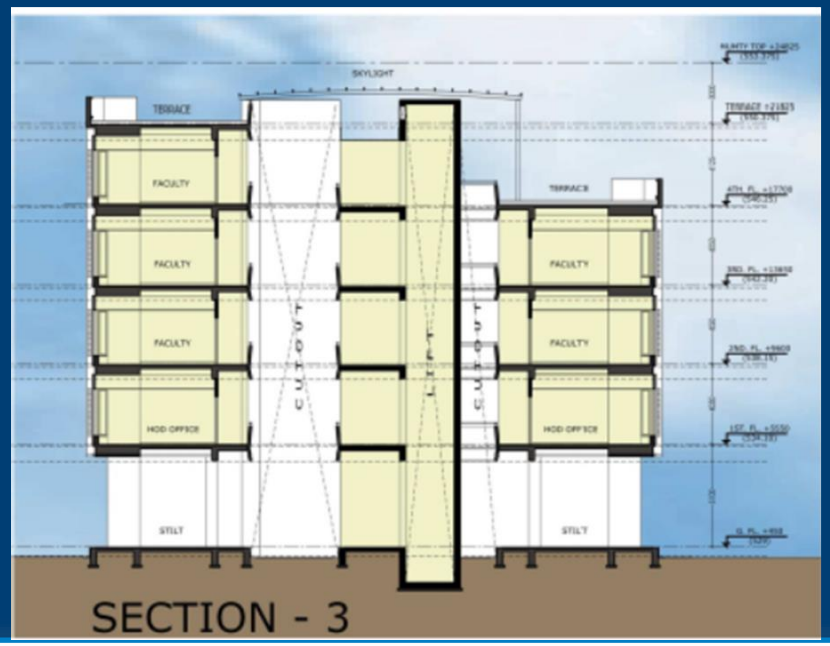
LONGITUDINAL SECTIONS



BUILDING HEIGHT IS 22.3 M

CROSS SECTIONS





Building elevation is designed with combination of precast panels (Concealing the Electro Mechanical Services) & DGU

DATA SHEET OF BTBM BUILDING

- **NO. OF FLOORS:** Bio-tech has Ground + four floors (G+4) , Bio-med has Ground + three floors (G+3)
- **BUILT-UP AREA:** 8552.80 Sqm (90,200 Sq.ft)
- **TYPE OF STRUCTURE:** Beam frame system.
- **TYPE OF MASONRY:** Aerated cement concrete blocks
- **FLOORING:** Labs – Vitrified tiles flooring
  Classrooms – Hardonite flooring
  Faculty/Ph.D student office – Vitrified tiles flooring
  Common areas (circulations) - Granite Flooring at ground floor & kota on typical floors
  Toilets - Vitrified tile
- **INTERNAL FINISH:**
  Wall - plaster & painted surface
  Ceiling: Cement plaster & paint & mineral fiber tile false ceiling in combination with gyp board.
- **EXTERNAL FINISH:**
  Wall - Exposed Architectural Concrete Finish with Grooves.
- **FENESTRATION:** Double Glass Unit (DGU) glazing with part open able panels.
- **FACADE FEATURE:** Exposed Architectural Concrete Finish with Grooves & Aluminum glazing.
- **ELECTRICAL INSTALLATION:** As per electrical DBR
- **SANITARY INSTALLATION:** As per PHE DBR
- **FIRE SAFETY:** Dry type fire extinguishers, FHC on every floors
- **PHYSICAL LY CHALLENGED PERSON ACCESSIBILITY:**
  - Barrier free design with Ramps & Lifts
  - Provision for Handicapped Toilet at every floor
  - Special hardware (like occupancy indicator, handrail, grab bar etc.)
  - Bigger circulation space inside toilets.

