

SIST ANNEXURE

A THESIS

Submitted in partial fulfillment of the requirements for the award of
Bachelor of Architecture degree

By

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**DEPARTMENT OF ARCHITECTURE
SCHOOL OF BUILDING AND ENVIRONMENT**

SATHYABAMA

INSTITUTE OF SCIENCE AND TECHNOLOGY

(DEEMED TO BE UNIVERSITY) Accredited

With Grade “A” by NAAC

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CHENNAI - 600 119**

MAY 2024



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BONAFIDE CERTIFICATE

This is to certify that Thesis Report is the bonafide work of **KEERTHANA SAJI (39210039)** who carried out the Thesis entitled "**SIST ANNEXURE**" under our supervision from December 2023 to May 2024.

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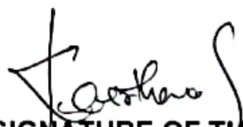
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DECLARATION

I, **KEERTHANA SAJI**, hereby declare that the Thesis Report entitled "SIST ANNEXURE" done by me under the guidance of **Dr.S.Ebin Horrison** (Internal Guide), **Ar.Ramkumar SSSR** (Internal Review Member) and **Ar.Sathish Moses** (External Guide) Sathyabama Institute of Science and Technology is submitted in partial fulfillment of the requirements for the award of Bachelor of Architecture Degree.

DATE: 24/05/2024

PLACE: Chennai


SIGNATURE OF THE CANDIDATE

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KEERTHANA SAJI

THESIS SYNOPSIS

This thesis explores the design and development of a research centre integrated with hostel accommodation. The project aims to create a vibrant environment that supports research, fosters collaboration, and provides comfortable living spaces for researchers, students, and staff. By combining advanced research facilities with modern residential amenities, the project addresses the need for integrated, sustainable, and community-oriented spaces in the context of contemporary academic and industrial research.

This architectural thesis outlines the broad approach to designing a multi-disciplinary research centre that integrates IT, biotechnology, and mechanical engineering industries. By addressing the specific requirements of each sector while fostering a collaborative and sustainable environment, the research centre aims to become a hub of innovation and technological advancement.

The objective is to design a research center that seamlessly integrates advanced research facilities with hostel accommodation, fostering an environment that promotes interdisciplinary collaboration and innovation. The design of the center will adhere to sustainable and green building practices, ensuring minimal environmental impact and energy efficiency. Additionally, the focus will be on enhancing the quality of life for researchers and students through well-designed living spaces that support their well-being and productivity.

The master plan emphasizes zoning and land utilization, spatial layout, and transportation and circulation systems. It has specific zones for IT, biotechnology, and mechanical engineering research, along with mixed-use areas that promote a live-work-play setting. Key facilities such as conference centers, auditoriums, and cafeterias are strategically located to serve the entire centre. Additionally, green spaces and open areas are designated to improve environmental quality and offer recreational opportunities.

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CHAPTER 1: INTRODUCTION

1.1 INTRODUCTION

Sathyabama Institute of Science and Technology is a well-regarded institution with a strong focus on science, technology, and engineering education. While it currently offers Ph.D. programs and encourages research activities, establishing a dedicated research centre could significantly enhance its research capabilities and bring several benefits.

The goal of the research centre is to establish a vibrant research and development (R&D) ecosystem. It encourages business and academic cooperation with the goal of bridging the knowledge gap between theory and practical implementations.

1.2 NEED OF THE PROJECT

A dedicated research centre would strengthen Sathyabama's research profile, making it more competitive for grants and funding from government agencies and private institutions. The centre could facilitate closer partnerships with industry leaders. This would expose researchers to real-world problems and allow them to tailor their research towards practical applications.

The university's research reputation would be enhanced with a separate research facility, increasing its competitiveness for grants and funding from public and private organisations. The centre might make it easier to form tighter ties with top business executives. As a result, researchers would be exposed to real-world issues and be able to focus their studies on useful applications.

1.3 AIM AND OBJECTIVE

- i. To design a research facility that can support interdisciplinary research to address complex, real-life problems.
- ii. Create platforms for collaboration with other universities, research institutions, and industry professionals.

- iii. Provide comfortable and efficient working spaces for researchers, including collaborative areas.

1.4 METHODOLOGY

The research employs a mixed-method approach, including literature review, case studies, site analysis, design development, and impact assessment. Primary data is collected through site visits, surveys, and interviews with stakeholders.

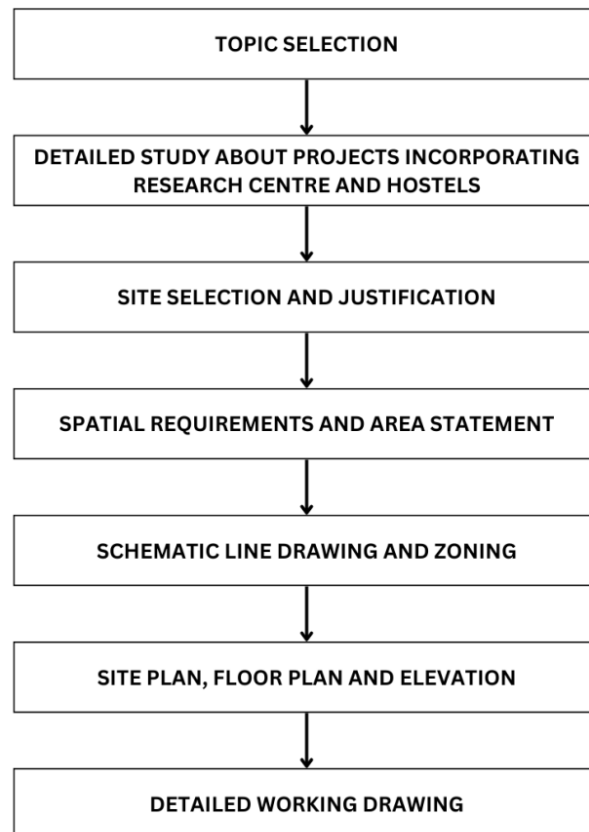


Figure 1: Methodology

CHAPTER 2: CASE STUDIES

2 IIT MADRAS RESEARCH PARK

Location – Chennai, Tamil Nadu, India

Area – 11.2 acres

Architect- Hafeez Contractor

Building type- Commercial

Project Completion – 2015

2.1 INTRODUCTION

The Indian Institute of Technology Madras (IITM), situated in Chennai, India, is the organisation behind the IIT Madras Research Park. It functions as a center for entrepreneurship, innovation, and industry-academia cooperation. Startups, research groups, and businesses can conduct research, develop, and market technology-based goods and services at the park thanks to its facilities and resources.

The center seeks to close the gap between academics and industry. The research park offers modern facilities, including advanced laboratories, office spaces, meeting rooms, and conference halls, designed to support high-tech research and business activities. It is a vibrant hub for innovation and entrepreneurship since houses a wide variety of businesses in industries like biotechnology, advanced manufacturing, engineering, and information technology.

The research park house 5 towers, where each of them are categorized according to a particular industries and their specific requirements. Each tower is designed for the particular industry, incorporating their specific needs.

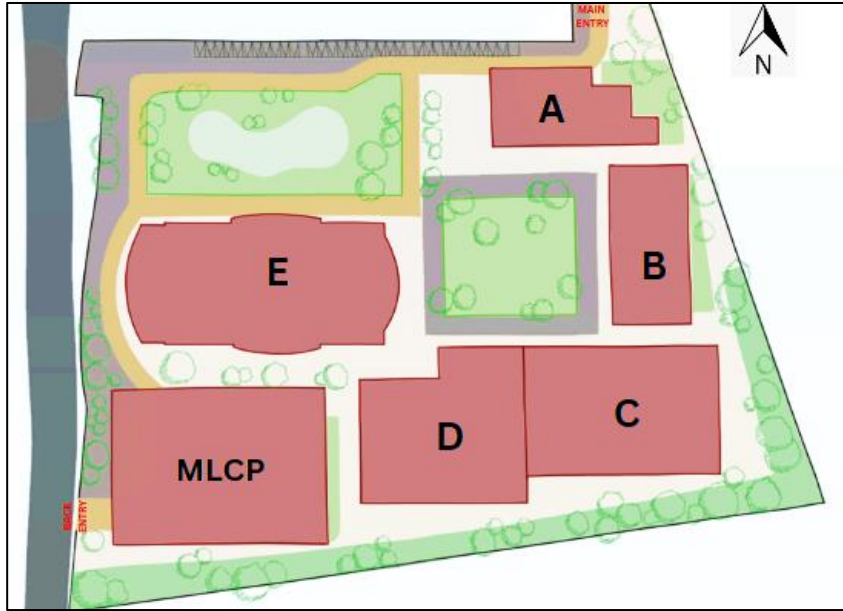


Figure 2: IITM - RP SITE PLAN

2.2 SITE PLANNING

The research park is located at Kanagam Road, Taramani, close to the IIT Madras campus. The research park is well-connected via major arterial roads like Old Mahabalipuram Road (OMR) and Rajiv Gandhi Salai, which are key routes in Chennai's IT corridor, making it easily accessible from various parts of Chennai. It is near major highways and public transport hubs, including bus services and suburban railways.

