THESIS REPORT ON

"BUSINESS AND INNOVATION HUB, BENGALURU SIGNATURE BUSINESS PARK, BENGALURU"

A THESIS SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENT FOR THE DEGREE OF:

BACHELOR OF ARCHITECTURE

BY

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THESIS GUIDE

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I hereby recommend that the thesis entitled "BUSINESS AND INNOVATION HUB, BENGALURU SIGNATURE BUSINESS PARK, BENGALURU" under the supervision, is the bonafide work of the students and can be accepted as partial fulfilment of the requirement for the degree of Bachelor's degree in Architecture, School of Architecture & Planning, BBDU, Lucknow.

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ABSTRACT

In the evolving landscape of urban development, the integration of business, technology, and innovation ecosystems within city frameworks has become critical. This thesis explores the conceptualization and architectural design of a **Business and Innovation Hub** within the **Bengaluru Signature Business Park**, aiming to foster entrepreneurship, collaboration, and sustainable urban growth.

Located in India's leading tech-driven city, the proposed development is envisioned as a dynamic mixed-use environment that brings together corporate offices, innovation incubators, co-working spaces, training centres, lifestyle amenities, and smart infrastructure. The design focuses on enhancing productivity, adaptability, and user experience through the incorporation of **advanced digital technologies** such as Virtual Reality (VR), Augmented Reality (AR), AI, and IoT.

The thesis addresses spatial planning strategies that promote knowledge sharing and interaction while maintaining functional zoning and environmental responsiveness. Emphasis is placed on **sustainability**, aiming for **LEED Platinum certification**, through the use of green building practices, passive design strategies, and efficient resource management.

By bridging the gap between physical workspace and digital innovation, this project seeks to redefine the future of business environments in urban India, aligning architectural design with the needs of a knowledge-based, tech-enabled economy.

CHAPTER-1- INTRODUCTION

1.INTRODUCTION

1.1 OVERVIEW OF THE BUSINESS AND INNOVATION HUB

A Business and Innovation Hub is a dynamic, multifunctional space designed to stimulate entrepreneurship, foster innovation, and support economic growth. It brings together startups, established companies, research institutions, and investors within a collaborative ecosystem that encourages knowledge exchange and technological advancement. These hubs typically feature flexible office spaces, incubation and acceleration centres, R&D labs, co-working zones, and training facilities aimed at developing digital and entrepreneurial skills. Integrated with smart technologies such as AI, IoT, and AR/VR, they enhance user experience and operational efficiency. Emphasizing sustainability, these hubs often follow green building standards, making them not only technologically advanced but also environmentally responsible. By enabling innovation, collaboration, and skill development, Business and Innovation Hubs play a vital role in driving urban development and competitiveness in the digital economy.

FIGURE 1 BUSSINESS AND INNOVATION HUB

1.2 HISTORY OF BUSINESS AND INNOVATION HUBS

The concept of Business and Innovation Hubs has evolved over time in response to changing economic, technological, and social needs. Their roots can be traced back to the post-industrial era when cities began shifting from manufacturing-based economies to knowledge-based ones. In the late 20th century, the rise of **Silicon Valley** in the United States became a global benchmark, demonstrating the value of clustering startups, research institutions, and venture capital in one region. This model inspired the development of similar innovation districts and business incubators worldwide. During the 1990s and early 2000s, governments and private sectors began investing in science parks, tech parks, and innovation centres to stimulate regional economic growth and technological advancement. Over time, these evolved into more integrated Business and Innovation Hubs—spaces not only for business development but also for interdisciplinary collaboration, digital transformation, and sustainability. Today, such hubs

are central to urban regeneration projects, smart city initiatives, and national innovation strategies across the globe.

FIGURE 2 SILICON VALLEY

1.3 BACKGROUND OF THE STUDY

In the 21st century, global cities are rapidly transforming into knowledge economies driven by innovation, entrepreneurship, and digital technology. With increasing urbanization and the evolution of work environments, there is a growing demand for integrated spaces that support collaboration, research, and the incubation of new ideas. Traditional business districts are no longer sufficient to meet the dynamic needs of emerging industries and startups.

Bengaluru, often referred to as the "Silicon Valley of India," has established itself as a hub for technology, innovation, and entrepreneurship. However, despite its global prominence, the city faces challenges related to infrastructure, spatial inefficiencies, and the lack of cohesive ecosystems that foster seamless interaction between corporates, startups, research institutions, and the community.

The concept of a **Business and Innovation Hub** emerges as a response to these challenges — aiming to provide a multifunctional urban space where businesses, innovators, and creators can thrive in a digitally connected, sustainable, and future-ready environment. Located within the **Bengaluru Signature Business Park**, this project intends to integrate smart architecture, adaptive planning, and technological interventions such as VR/AR, AI, and IoT to enhance user experience, operational efficiency, and long-term viability.

This study is rooted in the belief that architecture plays a crucial role in shaping innovation ecosystems, and through intelligent design, such hubs can catalyze economic growth, urban regeneration, and sustainable development.

1.4 LEADING BUSINESS AND INNOVATION HUBS ACROSS THE GLOBE

Globally, several Business and Innovation Hubs drive entrepreneurship and technological growth. Silicon Valley leads with tech giants and research institutions like Stanford. Shenzhen is a high-tech powerhouse with firms like Huawei and Tencent. Bengaluru thrives as India's tech hub, supported by companies like Infosys and IISc. Tel Aviv excels in cybersecurity and biotech, while Berlin fosters startups in fintech and digital media. London combines global connectivity with strengths in AI and finance. Singapore stands out for urban tech and pro-business policies. The Toronto-Waterloo Corridor is a major AI and startup hub backed by top research institutions.

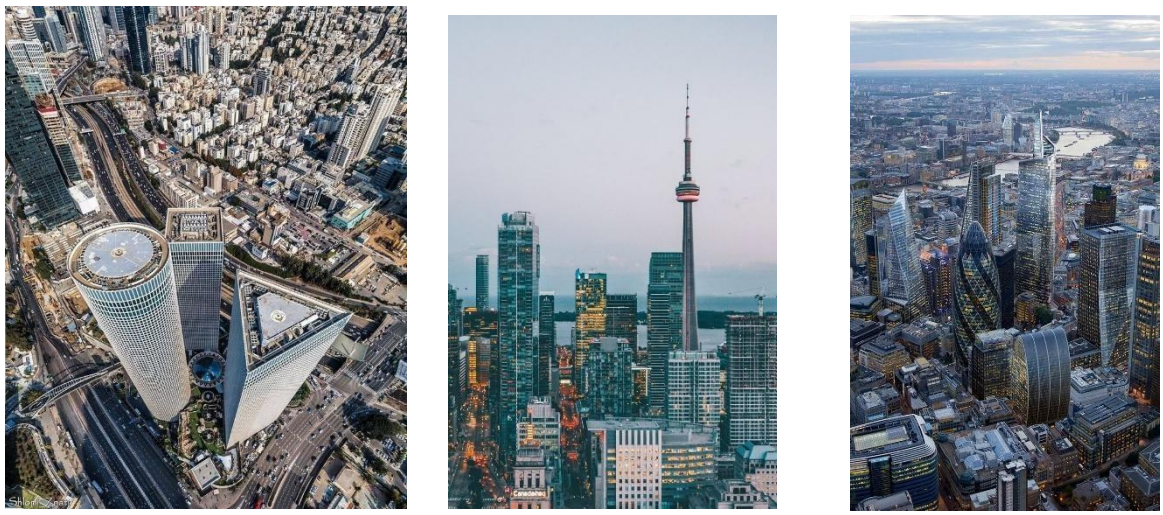


FIGURE 3LEADING BUSINESS AND INNOVATION HUBS ACROSS THE GLOBE

1.5 NEED OF AN INNOVATION AND BUSINESS HUB

With the rise of technology-driven industries, there is an increasing demand for Innovation and Business Hubs that can support startups, enterprises, and research centers. Traditional business environments often fall short in offering the flexibility and digital integration needed for emerging sectors like AI, ML, IoT, and immersive technologies. This project addresses that gap by incorporating Augmented Reality (AR) and Virtual Reality (VR) into architectural design. Through enhanced visualization and real-time spatial simulations, AR and VR reduce design errors and improve collaboration. The hub will feature adaptive, future-ready spaces tailored to evolving business needs, fostering innovation and digital transformation. By promoting efficient space utilization through interactive design tools, it will also ensure sustainability and functionality. Positioned in Bangalore, the project aims to reinforce the city's status as a global innovation center and set a new benchmark for smart, immersive, and innovation-driven infrastructure.

6. REASON FOR SELECTION OF TOPIC

The selection of "Business and Innovation Hub, Bengaluru Signature Business Park" as the focus of this thesis reflects a strong interest in how architecture can shape the future of work, innovation, and urban growth. As digital technologies and business dynamics rapidly evolve, there is a growing need for integrated, future-ready spaces that foster collaboration, creativity, and entrepreneurship.

Bengaluru, a global tech hub, offers a unique context where startups, corporates, and research institutions converge, creating opportunities to rethink conventional office environments. The city's expansion calls for smart, sustainable infrastructure that supports economic activity while enhancing user experience and environmental performance.

This topic also complements my academic exploration of Virtual Reality (VR), Augmented Reality (AR), and digital technologies in architecture, allowing me to translate research into a practical, design-driven solution. The goal is to develop a multifunctional hub that embodies innovation in both form and function, setting a benchmark for future business parks in India.

7. AIM

The project aims to design a technology-driven Innovation and Business Hub that integrates Augmented Reality (AR) and Virtual Reality (VR) to enhance visualization, collaboration, and user experience in architectural design. By leveraging immersive technologies, the project seeks to create a flexible, interactive, and future-ready ecosystem that supports startups, enterprises, and research initiatives.

This hub will serve as a catalyst for innovation and digital transformation, optimizing space utilization, decision-making, and stakeholder engagement through AR/VR-enabled design processes. The ultimate goal is to establish a smart, adaptive, and innovation-focused business environment, setting a new benchmark for entrepreneurial and technological ecosystems in urban spaces.

8. OBJECTIVES

- **Integrate AR and VR in Architectural Design** – Enhance spatial visualization, real-time modifications, and immersive user interactions.
- **Create a Flexible and Adaptive Business Environment** – Design dynamic spaces that cater to evolving business needs, startups, and enterprises.
- **Enhance Collaboration and Stakeholder Engagement** – Utilize interactive design tools to improve decision-making and user experience.
- **Optimize Space Utilization and Functionality** – Develop efficient layouts that maximize productivity and sustainability.
- **Foster Innovation and Digital Transformation** – Establish a hub that supports cutting-edge technologies, research, and entrepreneurship.
- **Set a Benchmark for Future Business Ecosystems** – Develop a model for smart, immersive, and technology-enabled business hubs.

1.9 SCOPE

- **Technological Integration** – Incorporates **AR and VR** to enhance architectural visualization, interactive design processes, and user experience.
- **Flexible & Adaptive Spaces** – Designs dynamic environments that cater to **startups, enterprises, and research-driven industries**.
- **Enhanced Collaboration** – Utilizes digital tools to improve communication between stakeholders, architects, and business professionals.
- **Smart & Sustainable Design** – Focuses on efficient space utilization, **energy-efficient solutions, and future-ready infrastructure**.
- **Application Across Industries** – Supports diverse sectors including **technology, business incubation, research, and digital transformation**.
- **Scalability & Replicability** – Establishes a design model that can be adapted and implemented in various urban and business contexts.

1.10 LIMITATIONS

- **Technological Dependency** – The integration of AR and VR requires **advanced digital infrastructure**, which may lead to higher initial costs.
- **Adoption Challenges** – Businesses and stakeholders may face a **learning curve** in adapting to immersive technologies for collaboration and decision-making.
- **Cost Constraints** – Implementing **high-end AR/VR solutions** and smart infrastructure may not be feasible for all business models.
- **Maintenance & Upgradation** – Continuous **technological updates and system maintenance** are necessary to keep the hub relevant and efficient.
- **Data Security & Privacy Concerns** – The use of **AI, IoT, and immersive technologies** raises concerns about **data protection and cybersecurity**.
- **Space & Infrastructure Limitations** – Physical constraints may impact the full implementation of **adaptive, modular, and interactive spaces**.

CHAPTER-2
RESEARCH

2. BUSINESS AND INNOVATION HUB PLANNING

1. INTRODUCTION

Planning a Business and Innovation Hub requires a strategic, multidisciplinary approach combining spatial design, technology, sustainability, and economic goals. It starts with selecting a well-connected urban or semi-urban location with growth potential. The master plan includes flexible spaces like offices, co-working zones, labs, training centers, and lifestyle amenities, designed to foster collaboration and innovation. Smart infrastructure with AI, IoT, and AR/VR integration ensures a future-ready environment, while green building practices support sustainability targets like LEED or GRIHA. Emphasis is placed on accessibility, public transport, green spaces, and walkability. Collaboration with government, academia, and industry ensures alignment with regional development goals, creating an inclusive ecosystem that drives entrepreneurship, R&D, and urban growth.

2. KEY COMPONENTS

The key components of a Business and Innovation Hub are thoughtfully designed to foster innovation, entrepreneurship, collaboration, and sustainable growth. Central to the hub are flexible office and workspaces that cater to startups, SMEs, and established firms through private offices, co-working zones, and shared meeting areas. Incubation and acceleration centres offer crucial support to early-stage ventures, including mentorship, funding access, and business development services. R&D labs equipped with advanced tools facilitate experimentation and innovation, while training and skill development centres focus on upskilling individuals in emerging technologies and industry-relevant fields. Collaboration zones such as lounges, cafes, event halls, and auditoriums promote networking and knowledge exchange. The hub also integrates smart technology infrastructure, including high-speed internet, AR/VR, AI, IoT, and data analytics, to enhance operations and user experience. Support infrastructure like cafeterias, recreation areas, childcare, logistics, and administrative services ensures operational efficiency. Sustainability is addressed through green roofs, solar panels, rainwater harvesting, and energy-efficient systems, aligning with certifications like LEED or GRIHA. Additionally, residential and lifestyle amenities—including housing, fitness centers, retail, and wellness services—create a live-work-play environment. Governance and policy support from public or private bodies further encourages innovation, investment, and long-term success.

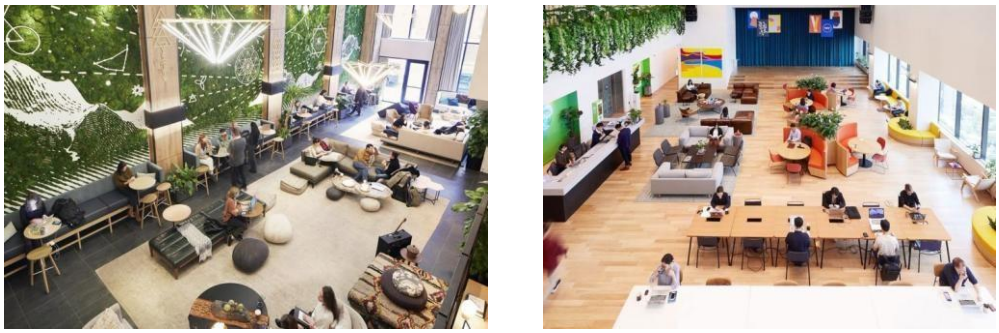


FIGURE 4 COWORKING SPACE

3. SITE SELECTION

Site selection for a Business and Innovation Hub is a strategic decision that significantly influences its success and long-term viability. The site should offer excellent connectivity to major transportation networks and be easily accessible for businesses, employees, and visitors. Proximity to academic institutions and a skilled talent pool is essential to foster research collaborations and innovation. The location should align with the region's economic strengths and offer scope for future expansion. Availability of essential infrastructure such as power, water, internet, and smart utilities is crucial, along with access to housing, healthcare, and lifestyle amenities to support a vibrant live–work–play environment. Environmental suitability, regulatory ease, safety, and community support are equally important, ensuring that the hub integrates seamlessly into the urban fabric while promoting sustainable and inclusive development.

4. LAND-USE PLANNING

Land use planning for a Business and Innovation Hub involves the strategic allocation of space to create a balanced, functional, and integrated environment that supports innovation, collaboration, and sustainable growth. The site is typically divided into distinct zones such as commercial areas for office spaces, incubation centres, and research labs; institutional areas for training and skill development; and mixed-use zones for co-working spaces, retail, hospitality, and recreational activities. Residential zones may be incorporated to support a live–work–play model, enhancing convenience for employees and entrepreneurs. Open green spaces, plazas, and pedestrian pathways are included to encourage social interaction and environmental sustainability. Adequate provision is made for infrastructure facilities like power stations, water treatment plants, parking, and waste management systems. The planning ensures seamless connectivity between zones, flexibility for future expansion, and integration of smart and green technologies. The goal is to create a cohesive, adaptive, and vibrant urban ecosystem that promotes business growth, knowledge exchange, and community well-being.

FIGURE 5 VARIOUS ZONES

5. FORECAST

Typically, the forecast is based on:

- **Total Occupant Load**
  Calculate expected occupants using the built-up area and typical space norms (e.g., 1 person per 10–15 sq.m for office spaces).
- **User Categories**
  Break down into employees, visitors, trainees, and support staff to understand varying arrival and departure patterns.
- **Peak Hours**
  Peak demand usually occurs during morning arrival (8–10 AM), lunch hours, and evening departure (5–7 PM), as well as during special events or training sessions.
- **Visitor Flow**
  Consider daily visitors, clients, and partners who may have staggered timings different from employees.
- **Facility Usage Patterns**
  Cafeterias, meeting rooms, parking, and public spaces may have different peak times requiring separate analysis.
- **Seasonal and Weekly Variations**
  Adjust forecasts for weekdays, weekends, holidays, and special occasions that affect occupancy.

3. SERVICES REQUIREMENT AND PLANNING

1. VEHICULAR PARKING

Vehicle parking in a Business and Innovation Hub should efficiently serve employees, visitors, and service vehicles while minimizing congestion. This involves a mix of surface lots, multi-level structures, EV and two-wheeler zones, and bike parking. Strategically located for easy access, parking areas should integrate with pedestrian paths and ensure smooth traffic flow. Smart systems for real-time availability and automated payments improve convenience, while sustainable features like permeable pavements and green landscaping support environmental goals. Overall, effective parking planning enhances functionality, safety, and user experience.

1. PARKING STANDARDS

1. **Car Parking**

- **1 parking space per 100–150 sq.m of office space** (net leasable area).
- For high-density areas or near public transport, this ratio can be reduced.
- Include dedicated spaces for visitors (about 10–15% of total car parking).

2. **Two-Wheeler Parking**

- **1 parking space per 20–30 sq.m of office space** or based on expected employee usage.
- Separate secure and covered areas recommended.

3. **Electric Vehicle (EV) Charging Stations**

- Minimum **5–10% of total car parking spaces** should be equipped with EV charging points, with scope for future expansion.

4. **Disabled Parking**

- Minimum **2–5% of total parking spaces** should be reserved for differently-abled users, located near building entrances.

5. **Bicycle Parking**

- Provision of **1 bicycle parking space per 10 car parking spaces** or based on local cycling culture.

6. **Service and Delivery Vehicle Parking**

- Dedicated loading/unloading bays should be planned, typically **1 bay per 1,000–2,000 sq.m** of commercial space.

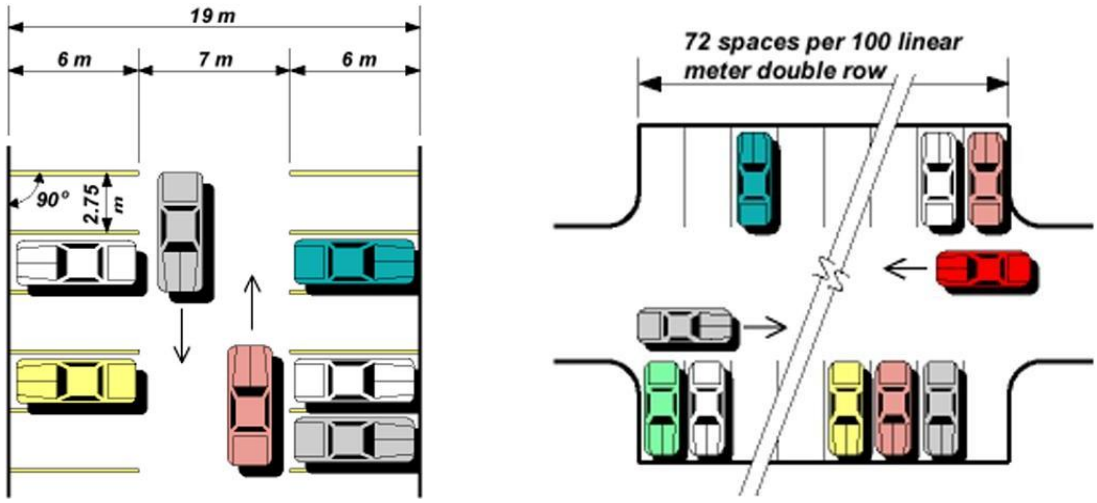


FIGURE 6 90 DEGREE PARKING ANGLE

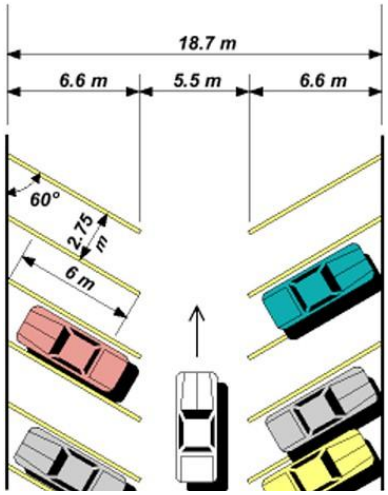


FIGURE 7 60 DEGREE PARKING ANGLE

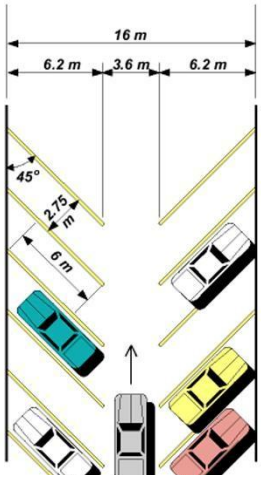


FIGURE 9 45 DEGREE PARKING ANGLE

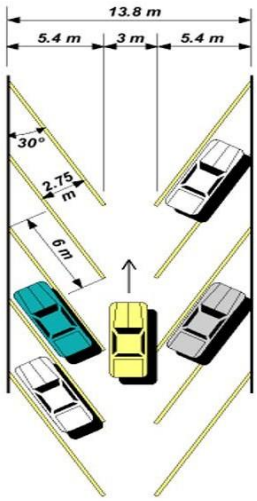


FIGURE 8 30 DEGREE PARKING ANGLE

3.2 FIRE STANDARDS

According to the National Building Code of India (NBC) 2016, office buildings classified under Group B (Business Occupancy) must follow specific fire safety standards. Structural elements should have fire resistance ratings as per NBC guidelines, and fire compartments must limit fire spread in areas exceeding 2,500 sq.m. Buildings taller than 15 meters or with large occupant loads require at least two separate staircases for emergency evacuation, with stair widths starting at 1.2 meters and increasing based on occupant numbers. Automatic fire detection and alarm systems are mandatory for buildings over 15 meters or with more than 100 occupants, along with manual alarm call points near exits and corridors. Automatic sprinklers are required in buildings taller than 15 meters or with floor areas exceeding 2,500 sq.m. Fire extinguishers should be placed at intervals of one per 200 sq.m, and fire hose reels must be provided on every floor near staircases or exits. Fire service access roads must be at least 6 meters wide, with external fire hydrants connected to water supply. Emergency lighting and luminous exit signs are essential along escape routes. High-rise buildings may need refuge floors designed as per NBC standards, and regular fire drills and training for occupants and fire wardens are mandatory.