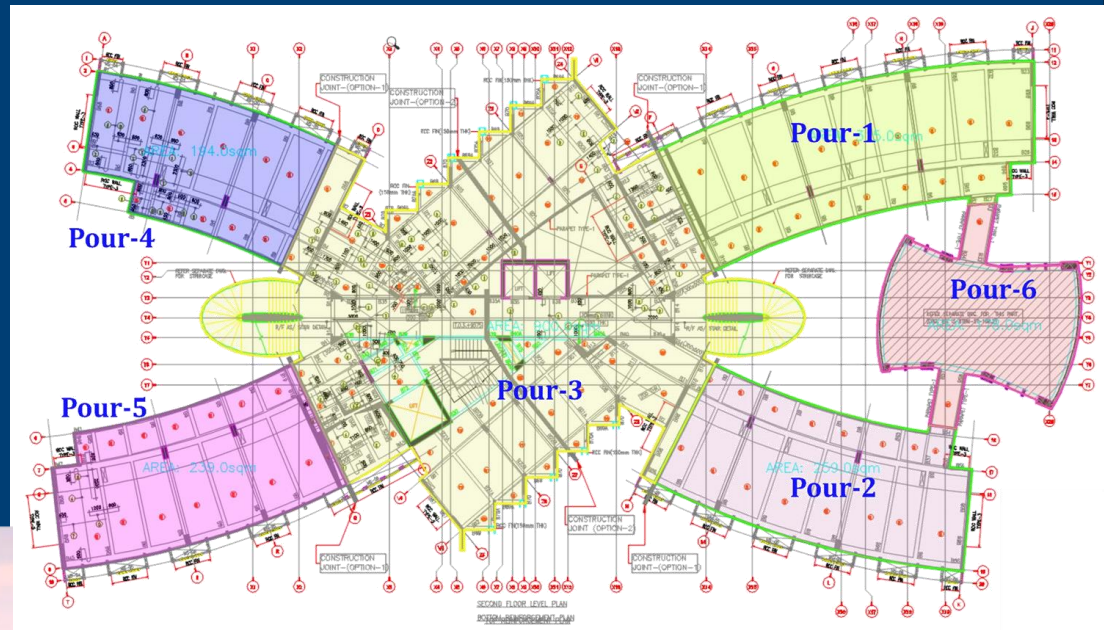
BIO-TECHNOLOGY AND BIO-MEDEDICAL DEPARTMENT'S BRIEF

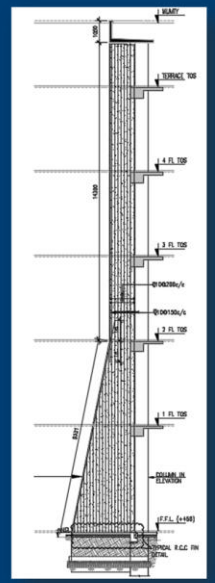
- The department of Bio-tech & Bio-med is part of Academic Quad AD1
- Faculty strength of department in all the divisions is 30.
- **The Bio-Tech building to be designed for:**
  - ✓ 1 No. of Classrooms A (80 Pax)
  - ✓ 2 No. of Classrooms B (40 Pax)
  - ✓ 1 No. of Dry Teaching Laboratory
  - ✓ 2 No. of Wet Teaching Laboratories
  - ✓ 16 No. Research Laboratories
  - ✓ Computer Labs, Equipment and Cold room,
  - ✓ Reception and Administration,
  - ✓ Conference Rooms, Office space, Pantry,
  - ✓ Receiving / storage room and service areas.
- **The Bio-Med building to be designed for:**
  - ✓ 1 No. of Classrooms A (30 Pax)
  - ✓ 5 No. of Computer Research Laboratory
  - ✓ 7 No. Research Laboratories
  - ✓ 1 No. of Comp. Teaching Laboratory
  - ✓ 1 No. of Wet Teaching Laboratory
  - ✓ Administration, Conference Rooms,
  - ✓ Office space, Ph.D, Pantry and Service areas.