The five connected buildings with courtyards on the architecturally planned campus provide a mix of formal and casual meeting spaces to promote conversation and the sharing of ideas. This makes it easier for academicians, business owners, and professionals from the industry to interact and collaborate.

The campus revolves around the main landscaped courtyard formed between an existing building and newly proposed research facilities. The design is inspired from the traditional kund or stepped tank that used to be common informal places for meeting and exchange of ideas. The rigid geometry of this stepped seating area is bisected by a free flowing paving band that connects the courtyard with lake and other important places on campus.

The landscape design contains a water management strategy that collects all surface water runoff into the existing lake to be reused for irrigation purposes. The planting plan included the use of native and adaptive species throughout the campus. The landscape design provides an inspiring enjoyable environment for researchers and students of the campus.



Figure 3: Central Courtyard

2.3 INTERNAL ZONING

The buildings are categorized as follows:

TOWER A: It Industry

Consists of 10 floors with multiple IT and telecom companies. They have simple and basic requirements like, communication systems, internet services, conference equipment, workstations, cabling server room equipment, access control etc.

TOWER B: Mechanical Industry

Tower B has 10 floors with companies mainly from the mechanical industry. Hosts the Advanced Manufacturing Technology Development Centre (AMTDC), the Centre for Battery Engineering and Electric Vehicles (CBEEV) and the International Centre for Clean Water (ICCW).



Figure 4: (a) OFFICES; (b) MECHANIAL LAB

TOWER C: Medical Industry

Tower C has 10 floors that houses companies from medical sciences. It has facilities like the Bio-Tech and the Med-tech Incubators, the Healthcare Technology Innovation Centre (HTIC) and the Centre for Urbanization, Buildings and Environment (CUBE). Wet labs generally have specific needs like different kinds of water, disposal of toxic waste, multiple exhaust shafts etc.



Figure 5: BIOINCUBATOR

TOWER D: Common Amenities and Private Offices

Block D is of 7 floors that consists of various common facilities like the food court, gym, crèche, auditorium etc. It has private offices from different industries. The 3rd and 6th floors have start-up offices. These floors have a common balcony that runs across towers A, B and C.



Figure 6: (a) AUDITORIUM (b) SEMINAR HALL

TOWER E: Public Spaces and Private Offices

This was the first tower that was built with 11 floors, therefore which the design and structure is different from the other towers. It has the main administration office of the research park and many private offices. Facilities like the ATM, IITMRP Office, Conference Halls, Board Rooms, Discussion Rooms, Mini Auditorium and the Exhibition Halls are located here. It also has the Rural Technology and Business Incubator (RTBI) and the Centre of Excellence in Wireless Technology (CEWIT)

HOTEL

The research park provides hotel facilities as well. The 11th floor in Tower E is dedicated to Ginger Hotel, with around 20 rooms on the floor. Since there are only a limited number of rooms available, the hotel mainly reserved for VIP clients and not publicized to the general public.

2.4 CIRCULATION

The site has 2 entries; the primary entrance is located on Kanagam Road, Taramani, adjacent to the IIT Madras campus. This entrance is designed for general access, including visitors, employees, and business partners. The secondary entrance is specifically for IIT Madras faculty, students, and staff who are involved in collaborative projects or research activities at the park. It is situated near the boundary shared with the IIT Madras campus, providing a convenient and direct link between the campus and the research park.

The site consists of a Multilevel Car Parking system of 7 floors mainly for employees, students and special guests. This can be accessed from the secondary entrance. There also another entrance into the site that is a flyover bridge connecting the research park directly to IIT Madras campus. It is called the Industry – Academia Bridge and connects into the MLCP of the research park.

The vehicular movement is restricted and the parking is located beside the main entrance. The secondary entrance also acts as a service entry and the service road goes all around the site.

Well-designed pedestrian pathways and sidewalks are present throughout the park, ensuring safe and convenient movement for pedestrians. Green spaces and seating areas are integrated within the research park, providing pleasant environments for walking, relaxing, and informal meetings. Pathways and entrances are designed to be accessible to individuals with disabilities, featuring ramps, tactile paving, and accessible restrooms to ensure inclusivity. The only drawback on site would be that the large courtyard is not accessible for wheelchair users. The central seating area is led by the stepped courtyard, which makes it difficult for wheelchair users.



Figure 7: Connecting Bridge between towers A, D & E

Within IITMRP, a system of closely constructed pedestrian paths connects the towers A, B, C and D. These broad, well-lit corridors, which are partially covered to offer shelter from the weather, make it simple and pleasant to move between buildings. Apart from this, there are also elevated walkways or skywalks connect tower A and D to tower E.

2.5 SPATIAL ANALYSIS

Building Infrastructure:

- × Office Spaces: Modern office spaces across several high-rise buildings inside the research park cater to large enterprises, SMEs, and startups.
- × Research Laboratories: There are several advanced labs with advanced technology accessible for a range of research and development tasks.
- × Meeting and Conference Rooms: Numerous meeting rooms, seminar halls, and large conference facilities support collaboration and knowledge sharing.
- × Incubation Space: Dedicated spaces for the purpose of fostering entrepreneurs and offering chances for funding, mentoring, and company development assistance.
- × Co-working Spaces: Flexible co-working spaces are available to foster collaboration among different companies and researchers. Collaboration Zones: Open areas and lounges designed for informal meetings and collaborative work.
- × Recreational Facilities: Onsite amenities such as fitness centers, cafeterias, and recreational rooms support employee well-being and work-life balance.
- × Hotel: The hotel offers a variety of room types, including standard rooms, executive rooms, and suites, equipped with modern amenities as well as an in-house restaurant to cater to the needs of business and leisure travelers.

2.6 ENERGY MANAGEMENT SYSTEM

2.6.1 SOLAR SYSTEM

One of the initial steps taken in the pursuit to green energy is setting up Rooftop Solar Systems on the buildings. Rooftop solar power can only meet up to 5 - 10% of a commercial

complex' electricity requirements in India which is insufficient for a building attempting to reduce its dependency on the grid and reduce electricity cost in the long run. Therefore, due to the energy intensity of commercial buildings and limited space available on rooftops meeting all the energy requirements on site through rooftop solar will be a difficult task.

Therefore, they decided to bring in renewable energy from solar / wind plants located at a distance using the existing grid infrastructure. Efficiently managing demand and supply between available renewable and grid power sources along with utilizing appropriate storage systems is essential and can also help in optimization for reducing the total operating costs incurred. Based on the current consumption profile of the Research Park a total of 4 MW of solar power and

2 MW of wind power with an additional of 1 MW from Rooftop solar supported by a Lithium – ion battery storage of 7898 kWh is estimated to help IITMRP move towards 90% of renewable energy.



Figure 8: (a) Rooftop Solar Panels at IITM-RP (b) Solar Power brought it

2.6.2AIR CONDITIONING SYSTEM

Air-conditioning is a major consumer of electric power, especially in office buildings, with HVAC systems typically consuming 60% of the overall power consumption. Efforts are therefore required to make the air-conditioning system as efficient as possible. A traditional HVAC system consists of chillers, pumps and Air handling units connected to each other. While chillers and

pumps consume half the power used by the cooling systems, the other half is consumed by air distribution systems involving AHUs.

