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International Convention Centre

Warangal, Telangana, India

Dec, 2025

International Convention Centre

Warangal, Telangana, India

BACHELOR OF ARCHITECTURE

BY

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DEPARTMENT OF ARCHITECTURE AND PLANNING

MAULANA AZAD NATIONAL INSTITUTE OF TECHNOLOGY, BHOPAL

DEC 2025

ARC 511 – Thesis Project

International Convention Centre

Warangal, Telangana, India

Submitted by:

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B. ARCH

9th Semester, 5th Year

UNDER THE GUIDANCE OF

Prof. Arshi Parashar

DEPARTMENT OF ARCHITECTURE AND PLANNING

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DEPARTMENT OF ARCHITECTURE AND PLANNING

MAULANA AZAD NATIONAL INSTITUTE OF TECHNOLOGY, BHOPAL

CANDIDATE DECLARATION

The Thesis Project in the subject ARC 511, entitled "**International Convention Centre, Warangal, Telangana, India"**, is being submitted in partial fulfilment of the requirement for the award of degree of Bachelor of Architecture by the undersigned for evaluation.
The matter embodied in this project is a record of my own work. If, in future, it is found that the above statement is false, then I have no objection in withdrawal of Bachelor of Architecture Degree awarded to me by the Institute.

Date: 1st – 2nd Dec, 2025

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RECOMMENDATION

Based on the above declaration of the student, the undersigned recommends that the work submitted by the candidate may be considered for the final end term examination of the subject ARC-511, Thesis Project.

Date: 1st – 2nd Dec, 2025

Prof. Arshi Parashar
Thesis Guide

CERTIFICATION OF EXAMINATION

The Bachelor of Architecture Thesis Viva-Voce examination of Ms. Swapnil Tripathi Scholar No. 211110045, was held on 1/12/2025 to 2/12/25.

Dr. Nakul Dhagat
Head of Department

Dr. Vicky Lalramsangi
Thesis Coordinator

ABSTRACT

This thesis is about designing a Convention Centre in Warangal, near the Textile Park. The aim of this project is to create a place where people can come together for events, exhibitions, conferences, and cultural programs. I wanted the design to feel welcoming, comfortable, and meaningful for the people who use it.

Warangal has a strong history of textiles and crafts, and this inspired the overall concept. The design tries to reflect the spirit of the city- its culture, identity, and energy. The Convention Centre is imagined not just as a building but as a community space where learning, business, and celebrations can happen in an open and friendly environment.

The project focuses on simple but effective ideas like bringing in natural light, keeping the spaces cool through shading and ventilation, and adding green areas that make the site calm and refreshing. The planning is kept flexible so that different types of events can be held easily without confusion in movement or function.

Overall, this thesis tries to show how architecture can support people, bring communities together, and create a space that feels both modern and connected to its roots.

ACKNOWLEDGMENT

I would like to express my sincere gratitude to everyone who supported me throughout this thesis journey. First, I am deeply thankful to my guide, ***Prof. Arshi Parashar****, whose encouragement, constructive feedback, and constant guidance helped me understand and refine my ideas with clarity. Her support has been invaluable in shaping this work.*

I would also like to extend my gratitude to ***Dr. Vicky Lalramsangi****, our thesis coordinator, for providing consistent direction, motivation, and a structured framework that helped me stay aligned and focused during the entire process.*

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A special thanks to my friend ***Anjali Swain****, who always pushed me forward, and to my classmates who stood by me during long working hours, site visits, discussions, and stressful days. Their support, teamwork, and humour made this journey lighter and more meaningful.*

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CHAPTER I

DESIGN BRIEF

1. OVERVIEW

A design brief is a document that outlines the objectives, requirements, and constraints of a design project. It serves as a roadmap for designers and other stakeholders involved in the project, providing a clear understanding of what needs to be accomplished and the parameters within which the design solution should operate. With the goal of being the best facility of its kind in India, the project will be designed to be a cohesive destination for meetings, hospitality, and entertainment. The project shall comprise an international convention centre, business hotel, entertainment and F&B. The Telangana government plans to build the project using the public-private partnership (PPP) mode under IALA Warangal. The project's designated property is Madikonda, Warangal, Telangana, and is around 10 acres (40468 square meters) in size.

2. INTRODUCTION

The Telangana State Industrial Infrastructure Corporation (TSIIC), under its objective of providing integrated industrial infrastructure development, envisages the need to undertake the development of the Warangal International Convention Centre (WICC) cum 3-Star Hotel at IT Park Madikonda, Warangal, Telangana on Public Private Partnership (PPP) mode under IALA Warangal. The project is proposed on approximately 10 acres (40,468 sq.m.) of land and includes a convention centre, a business hotel, entertainment and F&B facilities, and surface parking. The total built-up area is approximately 250,000 sq.ft. The project aims to provide comprehensive facilities for conventions, exhibitions, meetings, and hospitality in an integrated manner.

3. AIM

To design a comprehensive, inclusive, and culturally responsive convention centre and business hotel complex in Warangal that caters to diverse professional, cultural, and social needs, while harmonizing contemporary architecture with regional identity.

4. OBJECTIVE

- **To analyze the spatial and functional requirements** of a modern convention centre integrated with hospitality, including convention halls, breakout spaces, business hubs, and supporting infrastructure.
- **To design a flexible and sustainable built environment** that facilitates large-scale gatherings, exhibitions, and conferences without compromising user comfort, accessibility, or environmental responsiveness.
- **To establish a meaningful architectural language** that draws inspiration from Warangal's cultural and historic context, especially the Kakatiya heritage, while addressing present and future urban dynamics.
- **To explore efficient circulation, security, and service strategies** within the complex to ensure a smooth user experience for varied stakeholder groups—organizers, delegates, staff, and the public.

- **To assess and apply smart urban infrastructure models**, energy-efficient design strategies, and environmentally responsive technologies suited for Telangana's climatic and urban context.
- **To respond to the PPP framework of development** by proposing a design that is not only architecturally significant but also financially viable and adaptable for phased implementation.

5. PROPOSING AGENCY

The Telangana State Industrial Infrastructure Corporation Limited, envisages the need to undertake development of Warangal International Convention Centre (WICC) cum 3-Star Hotel @ IT Park Madikonda, Warangal, Telangana on Public Private Partnership (PPP) Mode Under IALA Warangal.

6. DETAILS OF SPACES

The Minimum Development Obligations (Build-Up) for the Project:

Sl. No.	Description	Area In sq.ft	
A	**Convention Centre cum Exhibition Centre (2,500 Pax)**	**50,000**	sq. ft.
I	Convention Centre	30,000	sq. ft.
II	Small Meeting rooms	2,000	sq. ft.
III	Large Meeting rooms	5,000	sq. ft.
IV	Business Centre	5,000	sq. ft.
V	Pre-function and Circulation Spaces	8,000	sq. ft.
B	**Business Hotel (150 Keys)**	**150,000**	sq.ft
C	**Entertainment and F&B**	**50,000**	sq. ft.
	Total	**250,000**	sq. ft.
D	**Parking**	As per GO 168	Surface Parking

Table 1 Site Details

7. SITE DETAILS

Project Site Attributes	
Location	Sy. No. 1791/ 1 of Madikonda (V) Warangal (U) District
Site Area	~ 10 acres (40,468 sq. m.)
Primary Access	NH 163
Visibility & Frontage	Excellent Visibility and Frontage along abutting roads ; contiguous site
Shape, Terrain	Regular and mostly flat
Project Site Boundary	
North	Vacant land
South	Vacant land
East	NH 163 Access road
West	Dharmasagar Canal

Table 2 Project Site Attributes

8. LOCATION

The Project Site is located in Sy. No. 1791/ 1 of Madikonda (V) in Warangal, Telangana, India. The site is located opposite to the Textile Park. Following map shows the location of the Project Site with respect to Warangal.

Latitude: 17.957690 N
Longitude: 79.447151 E

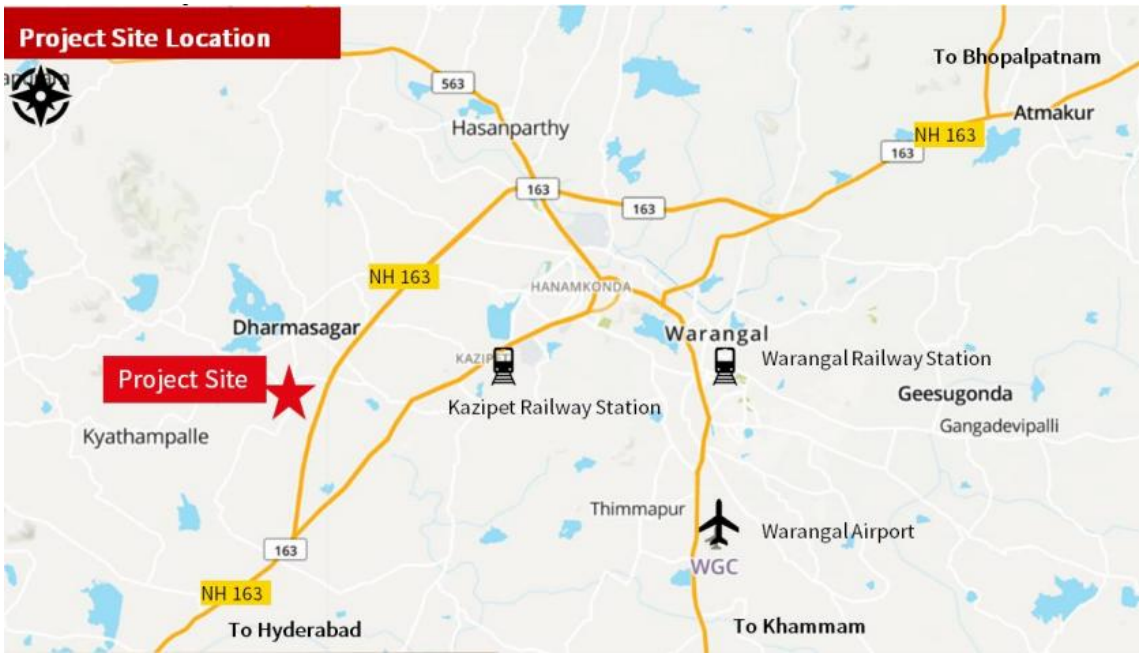


Figure 1: Project Site Location In Warangal

9. PROXIMITY

The table below provides distance of the Project Site with respect to few key landmarks. Details of Landmark Distances from project Site.

Location / Landmark	Approximate Distance from the Project Site
Textile Park	Opposite (Immediate Neighborhood)
V City Madikonda	~3.7 Km
Kazipet Junction	~9 Km
Warangal Railway Station	~20 Km
Hyderabad City	~140 Km
Hyderabad International Airport	~ 161 Km

Table 3 Proximity of Major Landmarks

10. PROPOSED LAND USE ZONE

Land is zoned to the category of Industrial Zone (I)

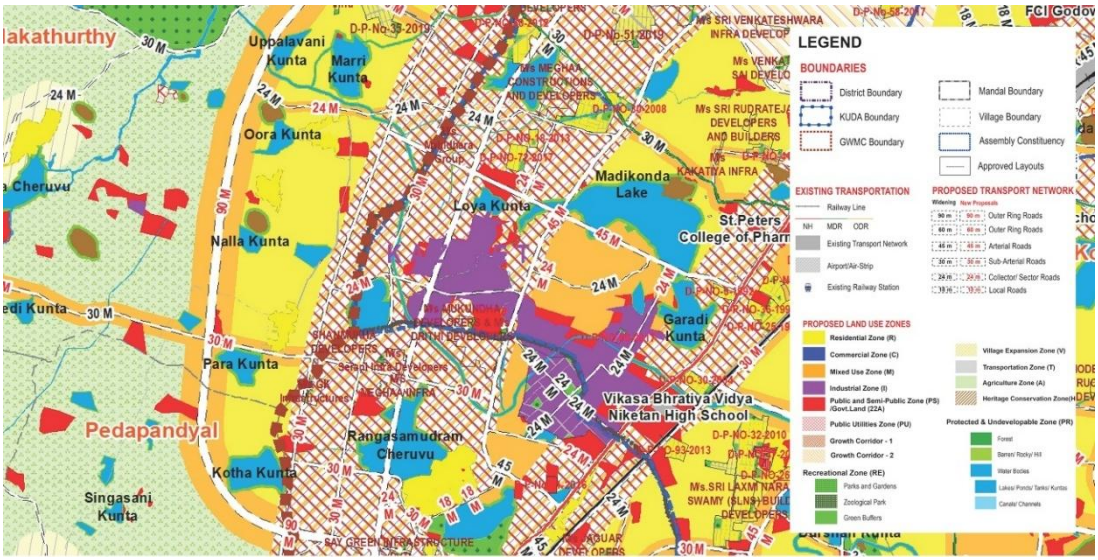


Figure 2: Proposal of Land Use Zone

11. DEVELOPMENT PARAMETERS

According to G.O. Ms. No. 423 (Government of Andhra Pradesh)

Site Area	10 acres (40,468 sq.m.)
Total Build up Area	250,000 sq.ft
F.A.R	2
Ground Coverage	40%
Front Setback	9m
Side Setback	6m
Rear Setback	6m
Minimum Frontage	9m
Internal Road	Varies

Table 4 Area Statement

12. PARKING DETAILS

Category	**Build up Area**	**ECS Per 100 Sq.m**	**Total ECS Required**
Convention Center	50,000 Sq.ft.	2.0 ECS/100 sq.m.	46
Hotel	150,000 Sq.ft.	3.0 ECS/100 sq.m.	139
Entertainment and F&B	50,000 Sq.ft.	2.0 ECS/100 sq.m.	46
Total	250,000 Sq.ft.		**231**

Table 5 Parking Details

13. PROJECT COST ESTIMATE

The project cost (excluding upfront development premium and annual rent during construction payable to TSIIC) is estimated to be ~ Rs. 175 Crores. The table below provides indicative break-up of the estimated Project Cost:
Estimated Project Cost

Particulars	Unit Cost (Rs. per sq. ft.)	Total Project Cost (Rs. Crores)
MICE (International Standard Convention Centre)	~ 6,430	~ 32.15
Business Hotel (150 Keys)	~ 6,607	~ 99.10
Entertainment and F&B	~ 4,620	~ 23.10
Total Development Cost		**~ 154.35**
Interest Cost		~ 20.65
Total Project Cost		**~175.00**

Table 6 Total Project Cost Estimation

14. SITE LAYOUT

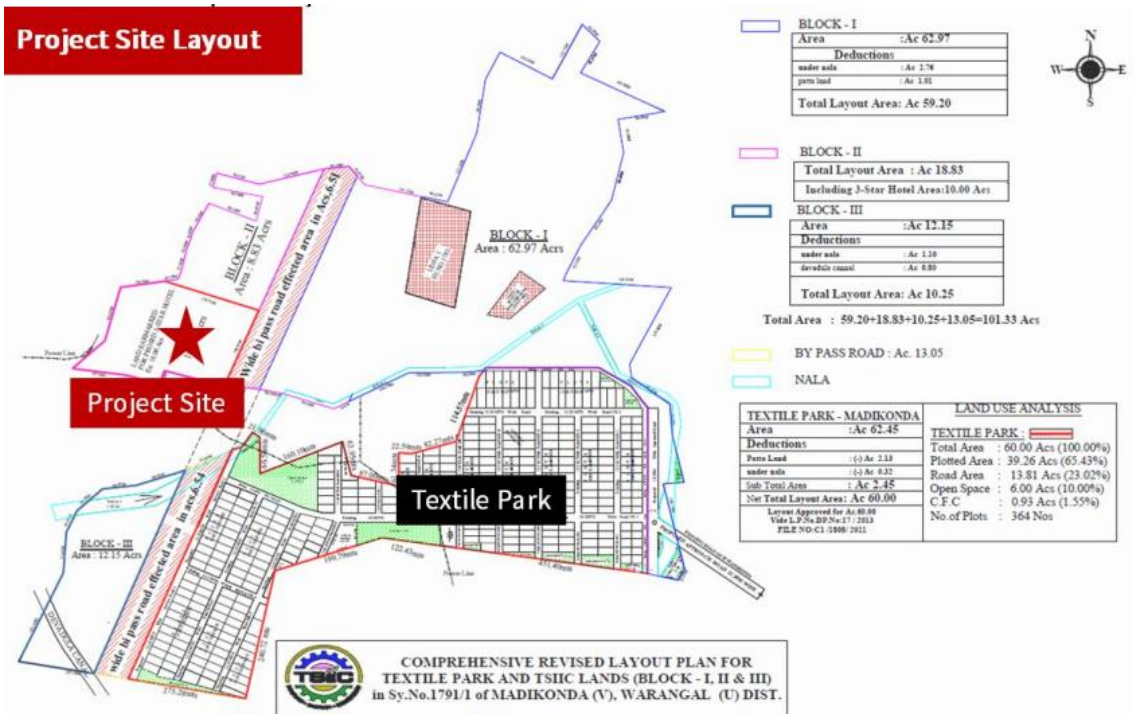


Figure 3: Project Site Layout in Textile Park

15. TENDER DOCUMENT

LETTER OF INVITATION

To:

<Name and Address of the Purchaser of the Request for Proposal Document>

Subject: **Invitation for Submission of Bid for 'Warangal International Convention Centre (WICC) cum 3-Star Hotel @ IT Park Madikonda, Warangal, Telangana on Public Private Partnership (PPP) Mode Under IALA Warangal'.**

Dear Madam / Sir,

We, the Telangana State Industrial Infrastructure Corporation Limited under our core objective of providing integrated infrastructure development for the state of Telangana, envisage the need to undertake development of Warangal International Convention Centre (WICC) on approximately 10 acres (40,468 sq. m.) of land located at Madikonda, Warangal, Telangana, India, on PPP Mode.

The Project is envisaged to be a Warangal International Convention Centre (WICC) cum 3-Star Hotel @ IT Park Madikonda, which is proposed to be developed at Madikonda, Warangal, Telangana, involving private developers.

We have earmarked about 10 acres (40,468 sq. m.)of land for the Project, which is envisaged to be an Warangal International Convention Centre (WICC) cum 3-Star Hotel @ IT Park Madikonda along with other support facilities. This Request for Proposal (the "RFP") document is for the Project, which is being proposed on approximately 10 acres (40,468 sq. m.) of land with about 200,000 sq. ft. of built-up area and corresponding car parking area.

We are pleased to invite you to participate in the bidding process and partner with the Government of Telangana in developing the proposed Warangal International Convention Centre (WICC) cum 3-Star Hotel @ IT Park Madikonda, Warangal, Telangana on Public Private Partnership (PPP) Mode Under IALA Warangal and contribute to the growth of the State of Telangana. This RFP document comprises of three volumes:

1. Volume 1: Instruction to the Bidders
2. Volume 2: Development Agreement
3. Volume 3: Project Information Memorandum

Please feel free to contact us if you need any clarifications and/or additional information.

Yours faithfully,
for Telangana State Industrial Infrastructure Corporation Limited

Vice Chairman & Managing Director

Figure 4: Tender Proposal Invitation

CHAPTER II

LITERATURE SURVEY

16. OVERVIEW

This is a comprehensive review and analysis of existing academic and professional literature relevant to a specific architectural topic or design project. It aims to understand the current state of knowledge, theories, and practices in the field. The survey begins with defining the research question or design focus and establishing the scope and search strategy. Through a systematic review process, relevant literature is selected, read thoroughly, and analyzed for key concepts, theories, and methodologies. By documenting and citing all sources, the survey establishes a foundation for the project, informs conceptual frameworks, and validates research or design decisions. It demonstrates critical engagement with the field and situates the project within the broader architectural discourse, enhancing its quality and relevance.

Convention is the name given to a general or formal meeting of a legislative body, social or economic group in order to provide information on a particular economic situation and in order to deliberate and consequently, establish consent on policies among the participants, usually of limited duration with set objectives but no determined frequency.

17. CONVENTION CENTER

A large civic building or group of buildings designed for conventions, industrial shows, and the like, having large unobstructed exhibit areas and often including conference rooms, hotel accommodations, restaurants, and other facilities. A convention center is generally defined as any property used in connection with a convention or meeting center, or similar facility, including auditoriums, exhibition halls, facilities for food preparation and serving, parking facilities, and administrative offices. A number of states have passed legislation enabling public funding to be used for convention centers in an effort to attract tourism and businesses to the local economy.

- A convention centre is a large building that is designed to hold a convention where individuals and groups gather to promote and share common interests.
- A convention centre is designed, in most cases, for the purpose of conducting meetings, rallies, or seminars. It may also be adapted for specific events, such is appearances by well-known speakers or musicians. In some cases, meetings or other events take place in centres or buildings not specifically designed for conventions, but large enough to accommodate attendees.
- Convention centres receive guests from local, national and international markets. The various market segments that visit these facilities are dictated by the types of events that are hosted.

Convention
A large meeting of member of profession, a political party, etc.
Center
A place or an area where a lot of people live, a place where a lot of business and cultural activity takes place.

18. EXPO

Exposition centre refers to one or more connected buildings, including furnishings and equipment that are owned, operated, or leased by a district and used primarily for conventions, expositions, trade shows, performances of music or theatre, or other events involving educational, cultural, or commercial activities, rather than primarily for leisure or sports.

18.1. TYPES OF EXPO

Expos are global events dedicated to finding solutions to fundamental challenges facing humanity by offering a journey inside a chosen theme through engaging and immersive activities. Organized and facilitated by governments and bringing together countries and international organizations (Official Participants), these major public events are unrivalled in their ability to gather millions of visitors, create new dynamics and catalyse change in their host cities.

Each in its own field aims at educating the public, sharing innovation, promoting progress and allowing dialogue and shared experience. Four types of Expo are –

- World Expos,
- Specialized Expos,
- Horticultural Expos,
- The Triennale di Milano

19. MICE

MICE is a type of tourism in which large groups, usually planned well in advance are brought together for a particular purpose. MICE is an acronym for the Meetings Incentives Conventions and Exhibitions tourism segment.
This is therefore a business-oriented segment, involving obligatory (or non-discretionary) travel. The Incentives part of MICE is the odd one out-though it is related to business, as it is usually provided to employees or dealers/distributors as a reward it tends to be leisure bated.



Figure 5: Bharat Mandapam, Delhi

20. TYPES OF CONVENTIONS

The most common conventions are based upon industry, profession, and fandom, along with them –

- **Trade shows/Exhibitions:** They are an opportunity for companies to exhibit some at their latest products, as well as yet to be released prototypes to journalists as well as others in the industry.

- **Professional Conventions:** They focus on issues of concern to the professional and advancements in the profession. Such conventions are generally organized by societies dedicated to promotion of the topic of interest.

- **Fan Conventions:** They usually feature displays, shows, and sales based on pop culture and guest celebrities.

- **Seminars:** They are meetings organized to inform a group of people about a specific topic, or to teach a specific skill. Expert speakers and teachers are usually invited to speak on various topics.

- **Social events:** A large gathering organized to celebrate major life event and religious ceremonies.

- **Common social events include:** anniversaries, weddings and birthdays.

21. PUBLIC USE

21.1. ENTRANCE HALL

Users: Delegates, performers and statt.

- The major connectivity between the various components of the convention centre.
- It acts as an ideal space for delegates to network.
- Spaces like Information kiosk and waiting lounges form a part of the entrance hall.

21.2. REGISTRATION CENTRE

Users: People taking part in various conventions

- It acts as a space where people attending various events register themselves.

21.3. TOILETS

Users: All occupants.

- The size and quantity of the toilets to be provided shall be decided in accordance to NBC standards.
- They shall be provided for peak capacity.

21.4. EXHIBITION HALLS

Users: All occupants

- Trade relative promoters take part in the trade shows to promote their products.
- Large span structures and column free spaces are required for these promotions

- Crowd management of such components becomes necessary.

21.5. PARKING

Users: Anyone visiting ICC.

- Car and bus parking as per norms laid by NBC and DDA. Loading Docks/ Bays

22. SEMI PUBLIC USE

22.1. AUDITORIUM/PLENARY HALL

Users: Performers, delegates and local people.

- The purpose of the auditorium is to accommodate large scale gatherings for various events like dance, drama and delegations
- The design of the auditorium shall be evolved in accordance to various standard guidelines subjected to auditorium design.

22.2. CONFERENCE ROOMS

Users: Delegates and staff

- They hold meetings and small company training sessions for 20-30 people.

22.3. SEMINAR ROOMS

Users: Delegates and staff.

- They are ideal for small scale events like workshops training sessions, press conferences, etc.
- They are large enough to seat attendees in theatre configurations ranging from 50-200 people.

22.4. PUBLIC AMENITIES

Users: Delegates

- They include smoking lounges, ATM's, phone booths, etc.
- Only people attending any event in the convention centre shall have an access to these amenities.

23. PRIVATE USE

23.1. ADMINISTRATIVE OFFICES

Users: Staff of the convention centre

- It contains offices for the convention centre which handles the general functioning of the building.