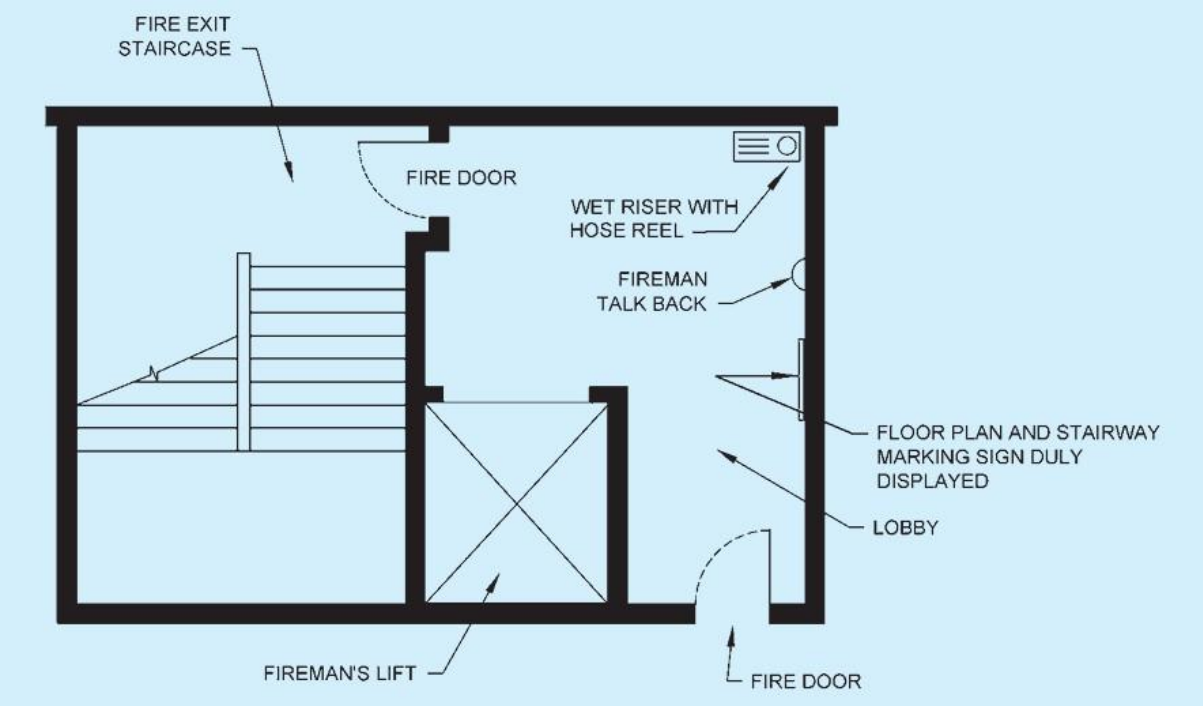


FIGURE 10 TYPICAL FIRE FIGHTING SHAFT

3.3 VERTICAL CIRCULATION SYSTEMS

Vertical circulation in a Business and Innovation Hub includes staircases, lifts, and escalators to ensure safe, efficient, and accessible movement. Staircases serve as primary and emergency exits, designed to be wide, well-lit, slip-resistant, and fire-rated. Lifts provide convenient access for all users, including fire and service lifts with safety features. Escalators aid flow in public or retail areas but don't replace stairs or lifts in emergencies. All elements follow accessibility standards and are strategically placed to optimize traffic and safety.

3.3.1 LIFTS

 Vertical circulation in a Business and Innovation Hub requires enough lifts to handle peak occupant loads comfortably, typically one lift per 200–250 occupants. Lift capacities usually range from 8 to 15 persons, or about 630–1,000 kg, depending on building size and usage. There are passenger lifts for employees and visitors, service lifts for goods and maintenance to avoid disrupting passenger flow, and fire lifts located in fire-rated shafts for emergencies. Lifts must be accessible for differently-abled users, featuring braille buttons, audio announcements, and wider doors. Fire lifts should have fire-rated shafts and independent power supply, automatically recalling to the ground floor and shutting down in fire events. Modern lifts use destination control systems to reduce wait times and include emergency communication. All lifts must comply with national standards like IS 14665 and local building regulations regarding safety, performance, and energy efficiency

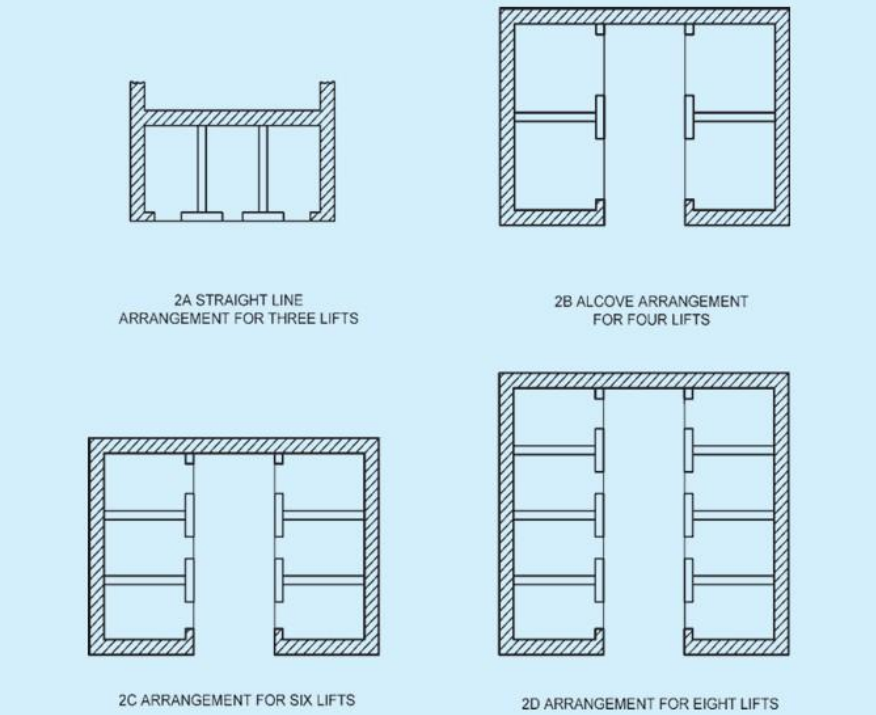


FIGURE 11TYPICAL ARRANGEMENT OF LIFTS

3.3.2 STAIRCASE

Buildings over 15 meters tall or with large occupant loads must have at least two staircases for safe emergency escape. Staircase widths start at a minimum clear width of 1.2 meters for up to 50 occupants, increasing by 0.3 meters for every additional 50 people, typically ranging between 1.2 to 2.0 meters. The maximum riser height is 190 mm, and the minimum tread depth is 250 mm for safe stepping. A minimum headroom clearance of 2.1 meters is required. Handrails must be on both sides if the staircase is wider than 1 meter, with a height between 900 mm and 1000 mm from the stair nosing. Staircases used for escape must be enclosed in fire-resistant shafts with fire-rated, self-closing doors. Landings should be provided after every 12 steps or 1.8 meters of vertical rise, with landing widths matching the staircase width. Adequate lighting, including emergency lighting, and clear exit signage are mandatory for safe evacuation.

4. LIGHTING AND NATURAL VENTILATION

1. LIGHTING STANDARDS

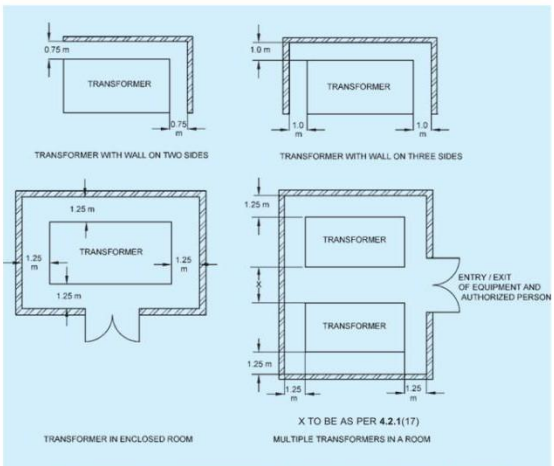
To ensure visual comfort and energy efficiency, at least 10% of the floor area must be provided as openable windows or other openings for natural daylight, evenly distributed to achieve uniform lighting in occupied spaces. Artificial lighting should maintain a minimum illumination of 300 lux in office areas, meeting rooms, and workspaces. Emergency lighting is mandatory in exits, staircases, and critical zones to ensure visibility during power outages. To prevent discomfort from excessive sunlight, glare control measures such as blinds or shading devices must be implemented.

2. NATURAL VENTILATION STANDARDS

To maintain indoor air quality and occupant comfort, ventilation openings should cover at least 5% (1/20th) of the floor area, with strategic placement to enable cross-ventilation. In spaces where natural ventilation isn't feasible, mechanical systems must provide 6–12 air changes per hour, especially in office environments. These systems should effectively remove pollutants and regulate temperature and humidity to ensure a healthy and comfortable indoor atmosphere.

3.5 ELECTRICAL AND ALLIED INSTALLATIONS

Electrical installations in a Business and Innovation Hub must follow IS standards to ensure safety, efficiency, and reliability. All cables, conduits, and equipment should be IS-certified, with concealed wiring and proper insulation to reduce fire risk. Earthing systems must comply with IS 3043, while lightning protection should follow IS 2309. Separate distribution boards are required for lighting, HVAC, elevators, and fire systems, using MCBs, ELCBs, and RCCBs for fault protection. Emergency power via UPS and generators should support critical systems like lifts, lighting, and alarms. Energy-efficient lighting, preferably LED with motion and daylight sensors, should be used throughout. Fire detection systems must include smoke detectors, fire-rated wiring, and centralized monitoring. Structured cabling for communication and data (as per IS 11900) supports internet, CCTV, and automation. Regular testing and maintenance ensure long-term safety and performance.



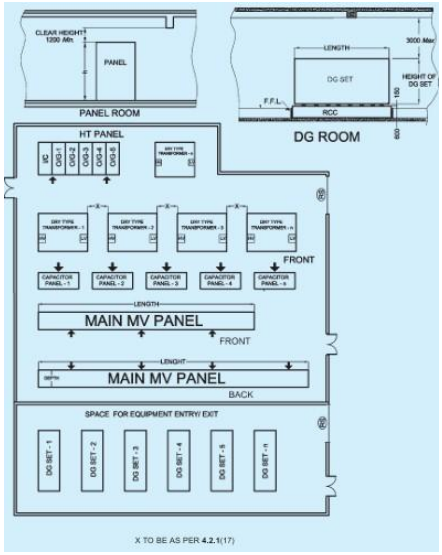


FIGURE 12 TRANSFORMER AND DG SET

6. HVAC AND MECHANICAL VENTILATION

Air conditioning and ventilation systems in a Business and Innovation Hub should maintain indoor temperatures between 22°C–26°C, using energy-efficient equipment per ECBC norms. Systems must include zoning and controls for optimal performance. Mechanical ventilation should supply 8–10 L/s of fresh air per person and meet IS 9669 standards, ensuring good air quality and pollutant removal. Heating, where needed, must be safe and well-ventilated. Use of HVAC filters, ERVs/HRVs, and programmable thermostats enhances efficiency and sustainability. Regular maintenance and adherence to fire safety norms are essential to prevent health and fire risks.

7. ACOUSTICS, SOUND INSULATION AND NOISE CONTROL

Acoustic design in a Business and Innovation Hub ensures comfortable, noise-controlled environments. Interior spaces like offices and conference rooms require sound-absorbing materials (e.g., acoustic panels, ceiling tiles, carpets) to reduce echo and enhance clarity. Partitions should have an STC rating of 45–55, and double-glazed windows help block external noise. Mechanical systems must be isolated to maintain noise levels below 45 dB(A) in workspaces. Outdoor noise can be mitigated using buffer zones and landscaping. Compliance with regulatory limits—55 dB(A) by day, 45 dB(A) by night—is essential. Vibration control protects sensitive equipment and user comfort.

8. INFORMATION AND COMMUNICATION ENABLED INSTALLATIONS

A structured cabling system ensures reliable, high-speed communication in a Business and Innovation Hub. It includes standardized Cat 6 or higher cabling and fiber optics for backbone connectivity, with power and data lines properly segregated. Scalable network infrastructure (routers, switches, servers) supports high bandwidth with redundancy. Wi-Fi access points ensure seamless coverage, supporting 5G and secure protocols. Integrated security systems (CCTV, access control) are monitored centrally. Building automation uses BACnet or KNX for centralized control. UPS and surge protection secure critical equipment. Compliance with IS 11801 and regular testing ensures system performance and safety.

9. WATER SUPPLY

Water demand for office buildings is calculated at a minimum of 45 liters per capita per day (lpcd), with additional allowances for cafeterias, landscaping, HVAC, and sanitation. Systems must handle peak hourly demand and include emergency storage. Dual sources (e.g., municipal and borewell/recycled) are preferred. Storage tanks (overhead and underground) should cover at least one day's needs, with separate provisions for potable, non-potable, and firefighting water. IS-certified pipes (e.g., CPVC, HDPE) must be used with proper pressure zoning and color coding. Rainwater harvesting is mandatory. Conservation measures include low-flow fixtures, dual-flush systems, greywater reuse, and water metering. Hygiene is maintained through backflow prevention and regular maintenance.

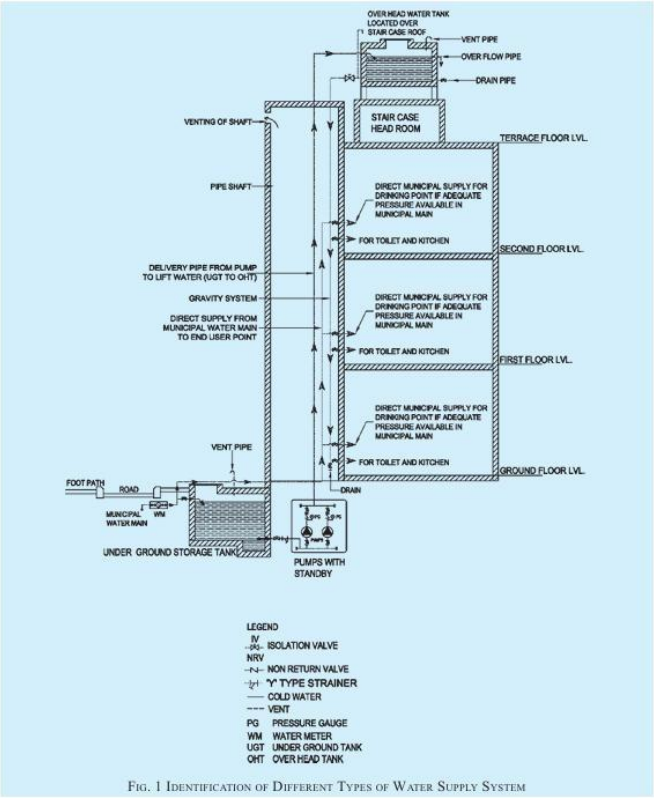


FIG. 1 IDENTIFICATION OF DIFFERENT TYPES OF WATER SUPPLY SYSTEM

FIGURE 13DIFFERENT TYPES OF WATER SUPPLY SYSTEMS

3.10DRAINAGE AND SANITATION

Sanitary provisions must include a minimum of 1 water closet per 25 males and 1 per 15 females, with separate facilities for males, females, and differently abled as per Harmonised Guidelines 2021. Drainage systems must segregate blackwater and greywater, using vented traps and maintaining a pipe slope of 1:40 to 1:60 for self-cleansing. IS-marked PVC/HDPE/cast iron pipes, airtight manholes, and sealed joints are required. Vent pipes (≥50 mm dia) must be installed for gas release, with accessible cleanouts and chambers. An on-site STP is mandatory for large projects, enabling reuse of treated water. Separate stormwater drains with proper slopes and grating, along with rainwater harvesting, ensure sustainability and flood control.

Table 1 Office Building
(*Clause* 4.2.5.1)

Sl No.	Fixtures	Public Toilets		Staff Toilets	
		Males	Females	Males	Females
(1)	(2)	(3)	(4)	(5)	(6)
	Executive Rooms and Conference Halls in Office Buildings				
i)	Toilet suite comprising one WC, one wash basin (with optional shower stall if building is used round the clock at user's option)	Unit could be common for male/female or separate depending on the number of user of each facility		For individual officer rooms	
	Pantry optional as per user requirement				
	Main Office Toilets for Staff and Visitors				
ii)	Water closets	*See* Note		1 per 25	1 per 15
iii)	Ablution tap with each water closet	← 1 in each water closet →			
iv)	Urinals	*See* Note	—	Nil up to 6 1 for 7 to 20 2 for 21 to 45 3 for 46 to 70 4 for 71 to 100 From 101 to 200, add @ 3% For over 200, add @ 2.5%	—
v)	Wash basins	*See* Note		1 per 25	1 per 25
vi)	Drinking water fountain	*See* Note		1 per 100	1 per 100
vii)	Cleaner's sink	← 1 per floor →			

NOTE — Staff and public toilet utilities are generally common in office buildings. Where public toilets are to be provided independently, similar requirements as that of staff toilet may be provided.

3.11SOLID WASTE MANAGEMENT

Waste Segregation at Source must be implemented with mandatory classification into biodegradable, non-biodegradable, recyclable, hazardous, and e-waste. Color-coded bins are to be used: Green for biodegradable, Blue for recyclable, and Red/Yellow for hazardous or e-waste. Daily waste must be collected from all levels and transported to centralized, rodent-proof waste rooms with ventilation and washable surfaces. Biodegradable waste should be treated on-site through composting or biogas, while dry waste is to be compacted and sent for recycling. Hazardous and e-waste must be stored separately and disposed of via authorized recyclers, maintaining disposal records per E-Waste (Management) Rules. Infrastructure must include designated waste collection rooms as per NBC Part 9, located near service cores or basements, with fire safety and sanitation features. Regular awareness training and digital monitoring of waste management practices ensure long-term compliance and efficiency.

FIGURE 14 COLOUR CODING OF DUSTBINS

3.12LANDSCAPE PLANNING

Green Cover and Open Space should comprise a minimum of 20–25% soft landscaping, such as lawns, gardens, and green buffers, with at least 10–15% tree cover using native, drought-resistant species to promote biodiversity and reduce upkeep. Zoning of landscaped areas should include entry plazas, courtyards, green roofs, buffer zones, and recreational spaces, using vegetation as noise and air pollution barriers. Emphasize sustainable practices like rain gardens, bioswales, permeable paving, xeriscaping, and drip irrigation to manage stormwater and conserve water. Hardscaped elements must incorporate accessible pathways, shaded resting spots, and ramps, using heat-reflective, non-toxic materials. Outdoor areas should feature solar-powered lighting and durable, ergonomic furniture. Landscaping must be integrated with building design to improve the microclimate through shading and evapotranspiration, while also encouraging outdoor engagement and social interaction.

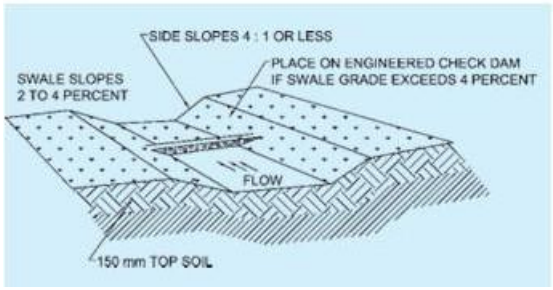


FIGURE 15 GRASS SWALE

3.13SIGNS AND OUTDOOR DISPLAY

Signage within buildings and campuses should include Identification Signs (building names, departments), Directional Signs (routes, exits, parking), Information Signs (maps, notices), and Regulatory/Safety Signs (fire exits, accessibility, no smoking). Placement must ensure clear visibility, correct height, high contrast, and non-obstructive positioning. Signs should be LED or solar-illuminated for night use, avoiding glare. Materials must be durable and weather-resistant (ACP, acrylic, metal), with legible typefaces and IS-compliant colors and symbols (e.g., IS 9457). Wall-mounted signs must not project more than 1 meter and should stay within 15% of façade area; freestanding hoardings must follow local bye-laws on size and height. Signage must support universal accessibility through tactile and Braille signs in key areas, per the Harmonised Guidelines. All signage must be structurally stable, resistant to wind loads, seismic events, and fire, and securely fixed to prevent hazards.

3.14SUSTAINABILITY AND GREEN BUILDING FEATURES

Design must prioritize **Energy Efficiency** through LED lighting, energy-efficient HVAC, motion sensors, BMS, and integration of **renewable energy** such as rooftop solar panels and solar water heaters. Buildings should incorporate **high-performance glazing** and insulation to reduce heat gain.**Water Conservation** measures include rainwater harvesting, low-flow fixtures, dual plumbing, and STPs with reuse of treated water. **Sustainable Site Planning** involves optimal building orientation, green roofs, native landscaping, permeable paving, and bioswales for stormwater management.**Waste Management** must ensure source segregation, composting of organic waste, recycling of C&D waste, and safe disposal of hazardous and e-waste.To enhance **Indoor Environmental Quality**, use low-VOC materials, maximize daylighting and ventilation, and provide green courtyards and wellness spaces. **Smart Integration** with IoT systems, smart meters, and AI-based monitoring enhances operational efficiency.Promote **Mobility and Accessibility** with EV charging stations, bicycle facilities, public transport access, and universal design for inclusivity.

FIGURE 16 SUSTAINABILITY AND GREEN BUILDING

3.15LEED STANDARDS

LEED (Leadership in Energy and Environmental Design), developed by the U.S. Green Building Council (USGBC), is a globally recognized green building certification system that provides a comprehensive framework for designing, constructing, operating, and maintaining sustainable buildings. For a Business and Innovation Hub, LEED standards such as LEED BD+C: New Construction, LEED O+M: Operations and Maintenance, or LEED ND: Neighborhood Development may be applicable depending on the project's scope. The rating system is structured around several key categories: Location and Transportation (LT), which promotes development in transit-accessible and pedestrian-friendly areas; Sustainable Sites (SS), focusing on stormwater management, reduction of the heat island effect, and open space conservation; Water Efficiency (WE), encouraging the use of low-flow fixtures, efficient landscaping, and water metering; and Energy and Atmosphere (EA), aimed at optimizing energy performance, integrating renewable energy sources, and managing building systems and refrigerants. The Materials and Resources (MR) category supports the use of sustainable building materials and waste reduction strategies, while Indoor Environmental Quality (IEQ) emphasizes occupant well-being through improved air quality, natural lighting, and the use of low-VOC materials. Additional points can be earned under Innovation (IN) for unique and exemplary strategies, and Regional Priority (RP) for addressing site-specific environmental priorities. Based on a total score out of 110 points, LEED certification is awarded at four levels: Certified (40–49 points), Silver (50–59), Gold (60–79), and Platinum (80+). Applying LEED principles in a Business and Innovation Hub not only enhances operational efficiency and environmental responsibility but also contributes to occupant satisfaction and long-term value, aligning the development with global benchmarks for sustainable design.

4.OFFICE SPACE PLANNING

1. SPACES

Space planning in office buildings must respond to the diverse and evolving needs of its various users. While developers and tenants prioritize maximum flexibility to adapt to future changes, office workers seek environments that offer comfort and support productivity. Facilities managers value ease of maintenance, and executives aim for spaces that project prestige, both visually and financially. With the emergence of advanced work-styles, traditional boundaries between workspace components—primary, support, ancillary, and social—are becoming

increasingly fluid. Hierarchical spatial arrangements are still present but are being re-evaluated in light of collaborative work models and tighter budgets. The specific spatial requirements vary based on business sector, tasks, and individual preferences. For instance, traders and journalists may perform best amid background noise, while report writing often demands quiet settings—sometimes even outside the office, such as at home or in a café. While some work areas remain dedicated to individuals, shared facilities like hot-desking are becoming more common, reflecting a shift toward more dynamic, short- and long-term working environments.

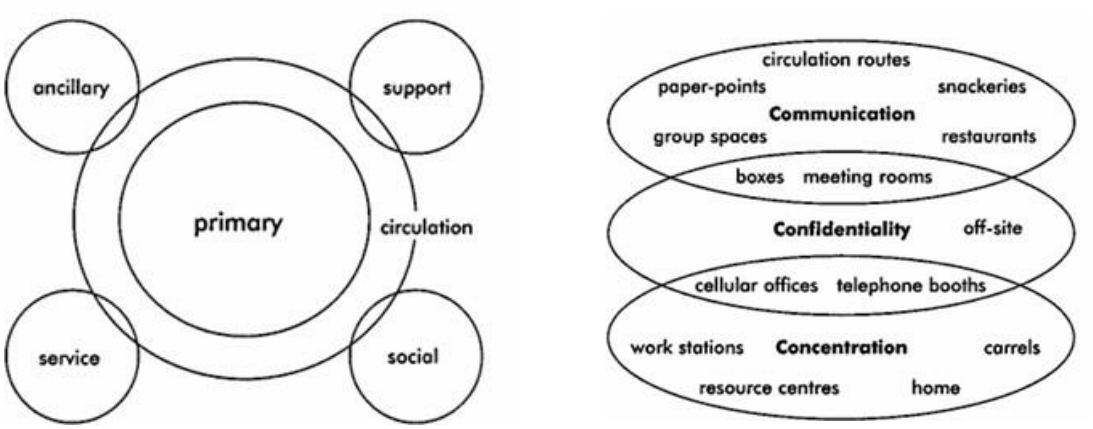


FIGURE 17 TYPES OF SPACES IN OFFICE

4.1.1 PRIMARY SPACE

Primary space w Spaces for solitary work include: **Workstations**: basic configuration of work surface, chair, storage and equipment, possibly with some screening. **Carrel**: screened area, containing single or multiple workstations. **Personal offices**: fully enclosed spaces, usually with a door, for one or more people. **Cell**: a non-dedicated, fully enclosed space for quiet or confidential working. **Spaces for collective work include**: Team rooms: enclosed spaces for long-term team-working, which clients may also use.**Team spaces**: areas for teams; often changing configuration frequently. **Group spaces**: dedicated 'family' space for groups of people who may, or may not, work as teams**. Meeting points**: extended workstations to allow for informal meetings. Meeting areas: open spaces with formal or informal meetings furniture. **Meeting rooms**: enclosed spaces with formal or informal meetings furniture, plus special facilities such as electronic whiteboards, and audio-visual or video-conferencing equipment.