ISSUES FACED:

- × Uneven Cold Air Distribution
- × Cooling at Unoccupied zone
- × No Controls and Automation
- × Results in excessive cooling
- × Discomforts
- × High Electricity bills

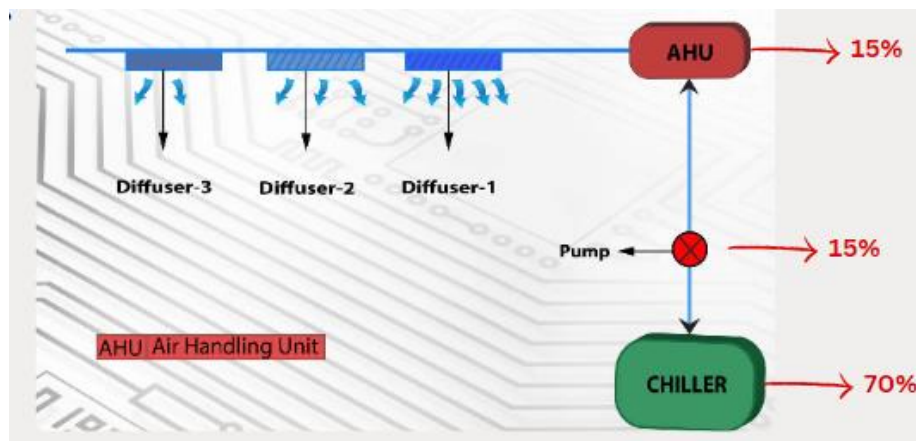
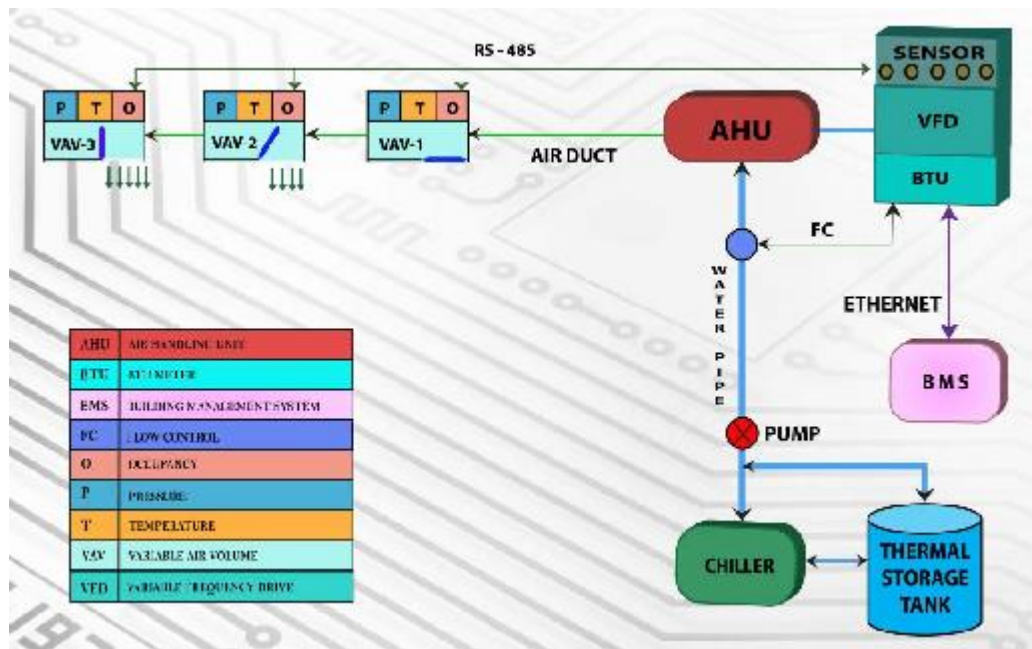


Figure 9: Conventional Cooling System

The proposed architecture constitutes of Variable Air Volume (VAV) boxes instead of diffusers. It has VFD to change the motor speed. It has various sensor networks to decide the amount of cooling required. It also has a connection to the Building Management System (BMS) for live monitoring and controlling of HVAC systems.

A Variable Frequency Drive (VFD) also has internal chilled water flow control option. As the VFD reduces the fan speed, the chilled water supply is also throttled and the water flow is optimized. With this, the water pump then gets a back pressure and further reduces its speed to optimize the water flow required, hence optimizing the power consumption. As the overall heat load of the building becomes optimized, the impact is reflected on the chiller which now runs at a lower capacity and reduces power consumption.



BEFORE: The TCOE office is about 3500 sqft and has 18 Ton AHU. Before converting the AC system of this office to a smart AC, it had a problem of unbalanced air distribution and energy wastage by cooling unoccupied zone.

AFTER: The entire office was retrofitted with VAVs and VFD. The office is now divided into 17 virtual zones. There is no physical partition, but each zone has a thermostat to control the Air Conditioning of that particular zone. This converts decentralized Air Conditioning system into a Centralized Air Conditioning system.

ADVANTAGE: The VFD has sensors connected for noting Chill Water Inlet Temperature, Chill Water Outlet Temperature, Water flow rate, Supply Air Temperature, Return Air Temperature, Carbon Dioxide level and Humidity. Based on the information transmitted by the VAVs and sensor network, the VFD decides the motor frequency. All the information is sent live to the BMS, where in the user can monitor and control the air conditioning.

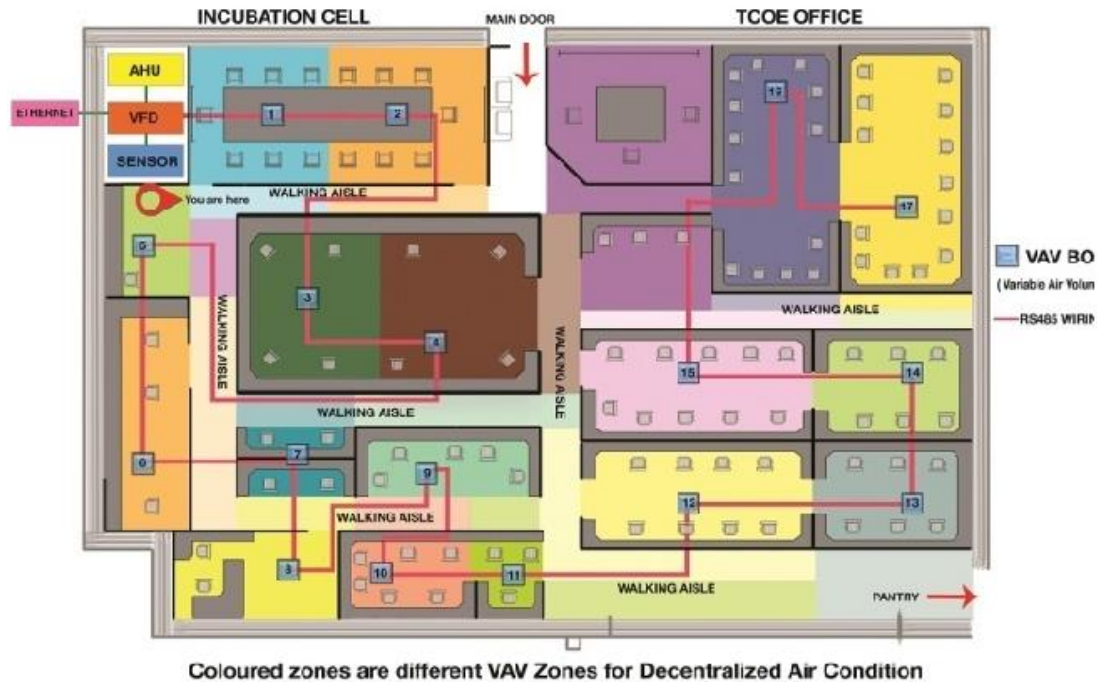


Figure 11: HVAC Control System at TCOE

The building cooling system applied has helped to solve two major problems. First, the issue of unbalanced air distribution, by providing every portion of the room with equal amount of cold air and second, energy wastage in an unoccupied zone which is avoided by sensory turning off of the VAV. This decentralized air conditioning saves 30% power compared to a conventional Air Conditioning system because of its energy efficient architecture. This solution can be further developed and adapted to suit the residential air-conditioning needs in the most efficient way. In addition, this solution can be integrated with heaters in the future for heating needs in the winters.

2.6.3 THERMAL STORAGE

40% of a commercial building's energy is utilized in air conditioning. Thermal energy storage systems store energy in thermal gradients (temperature differences) either as chilled or hot water. It is obtained by continuously heating or cooling the storage system.

IIT Madras Research Park has a requirement of 1800 Ton of regular cooling. The cooling requirement is maximum during noon; it is at this time that the electricity available from grid is constrained to the maximum extent. Drawing power from the grid to run the chiller and air

conditioning system to its peak-performance, impact the grid. On the other hand, the grid-supply available is surplus late in the night and early-morning hours. In order to be grid-friendly (and therefore environment-friendly), IITMRP decided to construct a 300,000 liters chilled water insulated-storage tank.

In the tank, water can be stored at 6 deg C for long hours. The chilling is carried out during early-morning hours and up to 800 Ton Hr water is stored in the tank. This water is then used during day time, when the air-conditioning demand peaks during peaktime the chilled-water requirement goes up by 200 Ton Hr, making it usable for four hours, even if the chiller is shut-down during that time. A mix of chilled water from the storage tank and chiller (operating with lower-power) could be used to make the chilled water usable for much longer time.