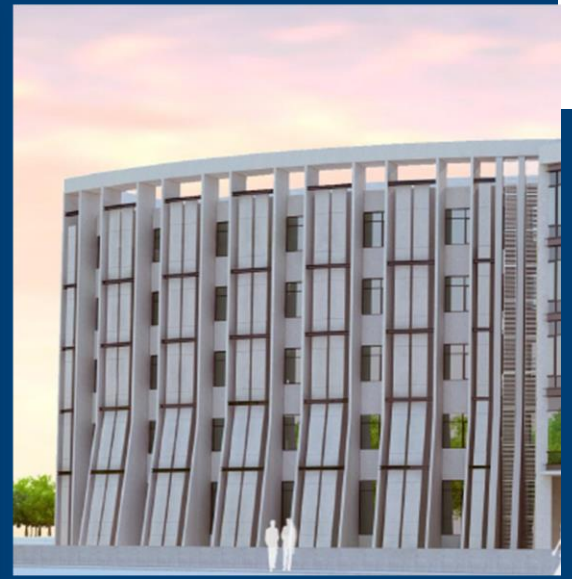
TECHNICAL CHALLENGES FACED DURING CONSTRUCTION

❑ Complexity in Construction

- ✓ Complexity in construction of 2D Curved Walls
- ✓ Fin Walls construction
- ✓ Form finish with Grooves
- ✓ 3D Spiral Staircases
- ✓ Precast RCC Panels @ Front & Rear Elevation