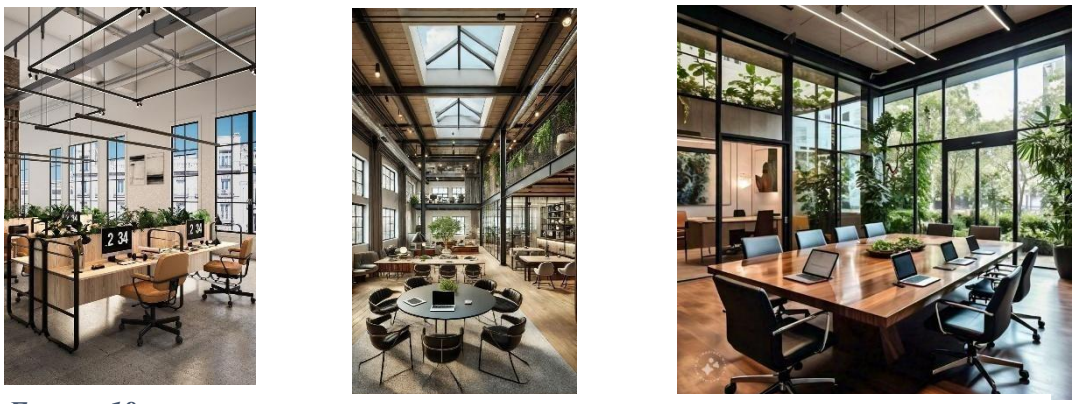


FIGURE 18 PRIMARY SPACES

4.1.2 SUPPORT SPACES

Support spaces in office buildings play a vital role in ensuring smooth operations while also shaping the building's public interface. Key areas include reception zones, which must balance welcoming visitors with providing security, featuring desks, seating, displays, and delivery provisions. Restaurants and cafés offer informal or formal dining, often doubling as workspaces throughout the day. Resource centres provide access to samples, media, and reference materials, supporting both control and service. Outdoor spaces like gardens, terraces, and atriums can function as alternative work zones when weather permits. Training and presentation suites are designed for flexibility, accommodating varied learning and communication formats with audio-visual tools. Reprographic units handle internal documentation needs, while retail areas may offer conveniences like a deli, a newsagent, or a salon. Social and wellness facilities—such as clubrooms, health centres, and medical clinics—address broader lifestyle needs. Lastly, day-care centres may be included to support families, serving children and sometimes the elderly, reflecting a holistic approach to occupant well-being.

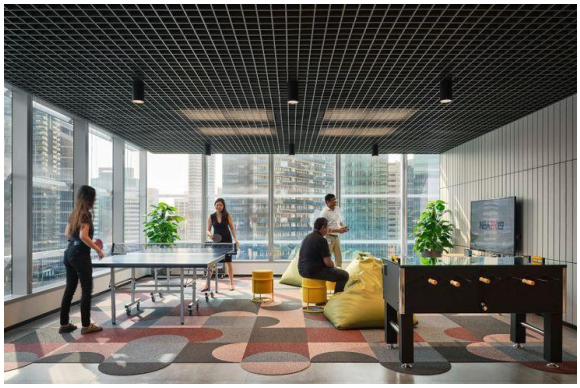


FIGURE 19 SUPPORT SPACES

4.1.3 ANCILLARY SPACES

Spaces that support specific departments or office floors—addressing needs related to refreshment, document handling, and personal care—are essential for daily operations. Paper processing centres are often enclosed or screened areas equipped with copiers, printers, fax machines, binders, shredders, and storage for stationery, enabling efficient document production. Filing centres provide accessible locations for team-based or shared storage of reference materials, using cabinets, cupboards, or high-density filing systems. Refreshment points, such as tea kitchens or vending zones, offer convenient areas for staff to access beverages and snacks throughout the day. Toilets, including facilities with showers, must be planned with flexibility to accommodate varying ratios of male and female staff, as well as higher staff densities where needed.

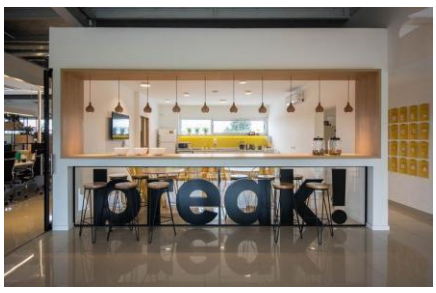


FIGURE 20 ANCILLARY SPACES

4.1.4 SERVICE SPACES

Service spaces in office buildings encompass a variety of functional areas essential for smooth operations. These include mail rooms, whose layout and size depend on specific business processes. Serveries, kitchens, and ancillary areas are designed based on functional requirements, available space, and service needs. Staff rooms provide toilets, showers, changing rooms, and resting areas for catering, maintenance, and visiting personnel. Storage spaces are allocated for furniture, office supplies, cleaning and maintenance equipment, as well as secure storage for office equipment. Service storage areas handle deliveries and segregated waste, including clean, dirty, recyclable, and compacted materials. Plant rooms are typically centralized, with a main plant room supported by control or patch rooms on each floor or designated area. Security rooms house CCTV monitors and workstations for security personnel, ensuring building safety and surveillance.

FIGURE 21SERVICE SPACES

5. CIRCULATION SPACES

Circulation spaces in office buildings encompass both primary and secondary routes, facilitating movement and interaction throughout the facility. These include corridors and passages, which may be enclosed or open, providing clear directional flow and opportunities for social engagement. Lifts, lift lobbies, and staircases are strategically positioned and designed to encourage interaction while ensuring efficient vertical movement. Escalators offer high-capacity, visible means of quickly moving people between levels. Refuges serve as well-protected safe areas for temporary use by individuals with special needs. Delivery areas and goods lifts are located for convenient access to all parts of the building, supporting efficient logistics and service operations.

6. OFF-SITE SPACE

Consideration should also be given to off-site spaces, which include satellite offices, home workspaces, and third-party facilities. Satellite offices typically offer long- or short-term workspaces and meeting areas but usually have minimal support facilities. Home workspaces require the same practical and legislative considerations as central office spaces to ensure safety and functionality. Third-party spaces such as car parks, clients' offices, and serviced or drop-in offices should provide facilities that meet reasonable standards to support users effectively.

4.2 WORKSTATIONS

Workstations and offices differ significantly in cost and function. Offices are more expensive in terms of space, construction, and servicing but provide greater individual privacy. While visual privacy can be achieved with screens, oral privacy requires walls or partitions that provide sound attenuation. The size of individual workspaces varies widely based on culture, status, and location. Minimum workstation footprints can be as small as 2.8 m², especially in touchdown work settings, with a general workstation averaging around 3.5 m² and managerial workstations about 6.5 m². However, when accounting for local circulation, the typical minimum space per person ranges between 6 m² and 9 m². The smallest individual offices usually measure about 12 m² net, though short-term work cells can be half that size. Beyond these dimensions, office sizes vary greatly depending on their function. Group and team rooms are sized according to the number, size, and layout of workstations, as well as the meeting spaces and storage requirements they incorporate.

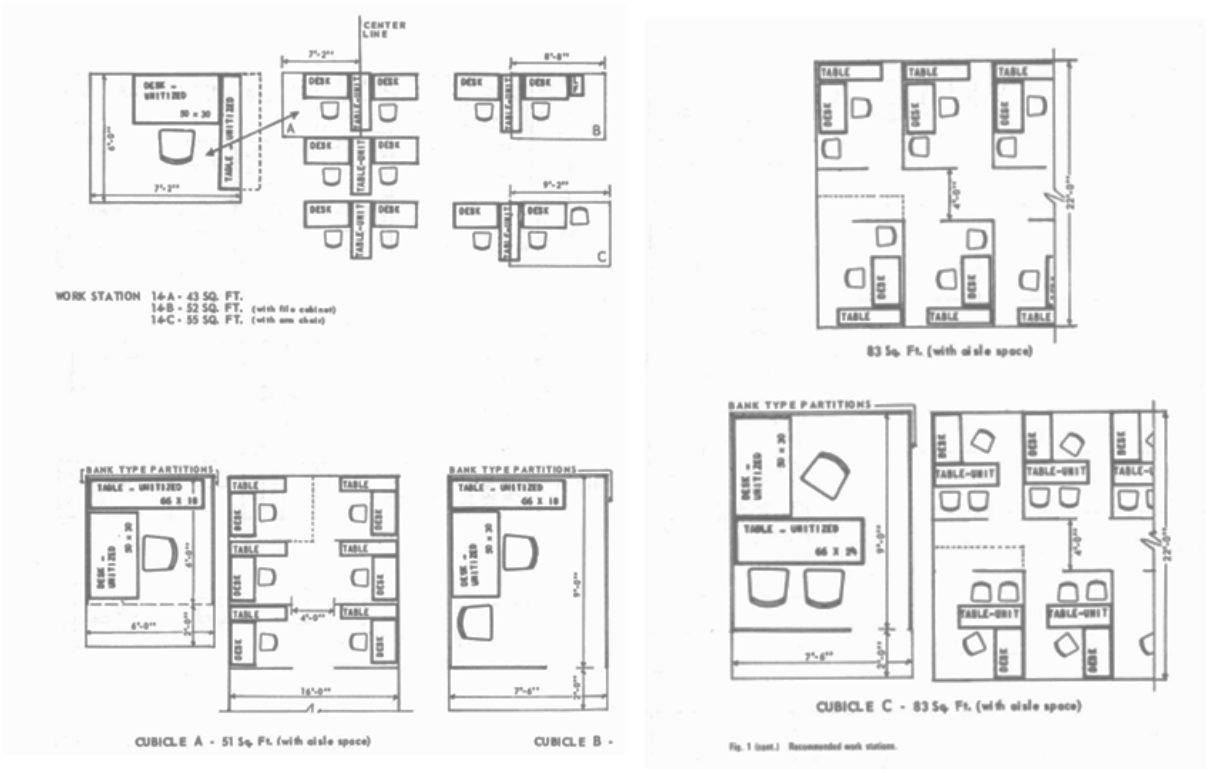


FIGURE 22 LAYOUT OF WORKSTATIONS

4.3 MEETING AND CONFERENCE ROOMS

How space for meetings is designed and allocated is central to the advanced workplace. Meeting rooms that are shared, and can be booked, are taking the place of meeting spaces in personal offices. Meeting spaces take up less space than meeting rooms, and they are more often furnished with lounging furniture - sofas, occasional chairs and even beanbags - than enclosed space. Small meeting rooms, for up to four people, are in higher demand in most organisations than large rooms. Where presentations take place, more space will be needed for audio-visual or video-conferencing equipment.

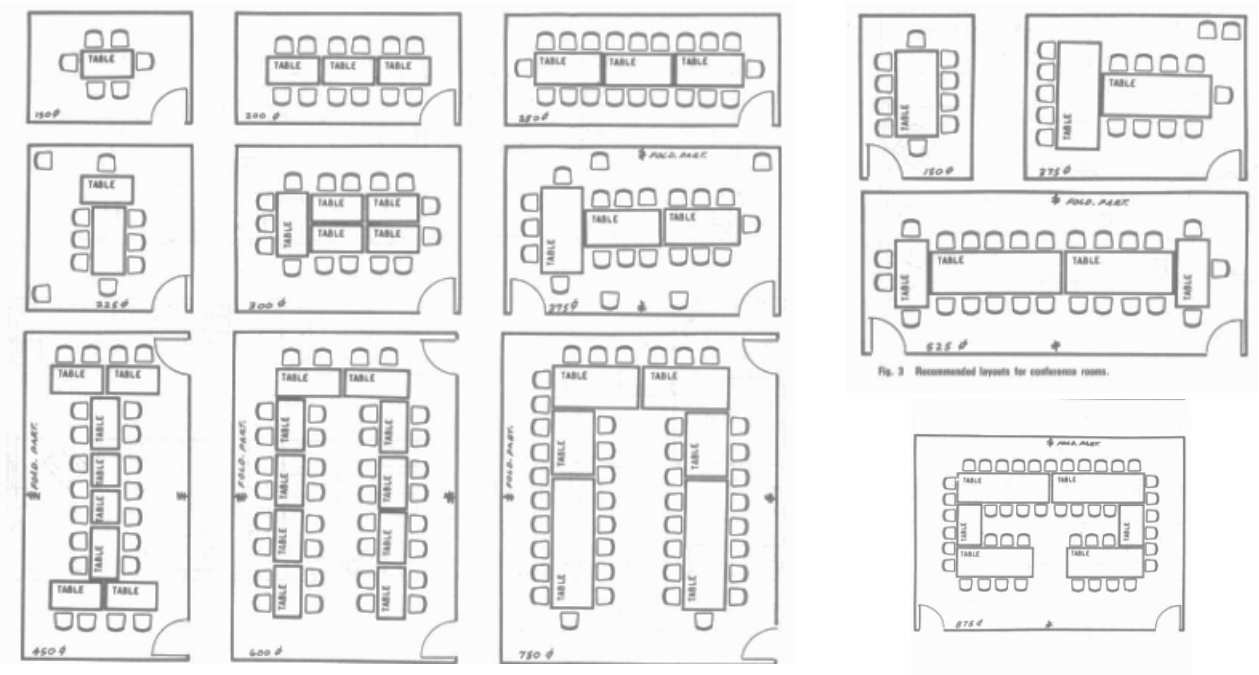


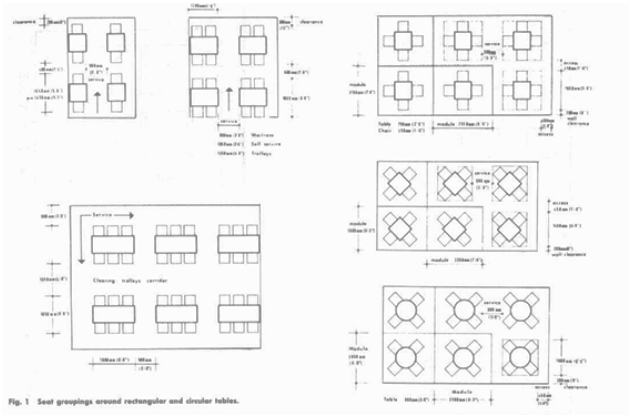
FIGURE 23CONFERENCE AND MEETING ROOMS LAYOUT

4.4 RECEPTION AREAS

Reception may still be a desk by the door or at the end of an echoey marble hall, but increasingly reception areas are the heart of the organisation. The receptionist may well be responsible for office co-ordination, diaries, booking of space as welcoming and directing visitors. Where the cafe is positioned alongside reception, it provides the opportunity for visitor meetings outside any security girdle. With customer-focused businesses, there may be small meeting rooms adjacent to reception. Considerations include the relationship between the street entrance and reception (with clear sight- lines and screening to reduce draughts), visitor seating, toilets and refreshments, and displays of corporate brochures, posters, awards or videos. Levels of security range from the receptionists having a good memory for faces, through various types of electronically controlled barriers, to the inclusion of separate security desks with surfaces on which to check bags.

4.5 REFRESHMENT AREAS

Corporate restaurants and cafés now serve as multifunctional spaces for dining, meetings, and individual work. Well-ventilated and attractively designed, they enhance workplace culture by offering comfort, privacy, and flexibility. Key factors include visibility, accessibility, natural light, suitable furniture, good acoustics, and quiet service operations. Cashless payment and minimal queuing improve efficiency. These spaces are no longer confined to basements—they may enjoy prime locations with views or near reception. Tea kitchens and vending areas, though simplified by safety rules, remain valuable with essentials like microwaves, vending machines, and ergonomic furnishings



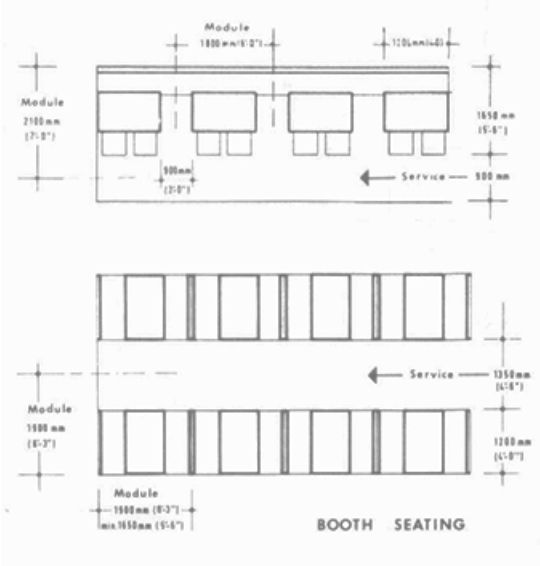


FIGURE 24REFRESHMENT AREAS LAYOUT

4.6 RESOURCE CENTRES

Resource centres have evolved from traditional libraries into dynamic information hubs central to an organisation's knowledge management. These spaces now combine physical resources—like books, periodicals, samples, and catalogues—with digital infrastructure, including internet-connected terminals, intranet/extranet access, and CD-ROMs, often doubling as training zones. Skilled librarians assist with navigating both physical and electronic information. Design requirements include shelving, drawers, and cupboards for storage, workstations for staff with clear visibility of entry points, and a mix of formal desks, informal seating, and private booths for individual research or study.

4.7 PAPER PROCESSING AREAS

Photocopiers, printers and faxes may be situated at the end of a block of workstations. However, they may need to be in a screened area to reduce disturbance, and also to encourage their function as gossip centres. Stationery stores, mail points, shredders, binders and work surfaces for correlation may also be included, as may space for hanging coats. In flexible working situations, storage is required for personal belongings, which may be housed in trolleys, bags or other mobile containers.

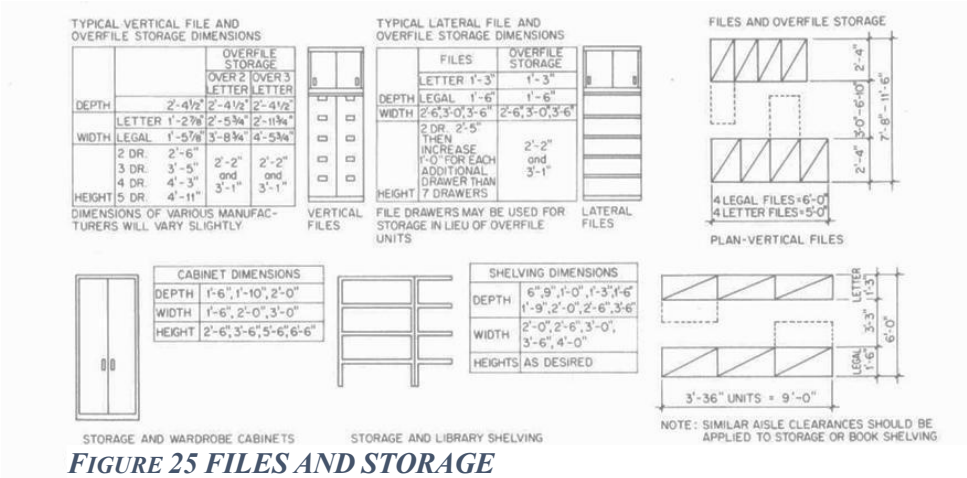


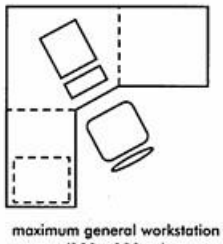
FIGURE 25 FILES AND STORAGE

4.8 RETREATS

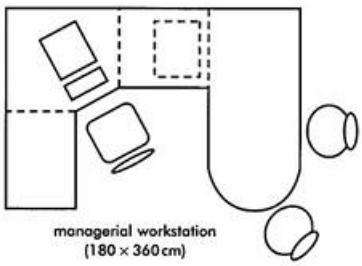
Retreats within the workplace cater to diverse personal and cultural needs, enhancing overall employee well-being. Smokers require well-ventilated, discreetly located areas to prevent affecting non-smokers, while with appropriate furniture and lighting, such spaces can double as informal work zones. Prayer rooms are essential for accommodating religious practices, such as Muslim prayer, and quiet zones or nap spaces are vital for night-shift workers. As home-working becomes more prevalent, home office layouts must be as efficient and ergonomic as those in the central office. Conversely, the way individuals set up their home workspaces often reflects what they find most comfortable—insights that can inform office design. Home offices may be personalized or part of a broader remote work initiative, and while workplace legislation applies in principle, enforcement is limited. Responsibility for providing and maintaining furniture, equipment, and services often lies with the facilities department, though this varies by organisation.

4.9 FURNITURE

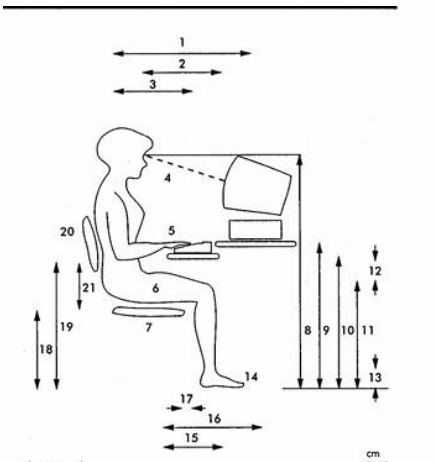
minimum workstation
(180 × 180 cm)



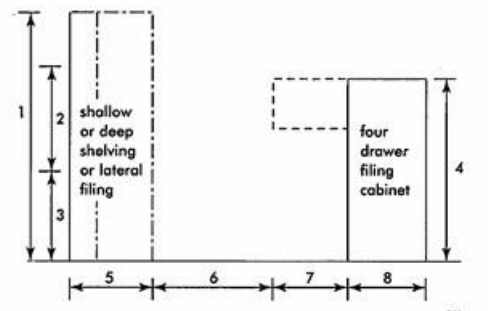
maximum general workstation
(180 × 180 cm)



managerial workstation
(180 × 360 cm)



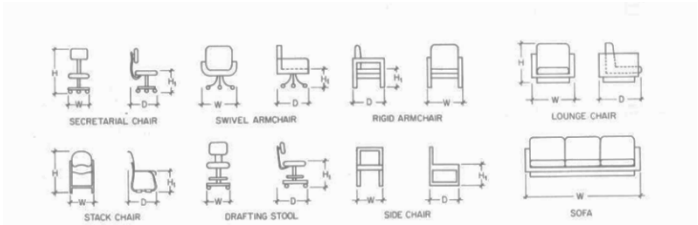
		cm
1	arm reach	40–60
2	distance to screen (more for large screens) plus document holder	50–75
3	elbow to keyboard reach	30–40
4	working angle from horizontal eye level to centre of screen	20–30°
5	neutral forearm and wrist angle	5–30°
6	open trunk to thigh angle	90–100°
7	adjustable seat (±5° from horizontal forwards and backwards)	40w × 36h × 40d
8	eye height to top of screen	100–140
9	general worktop height	65–76
10	keyboard height (rounded edges and wrist supports)	65–76
11	under desk knee clearance	50
12	clearance between thigh and work surface	20
13	under desk foot clearance	25
14	feet in firm contact with floor or footrest	
15	clearance for knees beneath desk	40–45
16	clearance for feet beneath desk	60
17	clearance between calf and front of seat	4–8
18	seat (pan) height	35–50
19	relaxed elbow height	55–75
20	seat back adjustable in height and angle (and position of lumbar support)	
21	armrest height above seat (adjustable and set back from seat edge 10cm)	20–25



		cm
1	maximum reach (for the average woman)	195
2	optimum shelving zone (for storage of heavy items)	75–80
3	low zone, easy reach	70–75
4	maximum height for seeing into a drawer	140
5	depth of shelving	30–60
6	aisle width (allowing for door opening)	90–120
7	clearance for filing drawer to open	45–75
8	filing cabinet	50–80

note: lateral storage has twice the capacity of filing cabinets, so floor loadings need consideration

24 Dimensions for storage



5.STRUCTURAL SPECIFICATIONS

1. FLOOR PLATE

The optimum width of a building is dictated by the distance through which daylight penetrates into a building. This is generally accepted to be about 5-7.5m (or floor-to-ceiling height x 2.0-2.5). A double zone building, with workspace on either side of central circulation, would be 15-18m in depth. Depths of less than 15m are preferred for natural ventilation, but very narrow floor plates (narrower than 13.5m) are less able to accommodate a mixture of open-plan and cellular workspace. Atriums are often incorporated in deep-plan buildings to bring daylight into the centre of the building, thus providing the equivalent of two medium depth plates. However, some businesses require the total depth of the building to be as open as possible.