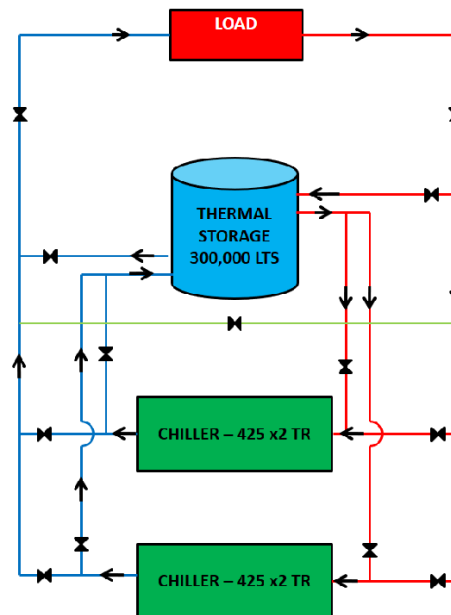


Figure 12: Thermal Storage Implementation

2.6.4 BATTERY STORAGE

Various battery technologies use different chemical compounds to store electricity. Each of these technologies have other characteristics and are used to store and release electricity for different durations ranging from a few minutes to several hours. Lithium-Ion Batteries are lightweight and have high energy density. Interest in the electric vehicle space has increased demand for lithium batteries. The global capacity of these batteries is expected to be 4 times the

current state by the end of this decade. Recent advancements in various cell chemistries, especially in Li ion-based energy storage systems has brought down costs significantly, improved calendar life and number of cycles, making it a more favourable choice for both large and small sized energy storage systems.

2.7 DESIGN REQUIREMENTS

BLOCK	TYOLOGY	FLOOR	SPACE	AREA (SQM)	NO. OF UNITS	TOTAL AREA (SQM)	
A	IT INDUSTRY	AG - A10	SERVICE CORE 1	54.46	1	54.46	
			SERVICE CORE 2	217.00	1	217.00	
			SERVICE CORE 3	85.00	1	85.00	
			OFFICE	2,491.35	11	27404.85	
		TOTAL AREA					27761.31
B	MECHANICAL INDUSTRY	BG - B10	SERVICE CORE 1	81.34	1	81.34	
			SERVICE CORE 2	145.45	1	145.45	
			OFFICE	1,543.45	11	16977.95	
			TOTAL AREA				
		C	WETLABS	CG - C10	SERVICE CORE 1	241.19	1
SERVICE CORE 2	135.13				1	135.13	
SERVICE CORE 3	180.38				1	180.38	
OFFICE	2,434.86				11	26783.46	
TOTAL AREA					27340.16		
D	COMMON FACILITIES AND PRIVATE OFFICES	DG	COMMON FACILITIES	1,204.37	1	1204.37	
		D1- D11	SERVICE CORE 1	214.08	1	214.08	
			SERVICE CORE 2	218.37	1	218.37	
			OFFICE	2,350.12	10	23501.20	
		TOTAL AREA					25138.02
BLOCK	TYOLOGY	FLOOR	SPACE	AREA (SQM)	NO. OF UNITS	TOTAL AREA (SQM)	
E	MAJORLY PUBLIC SOACES WITH PRIVATE OFFICES FROM DIFFERENT INDUSTRIES	GROUND	DEMO ROOM	20.00	3	60.00	
			OLD EXHIBITION HALL	182.32	1	182.32	
			HALL 1	101.61	1	101.61	
			HALL 2	143.90	1	143.90	
			HALL 3	85.28	1	85.28	
			HALL 4	85.28	1	85.28	
			RAMANUJAN HALL	127.41	1	127.41	
			TV LOUNGE	92.32	1	92.32	
			AUDITORIUM	171.85	1	171.85	
			RAMAN HALL	293.37	1	293.37	
			NEW EXHIBITION HALL	387.04	1	387.04	
			TOILET	27.36	2	54.72	
			LIFT	10.00	6	60.00	
			STAIR	23.29	3	69.87	
			GINGER HOTEL LOBBY	161.81	1	161.81	
			LOBBY	874.82	1	874.82	
		FIRST	HALL 5	101.73	1	101.73	
			HALL 6	101.73	1	101.73	
			HALL 7	101.73	1	101.73	
			TOILET	27.36	2	54.72	
		E3 - E9	OFFICE	2,727.08	7	19089.56	
			TOILET	27.36	14	383.04	
		E10	GINGER HOTEL	2,727.08	1	2727.08	
		TOTAL AREA					25511.19
AREA SPLIT UP		AREA (SQM)	PERCENTAGE (%)				
TOTAL BUILT UP AREA		122955.42					
PUBLIC SPCAES		2782.58	2.26				
OFFICE SPACES		113757.02	92.52				
HOTEL		2888.89	2.35				

Figure 13: IITM - RP Area Statement

CHAPTER 3: SITE

3.1 LOCATION

The selected site is located in Shollinganallur, Chennai, Tamil Nadu. With an area of 6.8 acres, the site has been specifically chosen mainly due to its proximity to Sathyabama Institute of Science and Technology.



Figure 14: Site Location

The site is situated along the Old Mahabalipuram Road (OMR), also known as Rajiv Gandhi Salai, which is a major IT corridor in Chennai. It is well-connected to other key areas like Thiruvanmiyur, Perungudi, and Siruseri.

Criteria considered for site selection:

- × Proximity to Sathyabama Institute of Science and Technology.
- × Close access to Old Mahabalipuram Road (OMR) providing direct access to the central parts of Chennai and other important suburbs.
- × Access to numerous IT parks and business centers

The site is located abutting a link road. The form of the buildings around the site varies from single storey to 4 storey, with some vacant land as well. Having vacant land around the site provides an extensive view to the site from the major nodes and landmarks.

3.2 SITE REGULATIONS

- × Minimum abutting existing road width: 18m
- × FSI: 2
- × The maximum plot coverage is 60% to 70%
- × The required minimum distance between the building and the front property line (abutting road) varies but is generally set at a minimum of 6 meters.
- × The side and rear setbacks may range from 1.5 to 3 meters.
- × Permissible building height : 18m
- × Parking must be provided at a rate of one parking space per 50-100 square meters of built-up area.

3.3 SITE INFERENCE

3.3.1 STRENGTH

- × The land is situated near the Old Mahabalipuram Road (OMR), a major IT corridor, making it highly efficient for commercial and residential developments targeting IT professionals.
- × Good connectivity to key areas of Chennai, including major roads like OMR and East Coast Road (ECR), enhances its appeal.
- × The site being in close proximity to the institute makes the interaction between academicians and professionals more convenient.
- × The area has a well-developed infrastructure with access to shopping malls, healthcare facilities, educational institutions, and entertainment centers.
- × The area has a high demand for both residential and commercial projects due to the booming IT industry and urban expansion

3.3.2WEAKNESS

- × Proximity to major roads can lead to traffic congestion, which might affect the ease of access and increase noise pollution.
- × Rapid development in the area can strain existing utilities and infrastructure, leading to potential issues with water supply, sewage, and electricity.
- × Being part of a coastal city, the area is prone to flooding during heavy rains or cyclones, requiring robust drainage solutions.

3.3.3OPPORTUNITIES

- × Proximity to IT hub can help bring in various professionals into the site
- × It can help provide startup companies the support and environment they require.
- × The upcoming metro rail extension can significantly enhance connectivity, making the area even more attractive for development.

3.3.4THREATS

- × The rapid development of surrounding areas could have a probable effect on the demand.
- × Increasing frequency of extreme weather conditions due to climate change. Floods caused by heavy rains can be a potential threat.
- × Economic downturns or changes in the IT sector's growth can impact investment and development opportunities in the area.

CHAPTER 4: DESIGN CONCEPT

4.1 DESIGN PROGRAM

The area statement calculated from the case study helped to deduce the requirements of this project. As the project consists of various elements, the requirements were listed out in percentage for an easier understanding of the split up area.