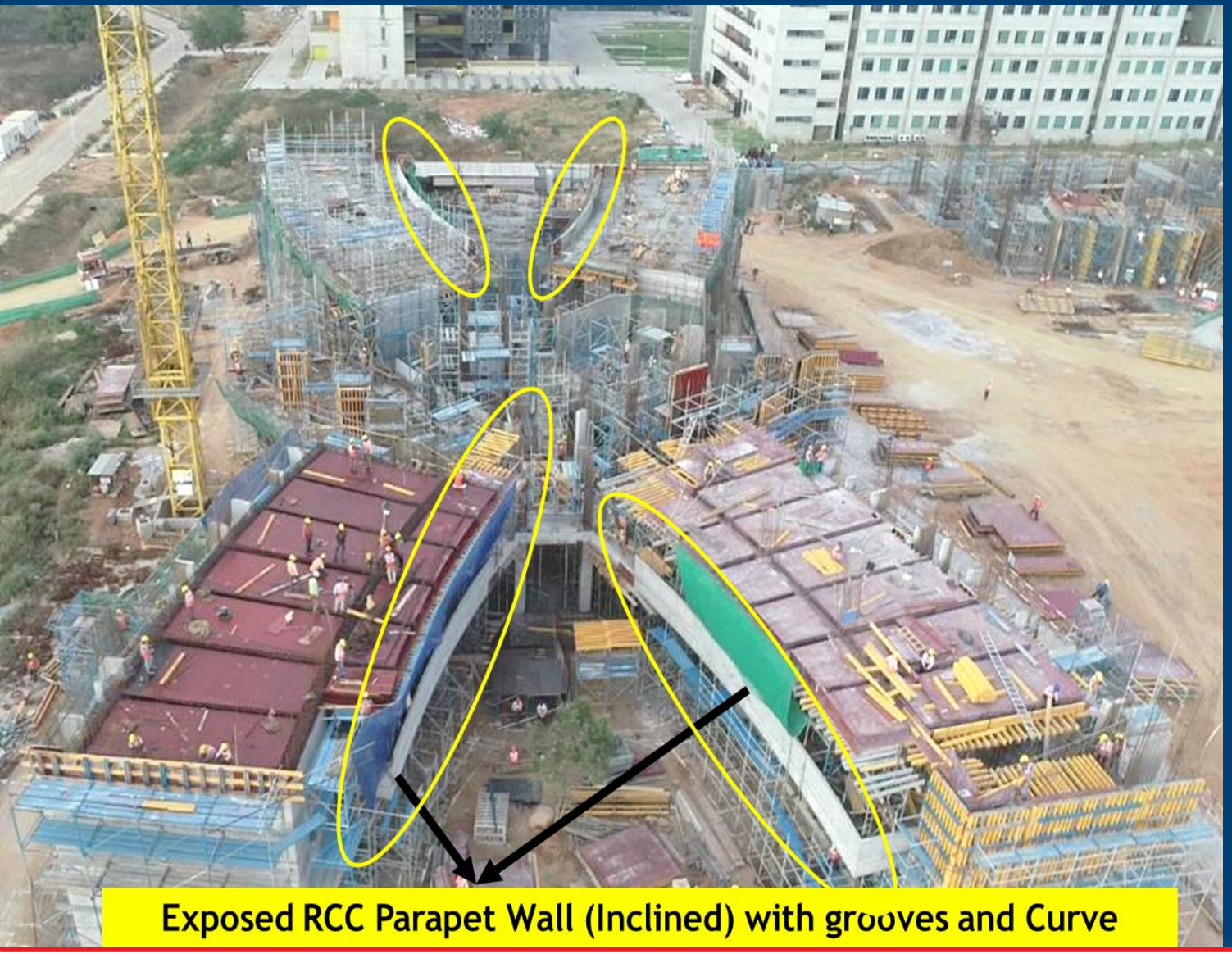






Inclined Fin Walls (Form Finish)