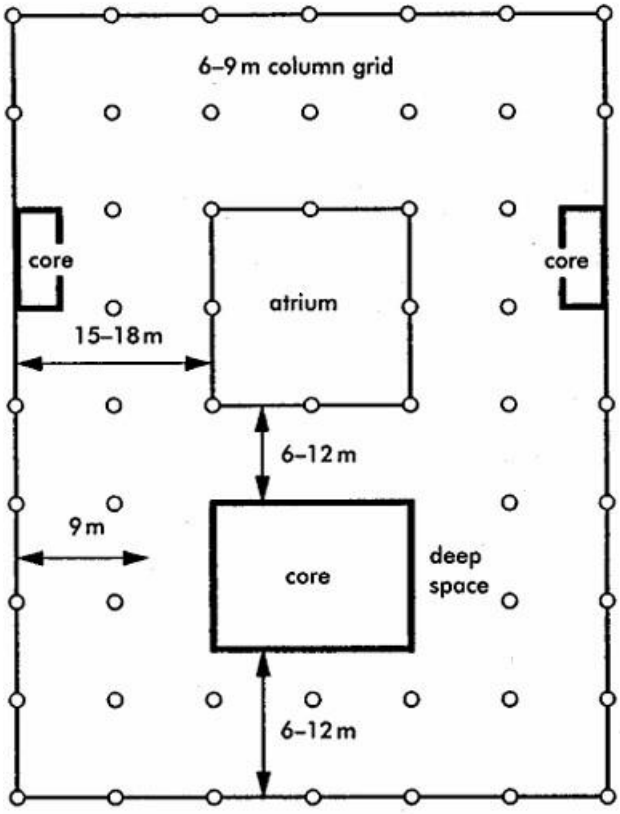


FIGURE 26 FLOOR PLATE

5.2 STRUCTURE

Structure A steel structure has the advantage that it is relatively light, good for longer spans and greater depths, and for holes and fixings. It is more efficient for rectangular plans, whereas concrete is efficient in both square and rectangular situations, and for relatively short spans. Standard loading allowances are taken as 2.5kN/mZ over 95% of the lettable floor area, with 7.5 kN/m2 for 5% high-loading areas (which may be in the centre of the building adjacent to the core). medium depth: 15-20m (double zone) 27 Building depths Where longer spans and shallower floors are adopted, the extent of vibration from footfall etc. should be checked.

3. SKIN

The envelope of the building must be watertight, airtight and meet thermal insulation requirements. The skin may be lightweight, and mainly glazed, or be faced with some apparently load-bearing material, such as stone or brick, with windows set within these panels. As its form varies dramatically, so does its function. The skin may let in the rain, or keep it out; it may be two part, with a maintenance walkway/ventilation stack between; there may be louvres that follow the sun, or blinds that adjust; the complex mechanics will almost certainly be controlled by a BMS. The horizontal skin (the roof), though more traditional in construction, may well support solar collectors and stacks as well as the more usual air- handling plant.

4. GRIDS

With each element of the building having its own grid (from structure to ceiling tiles), integration of grids is essential. The column grid should be as large as possible, and be a multiple of the space planning grid dimension. It may also relate to that of car parking, where this occurs within the building. Spans of 7.5 to 9.0m are most economic. The window mullion grid is most critical in cellular layouts where it dictates room size. A 3m grid, which is not uncommon, works with a 1.5m planning grid. Planning grids of 1.35m and 1.2m may also be adopted providing for rooms 2.7m and 2.4m in width.

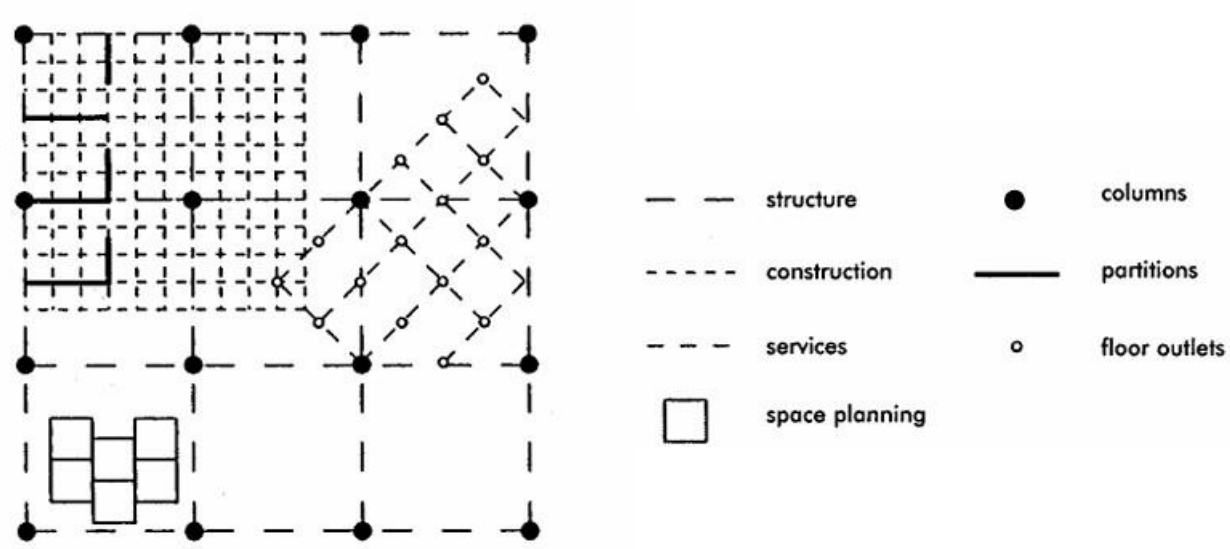


FIGURE 27GRID

5.5 CORE

Different elements of the core may be brought together in a single zone, or may be positioned separately with, for instance, staircases and toilets at the extremities, lifts in the centre, and ducts relating to the column grid. The position of cores affects the way buildings can be used. Though fire regulations dictate the distances between staircases, the manner in which a building is subdivided depends on where cores are situated. A central core can prove economical, and allows for subdivision for different tenancies, but restricts the use of the floors as single open-plan entities. Cores at the perimeter can be effective, and if outside the envelope of the building may not count as office space for planning purposes

5.6 SECTION

The height from the finished floor to the underside of the ceiling ranges from 2.6m to 3.0m. Suspended ceilings and raised floors provide space for ducting and cabling, but will increase the floor-to-floor height, and thus the overall height of the building. For column grids of up to 9m centres, the services are usually run in a separate horizontal zone. With larger spans, the space between beams will often house service runs. Raised floor zones are around 150mm for cabling, or for special operations, such as trader dealing floors, 200-300 mm. Where air conditioning or ventilation is adopted the depth will increase to 300-450 mm. The lighting zone, which includes luminaires and suspended ceilings, is around 140mm. The service zone in the ceiling will depend on what it contains. Where structure is exposed, it can be used as a heat reservoir, and can also allow for increased floor-to-ceiling heights, at least in part, which is particularly desirable in open-plan areas.

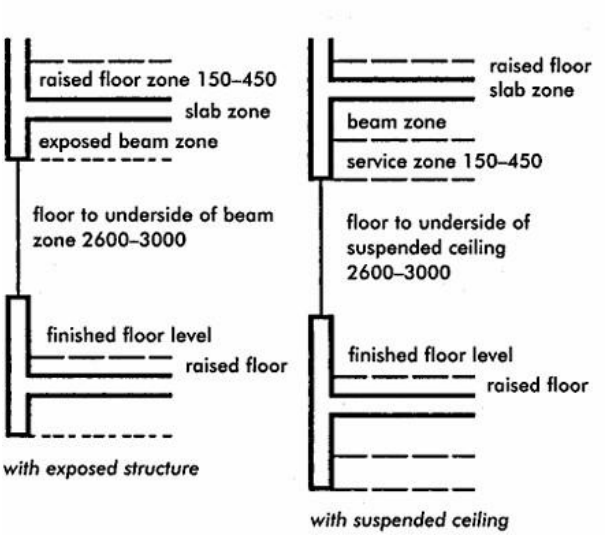


FIGURE 28 VERTICAL DIMENSIONS

5.7 FLOORS

In Europe and the USA, where raised floors are much less common, ducts in the floor slab provide limited cable provision. Cable-free equipment makes raised floors less important, and this helps with older or historic buildings, where the inclusion of a floor void is often not possible. Design considerations for raised floors include: Loading: the system must be strong enough to take the required distributed and point loads without deflection or damage; and where it stands on legs, these must be able to transfer point loads to the structural slab without buckling or penetration. Access: access to the void is required for re- cabling and maintenance for electronic and power systems, and for maintenance and cleaning of ducting. Terminals: will be provided by floor boxes or standards for electronics and power, and by grilles for air handling. Permeability: vertical under-floor barriers may be required to prevent the spread of sound or fire

8. WALLS AND PARTITIONS

Walls and partitions not only divide space but also control vision, sound, and fire. They can be fixed or demountable; while lightweight partitions are easier to move, dry-wall systems may be faster and cheaper to relocate. Heavy partitions like brick or block rest on the slab and can be load-bearing, whereas lightweight ones stand on raised floors. Plastered walls are durable but slow and messy to build. Demountable systems offer quick installation and sound control but are costly and have limited longevity. Fire and sound performance must be assessed for the entire wall, not just individual panels. For mobile partitions in conference rooms or auditoria, acoustic seals, support mechanisms, and storage also need careful planning

9. CEILINGS

Acoustic panels fixed to a suspended aluminium or steel lightweight metal grid are found in the majority of offices. Panel size, appearance and performance vary greatly: large panels, curved panels, panels to withstand heavy impact, humidity and fire are available. Luminaires, sprinkler heads and air diffusers are all supported by the ceiling grid. Ducts and wiring are hidden above the ceiling, but are easily accessible for maintenance. Panels in a suspended ceiling provide many advantages, but neat detailing around junctions can be difficult, and the grid lines can provide an excessive rhythm. A plasterboard ceiling, with either filled and taped joints, or a plaster skim, avoids this. Such ceilings may be essential in areas of complex configuration.

10. FLOOR FINISHES

Floors must wear well, be safe and communicate the desired image. Materials include timber, marble, vinyl, linoleum and steel. In British offices the most common floor covering is carpet, despite the consideration that hard materials are less likely to harbour pollutants. The choice depends on appearance, cost and perform- ance factors including safety, wear resistance, convenience, environment, ease of installation, and maintenance. Careful consideration- is required concerning reception flooring. Matting at the entrance removes dirt and moisture, but must be sufficient in quantity, be sensibly positioned and be flush with other floor finishes.

11. WALL FINISHES

Walls may be finished in plaster, marble, stone, tiles, timber, steel, aluminium, glass, mirror, various acrylic based materials and so on, but whatever the finish it must last well. Painted plaster or boarding remains a cheap option that can easily be refreshed, the colour scheme being easily adapted to the latest fashions. Special finishes (polished plaster or designer wallpaper)

CHAPTER-3 CASE STUDIES

6. CASE STUDIES-LIVE

1. CASE STUDY-1- DLF CYBERCITY GURUGRAM.

1. INTRODUCTION

DLF Cyber City, Gurgaon is a major corporate and IT hub in **Gurugram, Haryana**, developed by **DLF Limited**. It houses the headquarters of numerous multinational corporations, IT firms, and startups. Known for its modern infrastructure, high-rise office buildings, and seamless connectivity, Cyber City is a key business district in India. It features **Cyber Hub**, a popular commercial and entertainment zone with restaurants, bars, and retail outlets. The area is well-connected via the **Rapid Metro Gurgaon** and **NH-48**, making it a prime destination for businesses and professionals.

FIGURE 29 VIEW

2. PROJECT BRIEF

- **Project Name**- Cyber City Gurugram
- **Project Type**- Commercial
- **Developers**- DLF
- **Client**- DLF
- **Year Of Start**- 1997
- **Year Of Completion**- 2013
- **Includes**- Shops, Office Building, Recreational Area
- **No. Of Storeys**- For Office And Commercial Building G+20 Total
- **Project Area**- 128 Acre
- **Architect**- Hafeez Contractor And Mohit Gujral
- **Footfall**- More Than 1.5 Lakhs

3. SITE CHARACTER

- **Site Location-** DLF Cyber City, Sector 24, Gurugram, Haryana 122002, India
- **Site Area-** 128 Acres
- **Topography**- Site Is Flat
- **Site Slope-** South To North
- **Shape**- Site Is Irregular
- **Orientation**- Site Is North West Oriented
- Commercial Buildings Oriented In North East Orientation Allows More Open Spaces To Receive Indirect Sunlight And Lesser Heat Gain

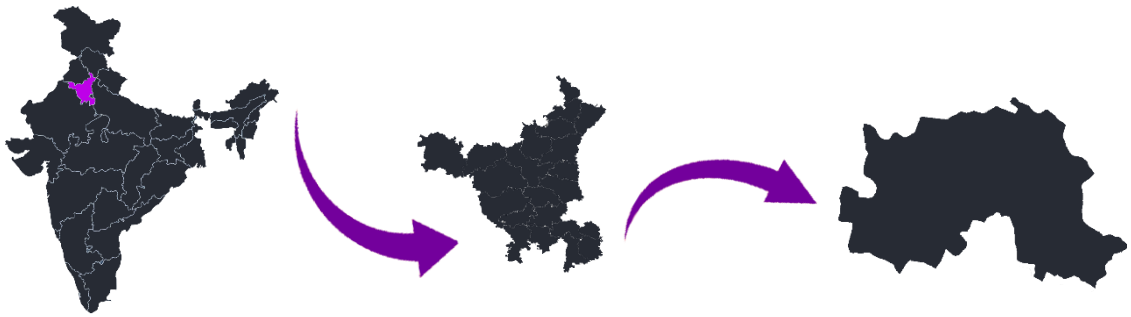
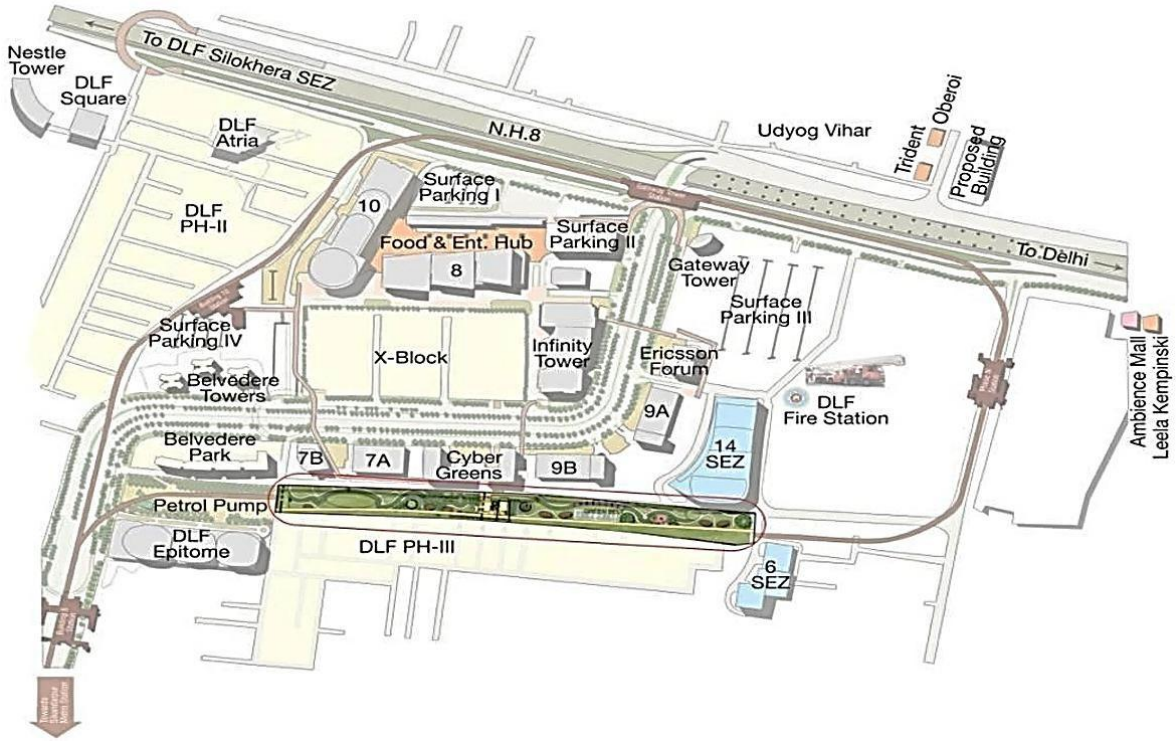


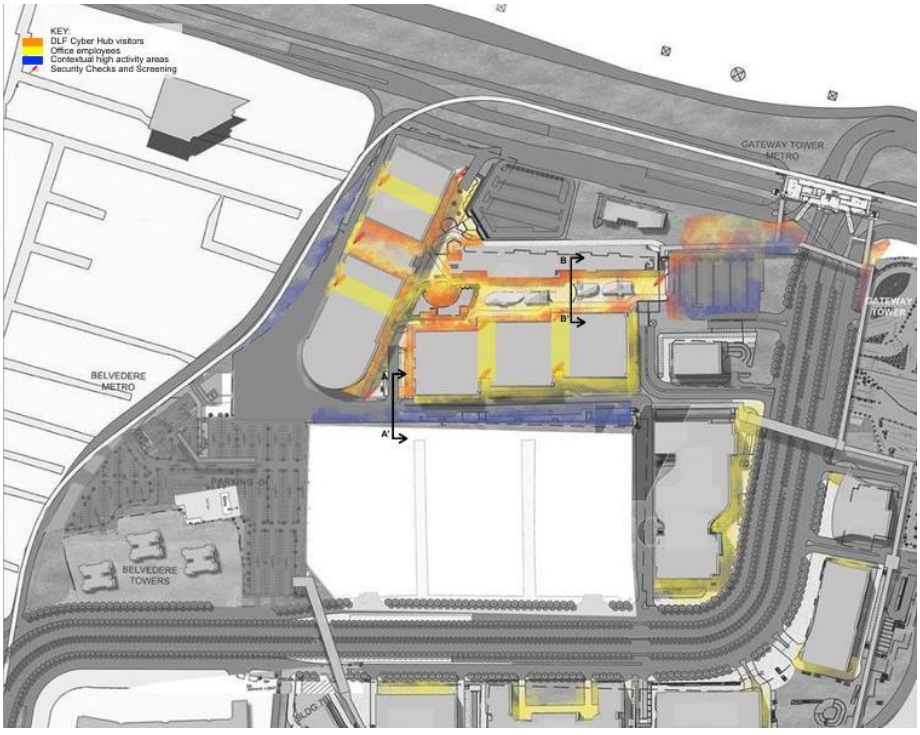
FIGURE 30 LOCATION OF GURUGRAM, HARYANA

6.1.4 MASTER PLAN



6.1.5 SITE ZONING

6.1.6 ACTIVITY MAPPING



6.1.7 DESCRIPTION AND ARCHITECTURAL DETAILS OF VARIOUS BUILDINGS

6.1.7.1 BUILDING 9A AND 9B

6.1.7.1.1 INTRODUCTION

DLF presents its mirror of corporate success - 9A and 9B, LEED Platinum Certified buildings, in DLF Cyber City. The elegant Twin Tower edifice offers the best that is found in contemporary structures across the world. The spectacular complex presents a plethora of futuristic amenities, which together more than meet the demands that an efficient and inspiring work environment asks for.9A and 9B are perfectly located in between Forum and DLF Cyber Greens, just off the national highway (NH-8) in Gurugram, and in close proximity to the international airport. What you get is the convenience of a central business location along with the advantage of Gurugram's most exclusive business address. The design incorporates large, efficient floor plates, a wide column span, and high floor-to-floor clearance, allowing for optimal space utilization. From the stunning foyer to the state-of-the-art amenities and ambience, you'll find a sophisticated design language beckoning you from every aspect.

FIGURE 31BUILDING 9A AND 9B

2. DLF EPITOME

1. INTRODUCTION

- Strategically located just off the National Highway-8 and in close proximity to the airport, DLF Epitome, a LEED Platinum Certified building, is directly linked through the Delhi-Gurugram expressway. Being positioned in the prime location of Gurugram - DLF Cyber City, DLF Epitome enjoys excellent connectivity through enhanced infrastructure - expressway, rapid metro, Walkways and 16 lane Raghavendra Marg.

- An integrated technology park offering state-of-the-art amenities and professional workplace to software & leading IT/ITES corporations, DLF Epitome is spread across 2.06 mn sq. ft. over 3 interconnected blocks. Variety of amenities such as fine dining, recreational, F&B, stationery shop, food court, and ATM on the Ground Floor.

FIGURE 32 DLF EPITOME VIEW

6.1.7.2.2 FLOOR PLAN

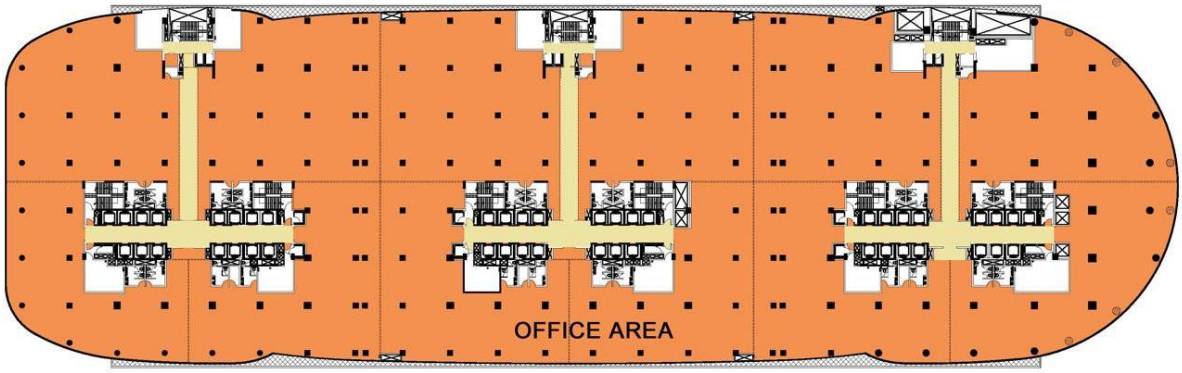


FIGURE 33TYPICAL FLOOR PLAN

3. BUILDING 7A AND 7B

1. INTRODUCTION

- Buildings 7A & 7B are spread across an area of 0.43 mn sq. ft.
- The buildings are part of DLF Cyber City, which is in close proximity to the International and domestic Airports and well connected to South, Central & West Delhi through National Highway - 8 & the Mehrauli – Gurgaon Road.

FIGURE 34BUILDING 7A AND 7B

6.1.7.4 DLF IQ- BUILDING 14

The modern and well-planned workspaces of DLF iQ lend a distinctive appeal to this aesthetically designed architectural wonder. A LEED Platinum Certified building, it's spread over approx. 2.01 mn sq. ft. and has 4 interconnected blocks, each block offering an intelligent IT/ITES SEZ workplace to new-age professionals. Benchmarked to global standards, the smartly designed workspaces will be instrumental in transforming your work life to a considerable extent. The office blocks are designed to ensure a dynamic interplay of open and enclosed spaces. The overall development has a campus feel, with buildings and landscapes visually integrated into one complete environment.

FIGURE 35 VIEW

FIGURE 36 SITE PLAN

6.1.7.5 BUILDING-10

BUILDING 10, a LEED Platinum Certified building, is an integrated technology Park offering modern workspace to IT/ITES companies. Offering a world-class contemporary structure, BUILDING 10 is a spectacular complex comprising a plethora of futuristic amenities, which together provide an interactive environment required for new-age IT professionals and are well connected to the rapid metro, 16-lane Raghavendra Marg and walkways.