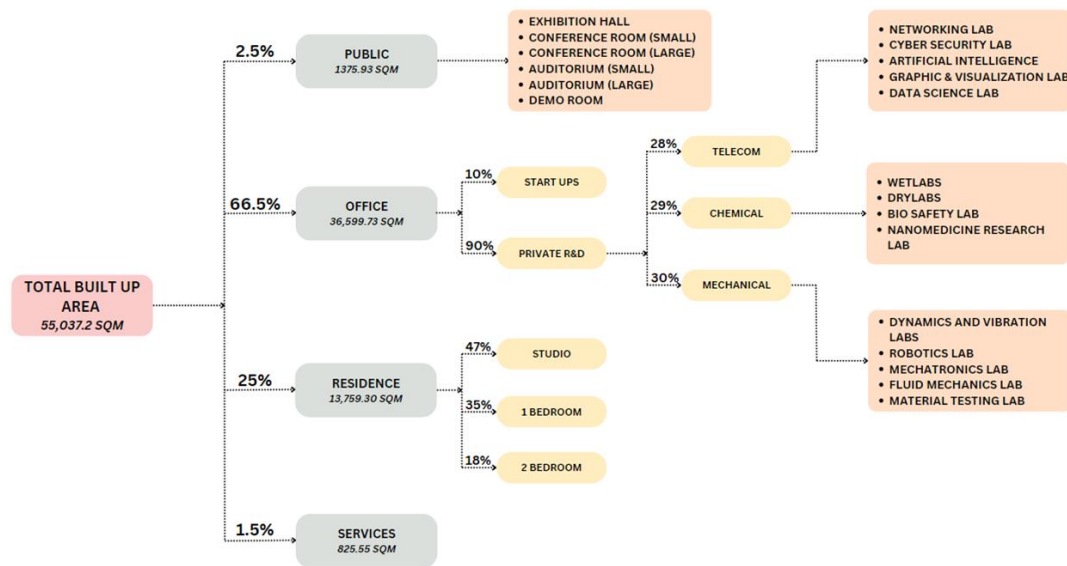


Figure 15: Area Split Up

This process has been repeated for each sector to find out the maximum area that can be used and formulate the requirements accordingly.

4.2 DESIGN REQUIREMENTS

The site is divided into several sectors as per their use and requirements.

They are as follows:

- ¶ PUBLIC
- ¶ IT
- ¶ BIO MEDICAL
- ¶ MECHANICAL
- ¶ HOSTEL

TYPOLOGY	SPACE	AREA (SQM)	NO. OF UNITS	TOTAL AREA
PUBLIC	DEMO ROOM	20	2	40
	EXHIBITION HALL	150	1	150
	CONFERENCE ROOM (50 PAX)	130	1	130
	AUDITORIUM (300 PAX)	500	1	500
	CONFERENCE ROOM (120 PAX)	290	1	290
	DINING	200	1	200
	LIBRARY	250	1	250
	TOTAL AREA			1560
OFFICE (STARTUPS)	LOUNGE	30	2	60
	CO-WORKING	450	1	450
	WORKSTATION	600	1	600
	MEETING ROOM	80	4	320
	PRIVATE OFFICE	640	1	640
	WORKSHOP	60	2	120
	STARTUPS AREA			2190
OFFICE (IT)	PRIVATE OFFICES	10336	1	10336
	NETWORKING LAB	50	1	50
	CYBER SECURITY LAB	50	1	50
	ARTIFICIAL INTELLIGENCE	50	1	50
	GRAPHIC & VISUALIZATION LAB	50	1	50
	DATA SCIENCE LAB	50	1	50
	IT OFFICE AREA			10586
OFFICE (BIO)	PRIVATE OFFICES	10336	1	10336
	WETLABS	120	1	120
	DRYLABS	120	1	120
	BIO SAFETY LAB	120	1	120
	NANOMEDICINE RESEARCH LAB	120	1	120
	MEDICAL OFFICE AREA			10816
OFFICE (MECHANICAL)	PRIVATE OFFICES	10336	1	10336
	DYNAMICS AND VIBRATION LABS	200	1	200
	ROBOTICS LAB	200	1	200
	MECHATRONICS LAB	200	1	200
	FLUID MECHANICS LAB	200	1	200
	MATERIAL TESTING LAB	200	1	200
	MECHANICAL OFFICE AREA			11336
TOTAL AREA				34928
SERVICE APARTMENTS	LOUNGE	30	1	30
	STUDIO APARTMENT	50	80	4000
	1 BHK	80	60	4800
	2BHK	100	30	3000
	TOTAL AREA			11800
TOTAL BUILT UP AREA (sqm)		48288		

Figure 16:Area Statement

4.3 DESIGN CONCEPT

4.3.1 BUILDING TYPOLOGIES AND FUNCTIONS

Office Spaces: Flexible office layouts that can accommodate different organizational needs and workstyles.

Incubator: Spaces designed to support startups and innovation-driven enterprises.

Research Laboratories: Advanced labs designed for various types of research, with for high-tech equipment.

Public Spaces: Large auditorium and halls are provided to host events within the centre or even from outside.

Hostel: Hostel facilities are provided for students or professionals coming from elsewhere to work on long term projects.

Integration of Open Spaces: Thoughtful landscaping that integrates with the built environment, promoting ecological balance and visual harmony. Provide outdoor seating, meeting areas, and recreational facilities to enhance user experience.

4.3.2 INDSTYRY SPECIFIC REQUIEMENTS

The design concept mainly revolves around connectivity between spaces and building. The site consists of 4 buildings;

A. PUBLIC SECTOR:

This building acts as an entrance plaza for the visitors. It consists of various public spaces such as auditorium, exhibition hall, library, conference hall etc.