BTBME BUILDING- COMPLEX SHAPE OF 2D CURVED WALLS



Exposed RCC Parapet Wall (Inclined) with grooves and Curve

Exposed RCC Wall (Inclined & Curved) with grooves

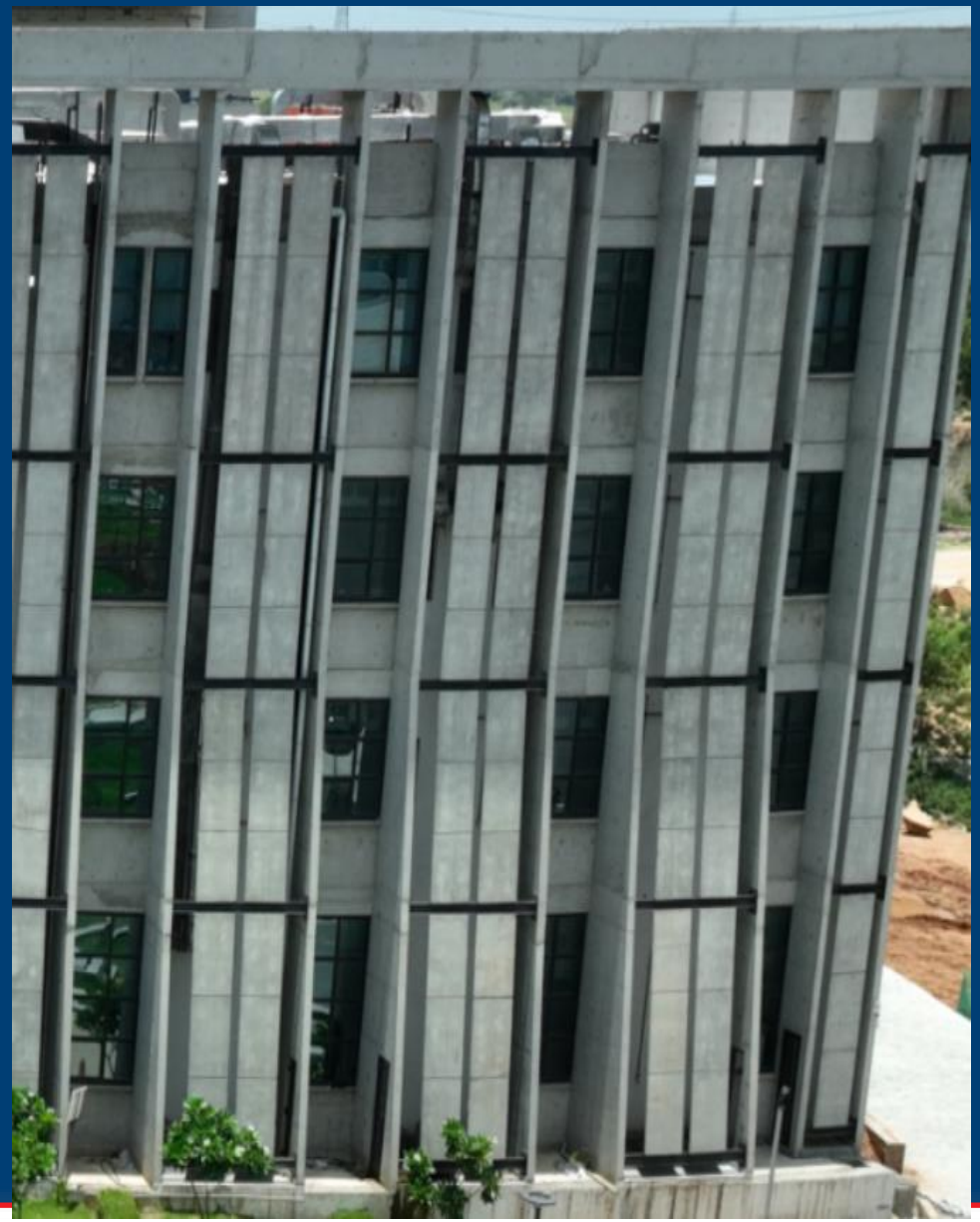