23.2. CONTROL ROOM

Users: Staff

- The control room will monitor the overall functioning of the convention centre.

24. SERVICE AREAS

Parking
Users: Staff

- They form a crucial part for loading/unloading purpose in the exhibition pavilions.

Service Block AC Plant room: Electrical substation: Maintenance Dept.
Users: Staff
Back of House: The Kitchen
Users: Staff

- It shall serve all the events hosted by the convention centre.

25. PUBLIC MOVEMENT PATTERN FOR THE CONVENTION CENTRES

Communication and functionality can be improved by implementing efficient circulation patterns in a convention centre. People visiting or working in a convention centre can be divided into 5 broad user categories:

- Public flow
- Delegate flow
- VIP flow
- Journalist flow
- Staff flow

25.1. PUBLIC FLOW:

Dignified personalities are invited depending on the nature of the conference. It can also have relatives and public guests invited by the organization. The public guests also have access to the exhibition areas and hence these areas shall separate access to manage the public flow during peak hours efficiently.

25.2. DELEGATES FLOW:

Delegates form the most important group of users for a convention centre the parking shall lead them to the main entrance foyer which further directs them to their destination. An unobstructed delegate movement is very important.

25.3. VIP FLOW:

They shall either directly lead to the dais of the main hall or shall enter through the VIP entrance which is connected to a VIP lounge.

25.4. JOURNALIST FLOW

It includes press people. Cameraman and diplomats. They shall have direct access to the documentation centre and the TV audio of the convention centre.

25.5. STAFF FLOW:

The staff can be divided into two categories namely the technical staff who are responsible for the efficient working of the convention centre while the others are the administrative staff who are exposed to the people coming to the centre. The paths are of the technical and administrative staff diverse at the staff entrance.

WHAT IS HABITAT CENTRE?

- It is centre of contemporary cultural, economic, business, social events.
- The concern for the habitat & its environment works as the back bone of Habitat Centre.
- It is not only provides an improved working environment to its employees but also contribute to the urban level functions that a living city requires.
- It provide an ideal physical environment with a range of facilities that would maximize the effectiveness of the individuals and institutions, in their holistic support of habitat.



Figure 5: Indian Habitat Centre, Delhi

Its principal" to restore at every level" environment and ecological a balanced & improved way of life is reflected, the habitat is not only a home to these offices and research organizations but in order to facilitate their interactions, the Centre provides a wide range of facilities like conference venues, exhibition halls, seminar halls, seminar rooms, restaurants and club and performance venues for the cultural activities.

26. OFFICE LAYOUT

26.1. IMPORTANCE OF OFFICE LAYOUTS

Work that needs to be executed for each type of task requires the necessary equipment within the allotted space. The office layout has to be designed in such a way that it is comfortable as well as functional. There are various reasons behind the need of having a proper office design layout.

1. **Impacts morale:** Studies have shown that the layout of an office influences employee morale that affects functioning. When we say layout, it does not imply only the décor and facilities, but the relationships between people who work there and the general environment. Often this is referred to as ergonomics.
2. **Impacts business:** As layout has an impact on morale, it directly affects the efficiency and thereby the business success rate. The more the people working there are happy, the better the output.

3. **Way the work is done:** The traditional style of work like working at one desk or work executed by only one person has been replaced by re-engineered organizational structure. The tremendous developments in this technology have influenced the office working hours and the way to perform tasks.
4. **Manage changes:** Businesses are prone to changes to manage the pressure of the market needs. To keep up with it, layouts are effective only when the changes can be accommodated within. Hence, having simpler layouts helps businesses to re-design whenever needed so that it does not affect the tasks being executed or the work done.
5. **Increase productivity:** Using office space effectively is important while designing office layouts. It should be such a way that it does not delay the work and the job is done quicker consuming less time.
6. **Facilitate Supervision:** When office accommodation and layout is designed to place managers or supervisor closer to their teams, they can meet or discuss issues immediately and get solutions. The communication gets smoother and quicker.
7. **Effective use of equipment**: Designing office equipment properly is indeed very important so that it is not underused or overused. Providing the place where the work needs to be completed is crucial. The power consumption is evenly distributed and the noisy equipment is placed away from workplaces where silence is required.

26.2. HISTORY AND EVOLUTION OF OFFICE LAYOUT

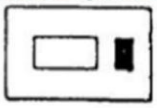
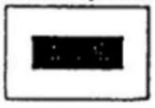
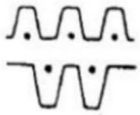
	Bürolandschaft	Traditional British speculative	New 'Broadgate' type of British speculative	Traditional North American speculative	New north European
					
No of storeys	5	10	10	80	5
Typical floor area (m^2)	2000	1000	3000	3000	multiples of 200
Typical office depth (m)	40	13.5	18 and 12	18	10
Furthest distance from perimeter aspect (m)	20	7	9 to 12	18	5
Efficiency: net to gross		80%	85%	90%	70% (lots of public circulation)
Maximum cellularisation (% of usable)	20%	70%	40%	20%	80%
Type of core	Semi-dispersed	Semi-dispersed	Concentrated: extremely compact	Concentrated: extremely compact	Dispersed: stairs more prominent than lifts
Type of HVAC service	Centralised	Minimal	Floor by floor	Centralised	Decentralised: minimal use of HVAC

Table 7 Planning and Design of Office Spaces

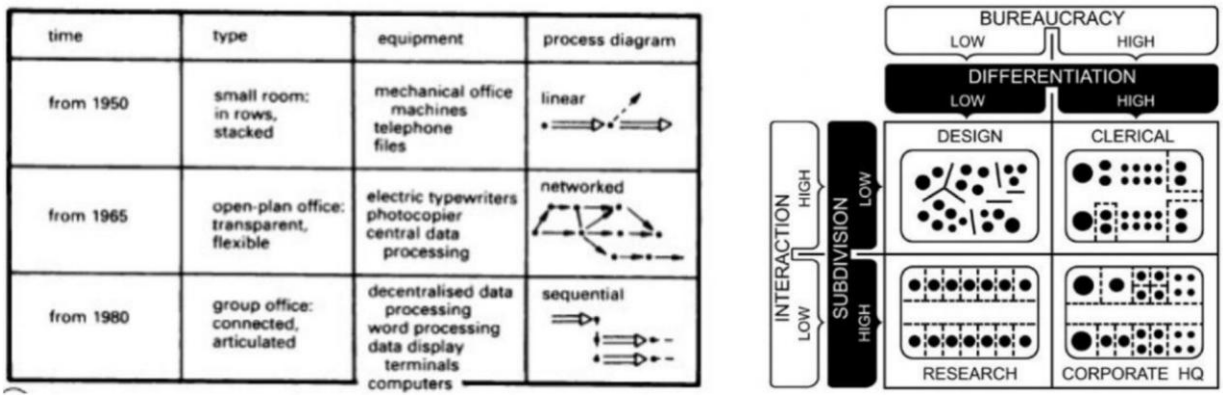


Figure 6: Evolution and Layout Hierarchy

26.3. ANTHROPOMETRICS

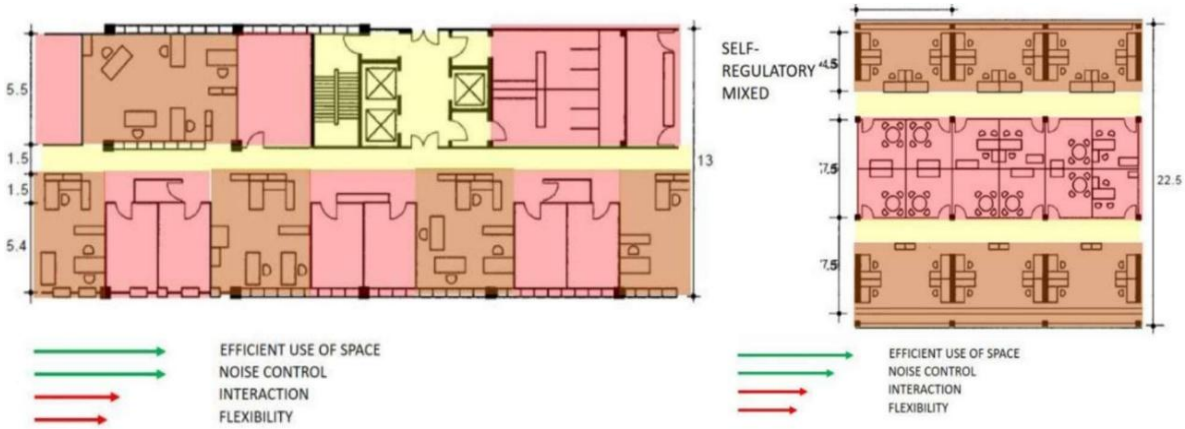


Figure 7: Group Spacing

1. OFFICE LAYOUT ANALYSIS



Figure 8: Combined Office

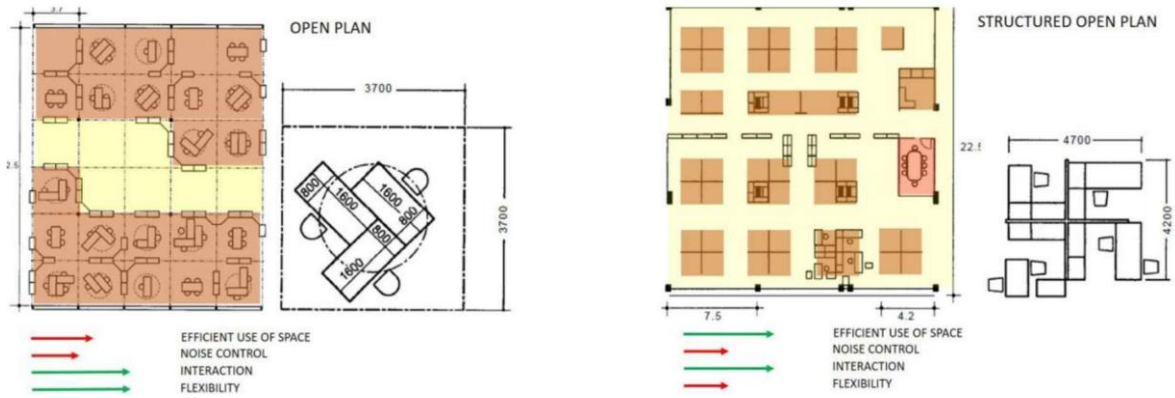


Figure 9: Open Plan

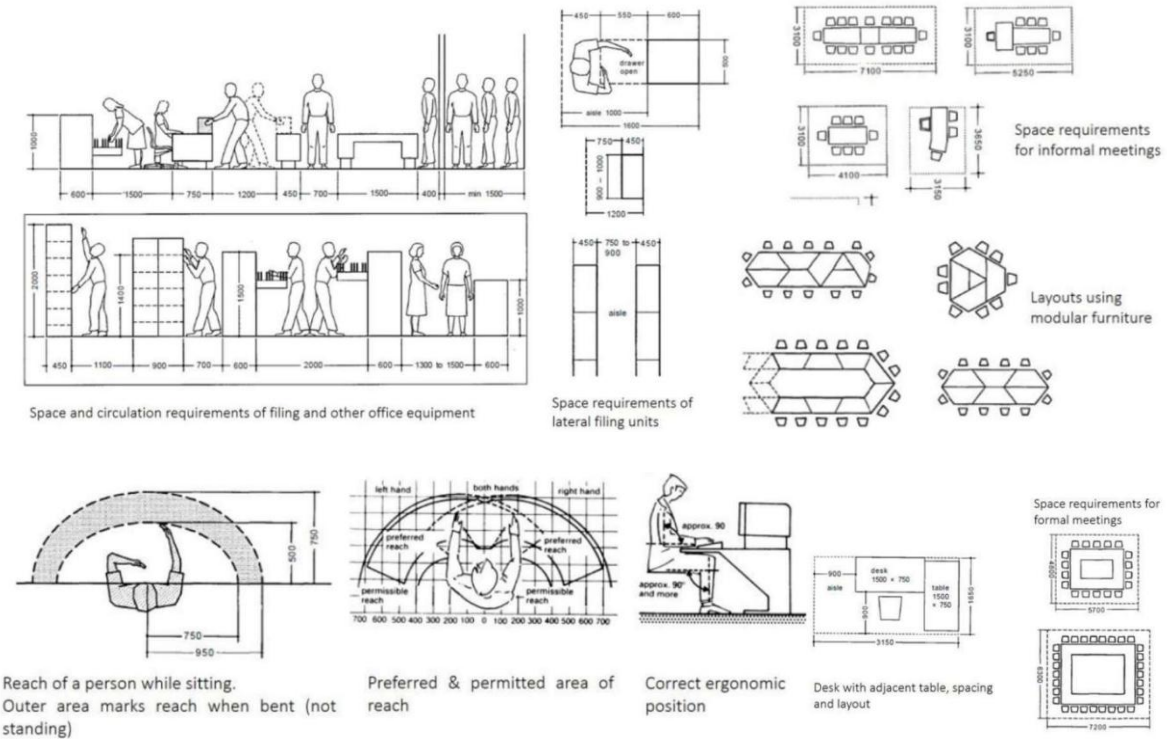


Figure 10: Anthropometric Office Plan

2. OBJECTIVES OF OFFICE LAYOUT

- To ensure proper utilization of space so that the spaces provided are effectively used.
- To ensure that work flow is uninterrupted and there is the maintenance of steady flow.
- To ensure that managers can supervise their team members in a better way.
- To be able to provide a comfortable work environment which brings satisfaction.
- To enable better communication between the team members.
- To provide a safe working environment.
- To have provisions for future expansions.

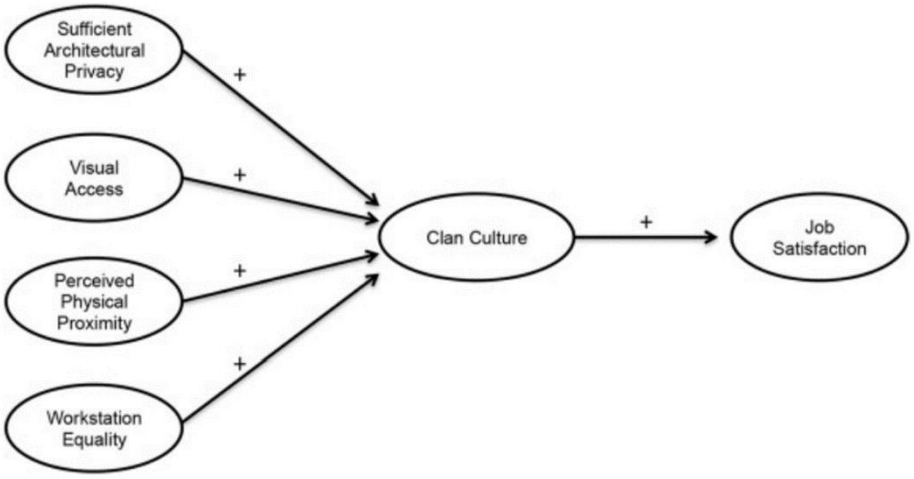


Figure 11

3. PRINCIPLES OF OFFICE LAYOUT

The main principle behind the office layout design should be such that it occupies the available space in an economical way so that the aim and objectives of the organization or business is achieved. The layout must be effective such that the workstations are planned to be positioned such that data is being transmitted with minimal costs and information can flow with minimum delays or without interruption. The workstation has to be provided with items necessary for executing the job. Care has to be taken for storage of information and documents. Listed are some of the principles to be taken care while designing.

- **Natural lighting:** Designing offices that face the north or east gets more of natural lighting. It avoids more consumption of power.
- **Placing computers:** Desks having computers or desktops must be placed in such a way that staff sitting at it must not have their backs or faces to the windows.
- **Designing work tables**: It is preferable to seat staff not facing each other. It is said to disrupt work. Besides having minimum intrusion is better. Also reducing the field of vision of employee to other employees will reduce distraction. Also, they need to be provided with adequate lighting, ventilation, and ergonomic chairs and tables to prevent eyestrain and muscle aches.
- **Flow of work:** By carefully studying the sequences of the tasks to be done, the design of the work space is imitated. If the person has to go back and forth in the space it will bring frustration and reduce output. Ensure that the flow of work is smooth and in one direction.
- **Pleasant:** The most important of all the aspects is that design should be aesthetically pleasant. Do not concentrate on functionality alone but also on its looks. Space has to be optimally used.
- **Provision of tools:** Assignments are completed quickly if they have the necessary space and tools to perform them. The work station should be spacious enough to accommodate their files, papers and their documents. Having copiers and printers closer to them is better to avoid them frequently moving out and wasting their time.
- **Grouping:** Placing the same functional type of work together or closer to each other will help to reduce time wastage. The employees have the freedom to consultation and information easily so that work is handled efficiently. Hence, it is better to list out the functions or tasks that employees perform and design the office planning and layout accordingly.

- **Open a private space:** The employer needs to verify which tasks require collaboration with one another and which set of tasks require concentration. Based on this, specific cubicles are designed with open or low separators and others with separate cubicles or traditional with closed doors. Making a separation between the two types is essential.
- **Informal and formal spaces:** Every work space does require employees to take breaks in between work. For this, communal spaces are designed that is closer to the work stations. These informal communal spaces are often built with more space to accommodate large numbers during coffee or lunch breaks. The informal communal spaces meant for conferences or meetings are often placed away from busy work space that is noisy.

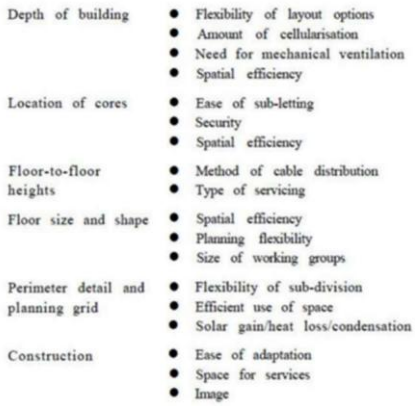


Figure 12 Building Shell Considerations

- **Security:** As it is aware that information is very critical to any business, care needs to be exercised to define a level of security and norms for workstations processing data. Mainly the storage of confidential and sensitive data has to be placed away from main work space and protected.
- **Reducing risk:** Designing has to be such that it reduces the risk of accidents or falls. Allowing ergonomic norms of wiring and placing of tables, chairs, and work stations provide safe working conditions. The safety would be maintained.

4. KEY FEATURES OF OFFICE LAYOUT

- Adaptability to meet a range of space and servicing requirements
- Contact with the outside world
- Better, healthier and more productive internal environmental quality. In all its aspects: heat, light, sound, colour, and air quality
- User control. Psychologists have observed that the human factor-for example, the operable window-is disproportionately significant to perceived wellbeing.

5. DEPTH OF BUILDING

Building depths are generally described as being predominantly 'glass to core' or 'glass to glass'.

- **Glass-to-core** depths of 9-12 m allow room for cellular office space or open plan plus storage.
- **Glass-to-glass** depths of 13.5-18 m allow two or three zones of office and support space.

6. PLANNING GRID

These determine how the organization uses its space. The size of the planning grid is less important in a completely open-plan office. If part of the space is enclosed, however, the planning grid will determine the size of the office modules and the overall efficiency in the use of space. A L35 m grid allows 2.7 m wide offices, a 1.5 m grid will provide 3m wide offices, and relates better to building components in 600 mm modules.

7. FLOOR-TO-FLOOR HEIGHTS

Related to floor depth and floor plate size, this has a major effect on air conditioning, cable distribution, ability to use natural ventilation and light, and on visual comfort. Floor-to-floor heights of 4-4.5 m provide maximum flexibility and good visual comfort.

8. FLOOR SIZE & SHAPE

These affect internal communications and circulation routes around the building. Small floors are inefficient in terms of the ratio between core space and usable floor area. Large departments have to be split over a number of floors, which is also inefficient. Very large floors, on the other hand, produce circulation routes with long distances between departments. Contiguous floor sizes between 500 m2 and 2500 m2 provide the most usable spaces.

9. OFFICE LAYOUT AND LOCATION OF CORE

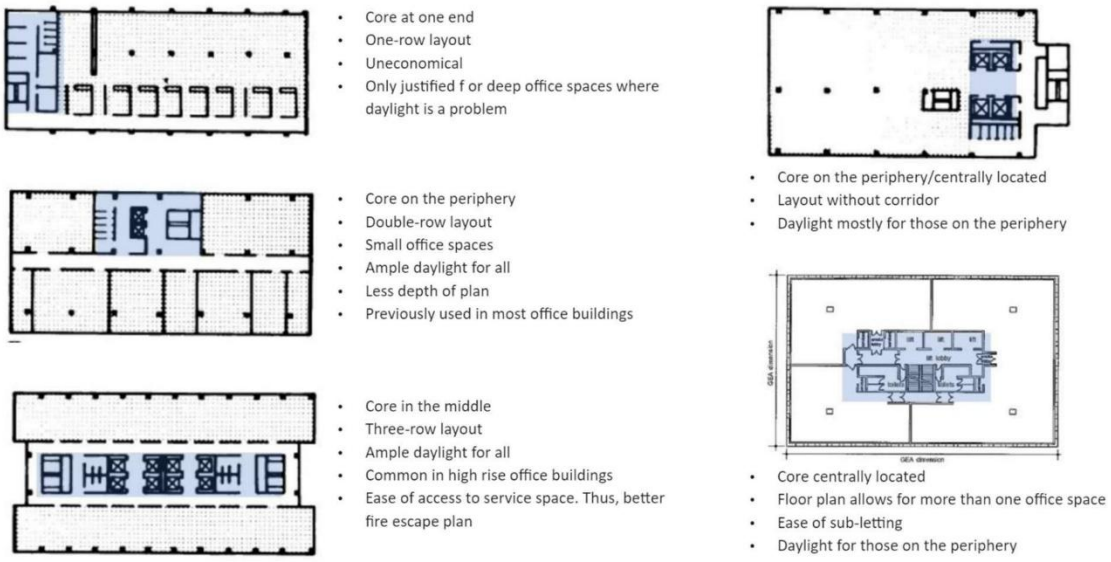


Figure 13: Layout of Core

10. THE AUDITORIUM

The three-dimensional volume of an auditorium is conditioned by the need for all members of the audience to be able to see the whole of the platform or stage: and to hear the actor, singer, musician or speaker. Seating density, floor rake and seating layout are partly determined by this, partly to give the audience an appropriate level of comfort and

essentially to ensure a means of escape in an emergency. Fire, within the time required by safety considerations and by legislation.

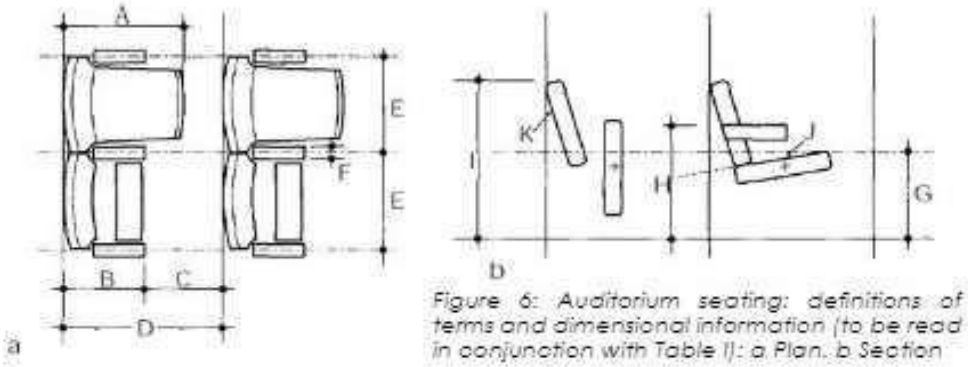


Figure 6: Auditorium seating: definitions of terms and dimensional information (to be read in conjunction with Table I): a Plan, b Section

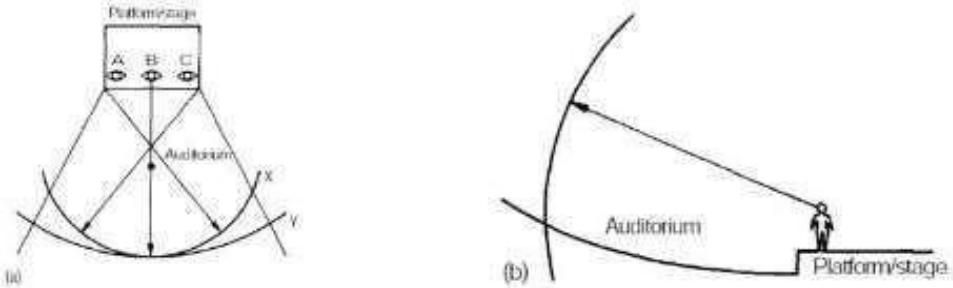


Figure 5: Visual and aural limitations: (a) Plan: for a performer at centre stage B there is an arc Y beyond which visual and aural perceptions are impaired. However, for performers nearer the sides of the stage at A and C produce more restrictive curves X. (b) Section: Similarly, visual and aural limits in section also set an arc centred on the performer.