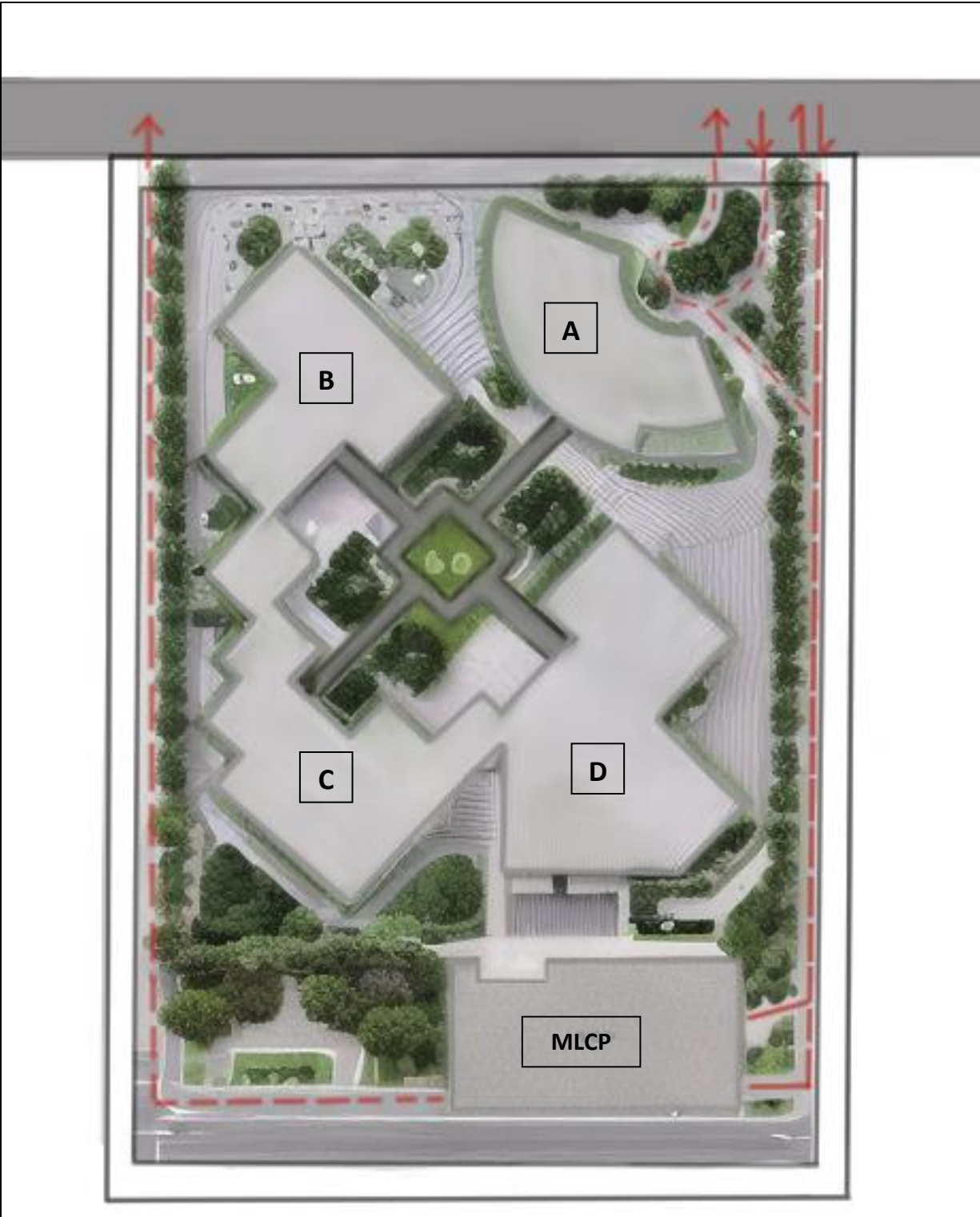


Figure 17: SITE PLAN

B. INFORMATION TECHNOLOGY (IT) SECTOR:

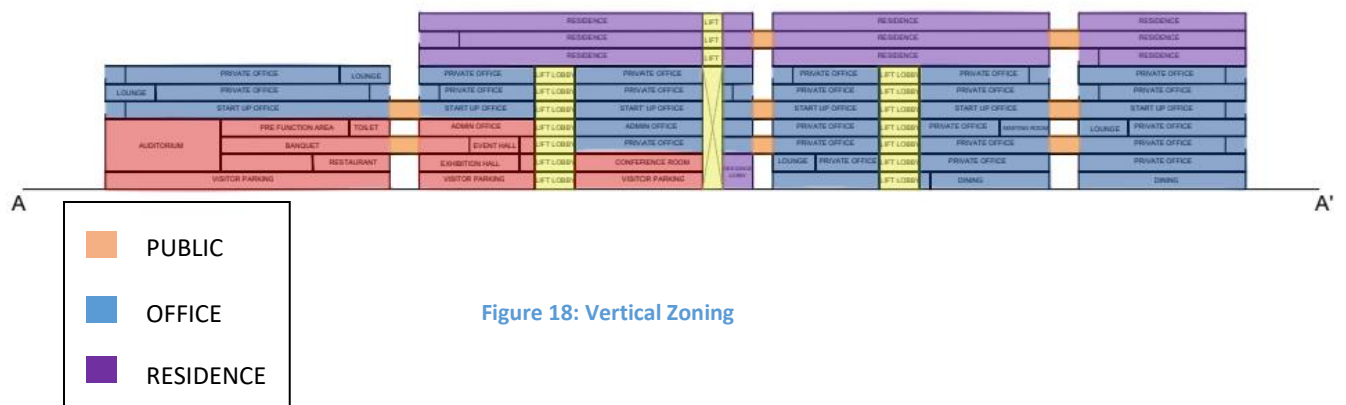
- × Data Centers: Design secure and efficient data centers with robust cooling and backup systems.
- × Innovation Labs: Flexible spaces equipped with the latest technology for software development, AI research, and cybersecurity.
- × Collaboration Spaces: Areas designed to foster teamwork, including open-plan offices and meeting rooms.

C. BIOTECHNOLOGY SECTOR:

- × Wet Labs: Specialized laboratories equipped with necessary safety and containment measures for biological research.
- × Clean Rooms: Controlled environments essential for sensitive experiments and pharmaceutical manufacturing.
- × Bioinformatics Facilities: Integration of IT infrastructure to support bioinformatics and computational biology.

D. MECHANICAL ENGINEERING SECTOR:

- × Workshops: Fully equipped workshops for prototyping, machining, and testing mechanical systems.
- × Testing Laboratories: Facilities designed for materials testing, fluid dynamics, and mechanical stress analysis.
- × Innovation Studios: Spaces that support design thinking and rapid prototyping with 3D printers and CNC machines.