FIGURE 37VIEW

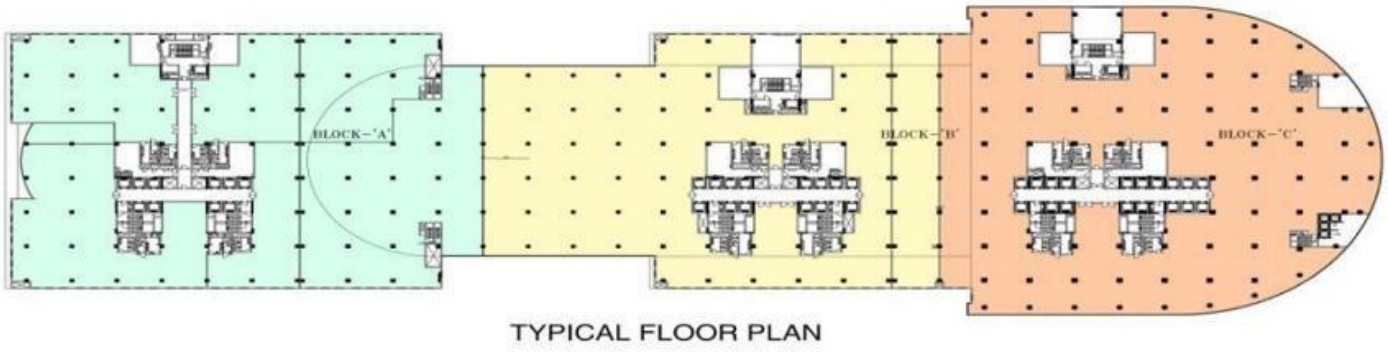


FIGURE 38TYPICAL FLOOR PLAN

6.1.7.6 INNOV8-BUILDING-8

- DLF presents an intelligent destination for the IT/ITES world, BUILDING 6. A LEED Platinum Certified building, it is an integrated technology park offering modern workspaces to IT and ITES companies. It is strategically located just off the NH-8 in close proximity to the airport and is directly linked through the expressway to Delhi. DLF Cyber City Gurugram is a benchmark business destination offering world class work spaces, exceptional infrastructure and facilities comprising a plethora of futuristic amenities.

FIGURE 40 VIEW OF INNOV8

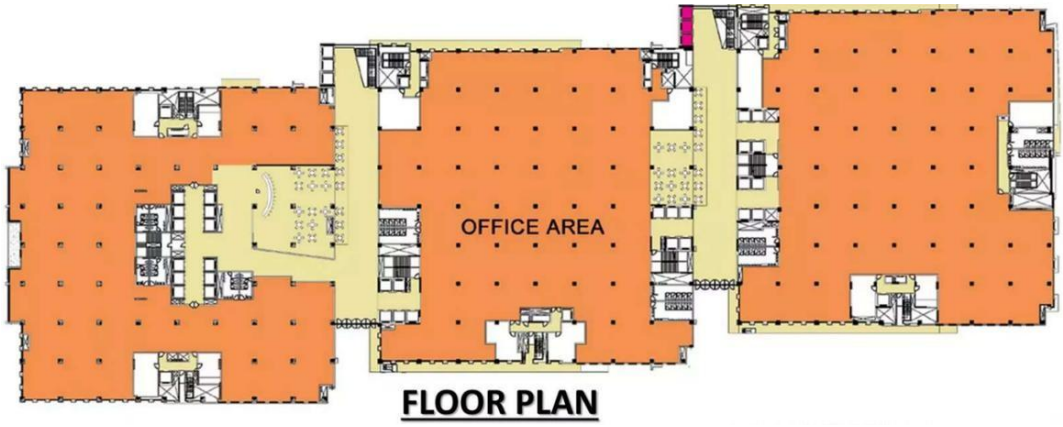


FIGURE 39 TYPICAL FLOOR PLAN

6.1.7.7 DLF GATEWAY

Gateway Tower, a LEED Platinum Certified building, is called so as it acts as a gateway to the 3000 acre landmark city of DLF. This 12-storey complex is spread across an area of 0.11 mn sq. ft. With its ship-like shape, Gateway Tower presents futuristic architecture, which is also reflected in its interiors.The unique feature of this complex is its high visibility and compact office space.

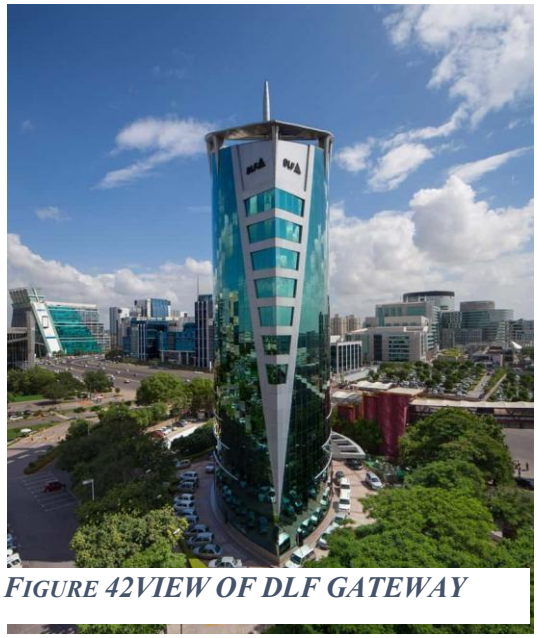


FIGURE 42VIEW OF DLF GATEWAY

FIGURE 41TYPICAL FLOOR PLAN

2. CASE STUDY-3 BAGMANE CONSTELLATIONS BUSINESS PARK

1. INTRODUCTION

The park is strategically situated along the Outer Ring Road in the Doddanekundi area, offering excellent connectivity to various parts of Bengaluru. It provides state-of-the-art facilities catering to the needs of modern businesses. The development includes multiple office towers with a total built-up area of approximately 2.5 million sq. ft. currently operational and an additional 2.4 million sq. ft. under construction, ensuring ample growth opportunities for occupants.

1. PROJECT BRIEF

Bagmane Constellation Business Park is a prominent commercial hub located in Bengaluru, India. Here are the details:

- **Project Name:** Bagmane Constellation Business Park
- **Project Type:** Commercial Business Park
- **Developers:** Bagmane Group
- **Includes:** Multiple office towers, modern amenities such as food courts, day-care centers, fitness centers, and sports facilities
- **Project Area:** Approximately 42 acres

FIGURE 43 VIEW OF THE SITE

1.10.2 SITE PLAN

FIGURE 44 SITE PLAN

6.2.2 DESCRIPTION AND ARCHITECTURAL DETAILS OF VARIOUS BUILDINGS

6.2.2.1 BUILDING-1-CARINA

The design addresses the challenge of a long frontage by adopting an enterprising and dynamic form inspired by the Carina constellation, resulting in a striking angular façade. Sculpted towers maintain junction of the two blocks encourages interaction and connectivity. their individuality while collectively expressing efficiency through the use of clean exterior lines and high-performance materials. A thoughtful façade treatment—combining strip windows with curtain glazing—ensures optimal daylight penetration into the office spaces. Functionally, the building features an elevated drop-off area that enhances the arrival experience, while a collaborative plaza at the

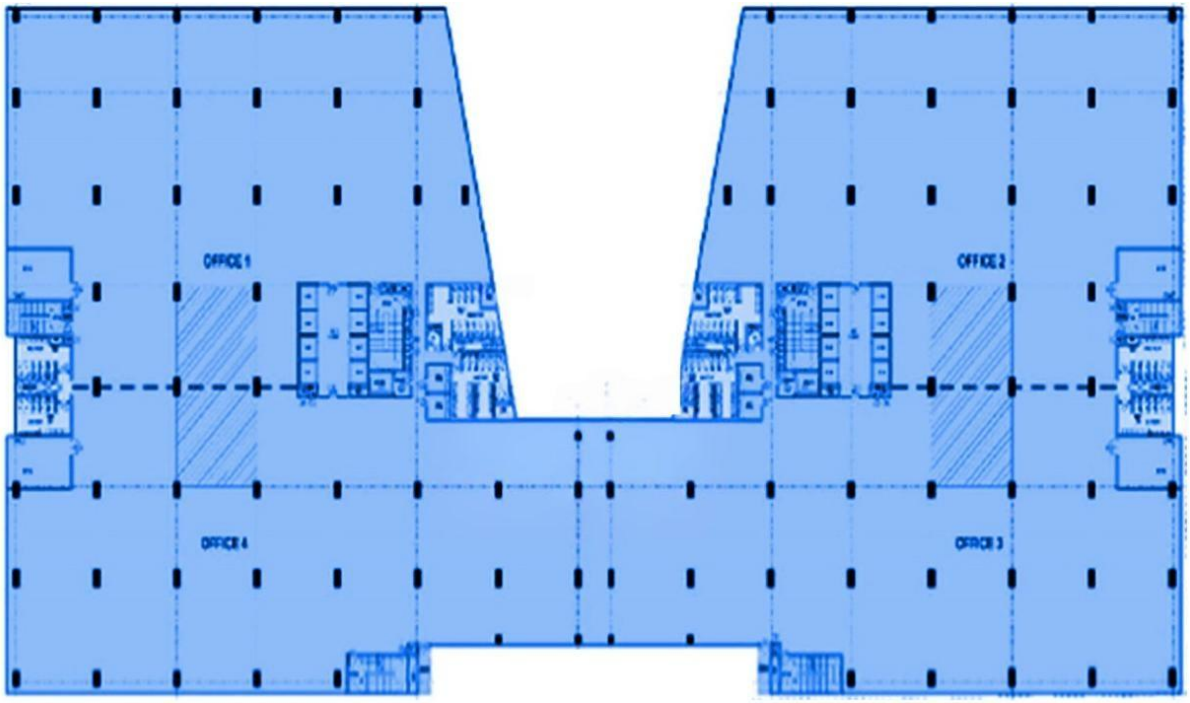


FIGURE 45TYPICAL FLOOR PLAN

FIGURE 46 VIEW

6.2.2.2 BUILDING-4-AQUILA

Aquila is a multi-tenanted IT office building thoughtfully designed to integrate landscaped plazas and amenity spaces, enhancing both functionality and aesthetics. The design is informed by terrain analysis, accessibility, infrastructure, and visibility, resulting in an interlocking box massing that combines masonry and glazed façades. Distinctive V-shaped columns not only provide structural support but also create a visually striking entrance experience. The building's five-storey height establishes a grand, open atmosphere that flows seamlessly from the main

lobby to the amenity spaces. Curtain-wall systems and strip windows frame panoramic views of the campus, reinforcing connectivity with the surrounding environment.

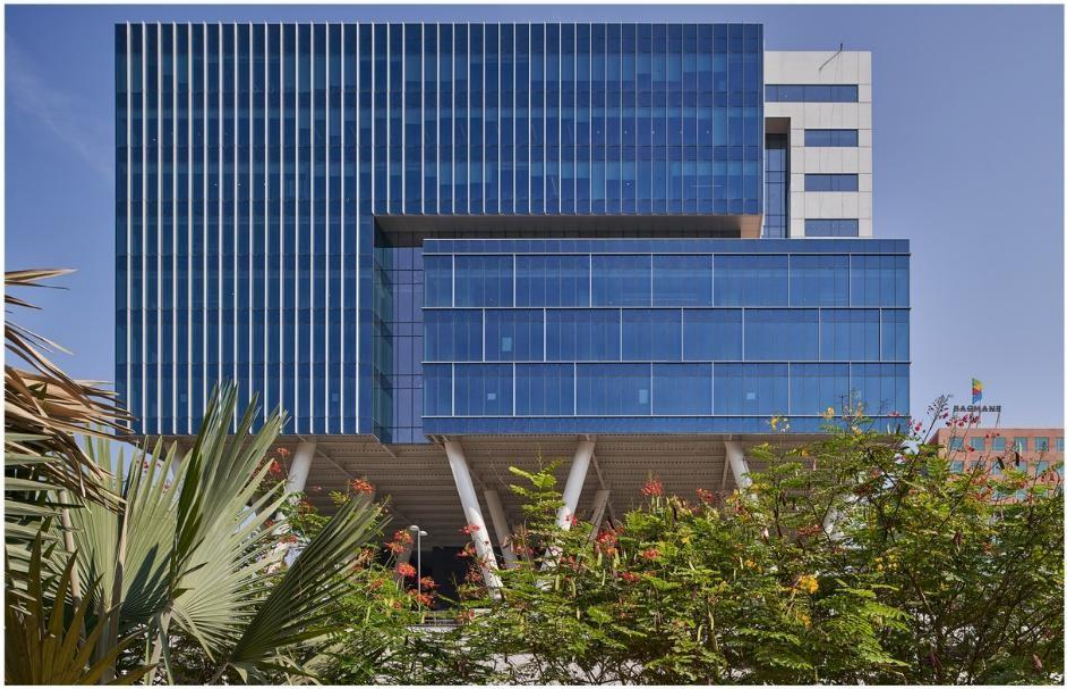


FIGURE 47VIEW

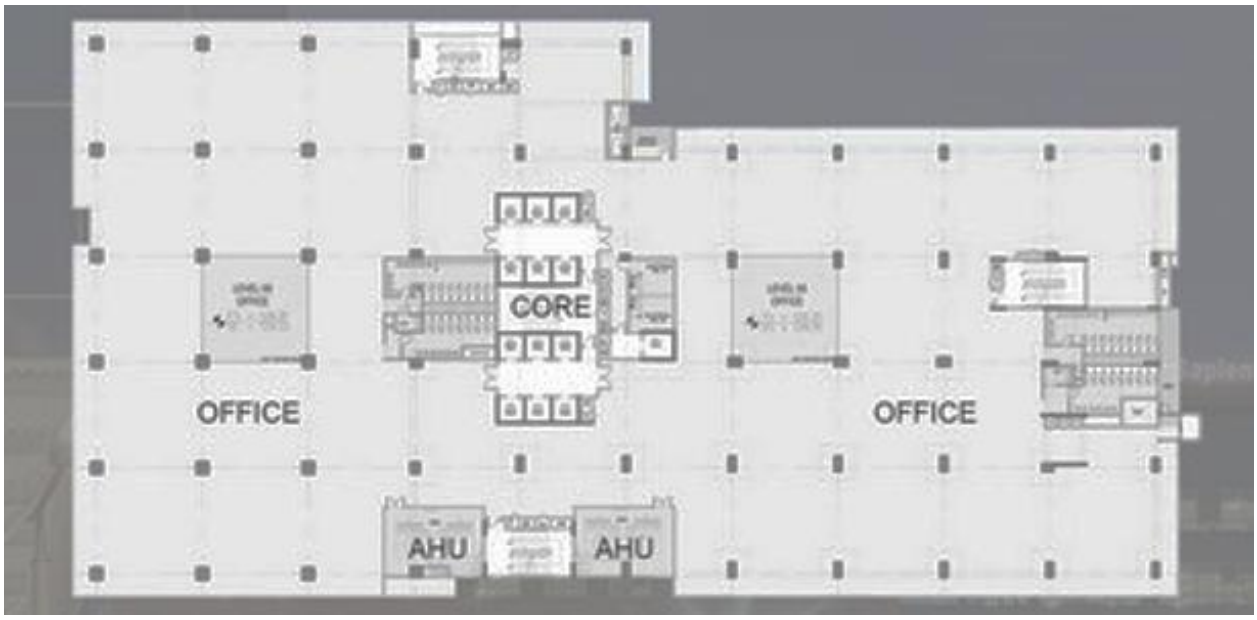


FIGURE 48 TYPICAL FLOOR PLAN

7. CASE STUDIES-DEAD

1. CASE STUDY-2 RMZ ECOWORLD, BENGALURU

1. INTRODUCTION

RMZ Ecoworld is designed to be an environmentally sustainable business park, offering a blend of technology and people-centric outdoor spaces. The development emphasizes pedestrian-friendly zones, with traffic circulation routed around the perimeter to free up central areas for social amenities. The Bay, a central feature of the project, serves as a hub for dining, retail, and cultural activities, set within landscaped gardens. The project is LEED Gold Rated and IWBI Certified, reflecting its commitment to sustainability and wellness.

FIGURE 49VIEW

2. PROJECT BRIEF

- **Project Name:** RMZ Ecoworld
- **Project Type:** Mixed-use development
- **Developers:** RMZ Corp Holdings Pvt. Ltd.
- **Client:** RMZ Corp Holdings Pvt. Ltd.
- **Year of Start:** 2012
- **Year of Completion:** 2016
- **Includes:** 16 office towers, retail spaces, food courts, amphitheater, art gallery, landscaped gardens, and other social amenities
- **No. of Storeys:** Varies by building; for example, Campus 30 comprises 3 basements + ground + 11 floors
- **Project Area:** Approximately 77.8 acres with a total built-up area of ~12 million sq. ft.
- **Architect:** DP Architects
- **Footfall:** Approximately 65,000 community members

3. ARCHITECTURE AND SCALE

"THE URBAN DESIGN AND ARCHITECTURE of the buildings aim to address the challenge of a highly intensified plot with a large footprint, which results in visually very massive blocks as well as potentially limited daylight penetration. The design strategy was crafted to reduce the apparent scale by breaking up the massing into smaller surfaces and volumes, which create visual interest."

4. VIEW OF THE SITE

7.1.5 CLIMATE AND CONTEXT

THE CLIMATE of this area is generally salubrious and warm. Our approach to site planning takes into consideration the orientation of the buildings to enjoy the natural breeze from the nearby lake, which helps to cool the buildings naturally, bringing down the cooling load.

Openings in the massive building form are strategically placed to funnel the breeze into the development. Many parts of the public areas are actually not air-conditioned. The facade, unlike many of the typical developments in the area, uses an innovative combination of glass and stone panels to reduce heat gain dramatically.

7.1.1 FLOOR PLAN

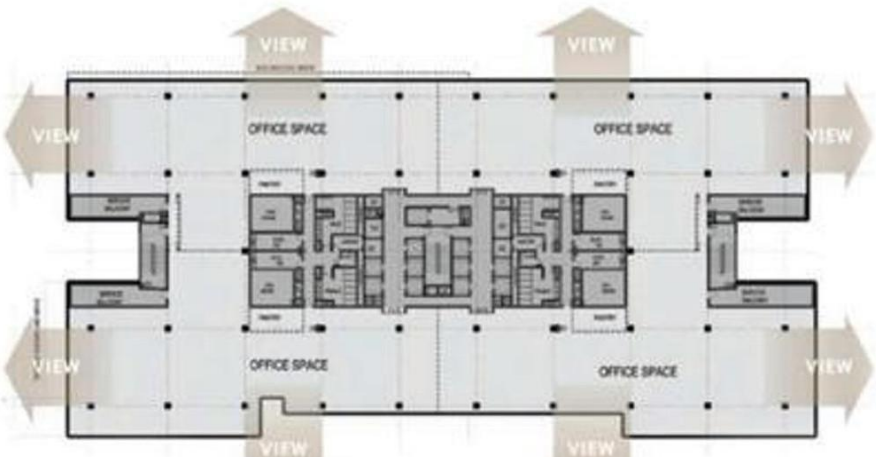


FIGURE 50 TYPICAL FLOOR PLAN

2. CASE STUDY-4 MARINA BAY ONE, SINGAPORE

1. INTRODUCTION

Marina One is a landmark mixed-use development located in Singapore's Marina Bay Central Business District, developed by M+S Pte Ltd—a joint venture between Temasek Holdings and Khazanah Nasional. Designed by Christoph Ingenhoven, the project embodies the "City in a Garden" concept, centered around the Green Heart—a lush 65,000 sq ft multi-level tropical garden that enhances natural ventilation and microclimate. The development comprises two 34-storey residential towers with 1,042 luxury units, two 30-storey Grade A office towers offering 1.88 million sq ft of workspace, and a retail podium known as "The Heart" featuring dining, shopping, and fitness amenities. Marina One is seamlessly connected to four major MRT lines and is flanked by Marina Station Square and Central Linear Park, ensuring high accessibility. Recognized for its sustainability, it has earned LEED Platinum and BCA Green Mark Platinum certifications, along with international awards like the MIPIM Award for Best Innovative Green Building and the CTBUH Best Tall Building Asia Award of Excellence.

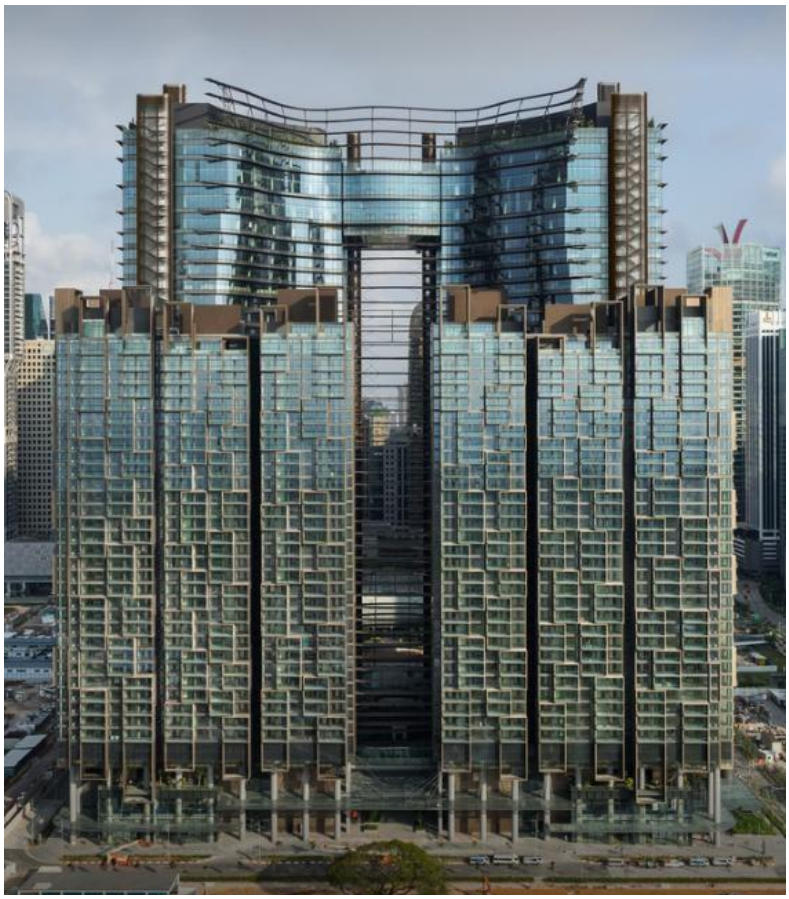


FIGURE 51FRONT VIEW

7.2.2 PROJECT BRIEF

Execution: 2011 - 2017
Build Area: 400,000 sqm
Retail: 18,382,10 sqm
Office: 226,165 sqm
Residential: 114,235 sqm / 1,042 apartments
Site Area: 26,200 sqm
Height Office Building: each 200 m
Height Residential Building: each 139 m
Green Building Certificates: LEED Platinum, Green Mark Platinum
Green area: 37,000 sqm
Number of plant species: 350