Figure 14: Auditorium Seating

Dimension	Description	Minimum(mm)	Maximum(mm)	Drawnn as
A	Overall seat depth	600	720	650
B	Tipped seat depth	425	500	450
C	Seatway	305	-	400
D	Back to back seat spacing	760	-	850
E	Seat width for seat with arms	500	750	525
F	Annrest height	50	-	50
G	Seat height	430	450	440
H	Armrest height	600		600
I	Seatback height	800	850	800
J	Seat inclination	17	9	7
K	Back inclination	15	20	15

Table 8 Dimension od Auditorium Seating

27. AUDITORIUM DESIGN

27.1. AUDIENCE REQUIREMENTS

Every member of the audience should be able to see and hear clearly whatever is happening on every part of the stage or platform. The greater the encirclement of the audience of the platform or stage, the more people can be accommodated within the aural and visual limitations up to 180° encirclement. With a full encirclement, the distance from the platform or stage is restricted to six rows.

27.2. NUMBER OF SEATS IN A ROW

With traditional seating, the maximum number is 22 if there are gangways at both ends of the row, and 11 for gangways at one end. Rows with more than 22 seats are permitted if the audience is not thereby imperiled.

27.3. ROW TO ROW SPACING

Spacing is controlled by the clearway between the leading edge of the seat and the rear of the back of the seat in front. For traditional seating, the minimum clearway for people to pass along the row is 300 mm and this dimension increases with the number of seats in a row. For continental seating the clearway is not less than 400 mm and not more than 500 mm.

27.4. GANGWAYS

As gangways are essential to escape routes, their widths are determined by the number of seats served. The minimum is 1100 mm. They can be ramped up to 10%. If the seating rake is steeper, gangways must-have steps extending the full width and these must have consistent treads and risers in each run.

27.5. SEATING GEOMETRY

Seating is usually laid out in straight or curved rows focused toward the platform or stage. Further forms are the angled row, straight row with the curved change of direction, and straight rows within emphasized blocks of seats.

27.6. SEATING DENSITY

Seats with arms and tippable seat can occupy a space as small as 500 mm wide with a how-to-row dimension of 760 mm: but can be as large as 750 mm wide by 1400 mm. The area per seat therefore varies between 0.38 m² and 3.05 m².

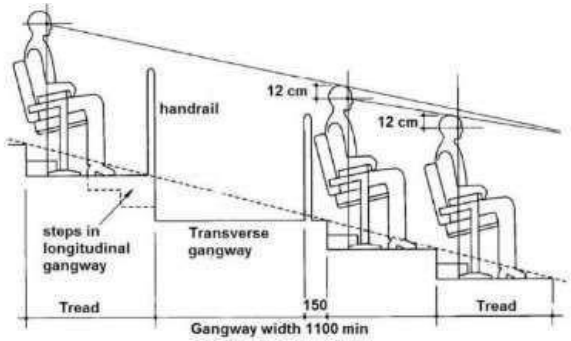


Figure 10 : Graphic representation of vertical sightlines at a transversal gangway

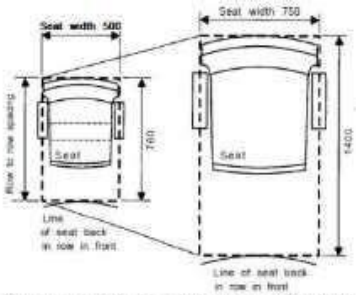


Figure 9 : Seating density, from 0.38 m² to 1.0.5 m² per person

Figure 15: Seating Section and Seating Density

27.7. WRITING SURFACE

Conference use may require a writing surface for note-taking. The writing surface may be: A tablet fixed to each seat, 20.10 A fixed table with fixed pivoting or sliding seat, 20.13.

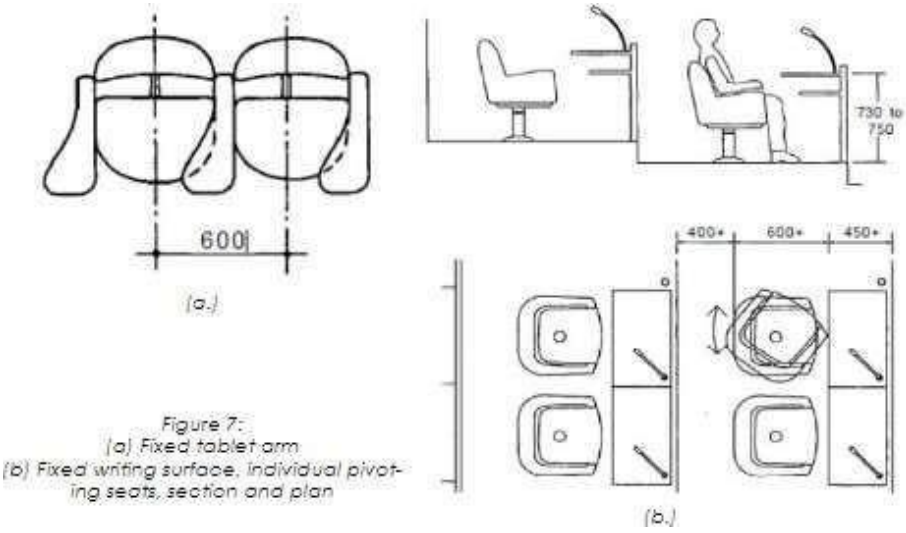


Figure 7:
(a) Fixed tablet arm
(b) Fixed writing surface, individual pivoting seats, section and plan

Figure 16: Seating Surface

27.8. FREQUENCY AND FLEXIBILITY OF CHANGE

Another key feature of sustainability is recycling. Buildings are relatively permanent, while the organisations and activities within them are continuously changing. Flexibility is hence very important for a building to be used to its maximum potential Frequency of change depicts the flexibility expected. To allow for maximum flexibility, different time scales of building briefing and design can be distinguished into separate functions off.

- **Building shell:** The structure and enclosure of the building lasting 50- 75 years, while the functions within change many times over. The ability of the shell to allow for change 1s reflected in the depth of space, location of cores, floor-to-floor height to allow capacity for services, and the floor plate configuration.

- **Building services:** The heating, ventilation, and cabling infrastructure of a building, which have a life span of 15 years or less before the technology, becomes obsolescent.

- **Scenery:** The fitting- out components of a building, such as ceilings, lighting, finishes which adapt a building to a specific organisation's requirements. The life span of a fit-out is between 5 and 7 years.

- **Setting:** The day-to- day re-arrangement of the furniture and equipment to meet changing needs.

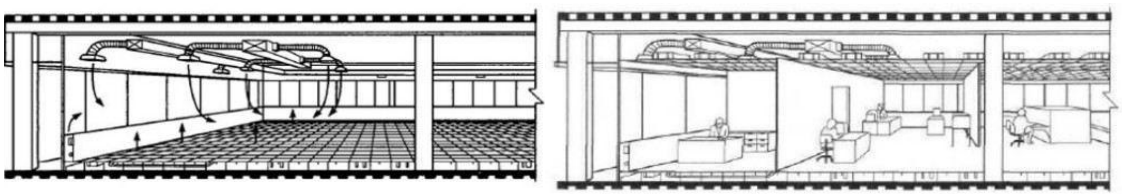


Figure 17: Flexibility to Adapt

27.9. VISUAL STANDARDS

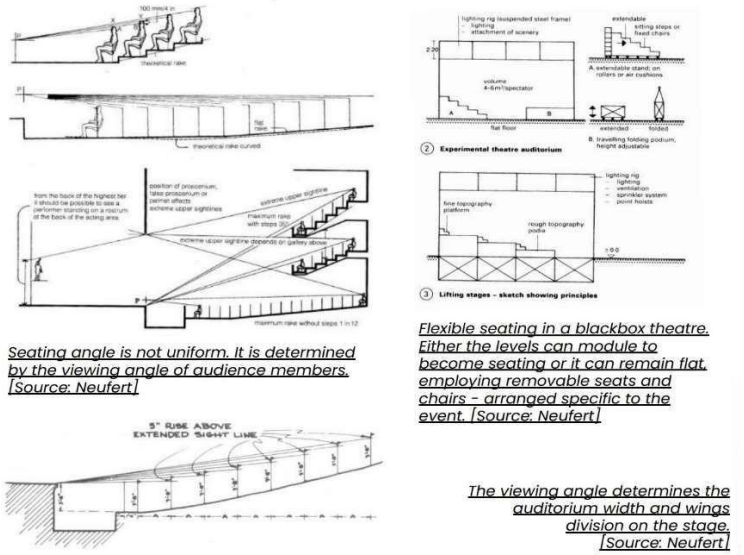


Figure 18: Visual Standards

27.10. OUTDOOR PERFORMING AREA

- Slope of seating should not be less than 12 Degrees.
- Wind direction is towards the audience from the stage.
- Backstage wall should be made reflective and broken into convex shaped surface.
- Depending on the ambient noise level of the site, orientation, layout and structural design should be arranged to provide necessary noise reduction so that the background noise level of not more than 40 to 45 dB

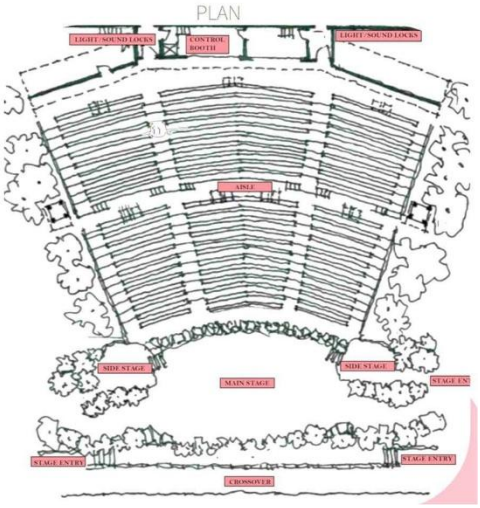


Figure 19: OAT Plan

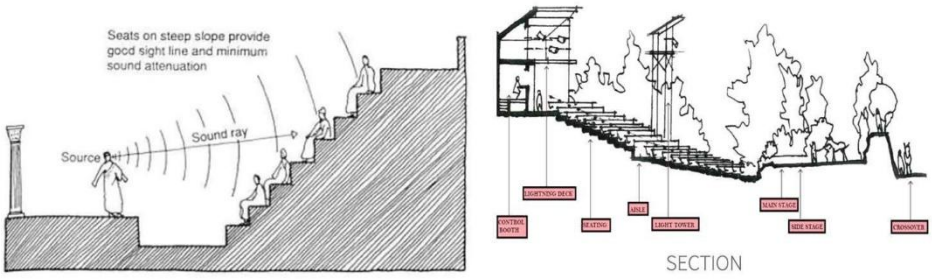


Figure 20: OAT Section

The function of an oat must fulfil the dual goal of maximizing the advantages of acoustic design and minimizing the effects of noise pollution**.**

Shape - When the caves of the theatre is modelled as sloped surfaces the theatre will resemble the shape of an inverse cone. This shape will tend to direct most of the

reflections towards the open sky and therefore the energy will dissipate quickly leaving few late reflections. Curved or bowl-shaped, both behind the stage and behind the audience, creating an area which echoes or amplifies sound, making the amphitheater ideal for musical or theatrical performances. Overall shape should be flat in plan; however, if it is desired to be concave. In order to begin planning a new facility one must have some general idea of potential audience size. It should be broken into convex surfaces which in either case should be of at least 90 to 180 m width.

Depth of stage should be arranged to suit individual requirements; where it exceeds 6 m, it is necessary to treat back stage wall acoustically. Wind velocities naturally experienced at site should not exceed 16 kin/h.

28. THEATRE

Proportions of the auditorium these are derived from the psychological awareness and angle of view of the spectator, or the requirement for a good view from all seats. Options are:

- Good view, without moving head, but light eye movements of approx. 30°.
- Good view with slight head movements and light eye movements of approx. 60°.
- Max. Awareness angle without head movement approx. 110°, i.e., all actions in the field are 'in view'. Outside this field, there is uncertainty, because 'something' is out of view.
- Full head and shoulder movement allows an angle of view of 360°.

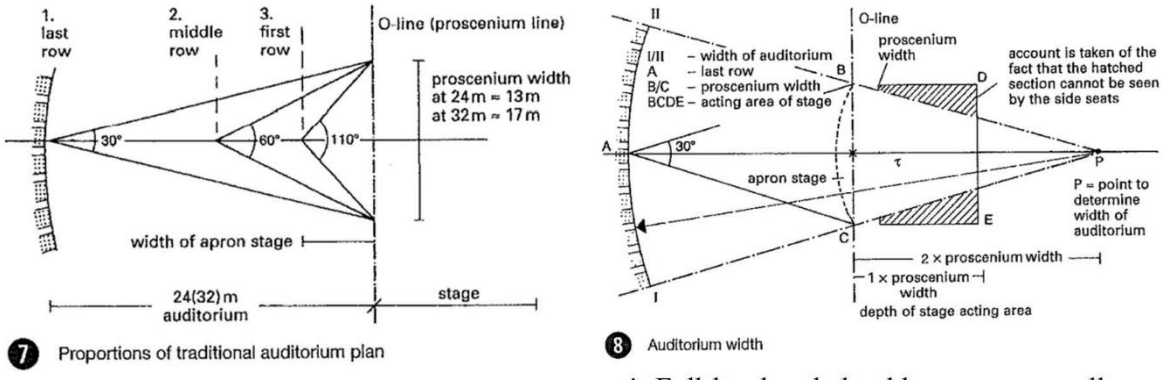


Figure 21: Theatre Plan

Proportions of the classic auditorium- Opera, multi-purpose theatre, and traditional playhouse: distance of the furthest row from the start of the stage should not exceed -

- Playhouse, max. 24 m (max. distance for the recognition of facial expressions);
- Opera, 32 m (large movements are still recognizable).

The spectators at the side being able to see the stage adequately, determine auditorium width.

The theatre situation is fundamentally one of the relationships between the performers and the audience. The audience wants to hear and see the show without distraction and in comfort and safety, as stated, but its ultimate objective in attending the show is to receive the utmost sensory stimulation toward the maximum emotional and intellectual experience.

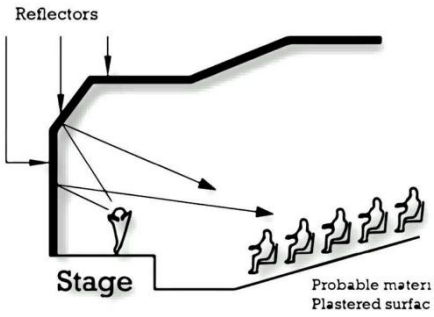


Figure 22: Reflectors

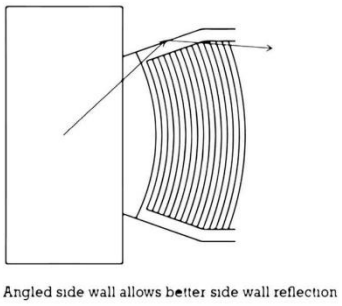


Figure 23: Wall Reflectors

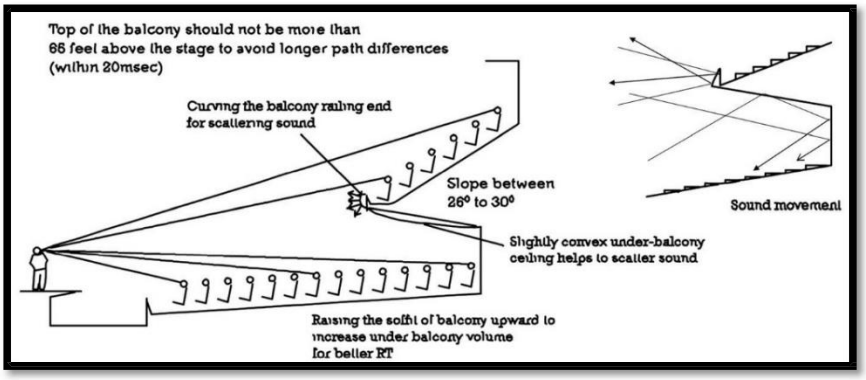


Figure 24: Balcony Section

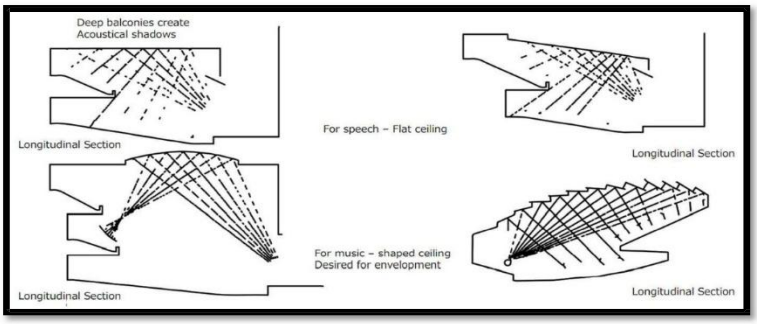
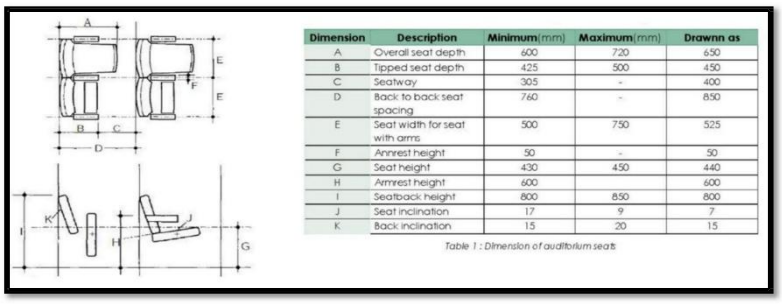


Figure 25: Acoustic



Dimension	Description	Minimum(mm)	Maximum(mm)	Drawn as
A	Overall seat depth	600	720	650
B	Tipped seat depth	425	500	450
C	Seatway	305	-	400
D	Back to back seat spacing	760	-	850
E	Seat width for seat with arms	500	750	525
F	Armrest height	50	-	50
G	Seat height	430	450	440
H	Armrest height	600		600
I	Seatback height	800	850	800
J	Seat inclination	17	9	7
K	Back inclination	15	20	15

Table 1 : Dimension of auditorium seats

Figure 26 : Seat Anthropometrics

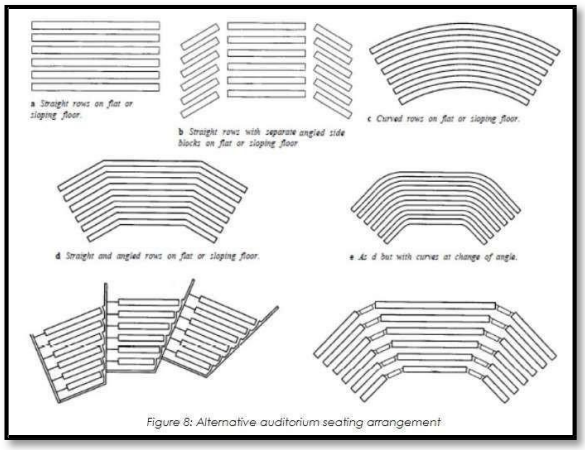


Figure 27: Seat Arrangement

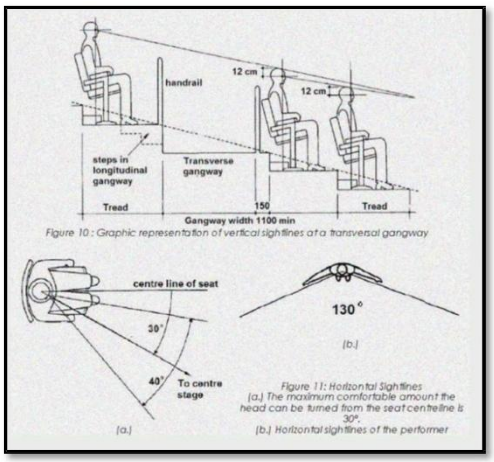


Figure 28: Sightline

28.1. USER SIGHTLINES

A sightline or visual axis is a normally unobstructed line of sight between an intended observer and a stage.
Spectator's eye **height must not be lower than 800 mm above the stage**. However, in larger theatres it is acceptable to locate the eye height of the first row on the level of the stage.

28.2. HANDICAPPED SEATING

- At least 1 percent of seats designated for wheelchairs users, with a minimum of two.
- Wheelchair projects approximately 16'' into cross aisle width should allow extra space.
- Some seats should be wider in order to allow larger size people to sit properly.

28.3. LIBRARY

System furniture for reference and lending libraries for all types of devices (telephone, PC, terminals, microfiche readers) and for all required cable ducts for network and communications systems.

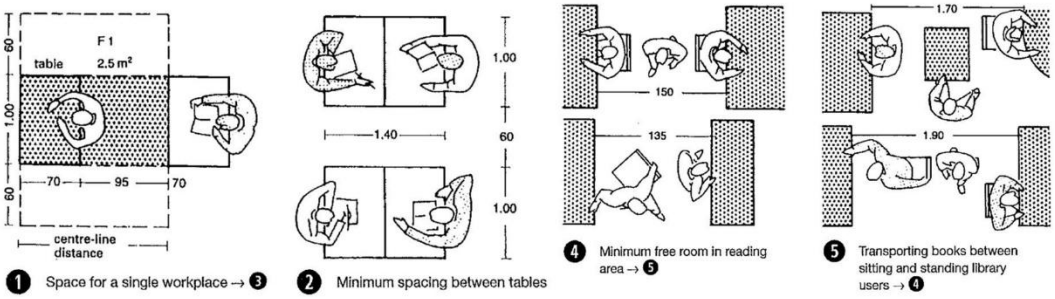


Figure 29: Library Seating Arrangement

Shelving systems for books, magazines, media; mostly freestanding double shelf units (vertical steel profiles, shelves steel sheet or wood) h = 2.25 m, spacing of verticals = 1.00 m, depth of shelves = 0.25-0.30 m, but also extra depths, e.g., for atlases and newspaper collected editions; shelves adjustable for height min. every 15 mm. Height of the freestanding double shelves max.

5 x depth. Capacity of the shelves depends on the number of shelves per unit, calculated at 25-30 vols/running m (--> DIN specialist report 13). Shelf spacing in stacks > 0.75 m, longer in accessible areas.
Mobile shelf units (only permissible in closed stacks) can, if the column grid is favourable and the shelf blocks fit, result in a capacity increase of up to approx. 100%. Required: floor load- bearing capacity ~12.5 kN/m2 (extra costs compared to the usual 7.5 kN/m2).

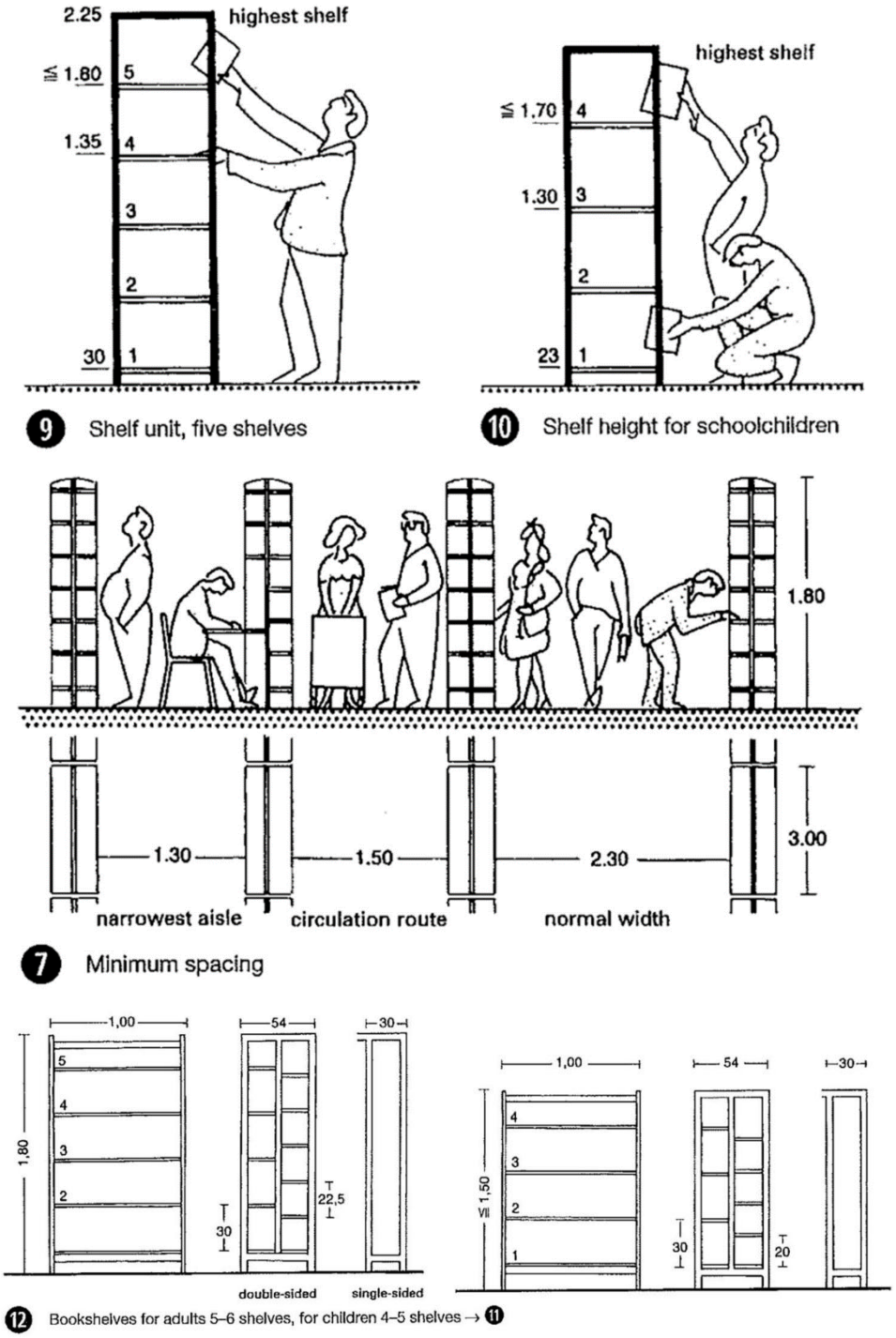


Figure 30: Library Anthropometry

28.4. TYPICAL LAYOUT PLAN OF LIBRARY

The users are children, young people and adults. Public libraries aim their range of stock and services at meeting the needs of the users.