4.4 DETAILED DRAWING

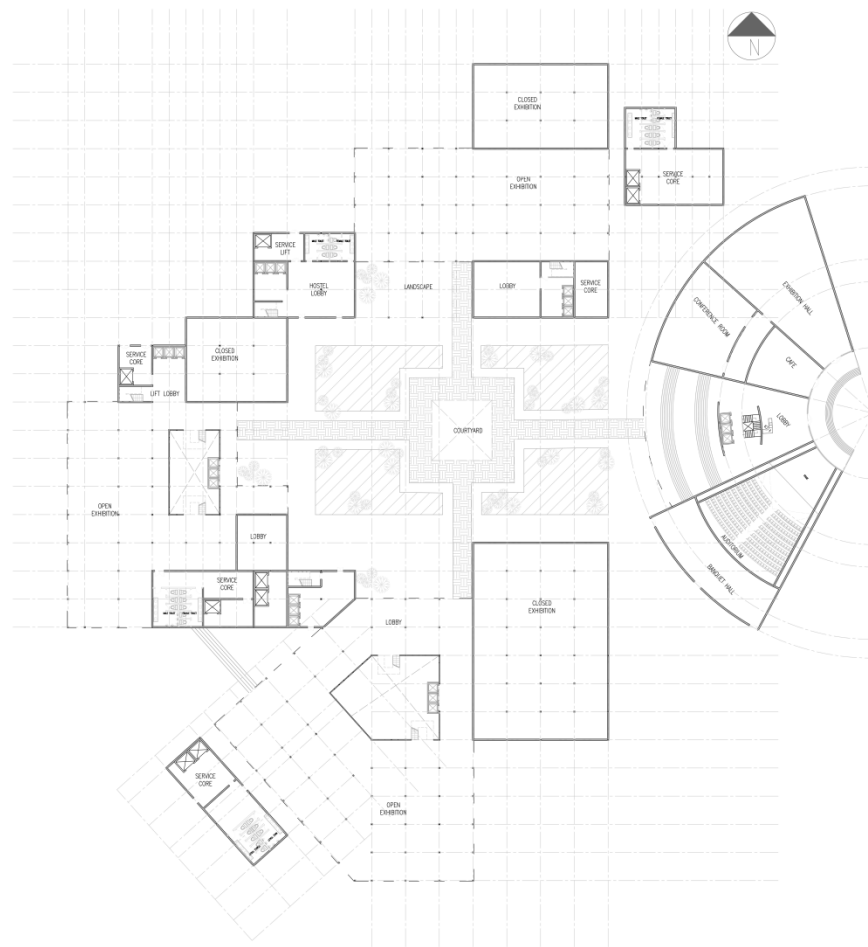


Figure 19: GROUND FLOOR PLAN

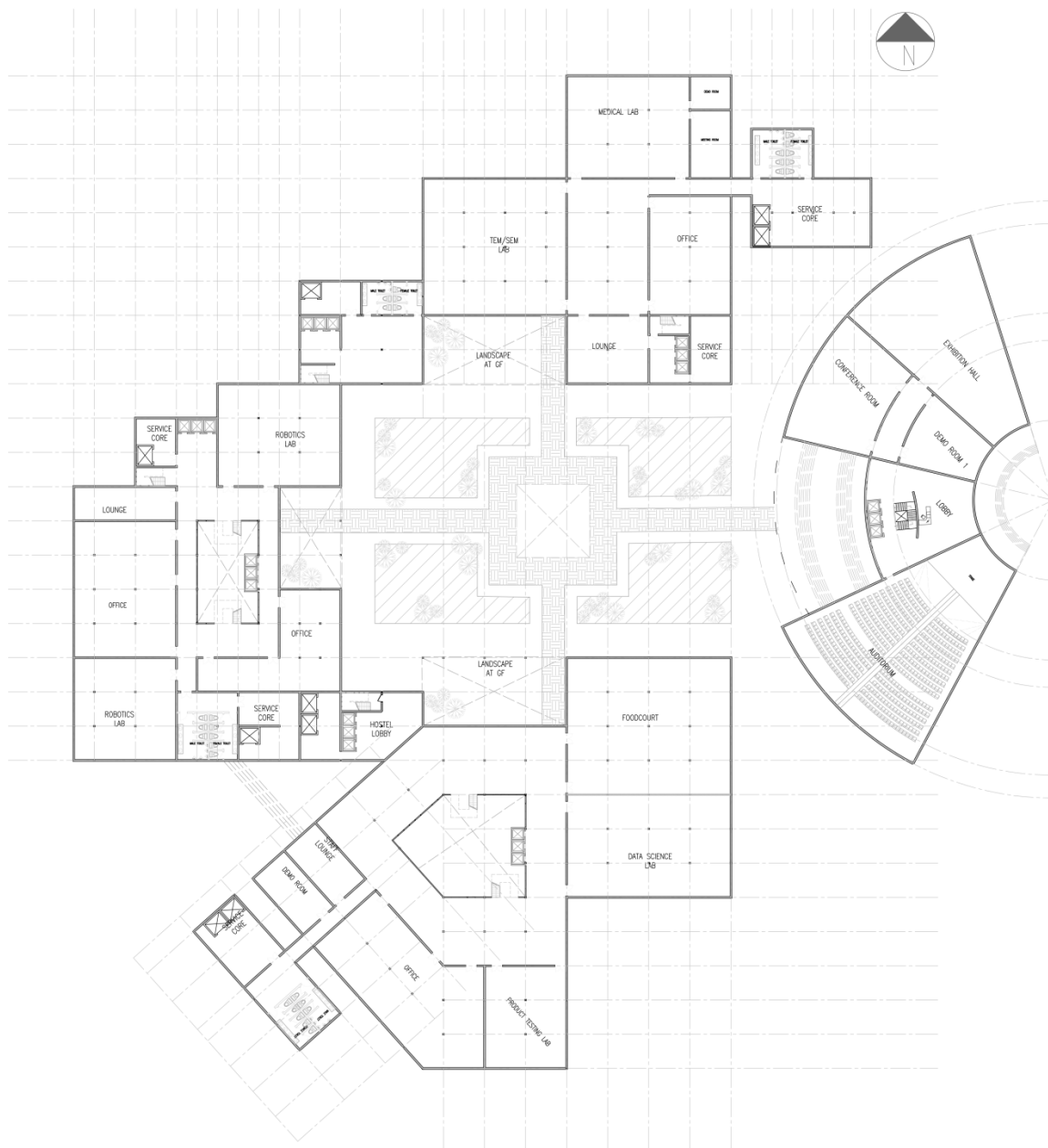


Figure 20: FIRST FLOOR PLAN

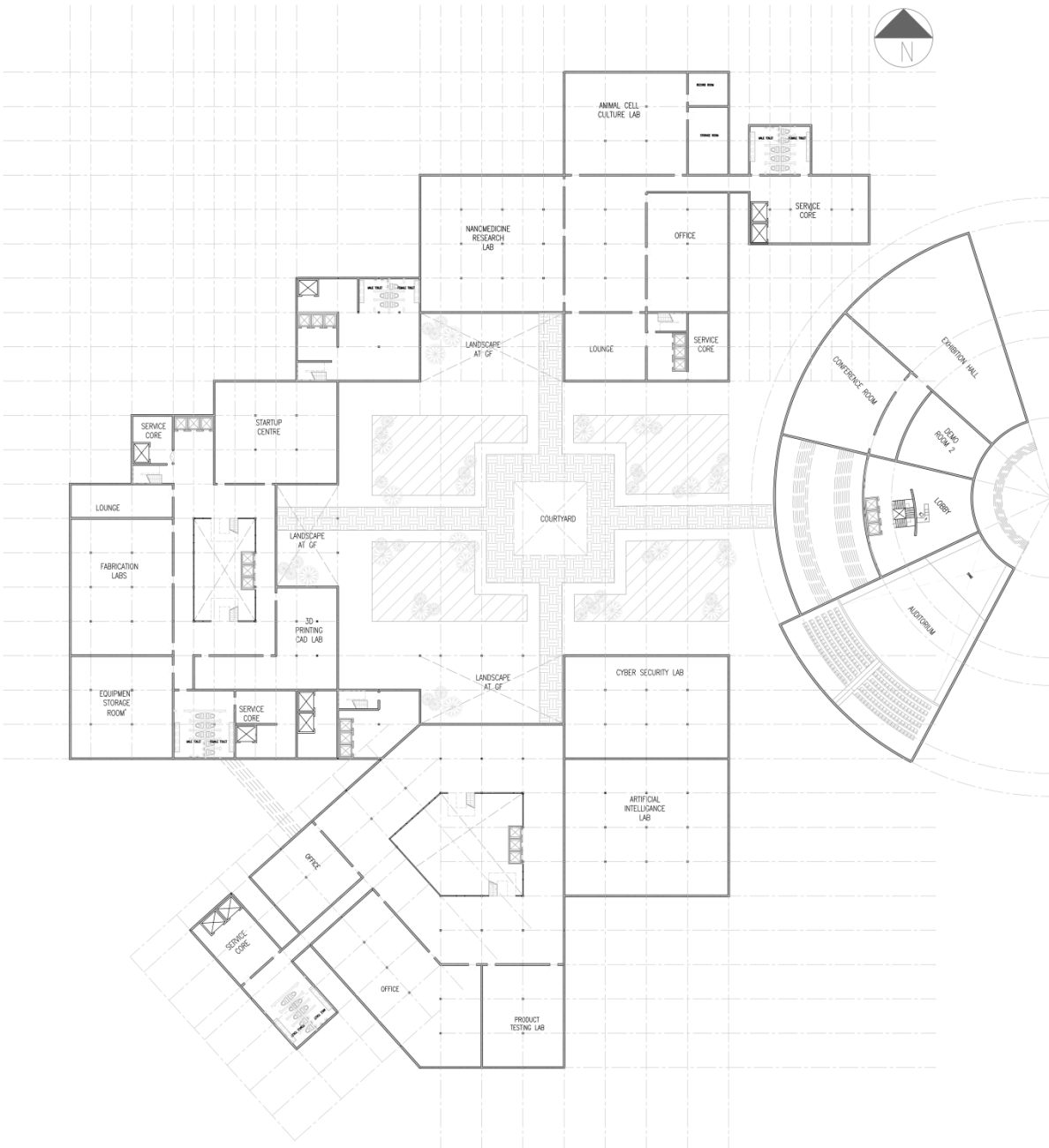


Figure 21: SECOND FLOOR PLAN