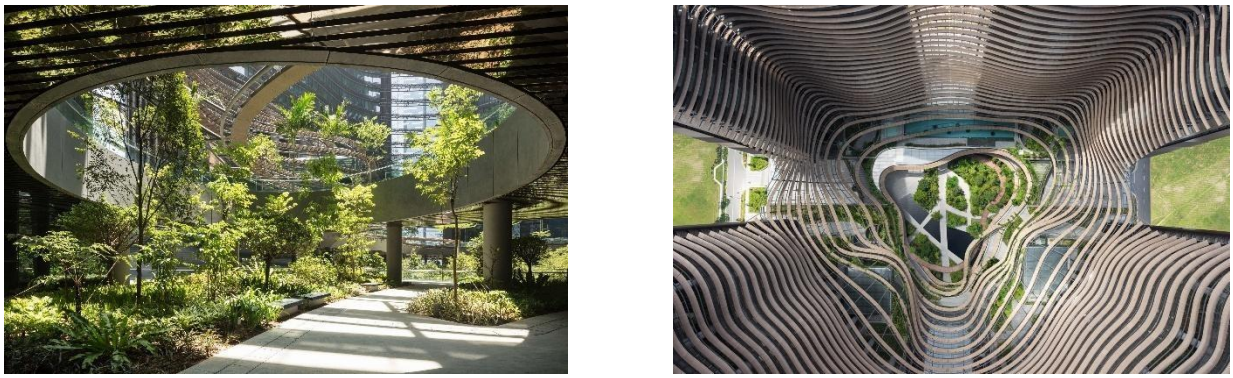
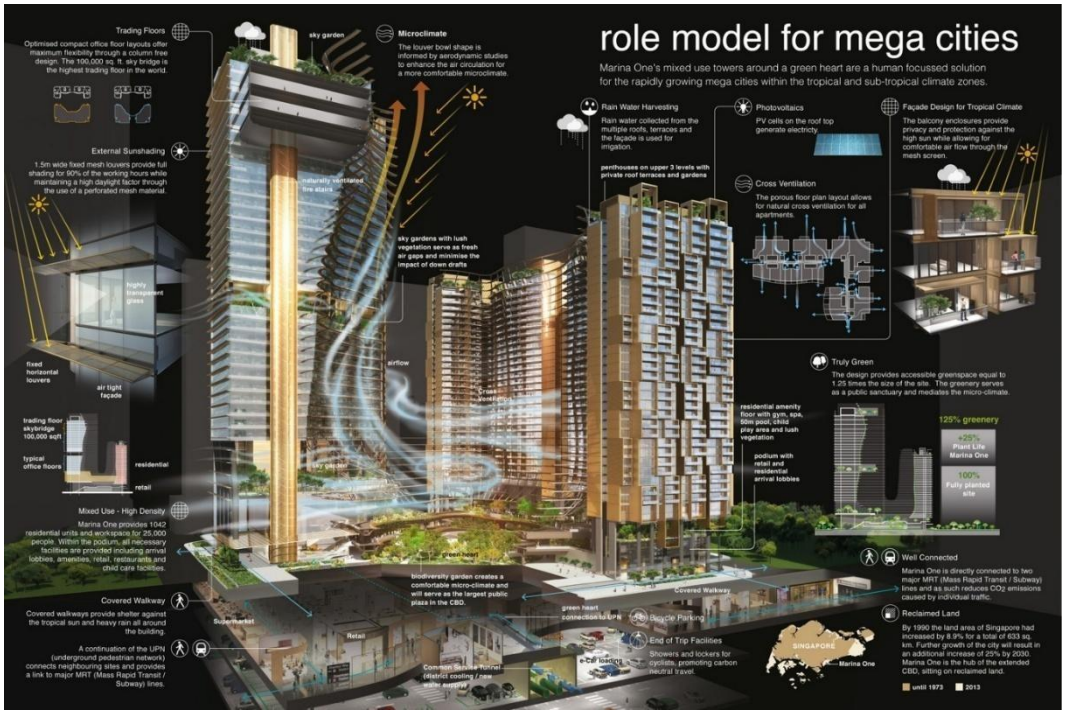


FIGURE 52 THE GREEN HEART

7.2.3 INFOGRAPHIC ON SUSTAINABLE FEATURES



7.2.4 FLOOR PLANS

FIGURE 54 1ST LEVEL PLAN

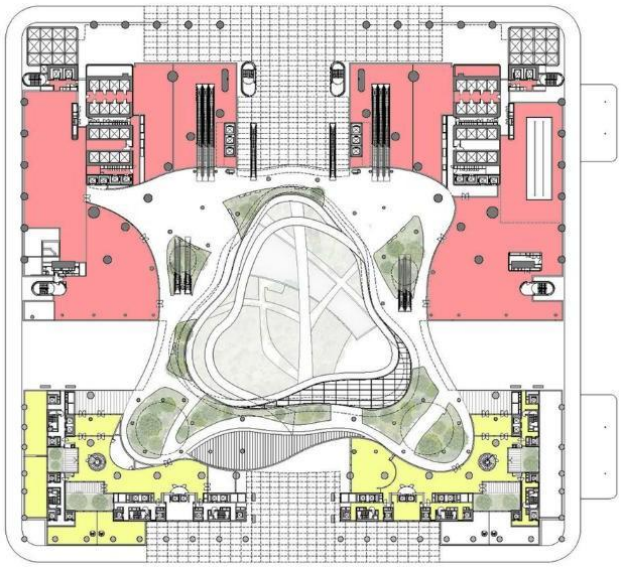


FIGURE 53 2ND LEVEL PLAN

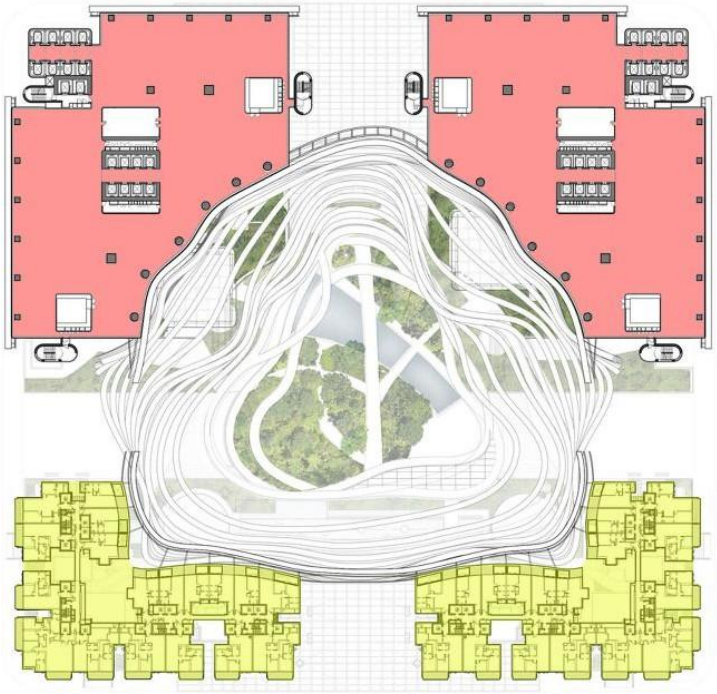


FIGURE 55TYPICAL FLOOR PLAN

7.2.5 ELVATIONS AND SECTIONS

FIGURE 57 SECTION

FIGURE 56 ELEVATION

8.COMPARITIVE ANALYSIS

SN	Parameter	DLF Cybercity, Gurugram	Bagmane Constellations, Bengaluru	RMZ Ecoworld, Bengaluru	Marina Bay One, Singapore	Collective Inference
1	Location	Prime NCR	Prime ORR, Bengaluru	Outer Bengaluru	Central Singapore	All are in prime business districts
2	Area	128 acres	42 acres	77.8 acres (7.7M sq.ft)	6.47 acres	RMZ is largest in built-up area
4	No. of Buildings	12	9	16	5	RMZ leads in number of buildings
5	Footfall (Daily)	~250,000	~40,000	~65,000	~15,000–20,000	DLF has highest daily footfall
6	Parking	~22,000	~5,000–5,300	~10,000	~3,000	DLF offers most extensive parking
8	Development Type	IT/ITeS SEZ	IT/ITeS	Mixed-use	Mixed-use	Marina and RMZ offer mixed-use diversity
9	Key Tenants	Google, IBM, PwC	Amazon, Samsung	Accenture, Shell	Facebook, Mitsubishi	High-end global tenant mix
10	Architectural Typology	High-rise towers	Mid-rise	Campus-style high-performance	Iconic green towers	Diverse typologies; Marina emphasizes identity
11	Amenities	Extensive user amenities	Cafeterias, lounges	Wellness centers, retail	Sky gardens,	All are user-centric; Marina most

					fitness clubs	lifestyle-oriented
13	Sustainability	IGBC Platinum	Rainwater harvesting, STP	LEED Platinum	BCA Green Mark	All meet sustainability standards
15	Smart Features	Basic surveillance	Basic automation	Smart BMS, HVAC	Lighting, sensors, automation	RMZ and Marina are most tech-driven
20	Energy Efficiency	Solar, LEED	Energy-efficient lighting	Green façade, LEED	Passive cooling	RMZ & Marina focus on envelope performance
22	Waste Management	Segregation, recycling	Basic segregation	On-site recycling	Integrated waste system	Marina & RMZ lead in waste integration
25	Opportunities	Tech adoption, expansion	Wellness, metro link	Mixed-use growth	Future-ready green branding	Growth driven by green, tech & urban integration
26	Threats	Competition, policy	Infra strain	Cost pressures	Market volatility	All face market saturation, infra or cost risks

CHAPTER-4- SITE ANALYSIS

9.SITE ANALYSIS

1. PROJECT OVERVIEW

The Bengaluru Signature Business District is envisioned as a world-class commercial hub within the Bengaluru Signature Business Park at Devanahalli. Spanning a significant portion of the development, the district will host a dynamic mix of corporate offices, premium business parks, retail spaces, mall & multiplex, and a modern club with lifestyle amenities. Designed to attract leading global and domestic companies, this district will serve as a key driver for business growth, offering state-of-the-art infrastructure, vibrant public spaces, and a seamless work-live-play environment, aligned with Bengaluru's position as a global innovation and business hub.

Proposed By: Government Of Karnataka

Developer: Karnataka State Industrial And Infrastructure Development Corporation (KSIIDC)

Client: Government Of Karnataka

2. PROOF OF THE SITE

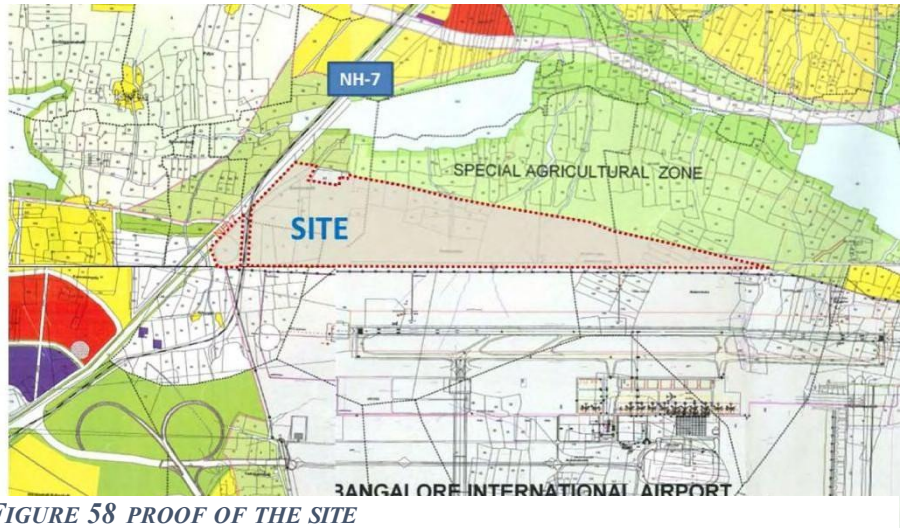


FIGURE 58 PROOF OF THE SITE

9.3 PROPOSED MASTER PLAN

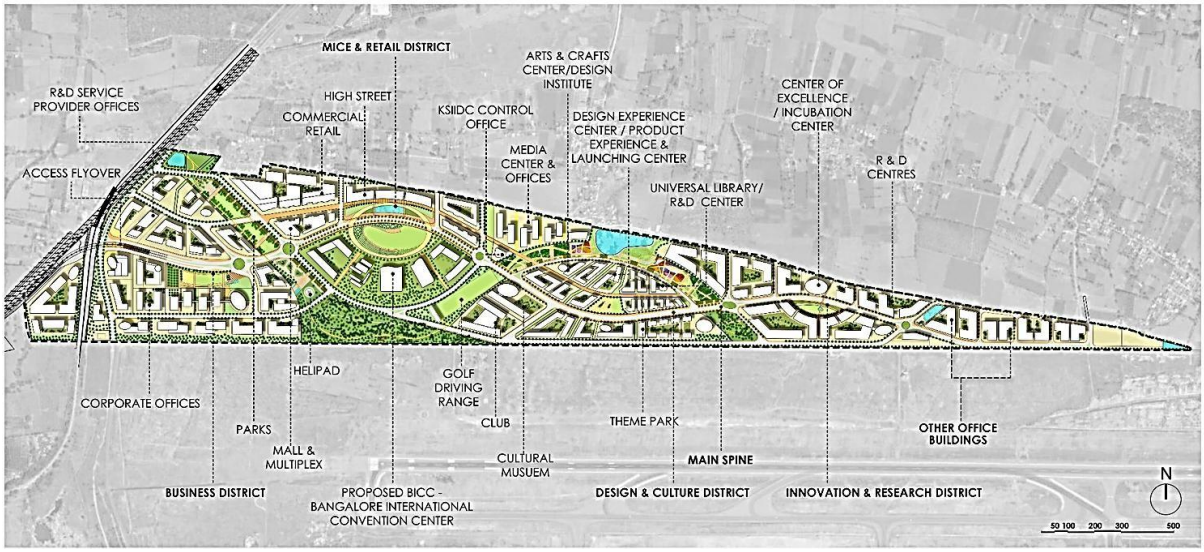


FIGURE 59 PROPOSED MASTER PLAN

9.4 PROPOSED SITE AND REQUIREMENTS

FIGURE 60 PROPOSED SITE AND REQUIREMENTS

- Access flyover
- Business district park
- Signature tower
- Corporate offices
- Premium corporate offices
- Green facing parcels (R&D service provider offices)
- R&D service provider office

9.5 GEOGRAPHICAL LOCATION

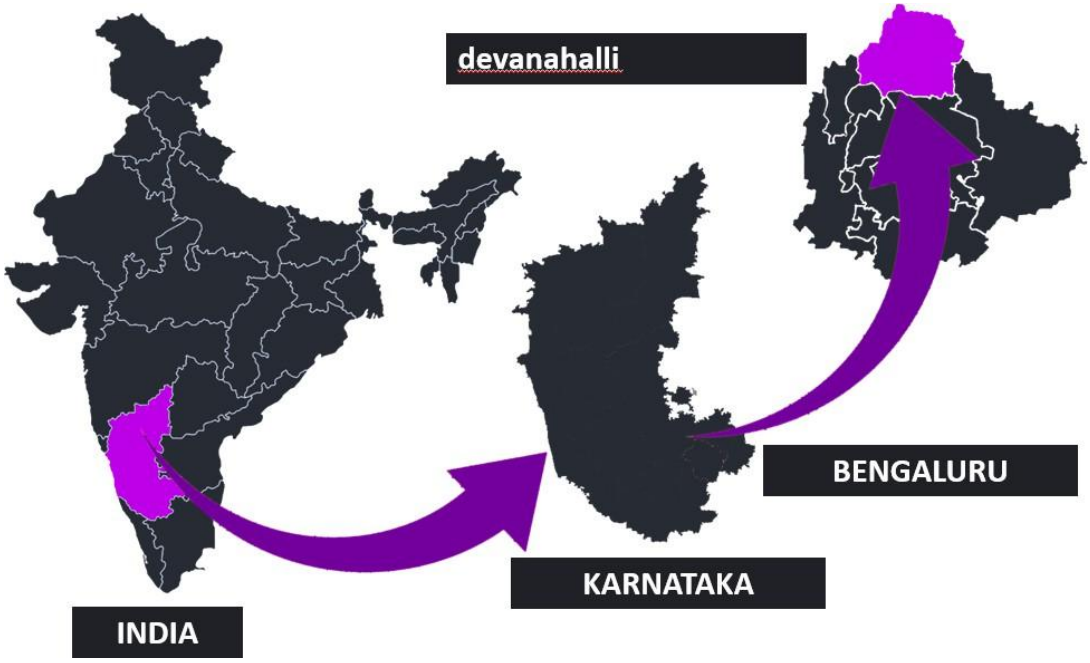


FIGURE 61 GEOGRAPHICAL LOCATION

- **NAME OF THE PROJECT**- Business District, Bengaluru Signature Business Park.
- **LOCATION**- Bengaluru Signature Business Park, Devanahalli Business Park, Doddasanne, Karnataka, India.
- **COORDINATES**- 13°12'40.90" N and 77°41'52.57" E
- **ORIENTATION**: North-South Oriented

9.6 SITE DETAILS

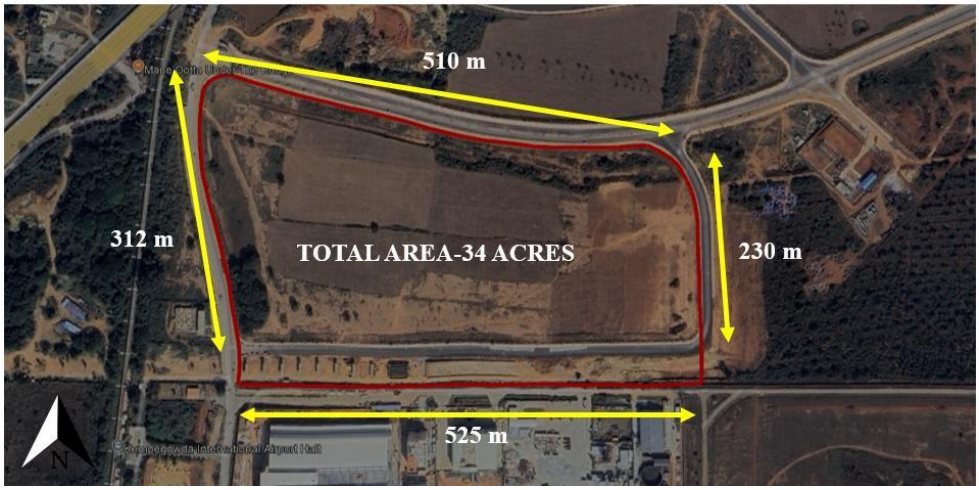


FIGURE 62 SITE DETAILS

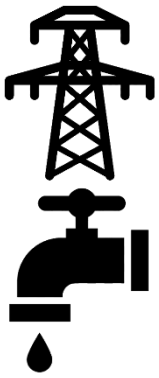
9.7 LAND USE BREAK-UP OF THE PROPOSED DEVELOPMENT

Trunk Infrastructure	Area (Acres)
Internal Roads	83.39
Green Parks and open spaces including water body and Social forestry) (Greens -40.84 Acres, Social Forest – 13.30 Acres, Water body – 5.65 Acres)	59.79
Utilities (STP, UGWT, Power Station, Waste Collection)	7.90
Parking and amenities (including bus bays and parking areas at basements 1&2 to an extent of 10.15 acres each)	10.15
Sub-total	**161.23**

Description	Area (Acres)
Business District	71.62
Design & Cultural District	36.75
MICE & Retail District	70.47
Innovation & Research District	56.86
Other Office buildings	10.15
Total	**245.85**

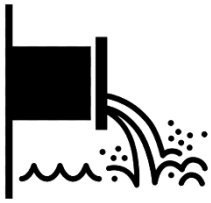
PHASE	PROPOSED DEVELOPMENT (Area to be developed & utilized)	PROPOSED YEAR OF COMPLETION
Phase I	41%	Year 0 – Year 10
Phase II	Balance 14%	Year 11 – Year 15
Phase III	Balance 13 %	Year 16 – Year 20
Phase IV	Balance 12 %	Year 21 – Year 25
Phase V	Balance 20 %	Year 26 – Year 30

9.8 INFRASTRUCTURE REQUIREMENTS



- The estimated power requirement for the project in construction phase is **85.7 kVA** which will be sourced from the **Bangalore Electricity Supply Company (BESCOM)**. **DG sets 2 No's** of **65.2 kVA**. During operation phase, the grid power will be supplied by **KPTCL**. **80 MVA** from Grid (KPTCL).

- Total water demand is **21,800** kilolitres per day. **9,210 kilolitres per day** potable water from Bangalore Water Supply and Sewerage Board. **12,590 kilolitres per day** non-potable water from Karnataka Industrial Areas Development Board. Additional **2,000 kilolitres per day** treated water from Karnataka Industrial Areas Development Board for early project stages.



- The project will generate **14,370 kilolitres per day** of wastewater, treated in modular sewage treatment plants with a total capacity of **13 million litres per day** using the MBBR process and chlorination. About 1**3,000 kilolitres per day** of treated water will be reused for toilet flushing, landscaping, and HVAC cooling towers. STPs will be implemented phase-wise based on detailed engineering for each phase.

- The project will provide direct employment of about **3,27,649 (Source: DPR-Part II)** during the operation Phase (Upon completion of all phases).

9.9 ACCESSIBILITY

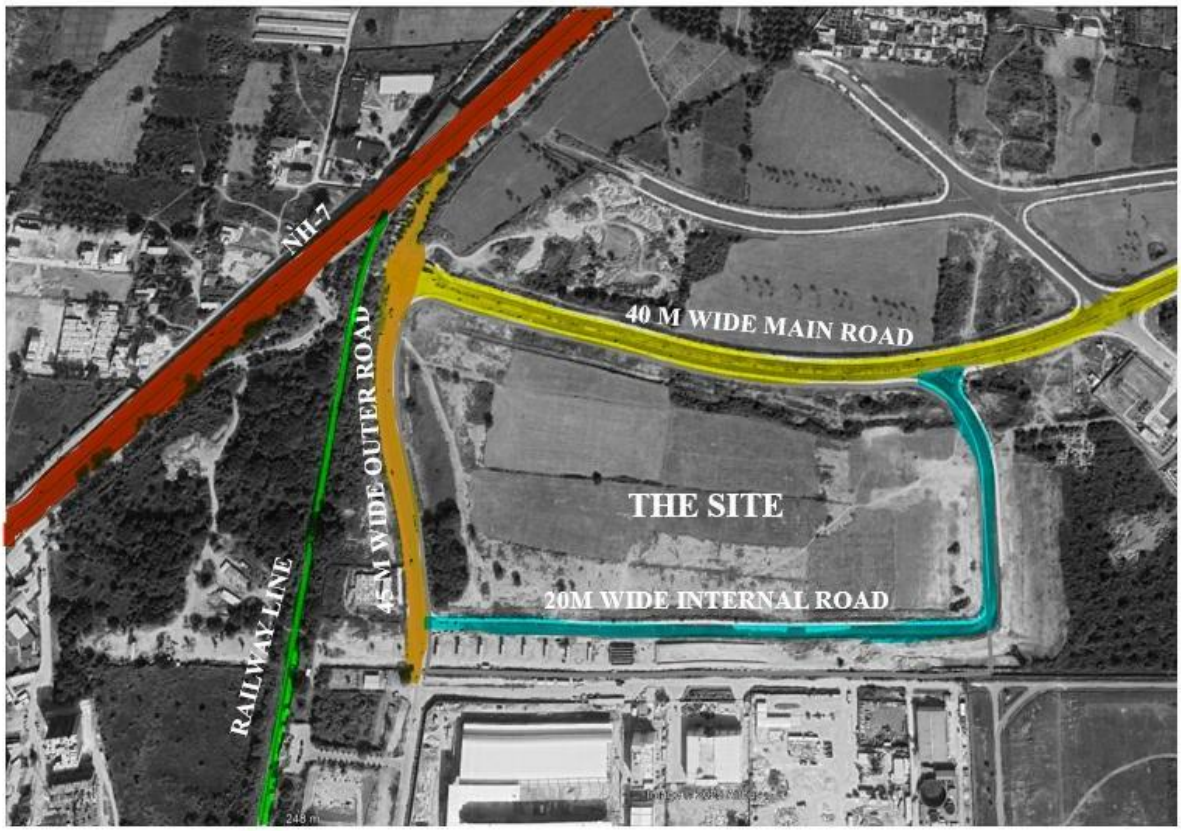
Kempegowda International Airport (BLR): 7.1 KM

Devanahalli Railway Station- 7.8 km

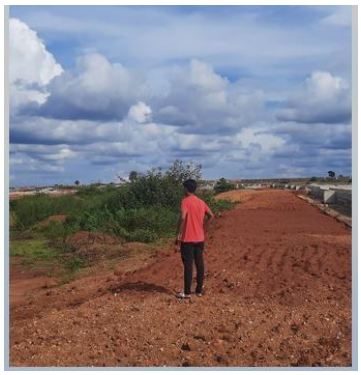
Devanahalli Old Bus Stand- 8.6 km

Namma Metro extension - UPCOMING

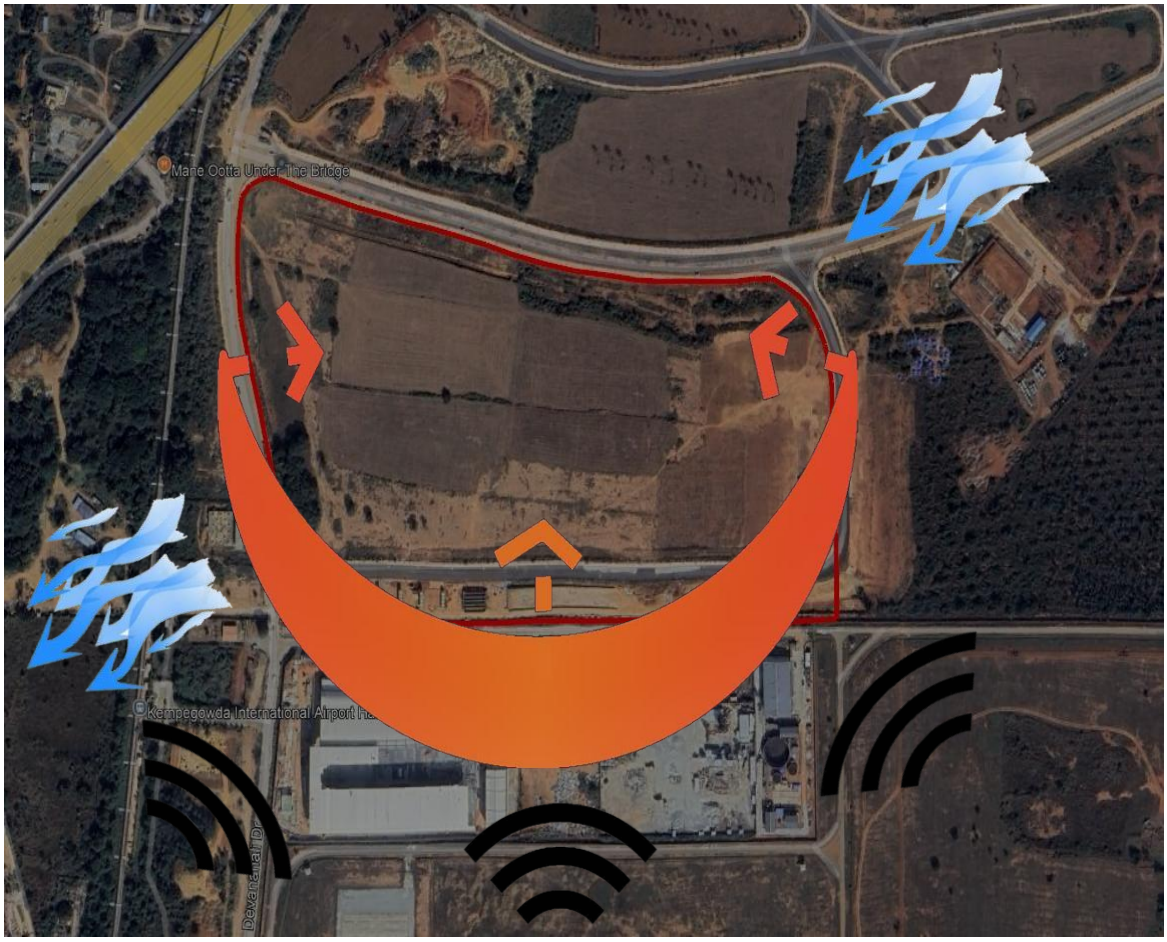
9.10ROAD NETWORK



9.11SITE PHOTOGRAPHS



9.12 SUN PATH, WIND AND NOISE DIRECTION



- **Sunpath**: East to West with high solar angles (tropical sun path).
- **Prevailing Wind**: Southwest winds during monsoon (June–September). Northeast winds during winter (October–February).
- **Noise Direction:** Major noise from the south and southeast (highways and airport).