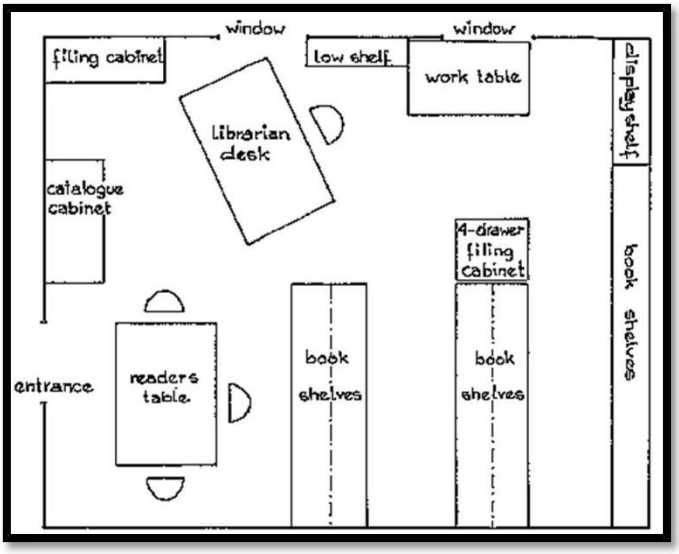


Figure31: Library Typical Layout

28.5. BASIC TYPES OF LAYOUTS OF ART GALLERY

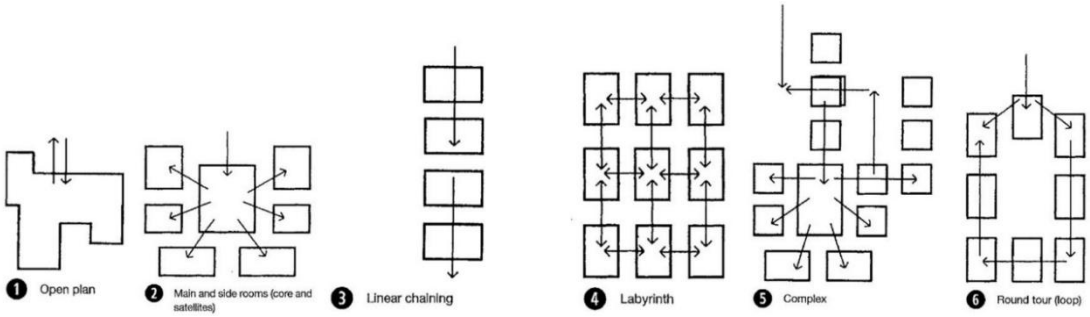


Figure 32: Types of gallery layout

The size and height of the display and storerooms depend on the dimensions of the works and the extent of the collection, but the minimum height is 4 m clear.

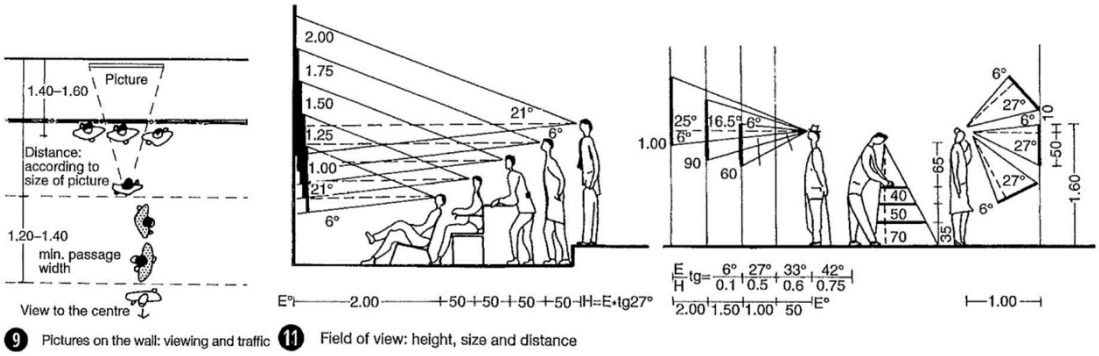


Figure 33 Viewing Angles

28.6. TOILETS

Toilet facilities should not contain more than 10 WC cubicles and 10 urinals.
With natural ventilation, the minimum ventilation sections are: with window ventilation on one side 1700 cm^2 /us, 1000 cm^2/urinal.

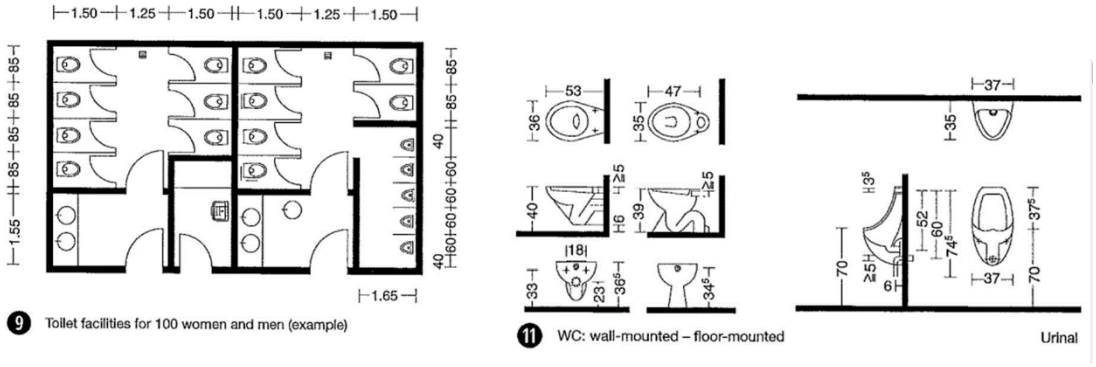


Figure 34: Toilet Design

28.7. ADMIN

The office's form and thus its room layout are part of a system influenced by activity, procedural organization, and IT technology and company culture. The building structure and design of rooms can have a significant influence on the use. Administrative Offices: May be private or semi-private acoustically and/or visually.

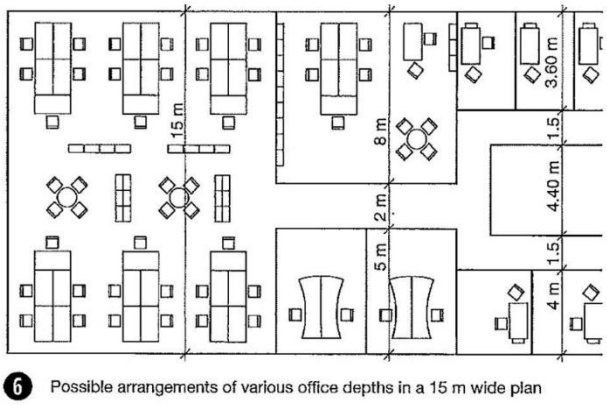


Figure 35: Admin Arrangement

28.8. WORKPLACE SEATING LAYOUT

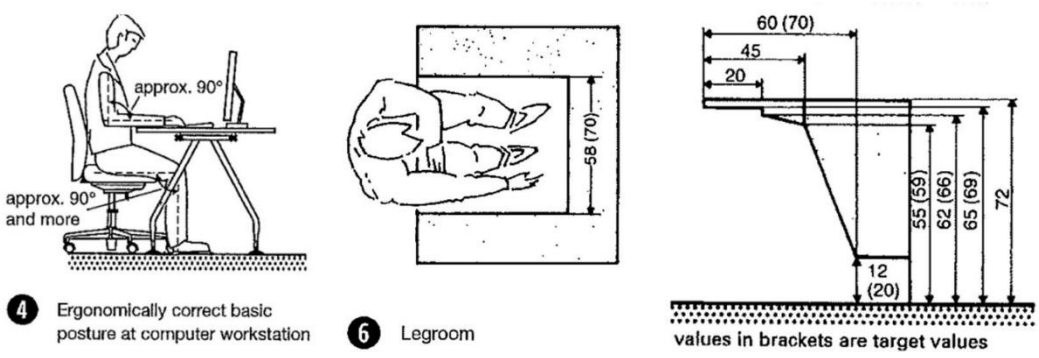


Figure 36: Workspace Anthropometry

28.9. RESTAURANTS

Different space standards required for waiter and diner are:

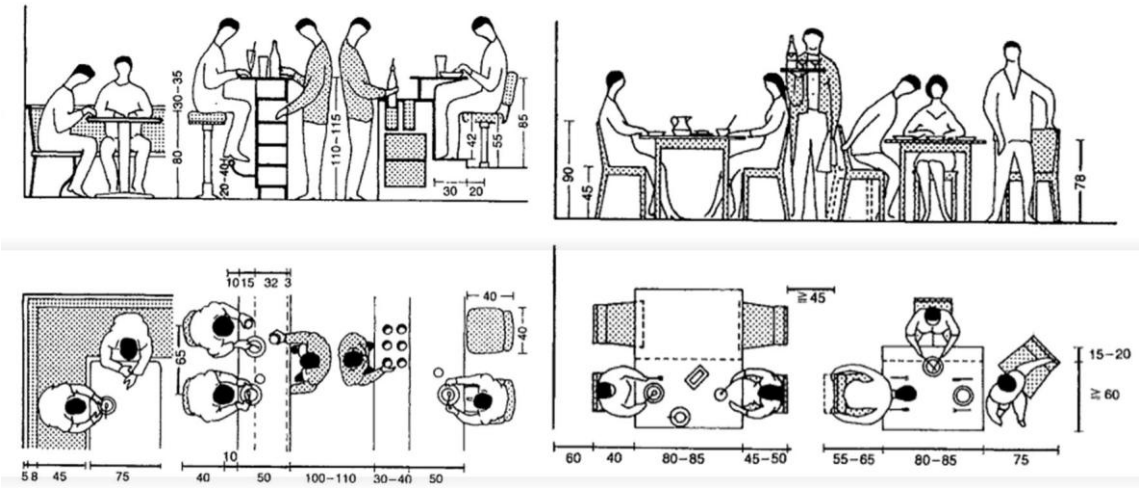


Figure 37: Restaurant Anthropometry

28.10. SEATING LAYOUT

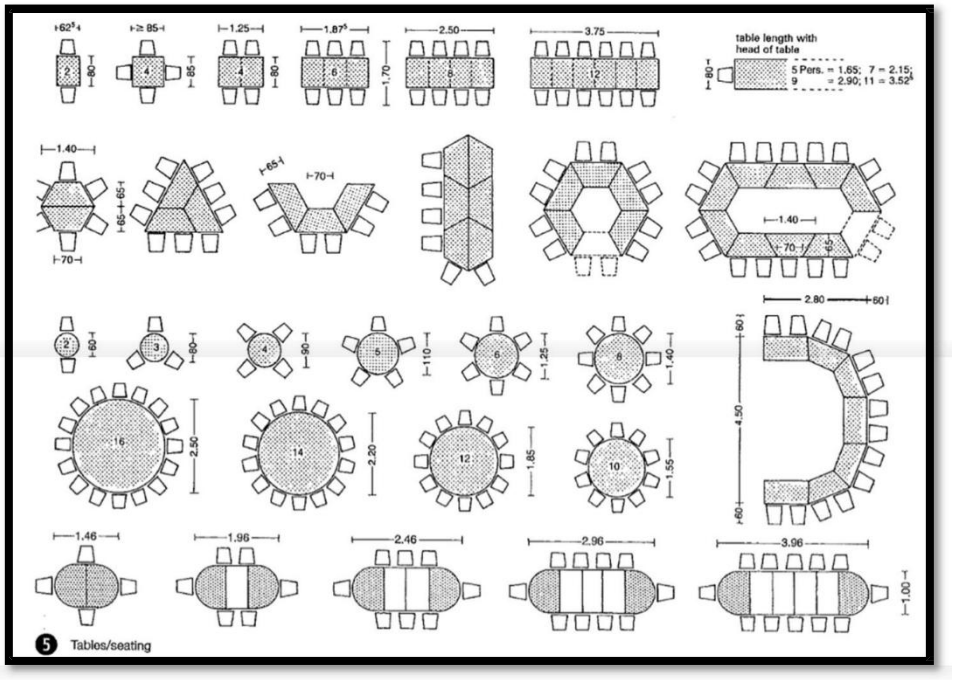


Figure 38: Seating Layout

28.11. RESTAURANT LAYOUT

The different layouts of restaurant are:

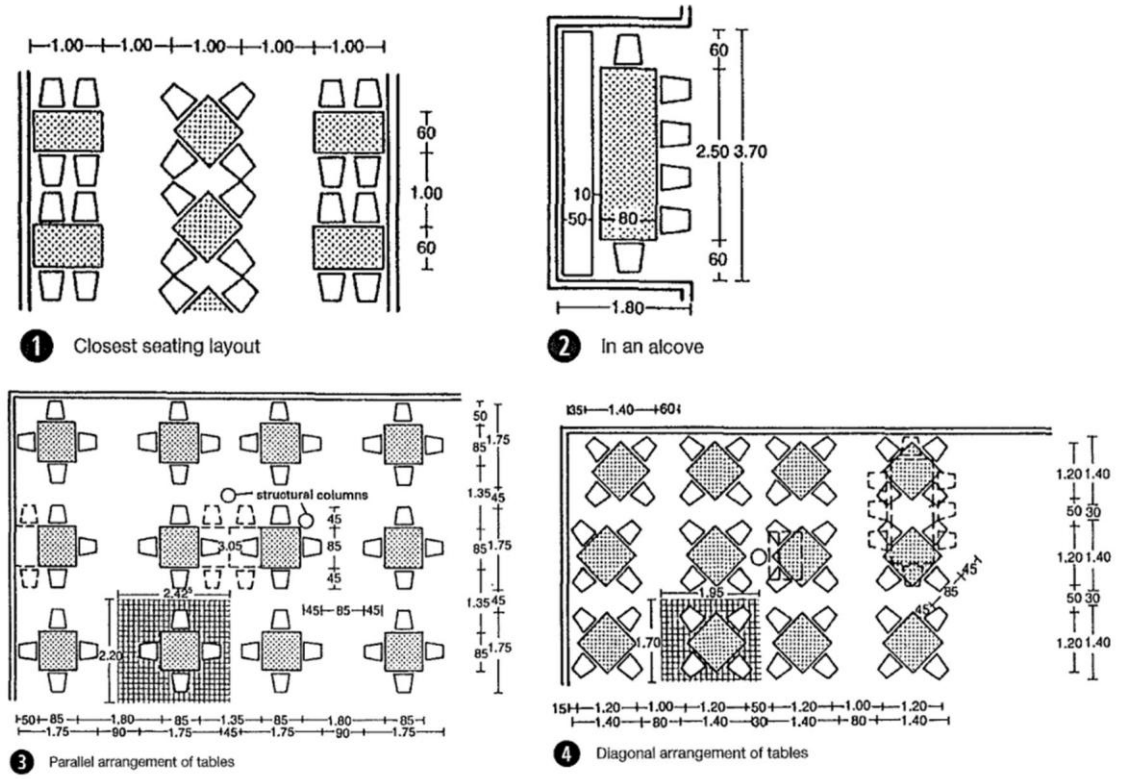


Figure 39: Restaurant Layout

28.12. RESTAURANT KITCHEN LAYOUT

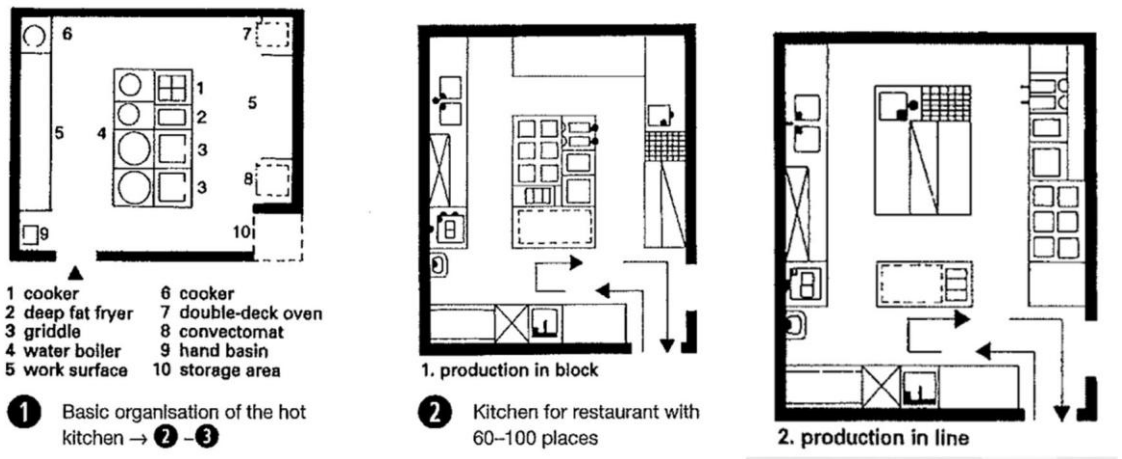
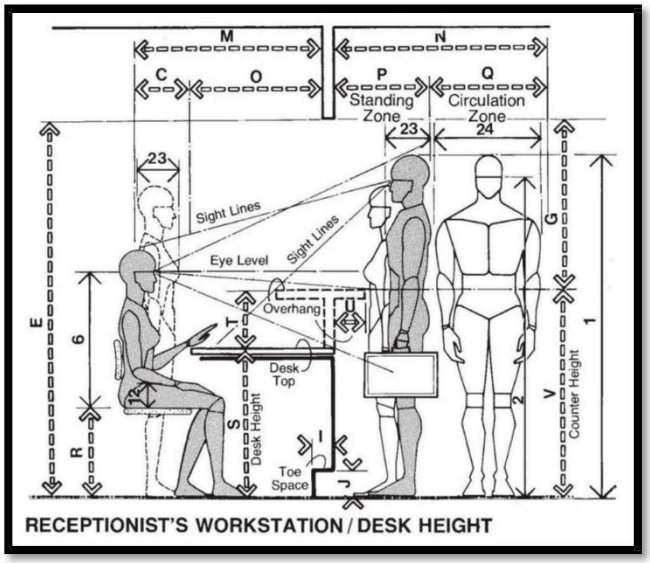
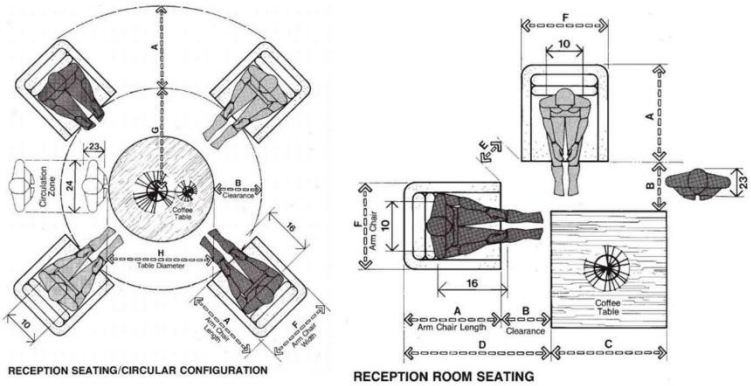


Figure 40: Kitchen Layout

28.13. RECEPTION AND WAITING



	in	cm
A	40–48	101.6–121.9
B	24 min.	61.0 min.
C	18	45.7
D	22–30	55.9–76.2
E	78 min.	198.1 min.
F	24–27	61.0–68.6
G	36–39	91.4–99.1
H	8–9	20.3–22.9
I	2–4	5.1–10.2
J	4	10.2
K	44–48	111.8–121.9
L	34 min.	86.4 min.
M	44–48	111.8–121.9
N	54	137.2
O	26–30	66.0–76.2
P	24	61.0
Q	30	76.2
R	15–18	38.1–45.7
S	29–30	73.7–76.2
T	10–12	25.4–30.5
U	6–9	15.2–22.9
V	39–42	99.1–106.7

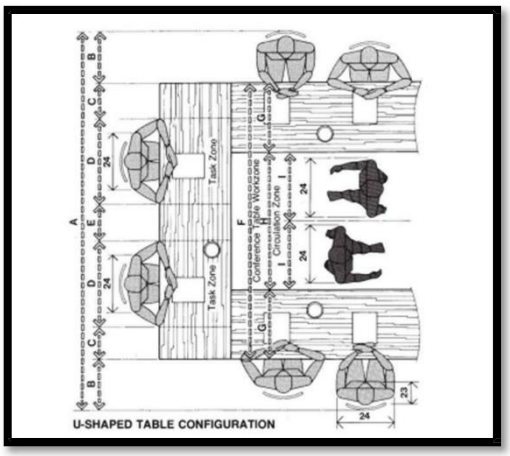


	in	cm
A	28–32	71.1–81.3
B	15–18	38.1–45.7
C	30–48	76.2–121.9
D	43–50	109.2–127.0
E	9–12	22.9–30.5
F	28–36	71.1–91.4
G	33–42	83.8–106.7
H	36–48	91.4–121.9

Figure 41: Reception Anthropometrics

28.14. CONFERENCE ROOM

The basic dimensions of a U-shaped conference table are given below:



	in	cm
A	138–180	350.5–457.2
B	18–24	45.7–61.0
C	12–21	30.5–53.3
D	32–36	81.3–91.4
E	14–18	35.6–45.7
F	108–132	274.3–335.3
G	24–36	61.0–91.4
H	60	152.4
I	30	76.2
J	72	182.9
K	24–28	61.0–71.1
L	3–6	7.6–15.2
M	12–16	30.5–40.6

Figure 42: Conference Anthropometrics

28.15. BARRIER FREE NORMS

A wheelchair user's movement pivots around his or her shoulders. Therefore, the range of reach is limited, approximately 630 mm for an adult male. While sitting in a wheelchair, the height of the eyes from the floor is about 1190 mm for an adult male.

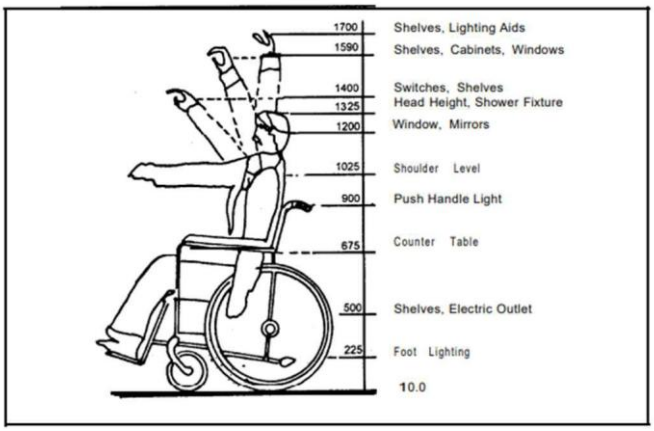


Figure 43:Typical Dimensions for Essential uses with ease in reach

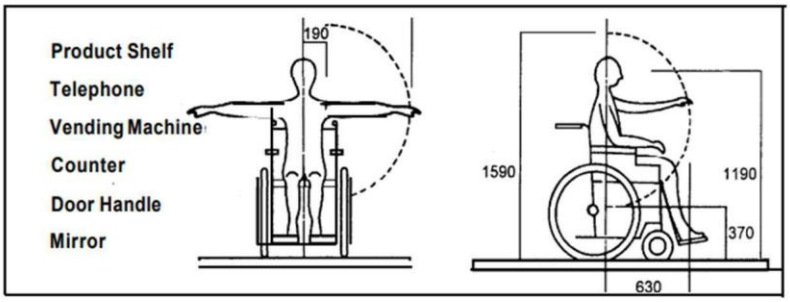


Figure 44 :Range of Reach

28.16. ENTRANCE/EXIT DOORS

Minimum clear opening of the entrance door shall be 900 mm. and it shall not be provided with a step that obstructs the passage of a wheel chair user. Threshold shall not be raised more than 12 mm.