BTBME BUILDING- COMPLEXITY OF STRUCTURE

BTBME BUILDING- COMPLEXITY OF STRUCTURE

3D Spiral Staircases- 2 nos

BTBME BUILDING- COMPLEXITY OF STRUCTURE

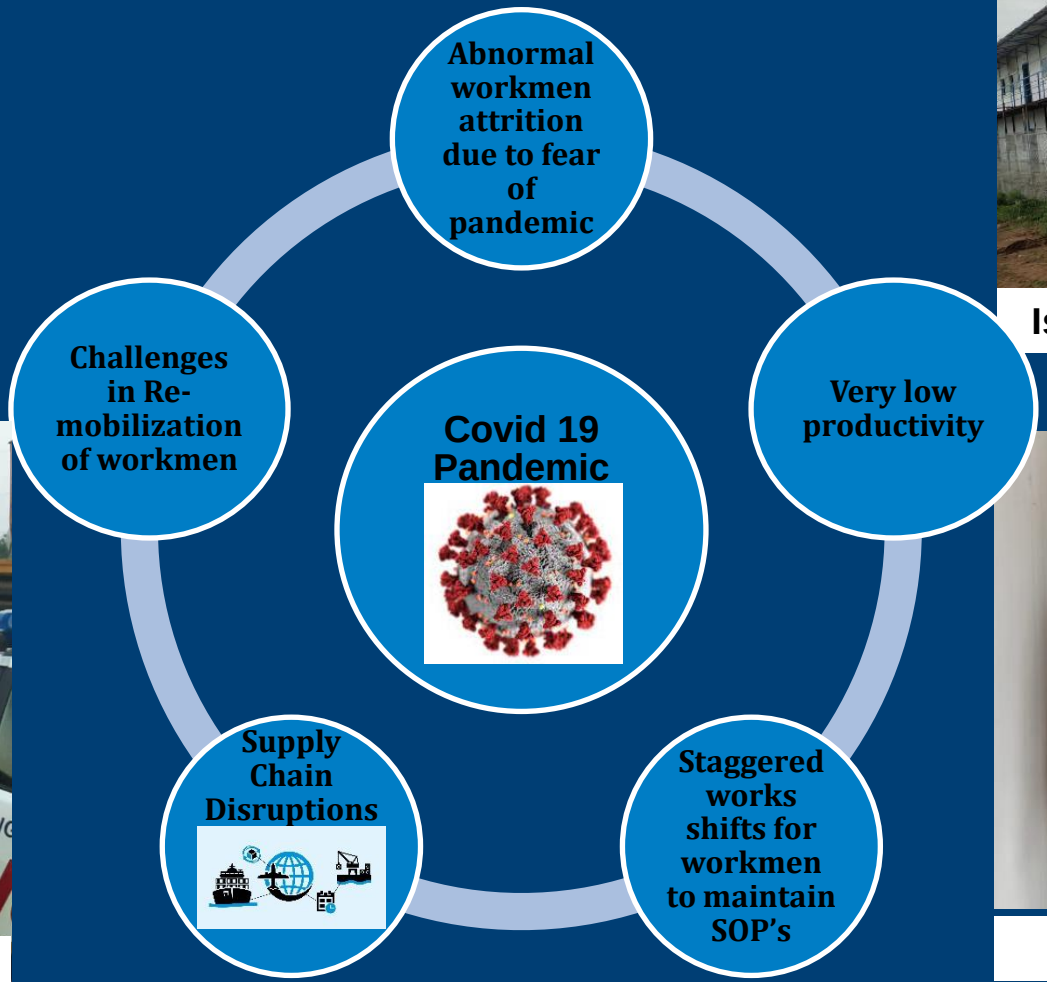
Precast RCC Panels @
Front & Rear Elevation