9.13 CLIMATIC DATA

	January	February	March	April	May	June	July	August	September	October	November	December
Avg. Temperature °C (°F)	20.7 °C (69.3) °F	22.8 °C (73) °F	25.4 °C (77.8) °F	26.6 °C (80) °F	25.5 °C (77.9) °F	23.2 °C (73.8) °F	22.4 °C (72.3) °F	22.2 °C (71.9) °F	22.4 °C (72.3) °F	22 °C (71.6) °F	20.9 °C (69.7) °F	20.1 °C (68.2) °F
Min. Temperature °C (°F)	14.6 °C (58.4) °F	16.1 °C (61) °F	18.7 °C (65.6) °F	20.8 °C (69.4) °F	21 °C (69.8) °F	20.2 °C (68.3) °F	19.8 °C (67.6) °F	19.4 °C (66.9) °F	19 °C (66.2) °F	18.4 °C (65.1) °F	16.7 °C (62) °F	15.1 °C (59.1) °F
Max. Temperature °C (°F)	27.4 °C (81.2) °F	29.6 °C (85.3) °F	32.1 °C (89.8) °F	32.8 °C (91.1) °F	31.2 °C (88.2) °F	27.5 °C (81.5) °F	26.4 °C (79.5) °F	26.1 °C (79) °F	26.7 °C (80) °F	26.4 °C (79.6) °F	25.7 °C (78.3) °F	25.8 °C (78.4) °F
Precipitation / Rainfall mm (in)	4 (0)	7 (0)	16 (0)	45 (1)	131 (5)	126 (4)	134 (5)	137 (5)	125 (4)	147 (5)	65 (2)	23 (0)
Humidity(%)	56%	46%	41%	51%	65%	76%	78%	79%	78%	78%	72%	65%
Rainy days (d)	1	1	2	5	11	14	15	15	12	13	7	3
avg. Sun hours (hours)	8.9	9.8	10.4	10.6	9.5	6.8	6.1	5.7	6.4	7.2	7.1	7.5

9.14FACTORS AFFECTING MICRO-CLIMATE

- Proximity to Major Roads and Highways: Increased vehicular movement contributes to localized heat (urban heat island effect) and noise pollution.
- Nearby Industrial and Commercial Areas: These can lead to higher ambient temperatures and localized air pollution.
- Water Bodies: Presence of nearby lakes and tanks can create cooling effects and increase local humidity.
- Vegetation Cover: Pockets of green areas and tree cover help in moderating temperature and improving air quality.
- Topography: Slight undulations in the terrain may influence wind flow patterns and water drainage around the site.

9.15 EXISTING VEGETATION ON SITE


Millettia pinnata


Millettia pinnata


Cocos nucifera


Azadirachta indica


Phoenix dactylifera


Ficus carica


Acacia nilotica


EXISTING GRASS ON SITE


EXISTING ROSE GARDEN ON SITE

9.16SORROUNDING WATERBODIES

Lakes near Devanahalli Business Park aid in **flood control, groundwater recharge**, and **cooling the microclimate.** They support **biodiversity,** enhance aesthetics, and promote sustainable water management for the development.

DODAJALA LAKE

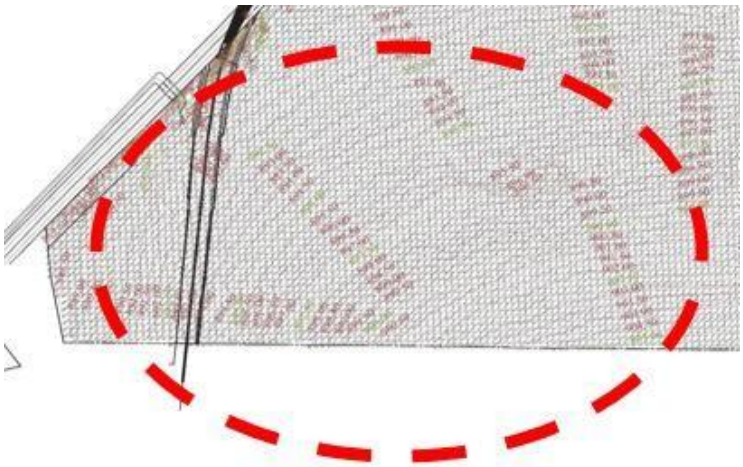
BETTAKOTE LAKE

9.17SOIL AND FOUNDATION TYPE

RED SOIL

- **Shallow Foundation** (e.g., isolated footings or strip footings) if the red soil is compact and has good bearing capacity.
- **Raft Foundation** if the red soil is moderately strong but needs uniform load distribution.
- **Pile Foundation** if red soil is loose, soft, or if deeper, stronger strata are required to support heavy loads.

9.18 SITE CONTOURS



Contour & Elevation:

- Contours are marked at 50m intervals, indicating elevation changes.
- Higher elevation areas are towards one end, while the other end is at a lower elevation.

Slope Analysis:

- The site slopes from left (northwest) to right (southeast).
- The steepest areas appear near the central and southeastern parts.
- The gentler slopes are located towards the northwest.

9.19SWOT ANALYSIS

STRENGTHS

- Proximity to Kempegowda International Airport.
- Well-connected via NH-44 and upcoming metro extension.
- Availability of large land parcels for development.

WEAKNESSES

- Dependence on airport-driven economy.
- Infrastructure still developing compared to central Bengaluru.
- Distance from core city limits may affect workforce commute.

OPPORTUNITIES

- Potential hub for aerospace, IT, and logistics industries.
- Upcoming metro connectivity will boost real estate and business prospects.
- Scope for sustainable and smart city infrastructure development.

THREATS

- Risk of urban sprawl and unplanned growth.
- Environmental concerns related to nearby lakes and agricultural zones.
- Competition from other business hubs like Whitefield and Electronic City.

9.20SURROUNDING LANDMARKS

Kempegowda International Airport

Located adjacent to the business park, this is Bengaluru's primary international airport, providing both domestic and international flights.

Devanahalli Fort

Approximately 5 kilometers northeast of the business park, this 16th-century fort is historically significant as the birthplace of Tipu Sultan.

Clarks Exotica Convention Resort & Spa

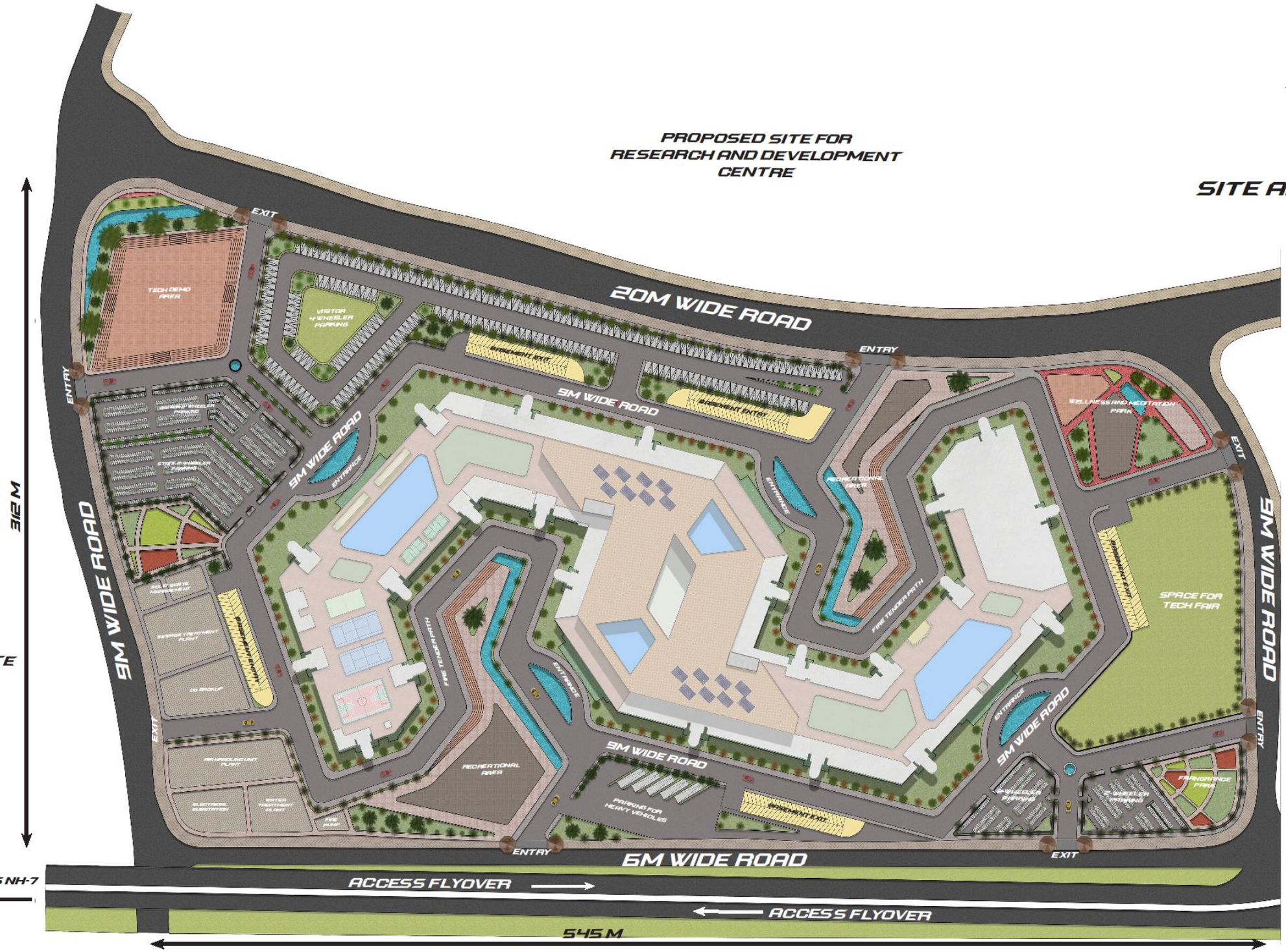
A luxury hotel and convention center, around 10 km away catering to business and leisure needs.

CHAPTER-4- DESIGN SHEETS

SITE PLAN

PROPOSED SITE FOR
RESEARCH AND DEVELOPMENT
CENTRE

SITE AREA- 33 ACRES

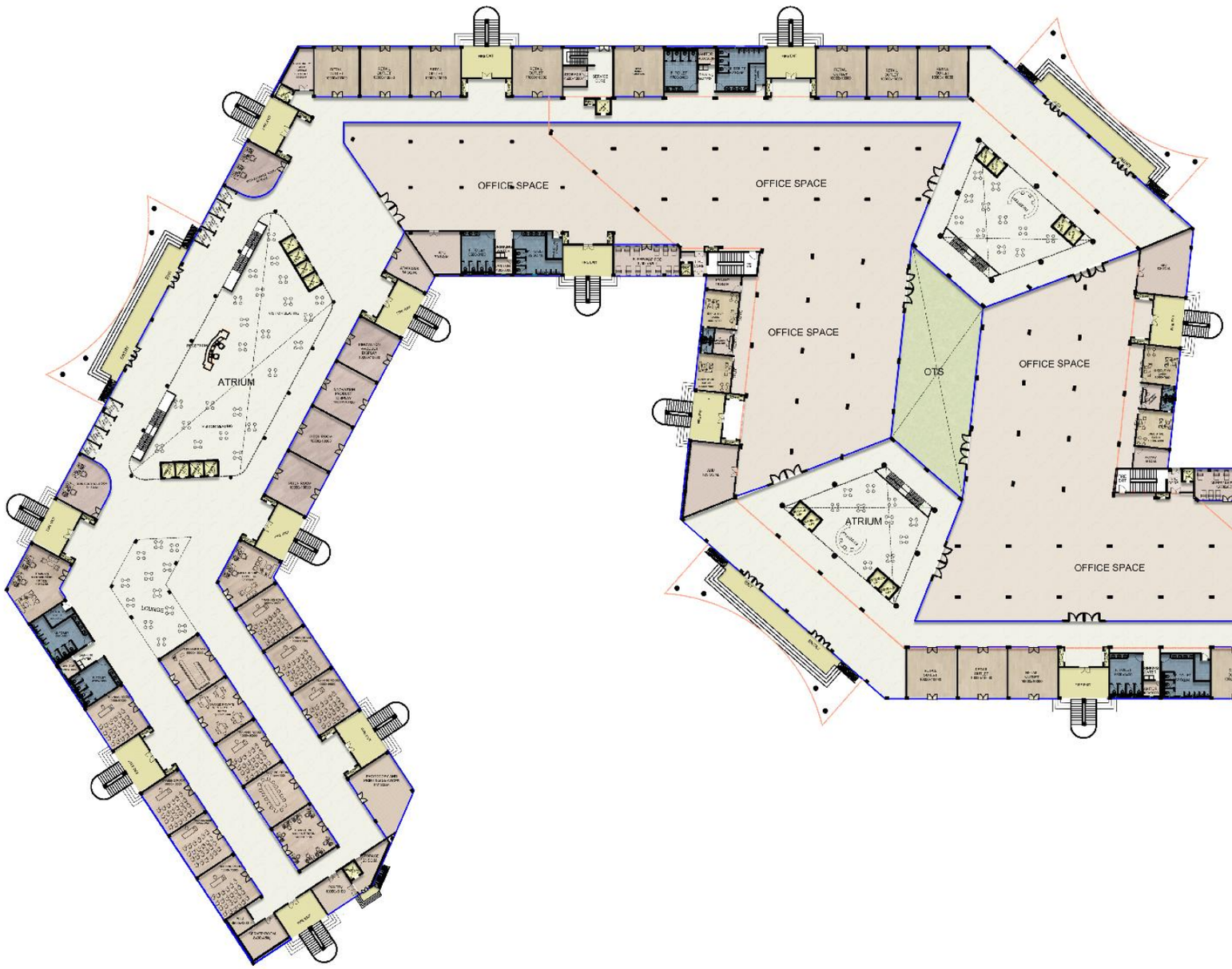


BUSINESS AND INNOVATION HUB

INSHA IMRAN
B.ARCH 5TH YEAR

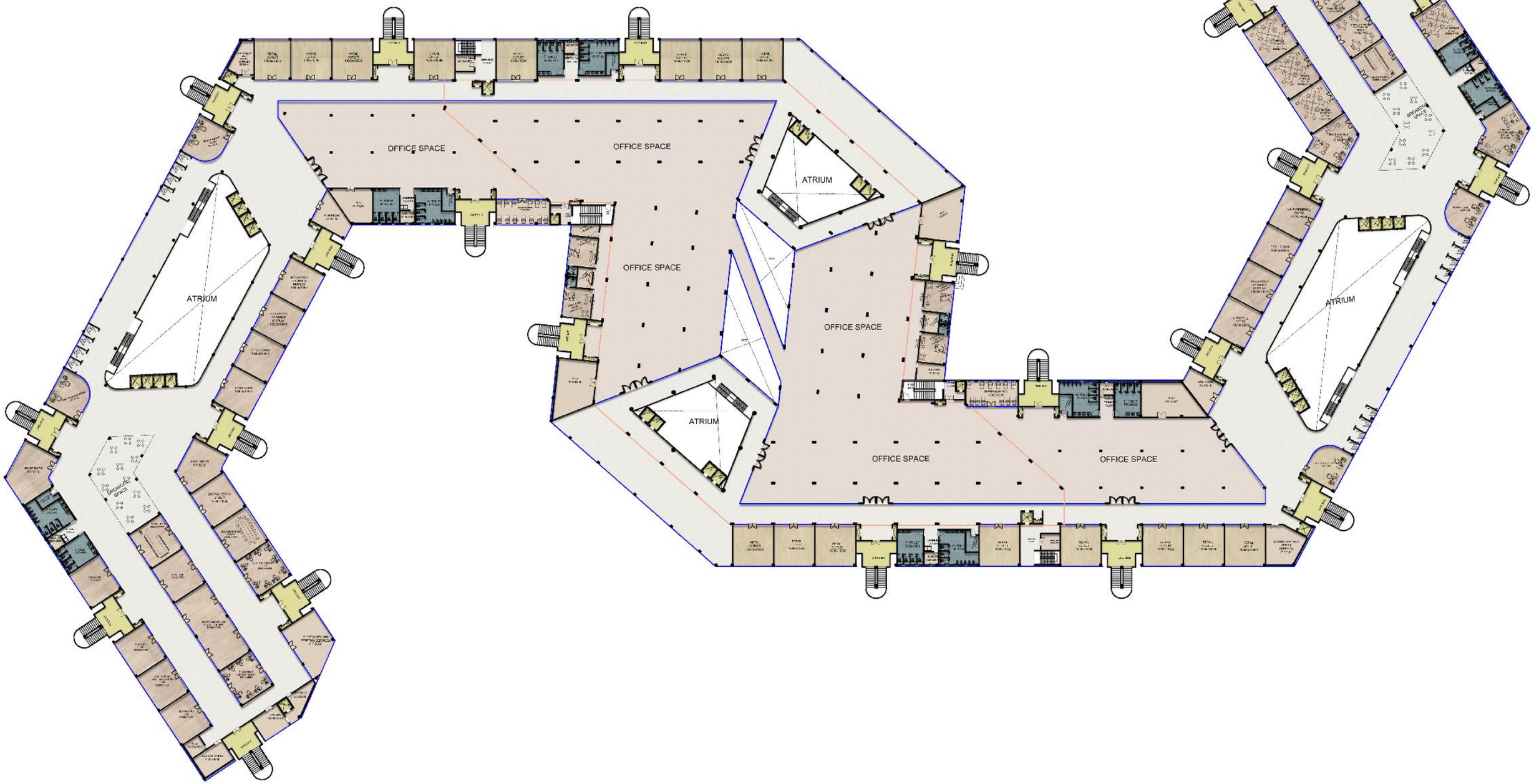
GROUND FLOOR PLAN

TOTAL AREA- 32357 SQ.M
CIRCULATION AREA -13722 SQ.M



FIRST FLOOR PLAN

TOTAL AREA- 32357 SQ.M
CIRCULATION AREA -13722 SQ.M



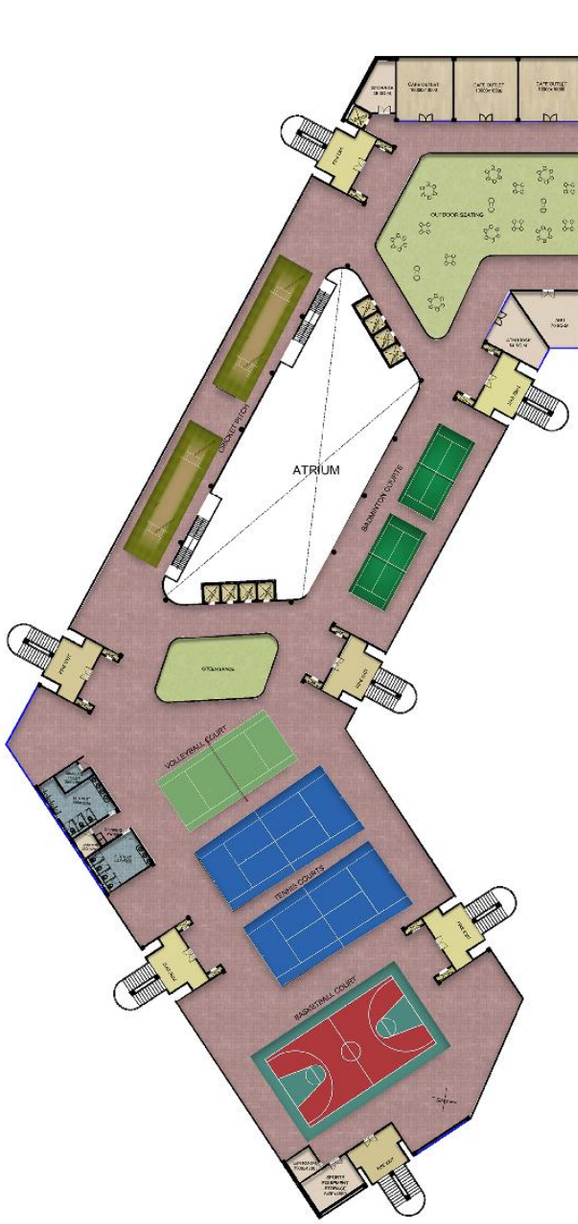
SECOND FLOOR PLAN

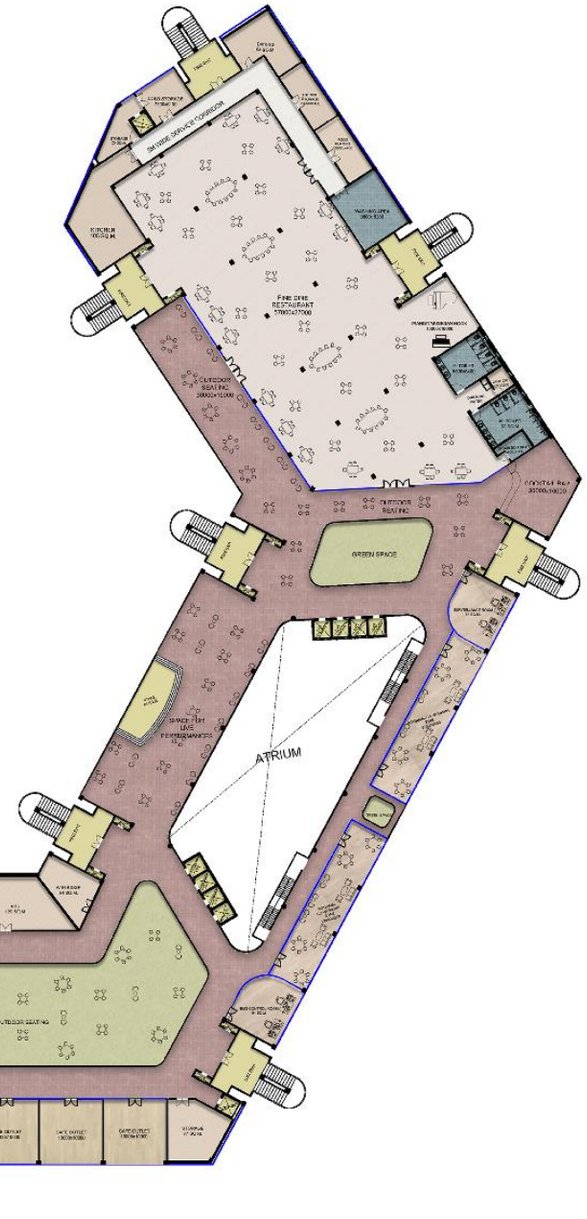
TOTAL AREA- 32357 SQ.M
CIRCULATION AREA -13722 SQ.M

INSHA IMRAN
B.ARCH 5TH YEAR

THIRD FLOOR PLAN

TOTAL AREA- 32357 SQ.M
COVERED AREA -14456 SQ.M
OPEN AREA- 17907 S SQ.M.