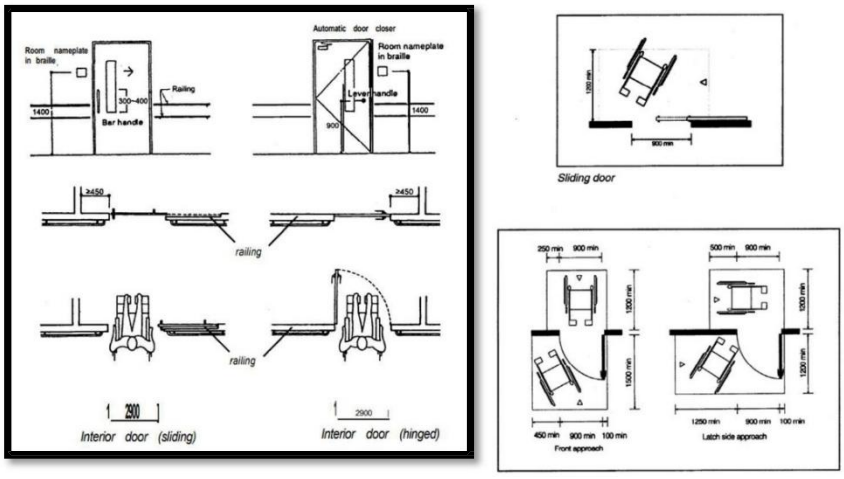


Figure 45:Doorways

28.17. PARKING

For car, minimum parking space to be 3m x 6m when individual parking space is required and 2.75m x 5m when common parking space is required
Space for two-wheeler and bicycle to not be less than 1.25 m^2 and 1.00 m^2, respectively.

Table 9 Norms for Off-Street Parking Spaces

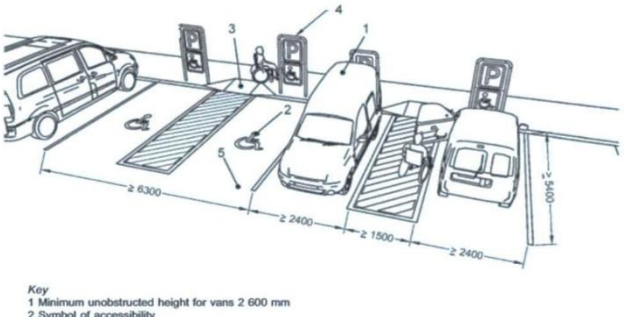
(Clause A-1)

Sl No.	Occupancy	One Car Parking Space for Every				
		Population Less than 50 000	Population Between 50 000 and 200 000	Population Between 200 000 and 1 000 000	Population Between 1 000 000 and 5 000 000	Population Above 5 000 000
iv)	a) Assembly halls, cinema theatres	120 seats	80 seats	25 seats	15 seats	10 seats

Table 9 Norms of Street Parking

Designated parking for physically handicapped:

- The minimum size of the parking space for a car shall be 3.9m x 5.4m.
- If two accessible parking spaces share a transfer area: min. width = 6.3 m



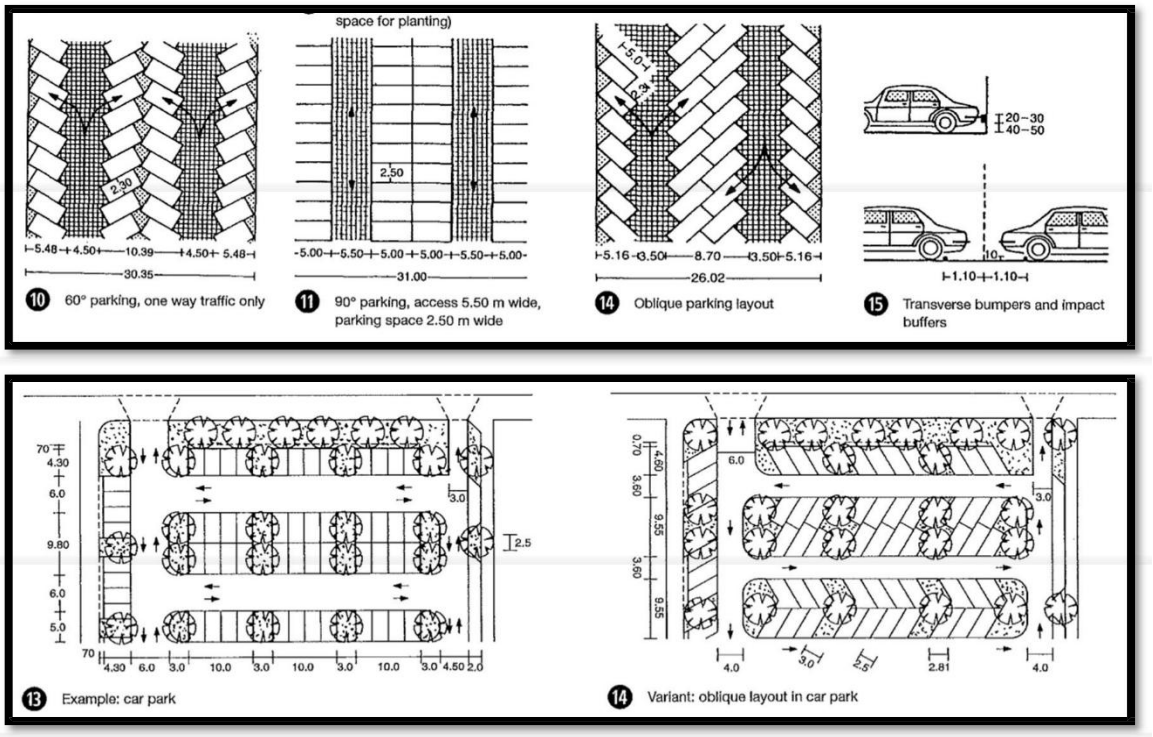


Figure 46: Various Parking

28.18. FOR PARKING OF VEHICLES OF HANDICAPPED PEOPLE, THE FOLLOWING PROVISIONS SHALL BE MADE:

Surface parking for two care spaces shall be provided near entrance for the physically handicapped persons with maximum travel distance of 30 M from building entrance.
The width of parking bay shall be minimum 3.60 Meter.
The information stating that the space is reserved for wheel chair users shall be conspicuously displayed.
Guiding floor materials shall be provided or a device which guides visually impaired persons with audible signals or other devices which serves the same purpose shall be provided.

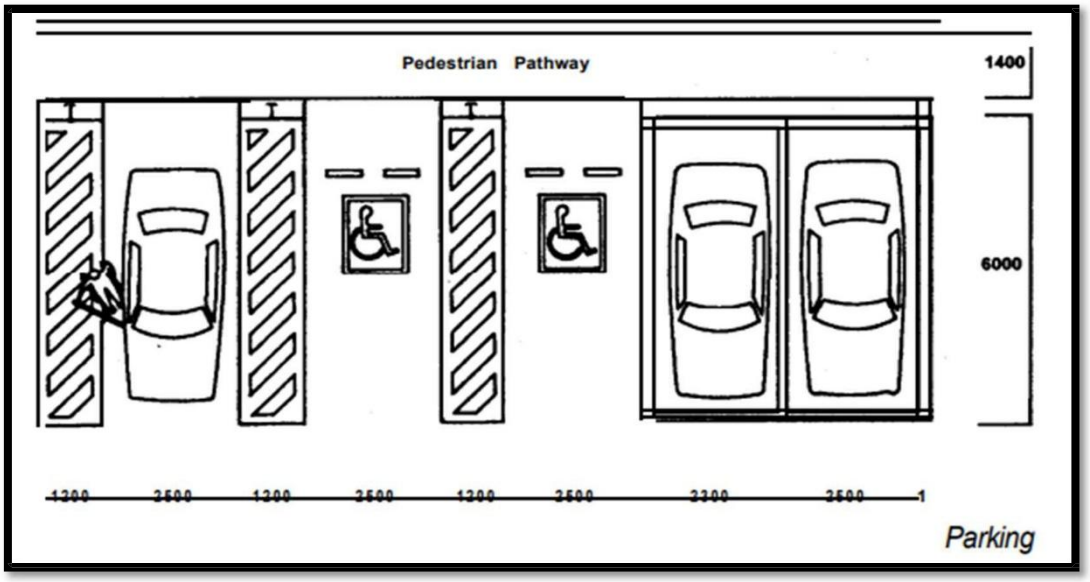


Figure 47: Parking for handicapped people

28.19. RAMP

Prevent the installation of steep ramps.

- Make sure the grade of a ramp is a moderate rise of 10 mm to each 120 mm of travel.
- Provide a flat surface 1500 mm or more in length at the top and bottom of the ramp for a wheelchair to pause and prevent it from going out of control.

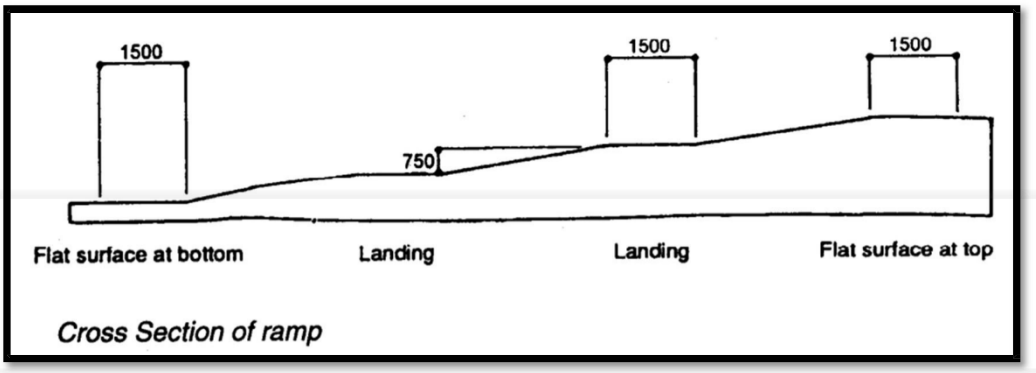


Figure 48: Ramp cross-section

28.20. SIGNAGE

Signage is an important part of our everyday Inco. From identifying a street name, to branding a specific store, to navigating through a museum, signage is any kind of visual graphic that displays information to a particular audience. Certain signs stand out from others based on the colours, typography, shape and graphics utilized. In addition to printed scrips, there are an increasing number of digital signs today.

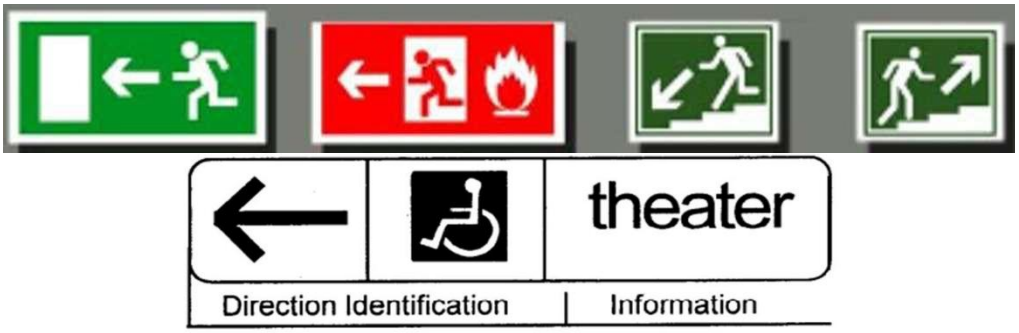


Figure 49 : Signage

29. NORMS AND BYELAWS

29.1. SOCIO-CULTURAL FACILITIES

Sl.No	Category	Maximum			Other Controls
		Ground Coverage	FAR	Height	
1.	a. Multipurpose Community Hall. b. Banquet hall	30% 30%	1.20 1.20	26m 26m	1. Parking standard @3.0ECS/100sq m of floor area. 2. Other controls related to basements etc. are given at end of this chapter.
2.	a. Community Recreational Club. b. Recreational Club	30% 25%	1.20	26m	Parking standard @2ECS/100sq.m of floor area.
3.	Socio- cultural activities such as auditorium, music, dance & drama centre/mediation & spiritual centre etc.	35%	1.20	26m	1. Parking standard @ 2ECS/100sq.m of floor area. 2. A proper scheme for visitors parking and parking adequacy statement shall be prepared taking into consideration large number of visitors.
4.	Exhibition cum Fair Ground	20%	0.20	26m	Subject to statutory clearances.
5.	Science centre	30%	1.20	NR,	Parking standard @2ECS.
6.	International Convention Centre	30%	1.20	Subject to approval of AAI, Fire Department and other statutory bodies	Parking standard @2ECS.

Notes:

i.In case of community recreational clubs, 0.50 FAR shall be admissible on the area beyond 2000 sqm.

ii.In the open area apart from outdoor games/sport facilities, swimming pool would be permissible upto an area of 300sqm. Free from ground coverage.

iii.Basement within the ground envelope shall be allowed for parking, stilt floor for parking is permissible.

iv.30% of basement area for services, storage shall not be counted in FAR.

Table 10 NBC FAR norms

29.2. STAIRCASE/EXIT REQUIREMENTS

The minimum clear width, minimum tread width and maximum riser of staircases for buildings shall be as given as below (see also Part 4 Fire and Life Safety of NBC 2005)

The minimum width of staircase shall be as follows:

A	Residential buildings (dwellings) NOTE — For row housing with 2 storeys, the min. width of shall be 0.75	1.0 m
B	Residential hotel buildings	1.5 m
C	Assembly buildings like auditoria, theatres and cinemas	2.0 m
D	Educational building	1.5 m
E	Institutional buildings	2.0 m
F	All other buildings	1.5 m

Table 11 Staircase Norms

29.3. CAPACITY FOR EXITS

The capacity of exits (staircase, ramps and doorways) indicating the number of persons could be safety evacuated through a unit exit width of 50 cm shall be as given below:

Sl. No.	Group of Occupancy	Number of Occupants		
		Stairways	Ramps	Doors
1	Residential	25	50	75
2	Educational	25	50	75
3	Institutional	25	50	75
4	Assembly	40	50	60
5	Business	50	60	75
6	Mercantile	50	60	75
7	Industrial	50	60	75
8	Storage	50	60	75
9	Hazardous	25	30	40

Table 12 NBC Fire exit norms

29.4. MINIMUM WIDTH PROVISIONS FOR PASSAGEWAY CORRIDORS

The following minimum width provisions shall be made way corridor for each passage.

a	Residential buildings, dwelling unit type.	1.00 m
b	Residential buildings, e.g., hostels, etc.	1.25 m
c	Assembly buildings like auditorium theatres and cinemas.	2.00 m
d.	All other buildings including hotels e) Hospital. Nursing Homes, etc.	1.50 m.

Table 13 Provisions for Minimum Width

29.5. RAMPS WITH GRADIENTS

1. Where ramps with gradients are necessary or desired, they shall conform to the following requirements.
2. A ramp when provided should not have a slope greater than 1 in 20 or maximum of 1 in 12 for a short distance up to 9000mm.
3. A ramp shall have handrails on at least one side, and preferably two sides, that are 900 mm high, measured from the surface of the ramp, that are smooth, and that extend 300 mm beyond the top and bottom of the ramp. Where major traffic is predominantly children, the handrails should be placed 760 mm high.

Sl. No.	Height of the Building (m.)	Exterior open spaces to be left on all sides in m. (front rear and sides in each plot) As per prescribed set backs
1	10	3
2	15	5
3	18	6
4	21	7
5	24	8
6	27	9
7	30	10
8	35	11
9	40	12
10	45	13
11	50	14
12	55 and above	16

Table 14: NBC Ramps

29.6. VENTILATION SHAFT

For ventilating the spaces for water closets and bathrooms, if not opening on the front side, rear and interior open spaces, shall open on the ventilation shaft, the size, of which shall not be less than the values given below:

Height of Building (m)	Size of ventilation shaft (sq m)	Minimum size of shaft (m)
Upto 10.0	1.2	0.9
Upto 12.0	2.8	1.2
Upto 18.0	4.0	1.5
Upto 24.0	5.4	1.8
Upto 30.0	8.0	2.4
Above 30.0	9.0	3.0

Table 15: NBC Shaft Norms

For buildings above 30.0 m. height, mechanical ventilation system shall be hustled besides the provision of minimum ventilation shaft

For fully air-conditioned residential buildings for lodging purposes, the ventilation shaft need not be insisted upon, provided the air-conditioning system works in an uninterrupted manner also, provided there is an alternative source of power supply. However, it is not mandatory in case of buildings where

ventilation is mechanized.

29.7. INTERIOR OPEN SPACE FOR LIGHT AND VENTILATION

i. The whole or part of one side of one or more rooms intended for human habitation and not abutting on either the front, rear or side open spaces shall abut on an interior open space whose minimum width in all directions shall be 3.0 m in case of buildings not more than 15 m 17.5 m (with stilts) in height, and in case of buildings above 15 m/ 17.5 m (with stilts) it shall have mandatory mechanical ventilation in addition.

ii. Sunken Courtyard: Sunken courtyard up to 3mt in depth from the ground level as 'light well within building envelop shall be permitted for light and ventilation for basement area.

iii. Skylight: Skylight in interior open space (courtyard) shall be permitted subject to the fact that it may not act as a covered space on the ground floor and does not violate the maximum minimum ground coverage rules.

29.8. JOINT OPEN-AIR SPACE

i. Every interior or exterior or air space, unless the latter is a street, shall be maintained for the benefit of such building exclusively and shall be entirely within the owner's own premises.

ii. If such interior or exterior open-air space is intended to be used for the benefit of more than one building belonging to the same owner, then the width of such open-air space shall be the one specified for the tallest building as specified in clause 4.10.3 and 4.10.4 abutting on such open-air space.

iii. Provision of Podium for parking and landscaping in case the buildings are to be constructed with stilt floor on individual plot for providing parking space and where basement could not be approached for parking, in such cases a podium may be constructed on ground floor in continuation of the stilt floor having access from the front for the parking after leaving minimum 3m setback from the plot line. The terrace of podium may be used for plantation & landscaping. For low rise development, the maximum height permitted is 15mnts. However, where the stilt floor is to be constructed for parking the height may be increased to 17.5 mt

29.9. PROJECTION INTO OPEN SPACES

i. Every interior or exterior open space shall be kept, free from any erection thereon and shall be open to the sky. Nothing except comice, chajja or weather shade (not more than 0.75 m. wide) shall overhang or project over the said open spaces so as to reduce the width to less than the minimum required.

Note: Such projections shall not be allowed at a height less than 20 m from the corresponding shed floor level

ii. A canopy or canopies each not exceeding 4.50 m. in length and 2.40 m in width in the form of cantilever or cantilevers, over the main entrance entrances, providing a minimum clear height of 2.2 m. below the canopy in single storeyed residential building, only one such canopy shall be permitted for each individual detached block. In more than one storeyed residential building, two canopies shall be permitted over ground floor higher floor entrances. In buildings of other occupancies, the permissibility of canopy, canopies shall be as decided by the Authority on its merits.

iii. In case of residential building only, a balcony or balconies at roof level of a width of 120 m overhanging in set-backs within one's own land and courtyards provided the minimum area required shall not be reduced by more than 30% of such open space

iv. The projections (cantilever) of cupboards and shelves shall be permitted and are exempted from

covered area calculations in case of residential buildings only

Such projection shall be up to 0.75 m. depth provided.

i. That no cupboard shall project in the side set back on the ground floor
ii. That outer length of cupboard overhanging in the set-backs shall not exceed 2.0 m. per habitable room. In addition to this, cupboard under the above and windows can be provided.
iii. Only one pergola on each floor shall be permitted in a residential building if constructed in the exterior open spaces or terrace. Such pergola shall not exceed 3.50 sq. m in area on which 40% shall be void and shall have a cleat height 2.20 m.

29.10. SANITATION REQUIREMENTS FOR ASSEMBLY BUILDINGS

Sl. No.	Sanitary Unit	For Public		For Staff	
		Male	Female	Male	Female
1	Water Closet (W.C.)	One for 200 persons upto 400 persons. For over 400 persons, add at the rate of 1 per 250 persons or part thereof	Four for 100 persons upto 200 persons. For over 200 persons, add at the rate of 1 per 50 persons or part thereof	One for 1-15 persons. Two for 16-35 persons.	Two for 1-12 persons. Four for 13-25 persons, add at the rate of 1 per 6 persons.
2	Ablution Taps	One in each W.C.	One in each W.C.	One in each W.C	One in each W.C
3	Urinals	One for 50 persons or part thereof	--	Nil upto 6 persons One for 7-20 persons Two for 21-45 persons	--
4	Wash Basins	One for every 200 persons or part thereof. For over 400 persons, add at the rate of 1 per 250 persons or part thereof.	One for every 200 persons or part thereof. For over 200 persons, add at the rate of 1 per 150 persons or part thereof	One for 1-15 persons Two for 16-35	One for 1-12 persons Two for 13-25 persons
5	Cleaner's Sink	One per floor, minimum			
6	Drinking Water Fountain	One per 100 persons or part thereof			
7	Shower/Bath	As per trade requirements			

Sl. No.	Sanitary Unit	For Public		For Staff	
		Male	Female	Male	Female
1.	Water Closet (W.C.)	One per 50 seats upto 200 seats. For over 200 seats, add at the rate of 1 per 100 seats or part thereof	One per 25 seats upto 200 seats. For over 200 seats, add at the rate of 1 per 50 seats or part thereof	1 for 15 persons. 2 for 16-35 persons. 3 for 36-65 persons. 4 for 66-100 persons.	2 per 1-12 persons. 4 for 13-25 persons. 6 for 26-40 persons. 8 for 41-57 persons. 10 for 58-77 persons. 12 for 78-100 persons.
2.	Ablution Taps	One in each W.C.	One in each W.C.	One in each W.C.	One in each W.C.
3.	Urinals	One for 50 persons or part thereof	--	Nil upto 6 persons. 1 for 7-20 persons. 2 for 21-45 persons. 3 for 46-70 persons. 4 for 71-100 persons.	--
4.	Wash Basins	One for every water closet			
5.	Kitchen Sinks & Dish Washer	One per each Kitchen			
6.	Service Sink	One in the restaurant			

Table 16: NBC Sanitary Norms for Assembly Building

29.11. NORMS FOR DIFFERENTLY ABLED WITHIN SEGREGATED TOILETS

i. One special W.C. in a set of toilets shall be provided for the use of differently abled persons, with essential provision of wash basin near the entrance.
ii. Minimum clear opening of the door shall be 900 mm and the door shall swing out
iii. Suitable arrangement of vertical/horizontal handrails with 50 mm clearance from wall shall be made in the toilet.
iv. The W.C. seat shall be 500 mm from the floor.

29.12. WATER REQUIREMENT AND FACILITIES

Water requirement for the facility may be worked out and enough storage for ½ day operation is to be kept in storage. If municipal water supply is reliable, the toilet blocks may have underground sump that can store half a day's requirement and overhead tanks for another half. If municipal water supply is not available, toilet block may have its own bore well and pump with no underground sump. Alternatively, a hand tube well can be used for storing water in an elevated (not overhead) tank. To minimize the wastage of water, self-closing water taps should be used.

The pans must be of Pour Flush (PF) design i.e. with a steep slope. Traps should be of a 20 mm water seal. (Use of 50 mm water seal traps will require more water for flushing.) If toilet is to be linked to city sewer, a master trap has to be provided at the sewer connection. Urinals may not be fitted with urinal pots as their replacement is expensive.

29.13. GENERAL GUIDANCE FOR WATER SUPPLY ARRANGEMENTS

1. For new construction: Provision shall be made for underground tank for the storage of water, having capacity at 200 one. Per person with adequate pumping arrangements to supply water to upper floors. Filtered water connection will be allowed only for use of drinking and bathing needs. For other purposes i.e. flushing and gardening etc., the individual shall be required to have own arrangements of tube well water within the premises. While according sanction to Layout Plan, the Authority shall make a special mention that provision for space shall be kept for the construction of underground reservoir of adequate capacity along with booster pumping station.
2. Arrangements as given in I above shall also be provided in Group Housing Societies.
3. The plumbing arrangement in case of new constructions shall be made in a way that the potable water shall be used for drinking, cooking & bathing only and for rest of the uses, provision for ground water can be made with dual piping system.
4. Low-capacity system should preferably be provided instead of normal 12.5 L capacity.
5. Provisions for sustainable methods of Water and Wastewater management and Water harvesting may be referred from section 9.2 in the Byelaws.

29.14. PROVISIONS FOR DIFFERENTLY-ABLED, ELDERLY AND CHILDREN

Types of buildings to adopt barrier-free guidelines as notified by the State Government

1. Buildings to be designed for Ambulant Disabled People
2. Higher Secondary School. Conference Hall, Dance Halls, Youth Centres. Youth Clubs. Sports Centres. Sports Pavilions, Boat Club Houses, Ice Rinks, Bowling Centres. Swimming Pools, Police Stations. Law Courts. Courts Houses. Sports Stadiums, Theatres, Concert Halls, Cinemas, Auditoria, Small Offices (the maximum plinth area 1400 sq. Mt) Snack Bars, Cafes, and banqueting rooms (for capacity above 50 dinners).
   Note:

a. In sports stadiums, provisions shall be made for non-ambulant spectators (small wheelchair)
b. @1:1000 up to 10,000 spectators and @ 1:2000 for spectators above 10,000.
c. In Theatres, Concert Halls, Cinemas and Auditoria provisions shall be made for non-ambulant spectators (Small Wheel Chairs) @ 1/250 up to 1000 spectators and 1/500 for spectators above 1000.