EXTERNAL CHALLENGES FACED DURING CONSTRUCTION

Social Distancing

Onslaught of Pandemic twice during building construction (Mar'20- Sep'20 & Apr'21 - Jul'21)



Isolation Wards at Workmen Colony

Labour Attrition

Thermal monitoring for all staff

JOURNEY OF THIS ICONIC STRUCTURE FROM INCEPTION TO COMPLETION









COMPARISION OF 3D VIEWS & COMPLETED VIEWS

FRONT ELEVATION- ACADEMIC QUAD- 3D IMAGE

FRONT ELEVATION- ACADEMIC QUAD- COMPLETED VIEW

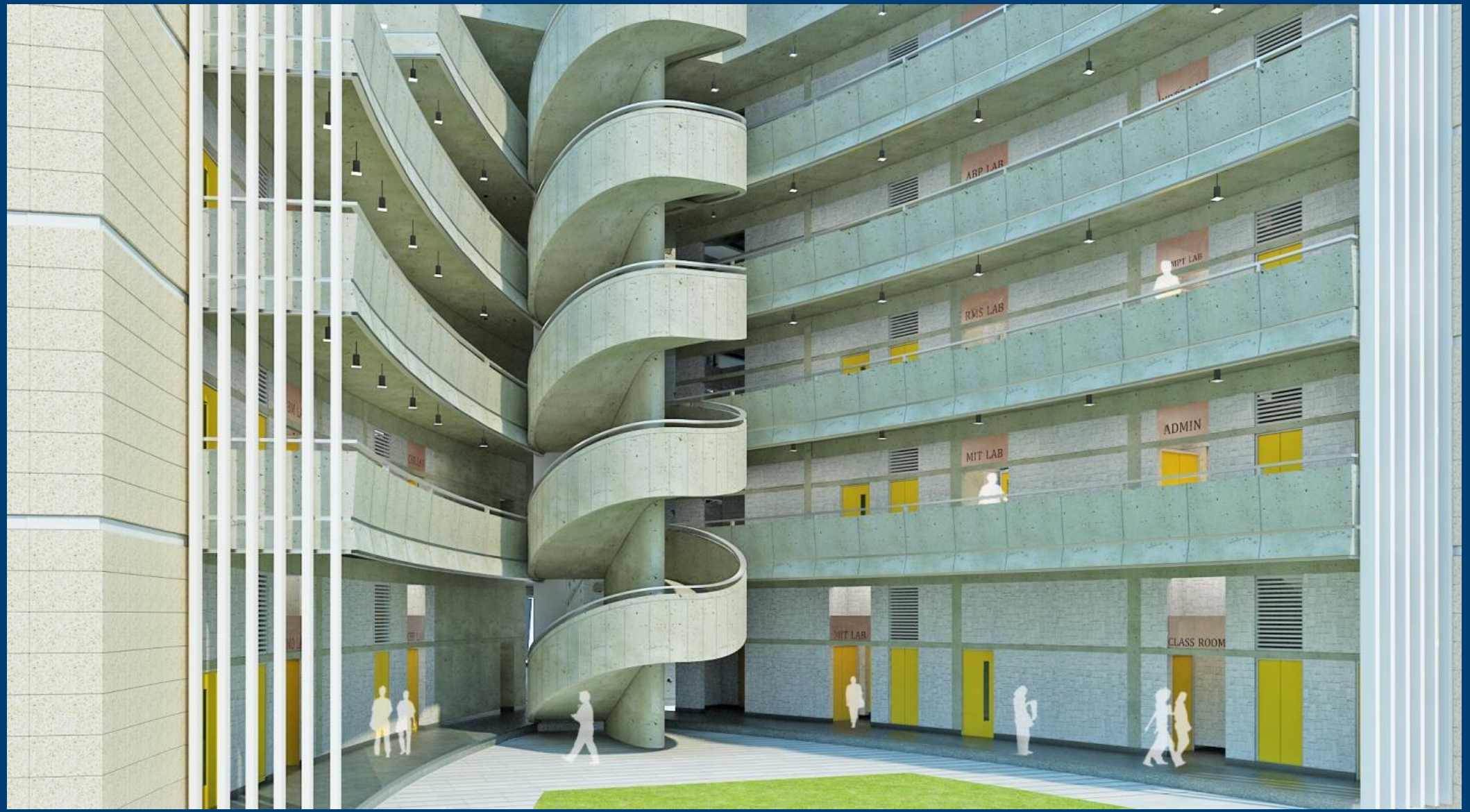
BTBM FRONT ELEVATION- 3D IMAGE

BTBM FRONT ELEVATION- COMPLETED VIEW

BTBM SIDE ELEVATION- 3D IMAGE

BTBM SIDE ELEVATION- COMPLETED VIEW

BTBM SPIRAL STAIRCASE-3D IMAGE



BTBM SPIRAL STAIRCASE- COMPLETED VIEW

BTBM BUILDING TOP VIEW- COMPLETED VIEW

QUALITY ASSURANCE

- Fly ash and Cement were procured from a Single source throughout the project to achieve a uniform concrete shade.
- Installed on site concrete Batching Plant to have better quality control
- Dedicated Reinforcement Steel Plant and automated de-coiling, shearing & bending equipment were installed to address the requirement of curvilinear shapes.
- Plywood uses were limited to a maximum of three repetitions only, to ensure fair finishes.
- Thorough checking and precision detailing has been made to ensure grooves are perfectly in line with the architectural requirements.
- Adopted BIM Model to have better insight on interfaces issues.

REWARDS & RECOGNITIONS

EHS AWARD

Five Star Occupational Health and Safety Audit
— Five Stars —

Valid until 08 October 2021

This is to certify that

Larsen & Toubro Limited, Construction, Buildings & Factories Independent Company, IIT Ph-II Project, Hyderabad

after an extensive evaluation by a British Safety Council auditor, has been awarded a rating of Five Stars.

Lawrence Waterman, OBE
Chair of The Board of Trustees

Mike Robinson
Chief Executive

Certificate number
FSA-Remote/228154

Issue date
10/09/2020

British Safety Council (Company Limited by Guarantee) Registered in England and Wales No. 4618713. Registered Charity No. 1097271 and OSCR No. SC037998.

BRITISH SAFETY COUNCIL

RoSPA Health & Safety Awards

RoSPA

The Royal Society for the Prevention of Accidents

Gold Award

Granted to

Larsen & Toubro Limited
Buildings & Factories
Independent Company
IIT Phase II Project
Hyderabad

2022

President

Judith Jolly

Baroness Jolly
Awarded 2022

THE QUEEN'S PLATINUM JUBILEE 2022

QUALITY AWARDS

Outstanding concrete structure of Telangana 2022

Certificate of Appreciation for Best Quality from Client, IITH