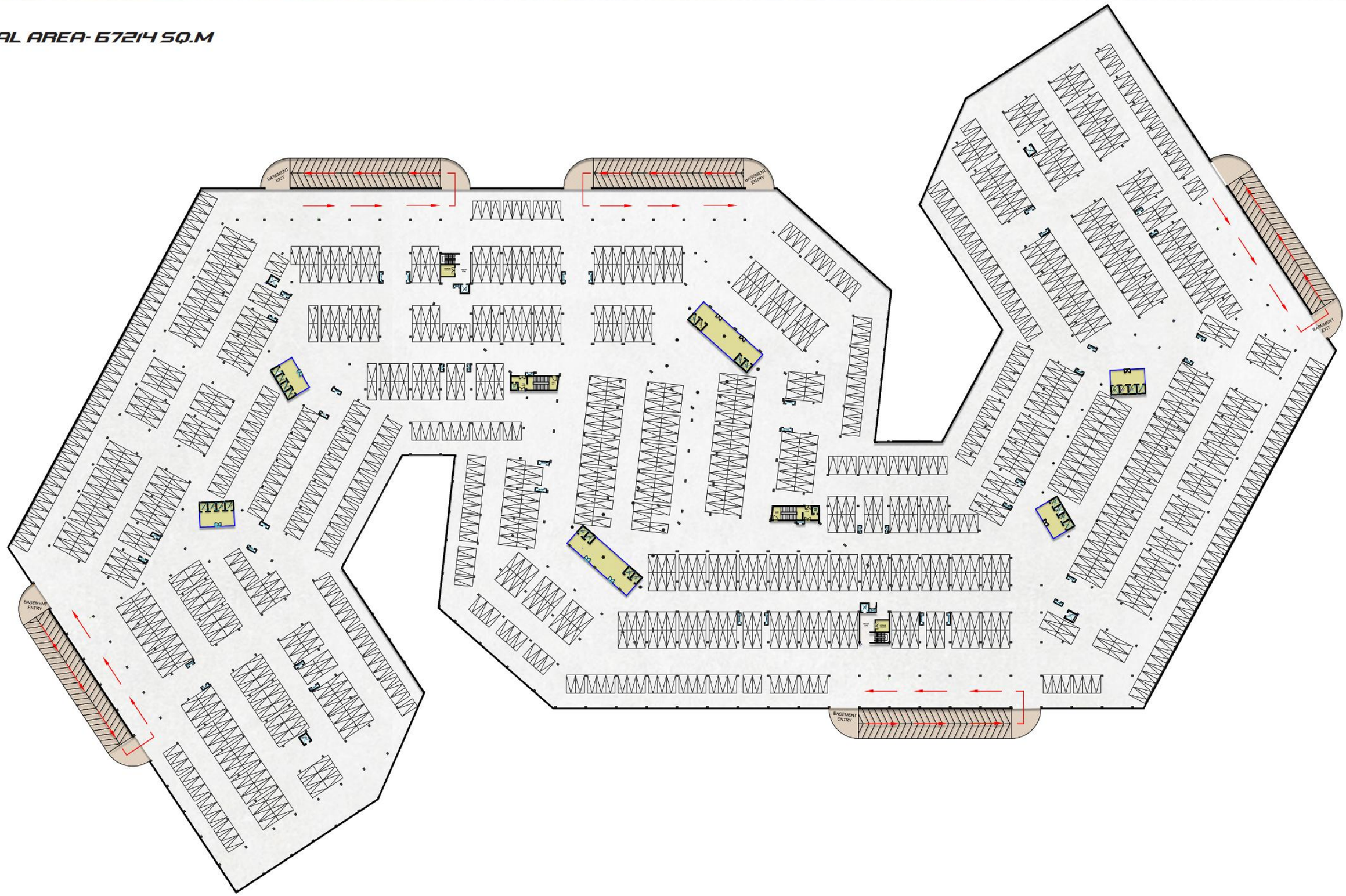




INSHA IMRAN
B.ARCH 5TH YEAR

TYPICAL BASEMENT PLAN

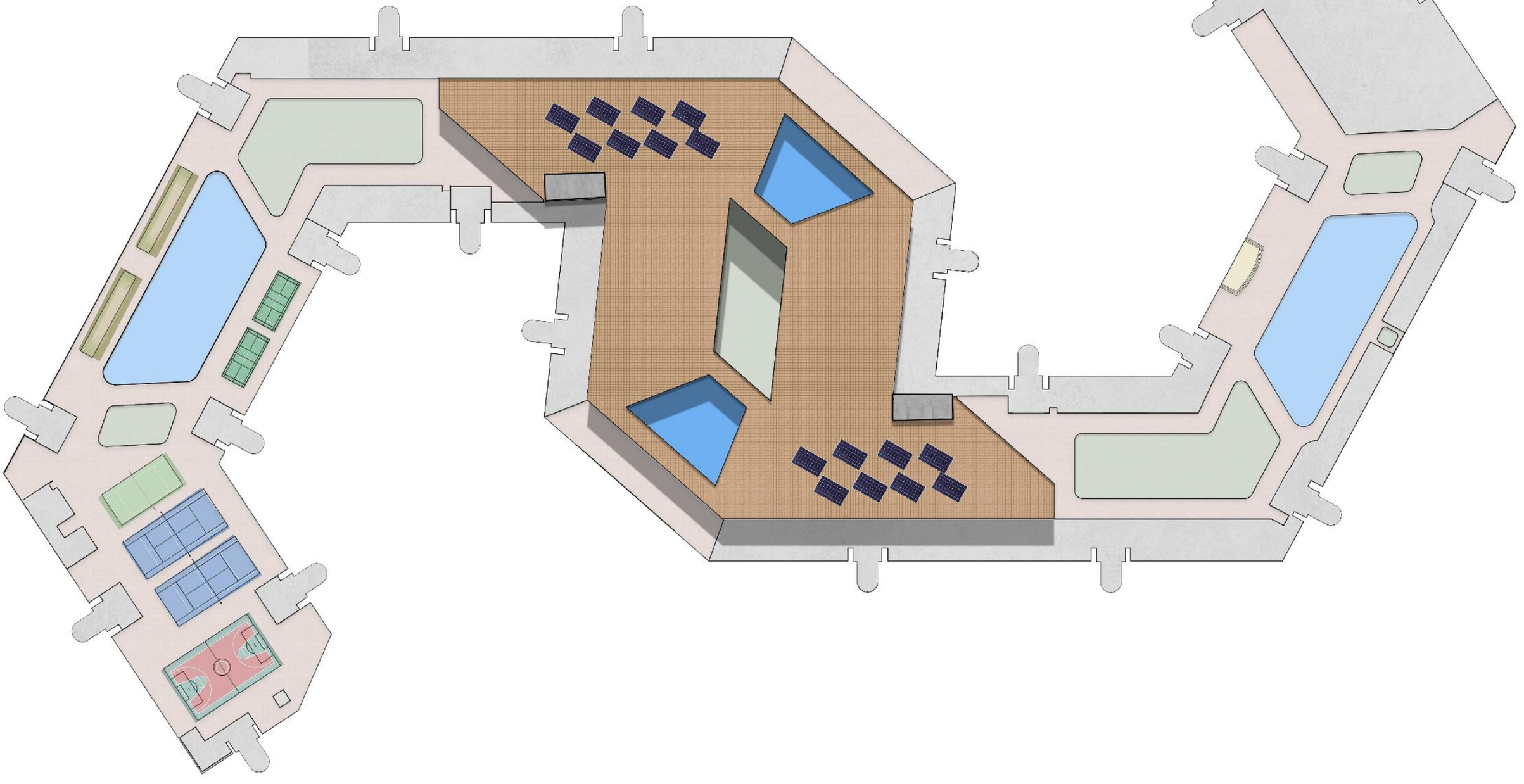
TOTAL AREA- 67214 SQ.M



INSHA IMRAN
B.ARCH 5TH YEAR

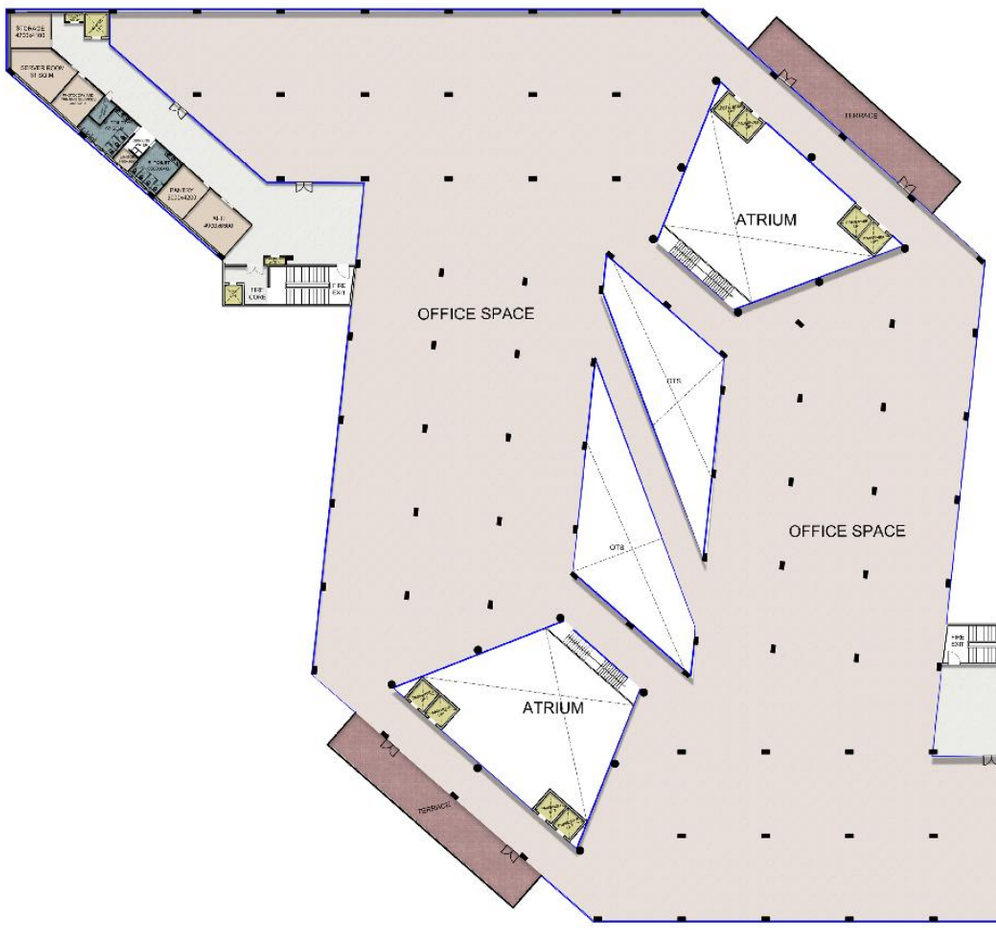
TERRACE FLOOR PLAN

TOTAL AREA- 32357 SQ.M
LOWER TERRACE AREA - 17964 SQ.M.
UPPER TERRACE AREA- 9153 SQ.M.



TYPICAL FLOOR PLAN AND VIEWS

TOTAL AREA- 9234 SQ.M
AREA UNDER OFFICE SPACE-8032 SQ.M



TYPICAL FLOOR PLAN (4TH-10TH FLOOR)

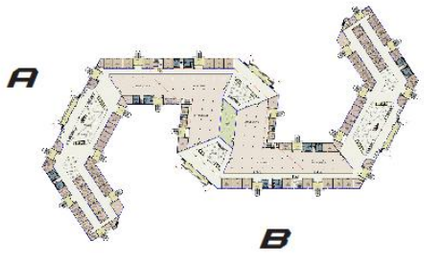
VIEWS

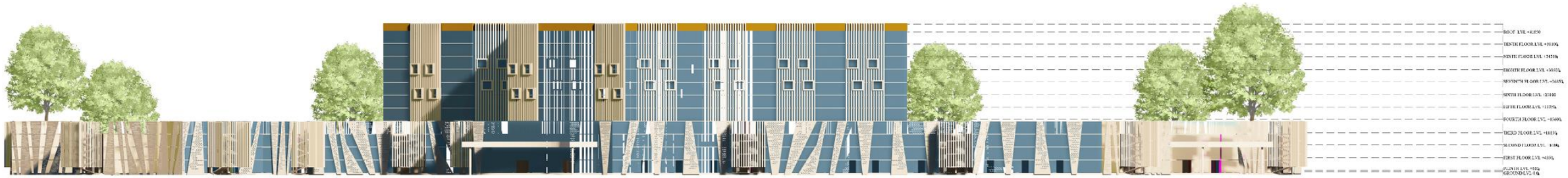
BUSINESS AND INNOVATION HUB

INSHA IMRAN
B.ARCH 5TH YEAR

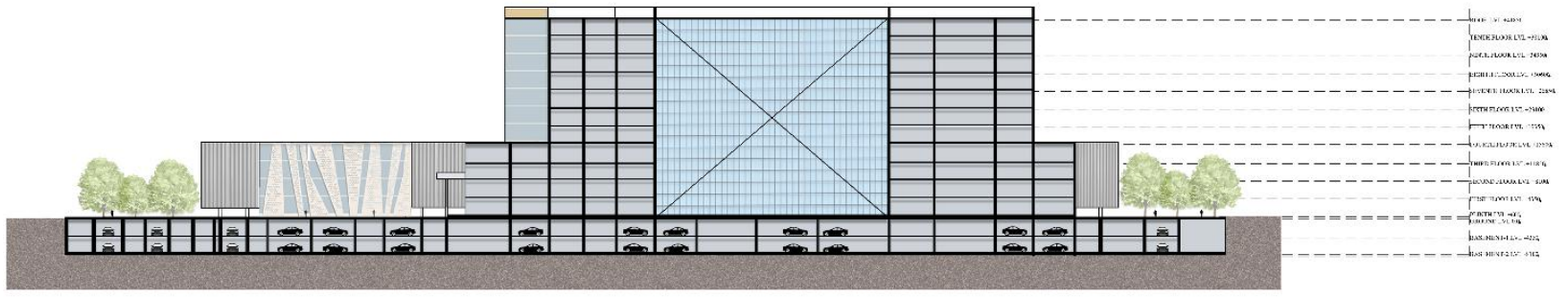
ELEVATIONS AND SECTIONS

ELEVATION AT A

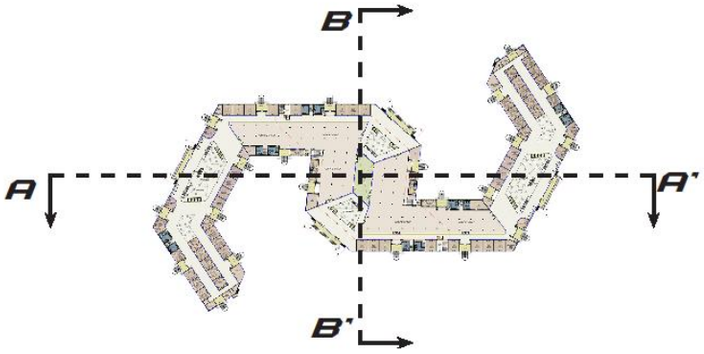


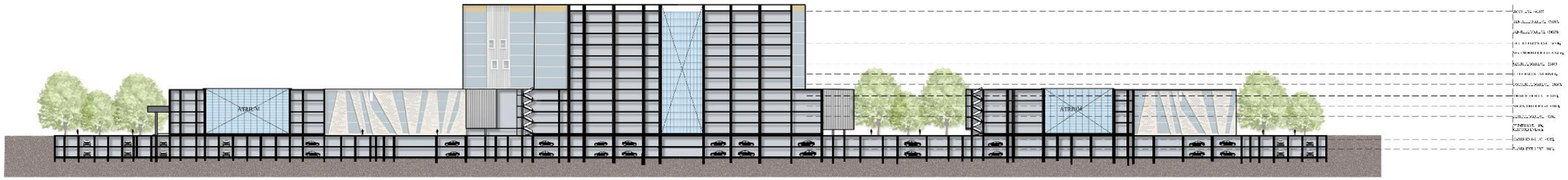


ELEVATION AT B



SECTION AA'



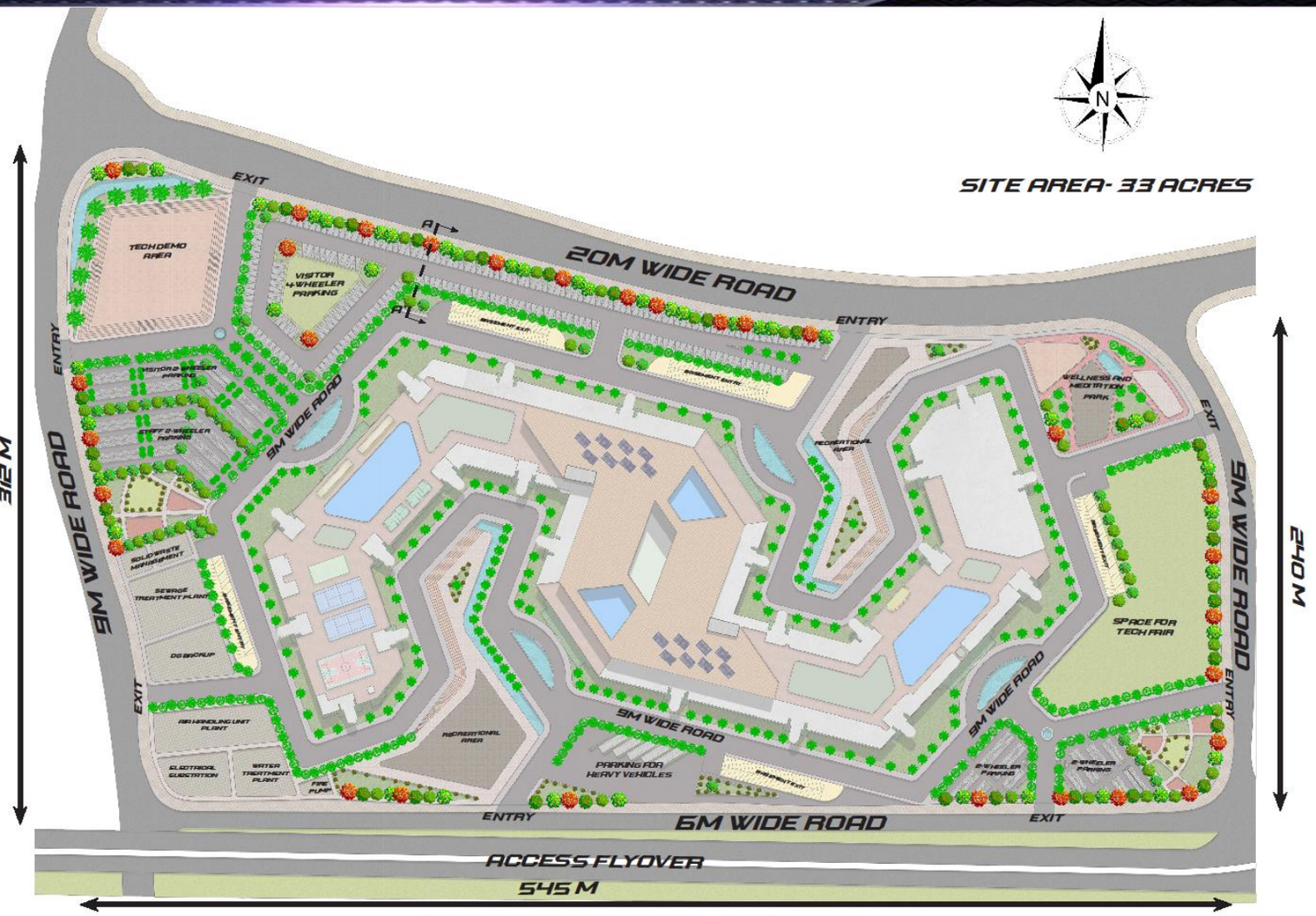


SECTION BB'

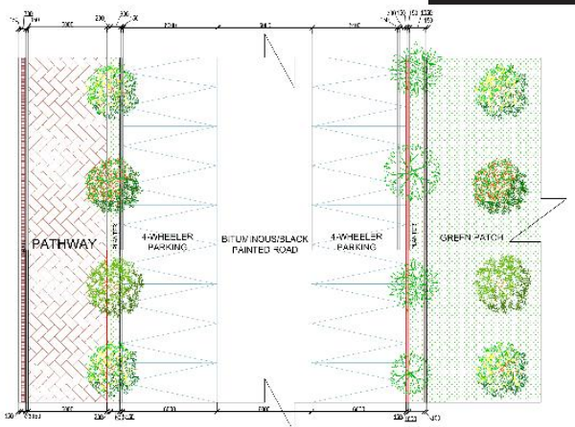
BUSINESS AND INNOVATION HUB

INSHA IMRAN
B.ARCH 5TH YEAR

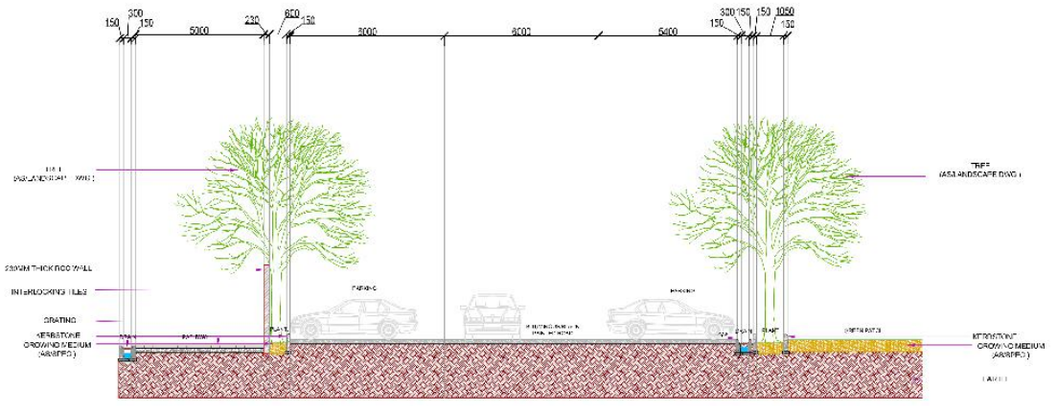
ELECTIVE-LANDSCAPE DESIGN



LANDSCAPE PLAN



DETAIL AA'



SECTION AA'

LEGEND FOR TREES AND SHRUBS			
COMMON NAME	BOTANICAL NAME	SYMBOL	IMAGE
ROYAL PALM	ROYSTONEA REGIA		
PRIDE OF INDIA	LAGERSSTROEMIA SPECIOSA		
BLACKBOARD TREE	ALSTONIA SCHOLARIS		
GULMOHAR	DELONIX REGIA		
AMALTAS	CASSIA FISTULA		
ASHOKA	SARACA ASOCA		
BOTTLE BRUSH	CALLISTEMON		
FLAME OF THE FOREST	BUTEA MONOSPERMA		
FLOWERING PLANTS (AS/ SEASONAL AVAILABILITY)			

LEGEND

- INTERLOCKING TILES-1
- INTERLOCKING TILES-2
- EPDM FLOORING
- SANDSTONE
- NATURAL TURF (DARK)
- NATURAL TURF (LIGHT)
- WATER
- WOODEN DECK
- BRICK
- BITUMEN
- COBBLE STONE

BUSINESS AND INNOVATION HUB

INSHA IMRAN
B.ARCH 5TH YEAR