29.15. SITE DEVELOPMENT

Level of the roads, access paths and parking areas shall be described in the plan along with specification of the materials.

29.16. ACCESS PATH/WALK WAY

Access path from plot entry and surface parking to building entrance shall be minimum of 1800 mm wide having even surface without any steps. Slope, if any, shall not have gradient greater than 5%. Selection of floor material shall be made suitably to attract or to guide visually impaired persons (limited to colored floor material whose color and brightness is conspicuously different from that of the surrounding floor material or the material that emits different sound to guide visually impaired persons: hereinafter referred "o as "guiding floor material". Finishes shall have a non- slip surface with a texture traversable by a wheel chair. Krebs wherever provided should blend to a common level.

29.17. PARKING

1. For parking of vehicles of differently-abled people, the following provisions shall apply:
2. Surface parking for two car spaces shall be provided near entrance for the physically differently-abled persons with maximum travel distance of 30.0 m. from building entrance.
3. The width of parking bay shall be minimum 3.6 meter.
4. The information stating that the space is reserved for wheel chair users shall be conspicuously displayed.
5. Guiding floor materials shall be provided or a device, which guides visually impaired persons with audible signals, or other devices, which serves the same purpose, shall be provided.

29.18. BUILDING REQUIREMENTS

The specified facilities in buildings for differently abled persons shall be as follows:Approach to plinth level

Every building should have at least one entrance accessible to the differently abled and shall be indicated by proper signage. This entrance shall be approached through a ramp together with the stepped entry.

a. Ramped Approach: Ramp shall be finished with non-slip material to enter the building. Minimum width of ramp shall be 1800mm with maximum gradient 1:12. Length of ramp shall not exceed 9.0 meter having 800mm high hand rail on both sides extending 300mm beyond top and bottom of the ramp. Minimum gap from the adjacent wall to the hand rail shall be 50mm
b. Stepped Approach: For stepped approach size of tread shall not be less than 300mm and maximum riser shall be 150mm. Provision of 800mm high hand rail on both sides of the stepped approach similar to the ramped approach.
c. Exit/Entrance Door: Minimum & clear opening of the entrance door shall be 900mm and it shall not be provided with a step that obstructs the passage of a wheel chair user. Threshold shall not be raised more than 12mm
d. Entrance Landing: Entrance landing shall be provided adjacent to ramp with the minimum dimension 1800mm x 2000mm. The entrance landing that adjoins the top end of a slope shall

be provided with floor materials to attract the attention of visually impaired person's (limited to colored floor material whose color and brightness is conspicuously different from that of the surrounding floor material or the material that emits different sound to guide visually impaired persons. Finishes shall have a non-slip surface with a texture traversable by a wheel chair. Krebs wherever provided should blend to a common level.

29.19. CORRIDOR CONNECTING THE ENTRANCE/ EXIT FOR THE DIFFERENTLY ABLED

The corridor connecting the entrance/exit for differently abled leading directly outdoors to a place where information concerning the overall use of the specified building can be provided to visually impaired persons either by a person or by signs, shall be provided as follows:

a) Guiding floor materials shall be provided or device that emits sound to guide visually impaired persons.
b) The minimum width shall be 1500mm.
c) In case there is a difference of level, slope ways shall be provided with a slope of 1:12.
d) Handrails shall be provided for ramps/slope ways.

29.20. STAIRWAYS

a) One of the stair-ways near the entrance/exit for the differently abled shall have the following provisions:
b) The minimum width shall be 1350 mm.
c) Height of the riser shall not be more than 150 mm and width of the tread 300mum. The steps shall not have abrupt (square) nosing.
d) Maximum number of risers on a flight shall be limited to 12.
e) Handrails shall be provided on both sides and shall extend 300 mm on the top and bottom of each flight of steps.

29.21. LIFTS

Wherever lift is required as per bye-laws. Provision of at least one lift shall be made for the wheel chair user with the following cage dimensions of lift recommended for passenger lift of 13 person's capacity of NBC 2005. BIS. Section 4.9.3 Table no.

29.22. DESIRABLE LIFT SIZE

i. Clear internal width 1100 mm
ii. Clear internal depth 2000 mm
iii. Entrance door width 900 mm

a) A hand rail not less than 600mm long at 1000mm above floor level shall be fixed adjacent to the control panel.

b) The lift lobby shall be of an inside measurement of 1800 mm x 2000 mm or more.

c) The time of an automatically closing door should be minimum 5 seconds and the closing speed should not exceed 0.25 m/ sec.

d) The interior of the cage shall be provided with a device that audibly indicates the floor, the cage has reached indicates that the door of the cage of entrance/exit is either open or closed.

e) Graphic Braille signage, as per the Harmonized Guidelines, shall be provided in the lift lobby.

29.23. TOILETS

One special W.C. in a set of toilets shall be provided for the use of differently abled with essential provision of washbasin near the entrance for the differently abled.

a) The minimum size shall be 1500 mm x 1750 mm.

b) Minimum clear opening of the door shall be 900mm and the door shall swing out.

c) Suitable arrangement of vertical horizontal handrails with 50mm clearance from wall shall be made in the toilet.

d) The W.C. seat shall be 500mm from the floor.

29.24. RAIN WATER HARVESTING PROVISIONS FOR OPEN SPACES IN CITIES

The open spaces for recreational land use generally constitute regional parks, district parks, playgrounds, and stadiums, sports complex, monument zones, public parking. Plaza and other public open spaces. This may be as high as 30% to 50% of the city's geographic area. All such public open spaces above the size of 500 sq.m shall have arrangements for complete utilization and capture of storm water with scientific rainwater harvesting arrangements.

The following ideas may also be included:

i. Well cum Channel cum Percolation pits.
ii. Use of al abandoned bore wells for recharging of groundwater.
iii. Artificial or natural Storage of storm water runoff from larger sites.

Category / Use	Area of Plot (sq.m.)	Provisions to be made	Other conditions
Residential Plotted Houses			
New Proposals	100 and above	Construction of Rain Water Harvesting Structure.	Shall have emphasis on both storage and reuse.
Group Housing			
New Proposals	All plot sizes	i. Construction of Rain Water Harvesting Structure. ii. Concrete paving to be avoided and permeable materials are to be used for all open parking spaces.	Should indicate the system of Strom Water Drainage, Rain Water Harvesting Structure and Recharging Well
Public and semi public buildings			
All Proposals	All plot sizes	i. Shall have Rain Water Harvesting Structure and storage ii. Shall have Recharge pits	Shall have emphasis on both storage and reuse.
Commercial / Mixed use			
All Proposals	All plot sizes	i. Construction of Rain Water Harvesting Structure. ii. Soft landscape provisions and open spaces with Percolation pits. iii. Common treatment plant to be made part of the integrated development, funded by sale of commercial space.	Should indicate the system of Strom Water Drainage, Rain Water Harvesting Structure and Recharging Well Shall have emphasis on both storage and reuse.
Industrial			
All proposals	All plot sizes	i. Construction of Rain Water Harvesting Structure. ii. Soft landscape provisions and open spaces with Percolation pits. iii. Use of abandoned bore wells for recharging of ground water. iv. Common treatment plant to be made part of the integrated development funded by sale of commercial space.	Should indicate the system of Strom Water Drainage, Rain Water Harvesting Structure and Recharging Well. Provision should be made not to inject contaminated water into recharge structures in industrial areas and care is to be taken to keep such structures away from sewer lines, septic tanks, soak pits, landfill and other sources of contamination.
Other proposals	All plot sizes	Similar as above	Similar as above

Table 17: NBC Rainwater Harvesting Norms

29.25. WATER CONSERVATION AND MANAGEMENT

- Rain Water Harvesting
- Low Water Consumption Plumbing Fixtures
- Waste Water Recycle and Reuse
- Reduction of Hardscape

29.26. SOLAR ENERGY UTILIZATION

- Installation of Solar Photovoltaic Panels (detailed at section 10.2.3 below)
- Installation of Solar Assisted Water Heating Systems

29.27. ENERGY EFFICIENCY (CONCEPT OF PASSIVE SOLAR DESIGN OF BUILDINGS)

- Low Energy Consumption Lighting Fixtures (Electrical Appliances - BEE Star and Energy Efficient Appliances)
- Energy Efficiency in HVAC systems.
- Lighting of Common areas by solar energy LED devices.

29.28. WASTE MANAGEMENT

- Segregation of Waste
- Organic Waste Management

In case owners of properties desire to procure green building ratings from one or more rating bodies, they may suitably incorporate any other provisions if required and additional incentive FAR as per Master Plan may be availed.

29.29. ROOF TOP SOLAR ENERGY INSTALLATIONS

Rooftop photovoltaic power station or rooftop PV system, is a photovoltaic system that has its electricity-generating solar panels mounted on the rooftop of residential or commercial buildings. The various components of such a system include photovoltaic modules, mounting systems, cables, solar inverters and other

29.30. INSTALLATION OF SOLAR ASSISTED WATER HEATING SYSTEM IN BUILDINGS

I. No new building in the following categories in which there is a system of installation for supplying hot water shall be built unless the system of the installation is also having an auxiliary solar-assisted water heating system

a) Hospitals and Nursing homes.
b) Hotels, Lodges, Guest Houses, and Group Housing with a plot area of 4000 sq m.
c) Hostels of Schools, Colleges, and Training Centres with more than 100 Students.
d) Barracks of armed forces, paramilitary forces, and police.
e) Individual residential buildings having more than 150 sq m. plinth area.
f) Functional Buildings of Railway Stations and Air Ports like waiting rooms retiring rooms, restrooms, inspection bungalows, and catering units.
g) Community Centres. Banquet Halls. Barat Ghars. Mangal Karyalayas and buildings for similar use.

i)	"Solar Assisted Water Heating System"	A device to heat water using solar energy as heat source.
ii)	"Auxiliary back-up"	Electricity operated or fuel fired boilers/systems to heat water coming out from solar water heating system to meet continuous requirement of hot water.
iii)	"New Building"	Such buildings of above said categories for which construction plans have been submitted to the Authority for clearance.
iv)	"Existing building"	Such buildings, which are licensed to perform their respective business.

Table 18 Water Heating systems in buildings

29.31. INSTALLATION OF SOLAR WATER HEATING SYSTEM

a) New Buildings: Clearance of plan for the construction of new buildings of the aforesaid categories shall only be given if they have a provision in the building design itself for an insulated pipeline from the rooftop in the building to various distribution points where hot water is required. The building must have a provision for continuous water supply to the solar water heating system. The building should also have open space on the rooftop. which receives direct sunlight. The load bearing capacity of the roof should at least be 50 kg. per sq m. All new buildings of above said categories must complete installation of solar water heating systems before obtaining necessary license to commence their business.
b) Existing Buildings: Installation of Solar Assisted Water Heating Systems in the existing building shall be made mandatory at the time of change of use to above said category provided there is a system or installation for supplying hot water.

29.32. CAPACITY

The capacity of solar water heating system to be installed on the building of different categories shall be decided in consultation with the local bodies. The recommended minimum capacity shall not be less than 25 liters per day for each bathroom and kitchen subject to the condition that maximum of 50% of the total roof area is provided with the system

29.33. SPECIFICATIONS

Installation of Solar Assisted Water Heating Systems shall conform to BIS specification IS 12933. The solar collectors used in the system shall have the BIS certification mark

29.34. AUXILIARY SYSTEM:

Wherever either hot water requirement is continuous, auxiliary heating arrangement with electric elements or oil of adequate capacity can be provided.'

29.35. SUSTAINABLE WASTE MANAGEMENT

Zero Waste is a concept of waste management and planning approaches that emphasize waste

prevention as opposed to end waste management. This means restructuring production and distribution systems, designing and managing products and processes to systematically follow the 3R rule of Reduce. Re-use and Re-cycle the volume of waste, to conserve and recover all used resources, and therefore eliminating all discharges to landfills, and prevent air, water and land pollution.

Zero Waste/ land-fill can be achieved by adopting systematic approach of segregation at source by planning, by collection facilitation and most importantly by creating public awareness.

The green waste can be converted into fuel cakes, and kitchen waste into manure construction & demolition waste into bricks, plastic waste into oil paper glass and steel back into the same and all residual inert materials can also be converted into bricks. Achieving zero land-fill is more conveniently possible if

i. The collection is made from house to house and some segregation is done at the household level and
ii. Separate wet and dry bins must be provided at the ground level.
iii. The recycling is done at decentralized, say, ward or even lower levels.

29.36. SUSTAINABILITY OF BUILDING MATERIALS

Sustainability of natural resources for building materials shall be ensured through conservation of available natural resources and use of supplementary materials such as industrial agricultural by-products, renewable resources, factory made building components and recycled construction and demolition waste.

Supplementary building materials (derived or processed waste) shall be suitably used in combination with conventional resources offers dual advantages in purview of health & environmental benefits.

a) Use of Factory made pre-fab/pre-cast and recycled components with green benefits:
b) Panels, hollow slabs, hollow blocks, etc. conservation of materials, less water requirement.
c) Fly Ash bricks, Portland Pozzolana cement, Fly ash concrete, phosphor-gypsum- based walling & Roofing panels, particle wood recycled use of industrial/ agricultural by-products. (Ref. Table 14)
d) Fly ash/ AAC (Autoclaved aerated light weight concrete) panels/ CLC (Cellular lightweight concrete) panels- ensures thermal comfort (significant reduction in air conditioning requirement)
e) Use of bamboo & rapidly growing plantation timbers- environmental benefits.
f) Local materials are generally suitable for prevailing geo-climatic conditions & have the advantage of low transportation cost & time. Sustainable use of building materials shall be encouraged which may combine certain mandatory provisions and incentives.

29.37. FIRE ESCAPES OR EXTERNAL STAIRS

a) Fire escape shall not be taken into account while calculating the number of staircases for a building.
b) All fire escapes shall be directly connected to the ground.
c) Entrance to the fire escape shall be separate and remote from internal staircase.
d) The route to fire escape shall be free of obstructions at all times except the doorway leading to the fire escape which shall have the required fire resistance.
e) Fire escape shall be constructed of non-combustible materials.
f) Fire escape stairs shall have straight flight not less than 125 cm wide with 25 cm treads and risers not more than 19 cm.
g) Handrails shall be at a height not less than 100 cm.
h) Fire escape staircase in the mercantile, business, assembly, hotel buildings above 24 m. height shall be a fire tower and in such a case width of the same shall not be less than the width of the

main staircase. No combustible material shall be allowed in the fire tower.

29.38. SPIRAL STAIRS

i. The use of spiral staircase shall be limited to low occupant load and to a building height 9 m.
ii. A spiral stair shall not be less than 150 cm in diameter and shall be designed to give the adequate headroom

29.39. STAIRCASE ENCLOSURES

i. The external enclosing walls of the staircase shall be of the brick or the R.C.C. construction having fire resistance of not less than two hours. All enclosed staircases shall have access through self-closing door of one-hour fire resistance. These shall be single swing doors opening in the direction of the escape. The door shall be fitted with the check action door closers.
ii. The staircase enclosures on the external wall of the building shall be ventilated to the atmosphere at each landing
iii. Permanent vent at the top equal to the 5% of the cross-sectional area of the enclosure and openable sashes at each floor level with area equal to 1 to 15% of the cross-sectional area of the enclosure on external shall be provided. The roof of the shaft shall be at least I m. above the surrounding roof. There shall be no glazing the glass bricks in any internal closing wall of staircase. If the staircase is in the core of the building and cannot be ventilated at each landing, a positive of 5-mm. e.g. by electrically operated blower/blowers shall be maintained.
iv. The mechanism for pressurizing the staircase shaft shall be so installed that the same shall operate automatically on fire alarm system/sprinkler system and be provided with manual operation facilities.

29.40. RAMPS

i. Ramps of slope of not more than 1 in 10 may be substituted for and shall comply with all the applicable requirements of all required stairways as to enclosure capacity and limiting dimensions. Larger slopes shall be provided for special uses but in no case greater than 1 in 8. For all slopes exceeding 1 in 10 and where the use is such as to involve danger of slipping, the ramp shall be surfaced with approved non-slipping material
ii. The minimum width of the ramps in the Hospitals shall be 2.4 m. and, in the basement, using car parking shall be 6.0 m
iii. Handrails shall be provided on both sides of the ramp.
iv. Ramp shall lead directly to outside open space at ground level or courtyards of safe place.
v. For building above 24.0 m in height, access to ramps from any floor of the building shall be through smoke fire check door.
vi. In case of nursing homes, hospitals, etc. area exceeding 300 sq m at each floor one of the exit facilities shall be a ramp of not less than 2.4 m. in width.

29.41. SERVICE DUCTS/REFUGE CHUTE

Service duct shall be enclosed by walls and door, if any, of 2 hours fire rating. If ducts are larger than 10 sq m. the floor should seal them, but provide suitable opening for the pipes to pass through, with the gaps sealed.

A vent opening at the top of the service shaft shall be provided between one- fourth and one-half of the area of the shaft. Refuge chutes shall have an outlet at least of wall of non-combustible material with fire resistance of not less than two hours. They shall not be located within the staircase enclosure or service shafts or air- conditioning shafts. Inspection panel and door shall be tight fitting with 1 hour fire resistance; the chutes should be as far away as possible form exits.

Refuge chutes shall not be provided in staircase walls and A/C shafts etc.

29.42. ELECTRICAL SERVICES

Electrical Services shall conform to the following:

a) The electric distribution cables/wiring shall be laid in a separate duct shall be sealed at every floor with non-combustible material having the same fire resistance as that of the duct. Low and medium voltage wiring running in shaft and in false ceiling shall run in separate conduits.
b) Water mains, telephone wires, inter-com lines, gas pipes or any other service lines shall not be laid in ducts for electric cables.
c) Separate conduits for water pumps, lifts, staircases and corridor lighting and blowers for pressuring system shall be directly from the main switch panel and these circuits shall be laid in separate conduit pipes, so that fire in one circuit will not affect the others. Master switches controlling essential service circuits shall be clearly labeled.
d) The inspection panel doors and any other opening in the shaft shall be provided with airtight fire doors having fire resistance of not less than 1 hour.
e) Medium and low voltage wiring running in shafts, and within false ceiling shall run in metal conduits. Any 230-voltage wiring for lighting or other services, above false ceiling should have 660V grade insulation. The false ceiling including all fixtures used for its suspension shall be of non-combustible material.
   An independent and well-ventilated service room shall be provided on the ground floor with direct access from outside or from the corridor for the purpose of termination of electrical supply from the licenses service and alternative supply cables. The doors provided for the service room shall have fire resistance of not less than I hour.
f) Miniature circuit breakers (MCB) and Earth leakage circuit breaker (ELCB) shall be provided for electrical circuit.

29.43. AIR-CONDITIONING

a. Air-conditioning system should be installed and maintained so as to minimize the danger of spread of fire, smoke or fumes thereby from one floor of fire area to another or from outside into any occupied building or structure
b. Air Conditioning systems circulating air to more than one floor area should be provided with dampers designed to close automatically in case of fire and thereby prevent spread of fire or smoke. Such a system should also be provided with automatic controls to stop fans in case of fire, unless arranged to remove smoke from a fire, in which case these should be designed to remain in operation.
c. Air- conditioning system serving large places of assembly (over one thousand persons), large departmental stores, or hostels with over 100 rooms in a single block should be provided with effective means for preventing circulation of smoke through the system in the case of fire in air filters or from other sources drawn into the system even though there is insufficient heat to actuate heat smoke sensitive devices controlling fans or dampers. Such means shall consist of approved effective smoke sensitive controls.

29.44. AIR-CONDITIONING SHOULD CONFORM TO THE FOLLOWING:

i. Escape routes like staircase, common corridors, lift lobbies: etc. should not be used as return air passage.
ii. The ducting should be constructed of metal in accordance with BIS 655:196
iii. Wherever the ducts pass through fire walls or floor, the opening around the ducts should be sealed with fire resisting material of same rating as of walls/floors.
iv. Metallic ducts should be used even for the return air instead of space above the false ceiling.

v. The material used for insulating the duct system (inside outside) should be of flame resistant (IS 4355: 1977) and non-conductor of heat.
vi. Area more than 750 sq m. on individual floor should be segregated by a firewall and automatic fire dampers for isolation should be provided.

29.45. FIRE DAMPERS

These shall be located in air ducts and return air ducts passages at the following points:

i. At the fire separation wall
ii. Where ducts/passages enter the central vertical shaft
iii. Where the ducts pass through floors
iv. At the inlet of supply air duct and the return air duct of each compartment on every floor.

The dampers shall operate automatically and shall simultaneously switch off the air- handling fans. Manual operation facilities shall also be provided.

Note: For blowers, where extraction system and dust accumulators are used, dampers shall be provided

a) Fire smoke dampers (for smoke extraction shafts) for building more than 24 m in height.
b) For apartment houses in non-ventilated lobbies corridor operated by detection system and manual control sprinkler system
c) For other buildings on operation of smoke heat detection system and manual control sprinkler system.
d) Automatic fire dampers shall be so arranged so as to close by gravity in the direction of air movement and to remain tightly closed on operation of a fusible link.

29.46. STATIC WATER STORAGE TANK

a) A satisfactory supply of water exclusively for the purpose of firefighting shall always be available in the form of underground static storage tank with capacity specified in Annexure-A' with arrangements of replenishment b town's main or alternative source of supply@ 1000 liters per minute. The static storage water supply required for the above-mentioned purpose should entirely be accessible to the fire tenders of the local fire service Provision of suitable number of manholes shall be made available for inspection repairs and insertion of suction hose etc. The covering slab shall be able to withstand the vehicular load of 45 tons in case of high rise and 22 tons in case of low-rise buildings. A draw off connection shall be provided. The slab need not strengthened if the static tank is not located in mandatory seat- back area.
b) To prevent stagnation of water in the static water tank the suction tank of the domestic water supply shall be fed only through an over flow arrangement to maintain the level therein at the minimum specified capacity.
c) The static water storage tank shall be provided with a fire brigade collecting branching with 4 Nos. 63mm Dia instantaneous male inlets arranged in a valve box with a suitable fixed pipe not less than 15 cm Dia to discharge water into the tank. This arrangement is not required where down comer is provided.

29.47. AUTOMATIC SPRINKLERS

An automatic sprinkler system shall be installed in the following buildings

a) All buildings of 24 m. and above in height, except group housing and 45 m and above in case of apartment group housing society building.
b) Hotels below 15 m. in height and above 1000 sq m. built up area at each floor and or if basement is existing.

c) All hotels, mercantile, and institutional buildings of 15 m. and above.
d) Mercantile buildings having basements more than one floor but below 15 m (floor area not exceeding 750 sq m.)
e) Underground Shopping Complex.
f) Underground car/scooter parking /enclosed car parking.
g) Basement area 200 sq m. and above.

29.48. EXHIBITION GALLERIES

An Exhibition is an organized presentation and display of a selection of items. In practice, exhibitions usually occur within museums, galleries and exhibition halls, and World's Fairs. Exhibitions can include many things such as art in both major museums and smaller galleries, interpretive exhibitions, natural history museums and history museums, and also varieties such as more commercially focused exhibitions and trade fairs.

Table 4 Art Galleries, Libraries and Museums
(*Clause* 4.2.5.1)

Sl No.	Fixtures	Public		Staff	
		Males	Females	Males	Females
(1)	(2)	(3)	(4)	(5)	(6)
i)	Water closets	1 per 200 up to 400 Over 400 add at 1 per 250 or part thereof	1 per 100 up to 200 Over 200 add at 1 per 150 or part thereof	1 for up to 15 2 for 16 to 35	1 for up to 12 2 for 13 to 25
ii)	Ablution tap	One in each water closet	One in each water closet	One in each water closet	One in each water closet
		1 water tap with draining arrangements shall be provided for every 50 persons or part thereof in the vicinity of water closets and urinals			
iii)	Urinals	1 per 50	—	Nil up to 6 1 per 7 to 20 2 per 21 to 45	—
iv)	Wash basins	1 for every 200 or part thereof. For over 400, add at 1 per 250 persons or part thereof	1 for every 200 or part thereof. For over 200, add at 1 per 150 persons or part thereof	1 for up to 15 2 for 16 to 35	1 for up to 12 2 for 13 to 25
v)	Drinking water fountain	← 1 per 100 persons or part thereof →			
vi)	Cleaner's sink	← 1 per floor (Minimum) →			
vii)	Showers/bathing rooms	← As per requirements →			

NOTES
1 Some WCs may be Indian style, if desired.
2 Male population may be assumed as two-third and female population as one-third.