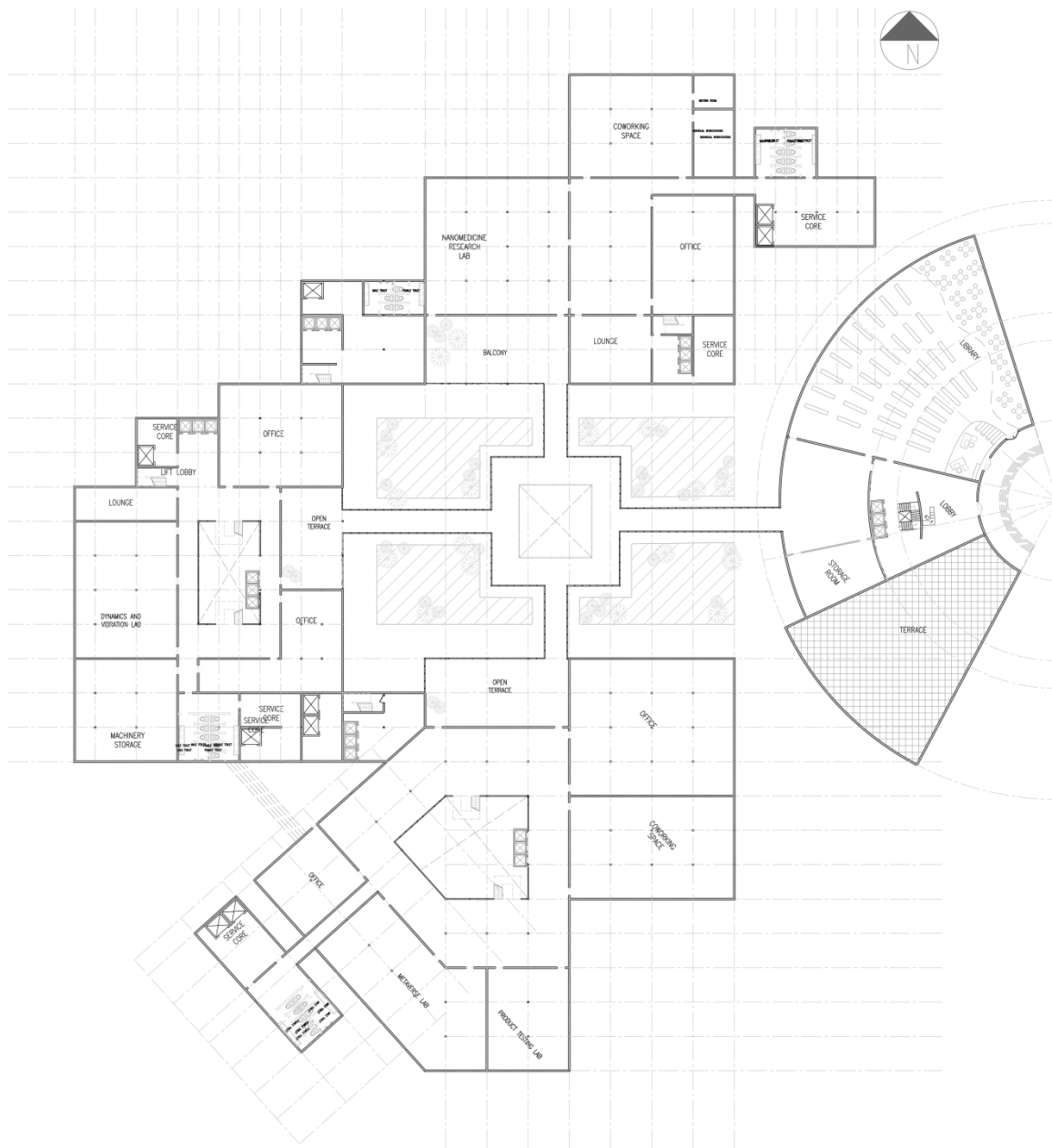


Figure 22: THIRD FLOOR PLAN

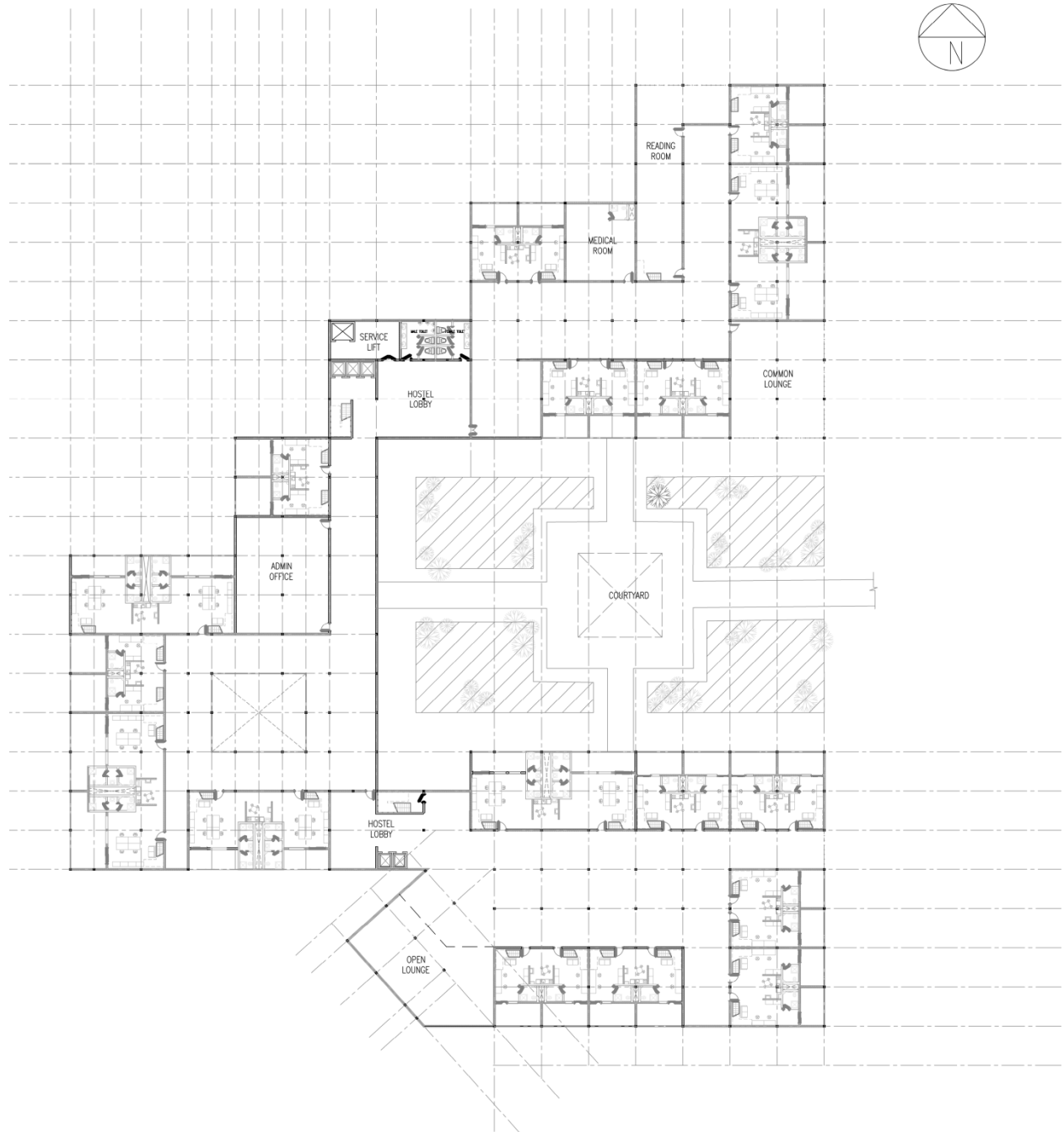


Figure 23: FOURTH FLOOR PLAN

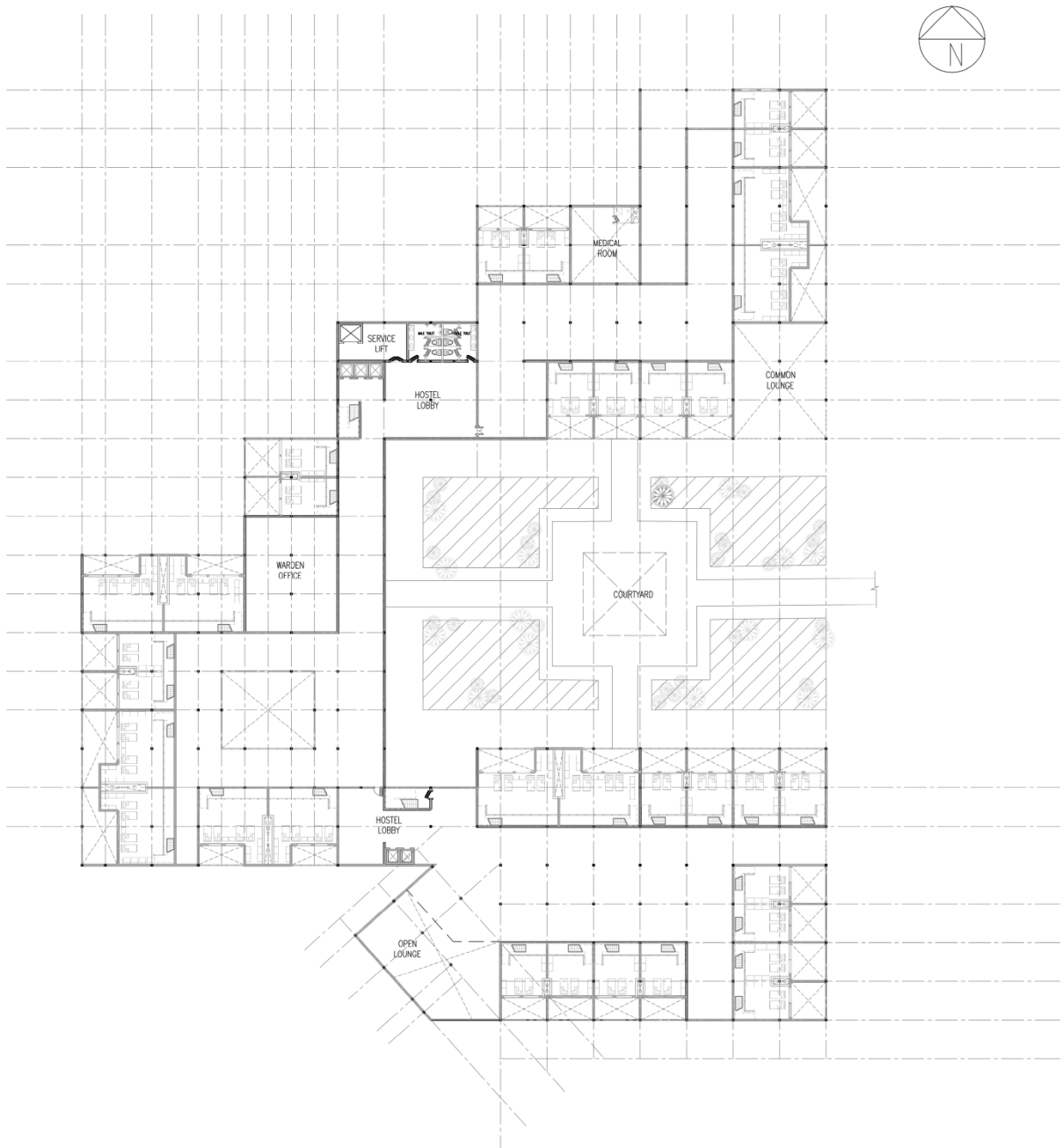


Figure 24: FIFTH FLOOR PLAN

CHAPTER 6

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