Table 19: Exhibition Gallery Norms

29.49. SPACE STANDARDS

a. Aisles:

Must be a minimum width of 3 meters. Must equal total width of existing exits. Must have 2 exits.

Must have no dead ends.

b. Fire exits/Clearways:

Designated fire exits and clear ways cannot be encroached upon under any circumstance.

Storage of materials or equipment in these areas is not permitted. It is the responsibility of the event organizer to ensure that stand holders comply with this requirement.

29.50. MEANS OF ESCAPE

29.50.1. TRAVEL DISTANCE:

The maximum travel distance from seat to exit within the auditorium is determined by the need to

evacuate from each level of the auditorium within 2 minutes. For traditional seating the maximum travel distance is 18 m measured from the gateway, for continental seating 15 m from any seat.

29.51. EXITS:

From each level of the auditorium two separate exits must be provided for the first 500 seats with an additional exit for each further 250 seats.

29.52. STAIRS:

Staircase fights should have at past two risers and not more than 16. Al treads should be 275 mm and risers 180 mm.

29.53. RAMPS:

Wheelchair users should be provided with flat or ramped escape routes which may be separate from other routes. Ramps should not be longer than 4.5 m or steeper than 8.5%

Number of people	Minimum total exit widths (m)
upto 200	2.2
201-300	2.4
301-400	2.8
401-500	3.2
751-1000	6.4
1001-2000	14.4

Table 20: Fire Safety Norms

29.54. FIRE SAFETY

Every building shall be so constructed, equipped, maintained and operated as to avoid undue danger to the life and safety of the occupants from fire, smoke, fumes, or panic during the time period necessary for escape.

29.55. GENERAL EXIT REQUIREMENTS

An exit may be a doorway; to an internal staircase, or external staircase, or terrace(s), which have access to the street, or to the roof of a building or a refuge area.

All exits shall provide continuous means of egress to the exterior of a building or to an exterior open space leading to a street.

Exits shall be so arranged that they may be reached without passing through another occupied unit.

29.56. CAPACITY OF EXITS

The unit of exit width, used to measure the capacity of any exit, shall be 500 mm. A clear width of 250 mm shall be counted as an additional half unit. Clear widths less than 250 mm shall not be counted for exit width.

In an assembly building (convention center), the capacity per storey per unit width of exit of stairways, ramps and doors is 40,50 and 60 respectively.

The travel distance to an exit from the dead end of a corridor shall not exceed 30m in case of assembly buildings.

29.57. DOORWAYS

No exit doorway shall be less than 1000 mm in width except assembly buildings where door width shall be not less than 2000 mm. Doorways shall be not less than 2000 mm in height.

29.58. STAIRWAYS AND RAMPS

The minimum width of tread shall be 300 mm and the maximum height of riser shall be 150 mm for assembly buildings.

The minimum width for a staircase shall be 2m.

The minimum headroom in a passage under the landing of a staircase and under the staircase shall be 2.2m.

The slope of a ramp shall not exceed 1 in 10. In certain cases, steeper slopes maybe permitted but in no case greater than 1 in 8.

29.59. HORIZONTAL EXITS

For buildings more than 24 m in height, refuge area of 15 m² or an area equivalent to 0.3 m² per person to accommodate the occupants of two consecutive floors.

29.60. VERTICAL CIRCULATION

29.60.1. ESCALATORS

Escalators are required for continuous mass transportation of people. The standard dimensions for various depths of an escalator are prescribed in the adjoining table.

Step width	600	800	1000
A	605-620	805-820	1005-1020
B	1170-1220	1320-1420	1570-1620
C	1280	1480	1680
Transportation capacity/hr	5000-6000	7000-8000	8000-10000

Table 21: Vertical Circulation Norms

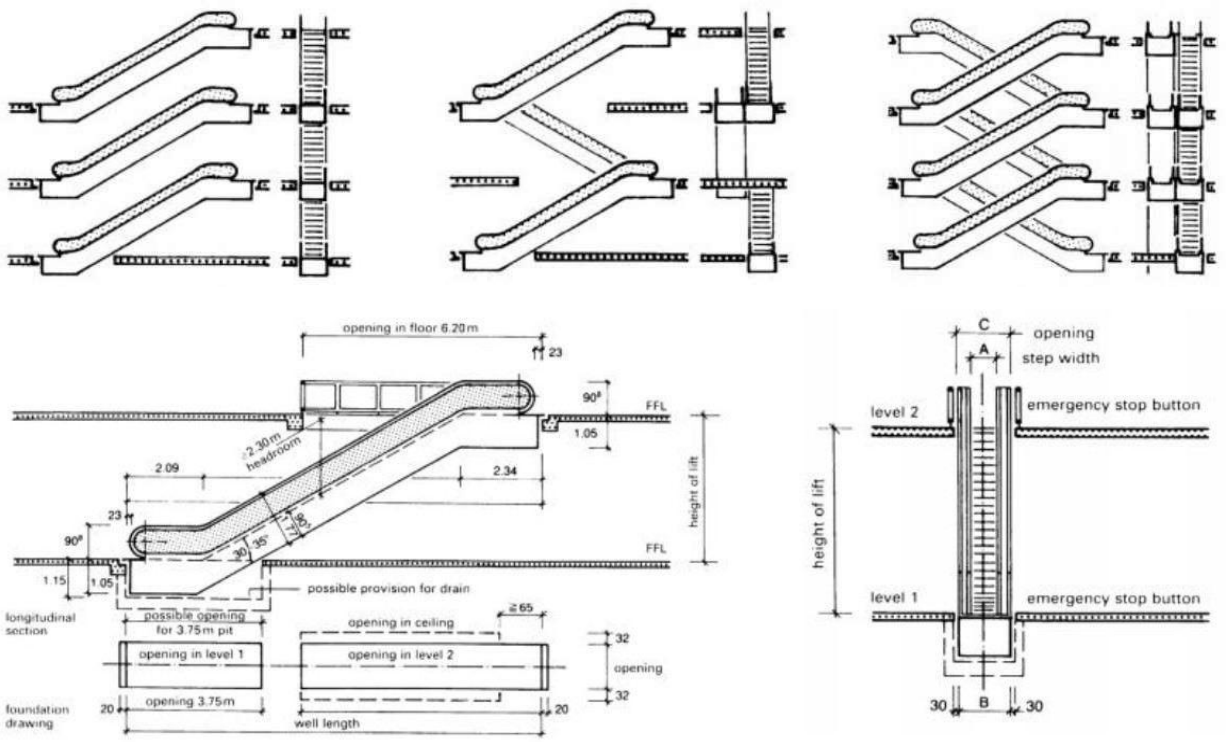


Figure 50: Escalator Norms

i. Angle of inclination of an escalator from the horizontal shall not exceed 30°. but for rises not exceeding 6 m the angle of inclination is permitted to be increased up to 35
ii. In accordance with a worldwide standard, the width of the step to be used is 60cm (for one person), 80cm (for one-to-two people width) and 100cm (for two people width). A 100cm step provides ample space for camuing goods.
iii. Calculation of length in plan for an escalator:
   a) with 30deg, escalator 1.732 storey height
   b) with 35deg, escalator = 1.428 storey height
iv. The landing area of escalators shall have a surface that provides a secure foot hold for a minimum distance of 0.85 m measured from the root of the comb teeth.

29.60.2. ELEVATORS

Passenger lifts should be within a reasonable walking distance from the furthest part of the floor areas served (say, 70 m maximum) and, where they are the only or main lifts near an entrance. The location of goods and service lifts will depend on their function, but they should not open into passenger lift lobbies or public areas.

29.60.3. PLANNING A PASSENGER LIFT:

Cul-de-sac or recessed lobbies, are essential to get the maximum performance from lift groups. Clearly, having called for lift service the waiting passengers should not have to walk further than necessary to the responding lift car, and should not be obstructed by passers-by.

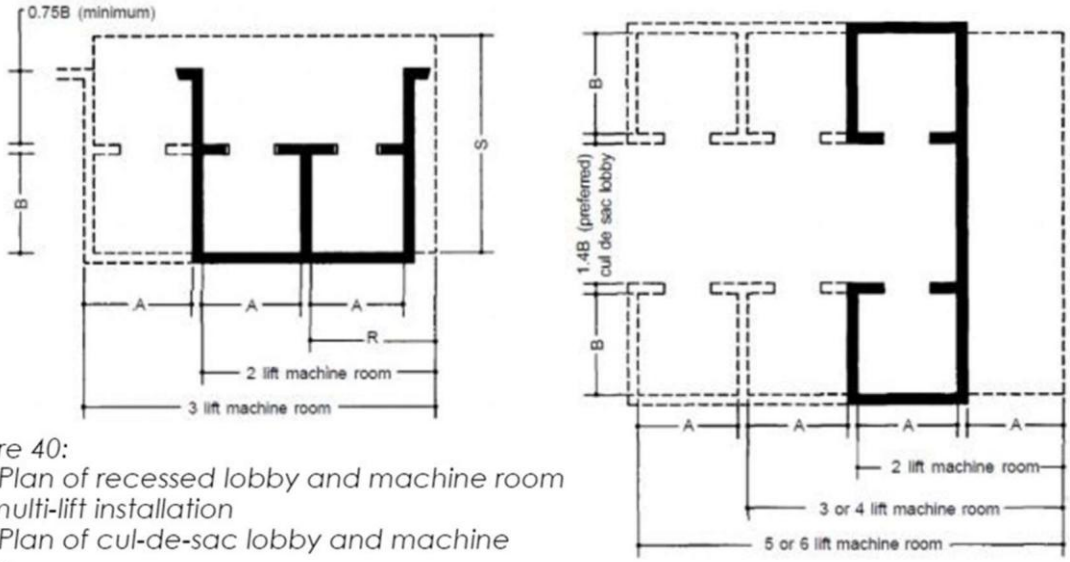


Figure 40:
(a.) Plan of recessed lobby and machine room for multi-lift installation
(b.) Plan of cul-de-sac lobby and machine room

Figure 50: Plan of Lobby and Machine Room

- **Selecting the size of an elevator:**

Type	Capacity/ load	Shaft size	Car size	Door	Pit
	persons/kg	mm	mm	mm	mm
General purpose passenger traffic (speed : 1m/s)	13/1000	2400*2300	1600*1400	1100	1800
	16/1250	2600*2300	1950*1400	1100	1900
	21/1600	2600*2600	1950*1750	1100	1900
Intensive passenger electric traction (speed : 2.5 m/s)	13/1000	2400*2300	1600*1400	1100	2800
	16/1250	2600*2300	1950*1400	1100	2800
	21/1600	2600*2600	1950*1750	1100	2800
General-purpose goods lifts, electric traction (speed : 0.5/0.63/1 m/s)	13/1000	2100*2100	1400*1800	1400	1500
Heavy-duty goods, electric traction	26/2000	2600*2900	1700*2000	1700	1500-1800
	26/2000	2900*2500	2000*2100	1800	1500-1800

Table 22: Elevator Norms

29.60.4. RAMPS

These are used to allow wheeled vehicles such as trolleys, wheelchairs and buggies to change levels.

a) A ramp when provided should not have a slope greater than 1 in 20 or maximum af I in 12 for short distance up to 9000 mm.
b) Each ramp shall have at least 1800 mm of straight clearance at the bottom
c) At least one entrance usable by individuals in wheelchairs shall be on a level that would make the elevators accessible.
d) Width of a ramp: It is determined according to type and intensity of use. One-way travel requires a minimum width of 900 mm clear, whereas two-way travel needs 1500 mm. Where turns occur at landings adequate space for maneuvering wheel chairs must be provided.

29.60.5. INTERNAL STAIRCASE

All assembly buildings having area more than 500 m on each floor shall have a minimum of two staircases.

a) The minimum width for a staircase in an assembly building shall be 1500mm. The formula for most staircases of twice the rise plus the going lies between 600 and 630mm will give a suitable relationship.
b) The rise should not exceed 190 mm, and the going should not be less than 250 mm.
c) The top of the handrail should be between 900 and 1000 mm above the pitch line.
d) The minimum headroom in a passage under the landing of a staircase and under the staircase shall be 2.2 m.

Maximum Pitch	Rise		Going		Maximum risers per flight
32.7degrees	Minimum	135	Minimum	280	16 risers
	Maximum	180	Maximum	340	

Table 23: Internal Staircase Norms

29.61. PARKING

6. INSTITUTIONAL (medical), ASSEMBLY PUBLIC BUILDINGS AND PUBLIC OFFICE COMPLEXES:

1. Maximum permissible FAR : Refer relevant statement.
2. Building Requirements and setbacks upto 10 mtrs. building height.

Plot area (Sq.mts.)	Max. Cov	Setbacks for Office buildings		Setbacks for Other buildings	
		Front	Remaining sides	Front	Remaining sides
a) Below 500	As per min.building setbacks	6.00	4.50	9.00	6.00
b) 500 – 2000	50%	6.00	4.50	9.00	6.00
c) 2000 & above	1000 sq.mts. or 40% whichever is higher	6.00	4.50	9.00	6.00

(3) for above category of buildings above 10 mtrs. height:
In addition to the setbacks prescribed above there shall be an increase of 1.0 mtrs. on all sides for every increase of 3.0 mtrs. height of building above 10 mtrs.

4. PARKING:

Type of Building	One vehicular parking space of 20 sq.mts. area for every
a) Institutional (Medical)	20 beds
b) Government or semi-public buildings	100 sq.mts. builtup area or fraction thereof

Table 24: GO 168 Parking Norms

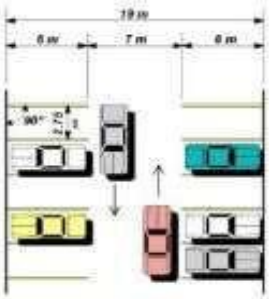
Type	Description	Layout	Advantage/Disadvantages
Perpendicular	• Effective in low turnover rate or long term parking areas. • Most efficient and economical since it accommodates the most vehicles per linear meter.		**Advantages:** • Works well with either one- or two-way aisles • Handles the most vehicles per square meter of pavement **Disadvantages:** • Requires widest area • Two-way traffic can create visibility problems
Angled - 60 degree	• This parking area configuration is ideal for a fast turnover rate or predominantly short term use. • This is often offset by difficulties of inefficient circulation patterns and one-way aisles.		**Advantages:** • Easy maneuvering in and out of parking spaces • Good visibility • Lends itself to either one-or two-way aisles **Disadvantages:** • Requires more pavement per vehicle than perpendicular configuration
Angled - 45 degree	• The 45 degree angled parking configuration displays similar benefits and limitations as the 60 degree.		**Advantages:** • Reduced width requirements for layout. • Easy maneuvering in and out of parking spaces. • Good visibility to the rear **Disadvantages:** • Doesn't work well with two-way aisles • Requires more pavement per vehicle than perpendicular parking configuration.

Figure 51: Parking Layout

CHAPTER III

SITE INVENTORY

30. OVERVIEW

The case study overview provides a concise summary of the study's objectives, methodology, findings, and implications. It begins with an introduction, giving a brief background and context of the case study. The objectives of the study are clearly stated, followed by a description of the research methodology employed, including data collection methods and analysis approaches. The overview then provides an overview of the case study, including its location, time frame, and participants. The key findings and outcomes of the study are summarized, emphasizing the most significant results. The implications and significance of the findings are discussed, offering potential applications and recommendations. Limitations of the study are acknowledged, addressing any constraints or biases encountered. The overview concludes by summarizing the main points and emphasizing the importance and relevance of the case study.

31. SITE DETAILS

31.1. PROJECT SITE ATTRIBUTES

- **Location**: Sy. No. 1791/1 of Madikonda (V), Warangal (U) District
- **Latitude:** 17.957690 N
- **Longitude:** 79.447151 E
- **Site Area**: ~ 10 acres (40,468 sq. m.)
- **Primary Access**: NH 163 (From East of Site)
- **Visibility & Frontage**: Excellent visibility and frontage along abutting roads; contiguous site
- **Shape, Terrain**: Regular and mostly flat

31.2. PROJECT SITE BOUNDARY

- **North**: Vacant land
- **South**: Vacant land
- **East**: NH 163 Access Road

- **West**: Dharmasagar Canal



Figure 52: Site Overview

31.3. SITE SURROUNDINGS

- The East side of the site is with large area of Textile Park and having NH 163 in front of site for access towards site.
- The West side and South side of the site is vacant land.
- The North side of the site is allocated for IT park development.

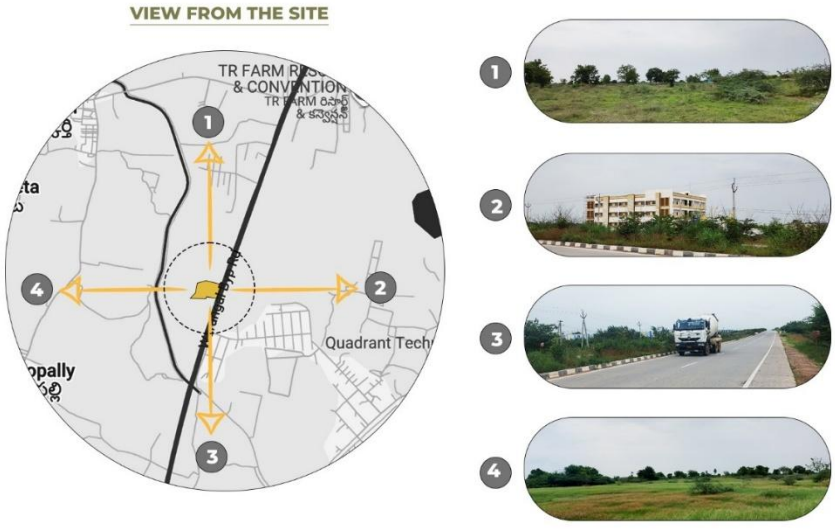


Figure 53: Views from Site

31.4. LANDMARK

Infront of Site there is TGIIC (Telangana Government Industrial Infrastructure Corporation Limited) Flatted factory complex.



Figure 54: TGIIC

31.5. SITE PLAN

Site Plan with dimensions-

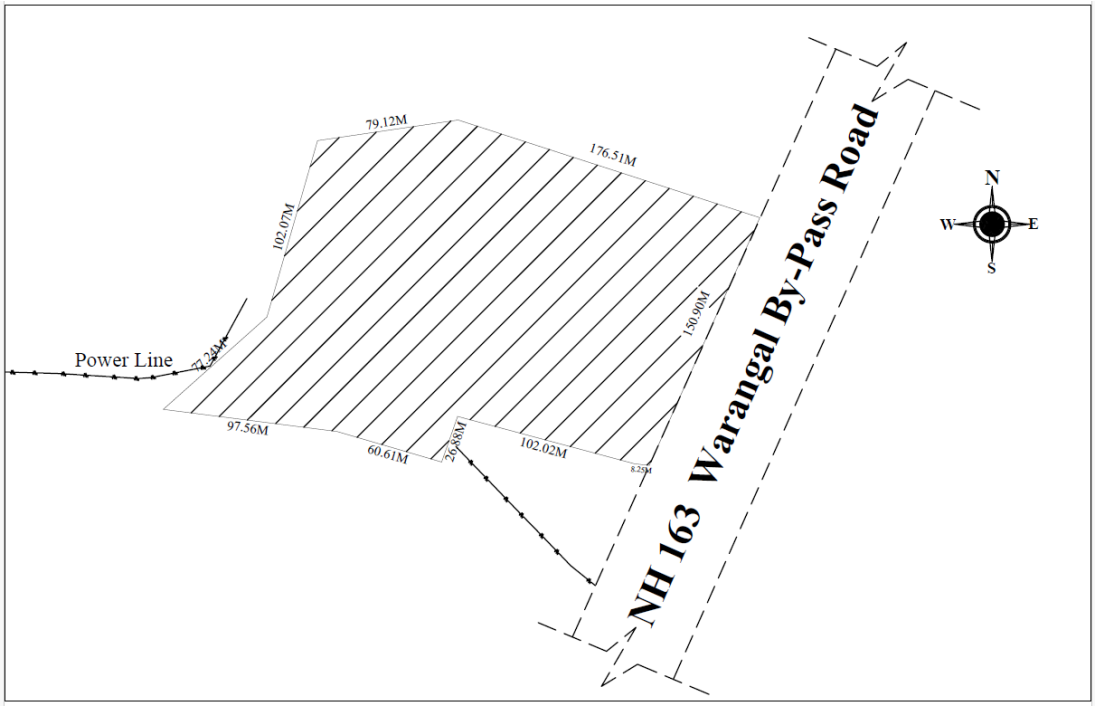


Figure 55: Sie Plan with Dimensions

32. CLIMATE ANALYSIS

Warangal, located in the state of Telangana, India, experiences a tropical climate characterized by hot summers, moderate monsoons, and mild winters. The city falls under the semi-arid climatic zone according to the Koppen climate classification. Climatic data plays a crucial role in urban planning, architecture, agriculture, and infrastructure development in Warangal, as it helps design systems and structures that are environmentally responsive and sustainable.

Warangal experiences a tropical climate with distinct seasonal variations in temperature, rainfall, humidity, and wind patterns. Summers are extremely hot, with temperatures often exceeding 40°C, particularly in April and May. In contrast, winters are relatively mild, with average minimum temperatures ranging between 15°C and 20°C during December and January. The region receives the majority of its annual rainfall during the southwest monsoon season, from June to September, with an average annual precipitation of about 900 to 1,100 mm. Humidity levels are generally high during the monsoon months, while the summer and winter seasons remain relatively dry. The wind direction varies seasonally, and moderate breezes are commonly experienced during both the summer and monsoon periods.

32.1. AVERAGE TEMPERATURE IN WARANGAL

The hot season lasts for 2.1 months, from April 2 to June 5, with an average daily high temperature above 101°F. The hottest month of the year in Warangal is May, with an average high of 105°F and low of 84°F.
The cool season lasts for 3.4 months, from October 18 to February 1, with an average daily high temperature below 88°F. The coldest month of the year in Warangal is December, with an average low of 62°F and high of 84°F.

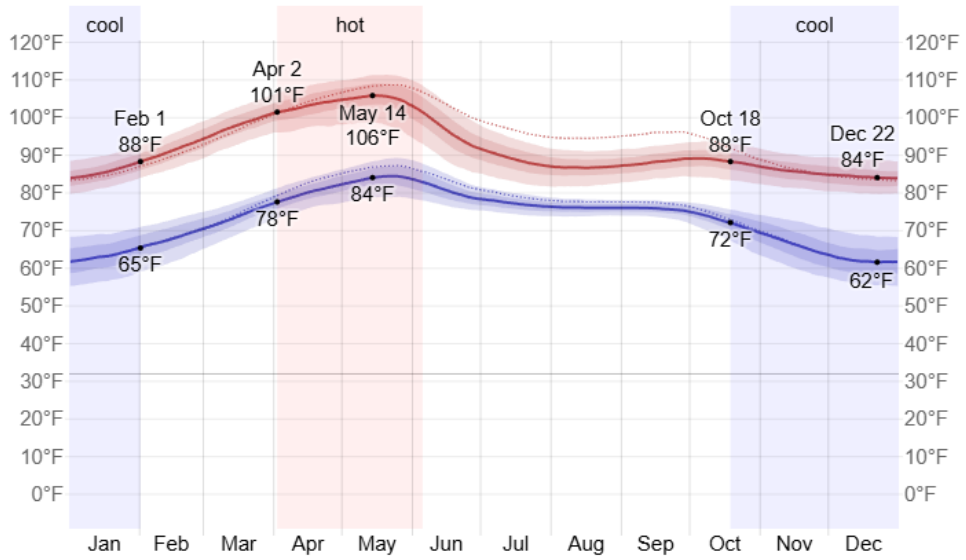


Figure 56: Average Temperature

Average	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
High	86°F	91°F	98°F	103°F	105°F	97°F	89°F	87°F	88°F	88°F	86°F	84°F
Temp.	75°F	80°F	87°F	92°F	95°F	88°F	83°F	81°F	82°F	81°F	77°F	74°F
Low	63°F	68°F	74°F	80°F	84°F	81°F	77°F	76°F	76°F	72°F	66°F	62°F

Table 25 Average temperature in Warangal

32.2. AVERAGE HOURLY TEMPERATURE IN WARANGAL

The figure below shows you a compact characterization of the entire year of hourly average temperatures. The horizontal axis is the day of the year, the vertical axis is the hour of the day, and the color is the average temperature for that hour and day.

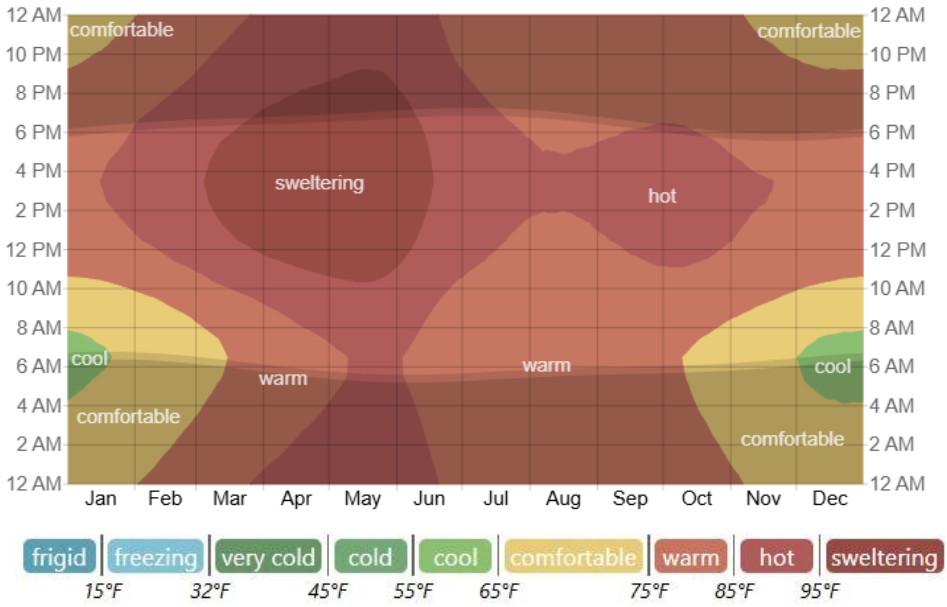


Figure 57: Average Hourly Temperature

32.3. CLOUD

The clearer part of the year in Warangal begins around October 11 and lasts for 7.1 months, ending around May 15.The clearest month of the year in Warangal is February, during which on average the sky is clear, mostly clear, or partly cloudy 78% of the time.The cloudier part of the year begins around May 15 and lasts for 4.9 months, ending around October 11.The cloudiest month of the year in Warangal is July, during which on average the sky is overcast or mostly cloudy 92% of the time.

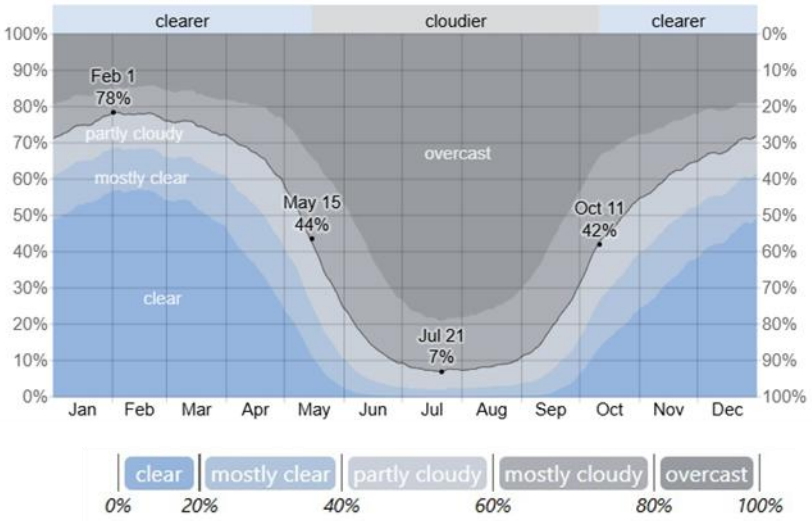


Figure 58: Cloud

Fraction	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Cloudier	25%	22%	26%	34%	60%	85%	92%	91%	80%	54%	39%	31%
Clearer	75%	78%	74%	66%	40%	15%	8%	9%	20%	46%	61%	69%

32.4. PRECIPITATION

The wetter season lasts 3.8 months, from June 8 to October 2, with a greater than 29% chance of a given day being a wet day. The month with the most wet days in Warangal is July, with an average of 16.2 days with at least 0.04 inches of precipitation.
The drier season lasts 8.2 months, from October 2 to June 8. The month with the fewest wet days in Warangal is December, with an average of 0.7 days with at least 0.04 inches of precipitation.

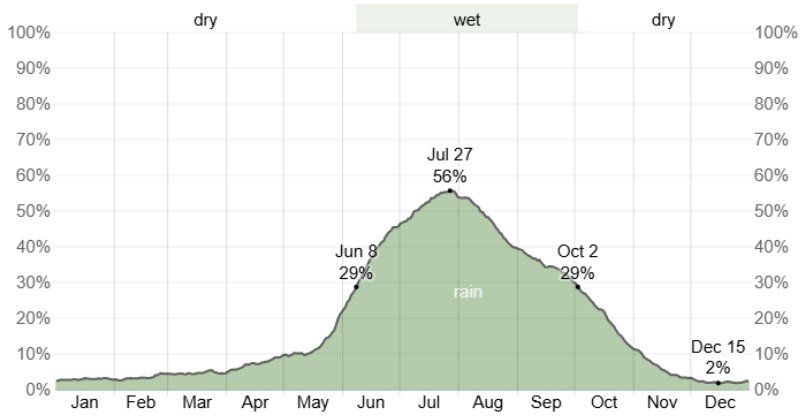


Figure 59: Precipitation

Days of	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Rain	0.9d	1.0d	1.4d	2.2d	4.0d	11.0d	16.2d	14.6d	10.4d	6.2d	1.8d	0.7d

Table 26 :Precipitation on daily basis

32.5. RAINFALL

The rainy period of the year lasts for 7.4 months, from April 9 to November 21, with a sliding 31-day rainfall of at least 0.5 inches. The month with the most rain in Warangal is July, with an average rainfall of 7.4 inches.
The rainless period of the year lasts for 4.6 months, from November 21 to April 9. The month with the least rain in Warangal is December, with an average rainfall of 0.1 inches.

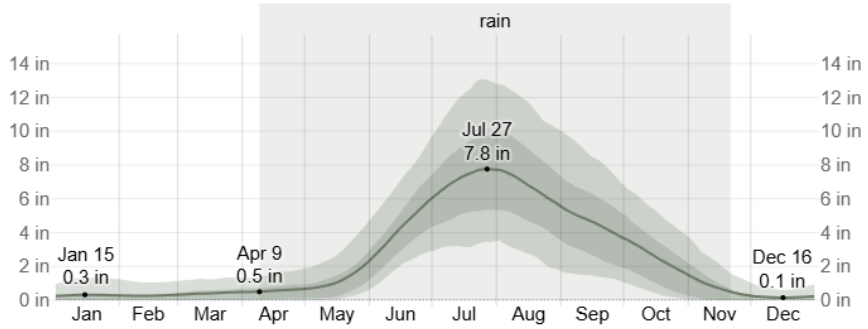


Figure 60: Rainfall

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Rainfall	0.3″	0.3″	0.4″	0.6″	1.1″	4.2″	7.4″	6.8″	4.7″	2.6″	0.7″	0.1″

32.6. HUMIDITY

Warangal experiences extreme seasonal variation in the perceived humidity.The muggier period of the year lasts for 7.8 months, from March 25 to November 17, during which time the comfort level is muggy, oppressive, or miserable at least 34% of the time. The month with the most muggy days in Warangal is August, with 30.8 days that are muggy or worse.The month with the fewest muggy days in Warangal is December, with 4.2 days that are muggy or worse.

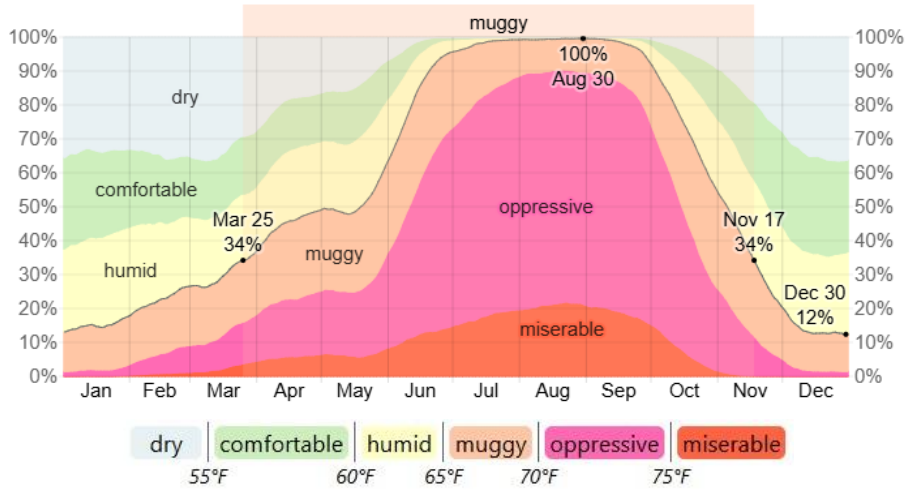


Figure 61: Humidity

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Muggy days	4.7d	6.3d	9.5d	13.6d	16.1d	25.3d	30.4d	30.8d	29.3d	22.5d	10.7d	4.2d

Table 27 Muggy Days

32.7. WIND

The windier part of the year lasts for 4.4 months, from April 19 to August 31, with average wind speeds of more than 8.0 miles per hour. The windiest month of the year in Warangal is June, with an average hourly wind speed of 10.4 miles per hour.The calmer time of year lasts for 7.6 months, from August 31 to April 19. The calmest month of the year in Warangal is December, with an average hourly wind speed of 5.3 miles per hour.

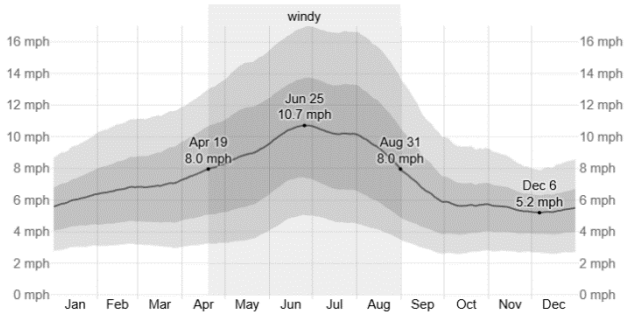


Figure 62: Wind

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Windspeed (mph)	6.0	6.6	7.0	7.8	8.9	10.4	10.3	9.1	6.7	5.7	5.5	5.3

Table 28: Windspeed

32.8. WIND DIRECTION IN WARANGAL

The wind is most often from the west for 4.0 months, from May 25 to September 26, with a peak percentage of 86% on August 1. The wind is most often from the east for 1.8 months, from November 2 to December 28, with a peak percentage of 48% on November 21. The wind is most often from the south for 4.9 months, from December 28 to May 25, with a peak percentage of 43% on January 1.

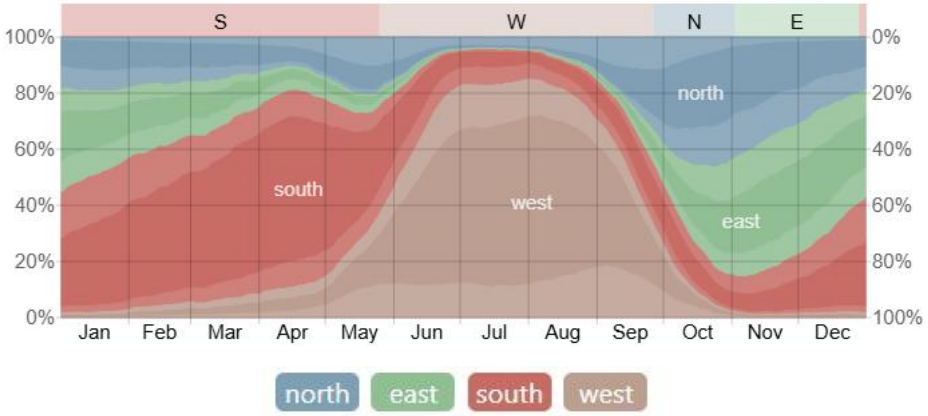


Figure 61: Wind Direction

- **West winds** dominate during the **monsoon months** (June to September), making it the strongest seasonal wind.
- **South winds** prevail from **winter to early summer** (January to May), useful for designing openings for ventilation.
- **East winds** occur for a **short period** in **late autumn** (November–December) and are moderate in strength.

Design should prioritize openings and shading considering west and south winds for natural ventilation and climate responsiveness.

32.9. SOIL TYPE

The Soil Condition of the Site is Sandy Loam Soil.

Sandy loam soil**,** the most suitable type of foundation depends on several factors like the load of the structure**,** water table level**,** and depth of the stable strata**.**

Sandy loam soils are moderately stable and drain well.



Figure 62: Soil Type

32.10. TYPE OF FOUNDATION CAN BE USED:

32.10.1. PILE FOUNDATION

- When used**:** If the sandy loam is shallow and underlain by weak strata **or** high water table**.**
- Why**:** Transfers the load to deeper, stable soil layers.
- Type: Driven or bored piles (depending on equipment and depth).

32.10.2. CONSIDERATIONS FOR FOUNDATION IN SANDY LOAM:

- **Compaction** is essential to reduce settlement.
- **Water table** must be checked; high water can weaken soil strength.
- **Proper drainage** around the foundation is crucial to avoid erosion.

32.11. STREETSCAPE



Figure 63: Streetscape

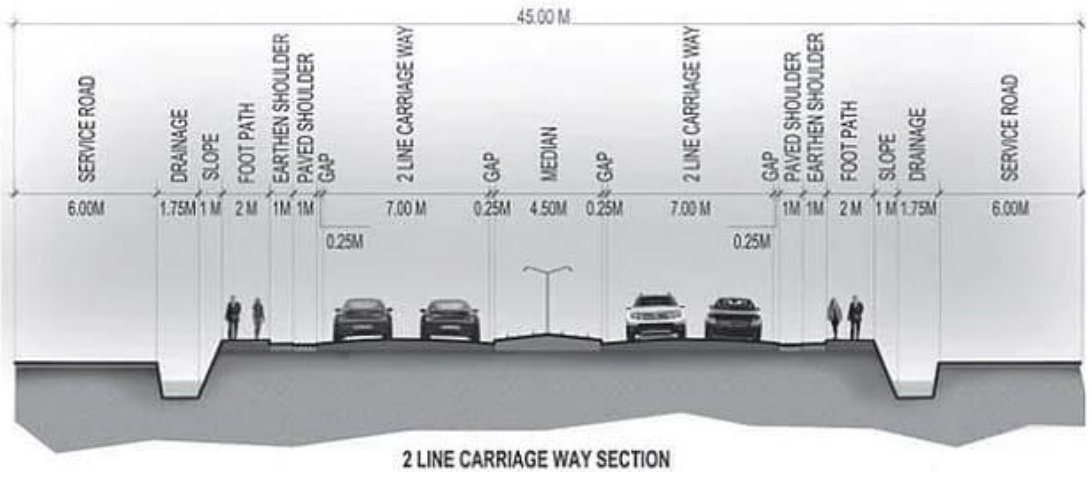


Figure 64: Street Section

32.12. TYPOGRAPHY

The site terrain is regular and mostly flat, with gentle slopes.



Figure 65: Typography

32.13. ELEVATION



Figure 66: Site Elevation

32.14. CONTOURS

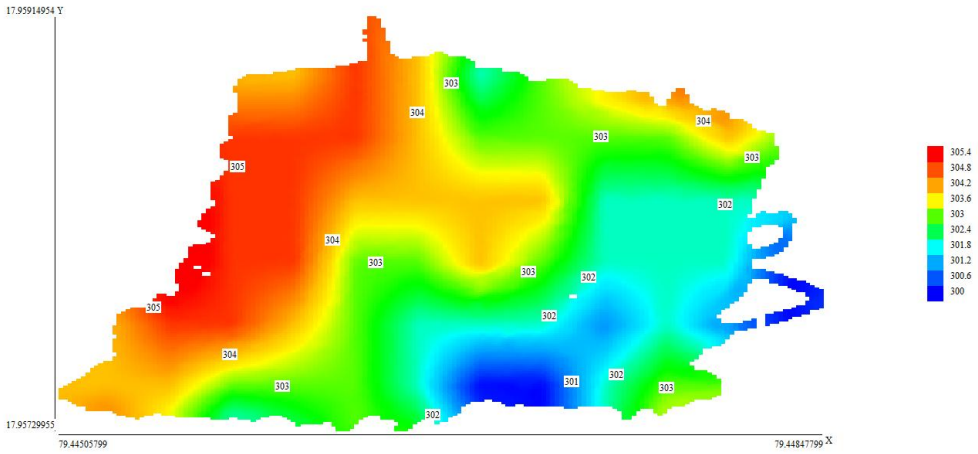


Figure 67: contour Mapping

32.15. VEGETATION

32.15.1. ASIAN PALMYRA PALM

Common Name: Asian Palmyra Palm / Toddy Palm / Ice Apple Tree
Scientific Name: *Borassus flabellifer*
Average Trunk Radius:

- **Radius:** ~30–50 cm (0.3–0.5 m)
- **Diameter:** ~60–100 cm (can vary based on age and soil)

Average Height:

- **Typical Range:** 20–30 meters
- **Mature Height:** Up to 30 meters in ideal conditions

Foliage Type:

- **Type:** Evergreen
- **Leaf Shape:** Fan-shaped
- **Leaf Size:** Each leaf can be 1.5–2 meters long, forming a dense crown
- **Crown Spread:** Roughly 6–10 meters wide at maturity



Figure 68:Asian Palmyra Palm

32.15.2. NEEM TREE



Figure 69:-Neem Tree

- **Common Name:** Neem Tree
- **Scientific Name:** *Azadirachta indica*
- **Region:** Common and native to Warangal and across the Indian subcontinent
- **Trunk Radius:** ~30 to 45 cm (diameter ~60–90 cm)
- **Height:** Around 15–20 m in mature local specimens
- **Foliage:** Evergreen compound leaves, occasionally shedding in severe drought
- **Crown Spread:** Dense, rounded canopy 10–15 m wide under open growth.

32.16. PROXIMITY

The site is strategically located near several important landmarks and infrastructure developments:

- **TR Farm Resort and Convention Centre** – A nearby hospitality and event facility.
- **Flatted Factory Complex** – A planned industrial development.
- **Textile Park Warangal** – A major employment and industrial hub.
- **Darmasagar Canal** – A natural water body adding to the site's ecological value.
- **IT Park (under construction)** – Indicates emerging economic activity and future growth potential in the region.

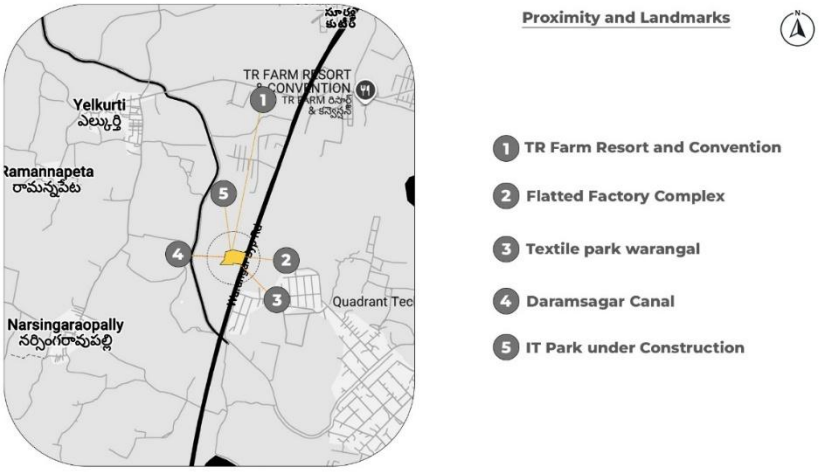


Figure 70: Site Proximity within Warangal

32.17. CONNECTIVITY

Nearest Railway station	Kazipet railway station - 14 km
Nearest Airport	Warangal International Airport - 31 km
Nearest Bus station	Kazipet railway station - 14 km
Nearest Town	Kazipet - 14 km
Nearest City	Warangal - 27 km

Table 29: Proximity

32.18. NOISE ANALYSIS

32.18.1. TRAFFIC NOISE (EAST SIDE)

- The site is adjacent to a highway (NH 163) on the eastern side, which is a major source of noise due to constant vehicular movement.
- Noise impact will be higher near the eastern boundary.

32.18.2. IT PARK CONSTRUCTION (NORTH SIDE)

- Ongoing or upcoming construction work for an IT Park in the north may generate temporary but high levels of noise (machinery, trucks, etc.).
- This may cause disturbance during the day, especially in the short term.

32.18.3. TEXTILE PARK (SOUTH-EAST SIDE)

- The presence of a Textile Park in the south-east may contribute to industrial or mechanical noise, possibly operational during both day and night.

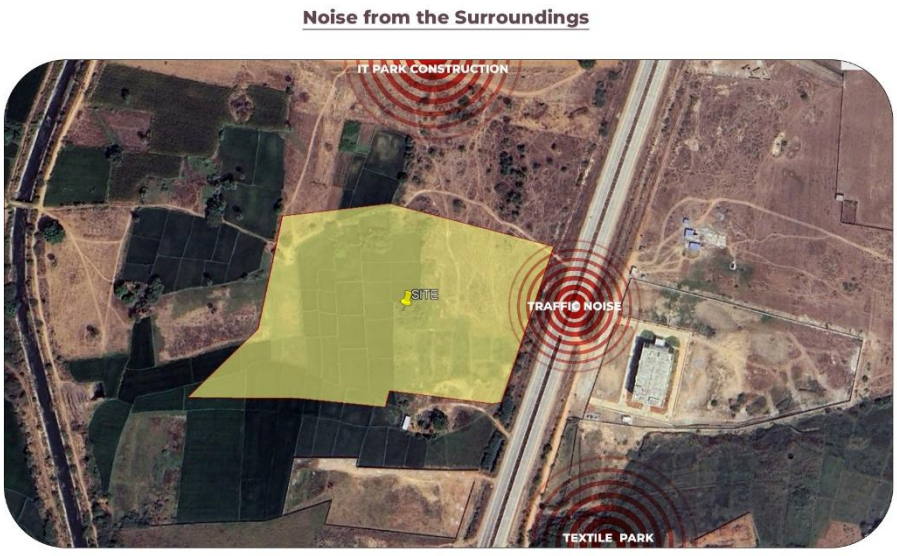


Figure 71: Noie Sources

SITE GALLERY



Figure 72: Site View-1



Figure 73: Site View-2



Figure 74: Site View-3



Figure 75 - Site View-4

CHAPTER IV

CASE STUDIES

33. OVERVIEW

The case study overview provides a concise summary of the study's objectives, methodology, findings, and implications. It begins with an introduction, giving a brief background and context of the case study. The objectives of the study are clearly stated, followed by a description of the research methodology employed, including data collection methods and analysis approaches. The overview then provides an overview of the case study, including its location, time frame, and participants. The key findings and outcomes of the study are summarized, emphasizing the most significant results. The implications and significance of the findings are discussed, offering potential applications and recommendations. Limitations of the study are acknowledged, addressing any constraints or biases encountered. The overview concludes by summarizing the main points and emphasizing the importance and relevance of the case study.

34. INTRODUCTION

A collection of brief case studies with an emphasis on convention centre (both live and desk appraisal) design are presented in this section. These studies provide insightful information about the architectural issues, difficulties, and creative solutions involved in designing effective convention centre. We can get inspiration and useful information for their own convention centre designs by studying these real- world examples.
Following case studies include –

- **Live Study**

Bharat Mandapam, New Delhi, India

IHC (India Habitat Centre), New Delhi, India

- **Desk Appraisal**

Hyderabad International Convention Centre, India

ICE Krakow Congress Centre, Krakow, Poland

35. LIVE CASE STUDY

35.1.1. BHARAT MANDAPAM, NEW DELHI, INDIA

Location: Pragati Maidan, New Delhi, India.
Site context: Central exhibition precinct within Pragati Maidan complex.
Site area (Pragati Maidan): ~123 acres (site context).
Site area (Bharat Mandapam): ~12.5 acres.

Year of completion: 2023.
Architects / Design consultants: AEDAS + ARCOP (collaborative design team).
Ground coverage: ~35%



Figure 76: Bharat Mandapam, Delhi

1. INTRODUCTION

Bharat Mandapam (International Exhibition-cum-Convention Centre – IECC) is a newly completed, world-class convention and exhibition complex located within the Pragati Maidan precinct of New Delhi. Conceived as a flagship MICE (Meetings, Incentives, Conferences and Exhibitions) facility, the complex integrates large flexible exhibition halls, a major plenary/arena space, conference and breakout rooms, VIP facilities and associated support services to host national and international summits, cultural events and large exhibitions. Its design language fuses contemporary materiality with formal clarity to create a civic landmark at the heart of the city's exhibition district.

2. ACCESSIBILITY & CONNECTIVITY

Bharat Mandapam benefits from a highly central, urban location within Pragati Maidan. It is readily accessible by the city's arterial road network and public transport, and is located within walking/driving distance of New Delhi's ceremonial and institutional nodes. The site's master plan establishes clear vehicular and pedestrian routes for visitors, service access and logistics for exhibition load-in/out.

3. SITE & SURROUNDINGS

The complex sits within the larger Pragati Maidan precinct and responds to an urban grain of large open plazas, processional approaches and adjacent exhibition/administrative buildings. Landscaping and water bodies in the precinct have been used to create a staged approach to the building's primary entrance and to provide outdoor pre-function and circulation spaces for large events.

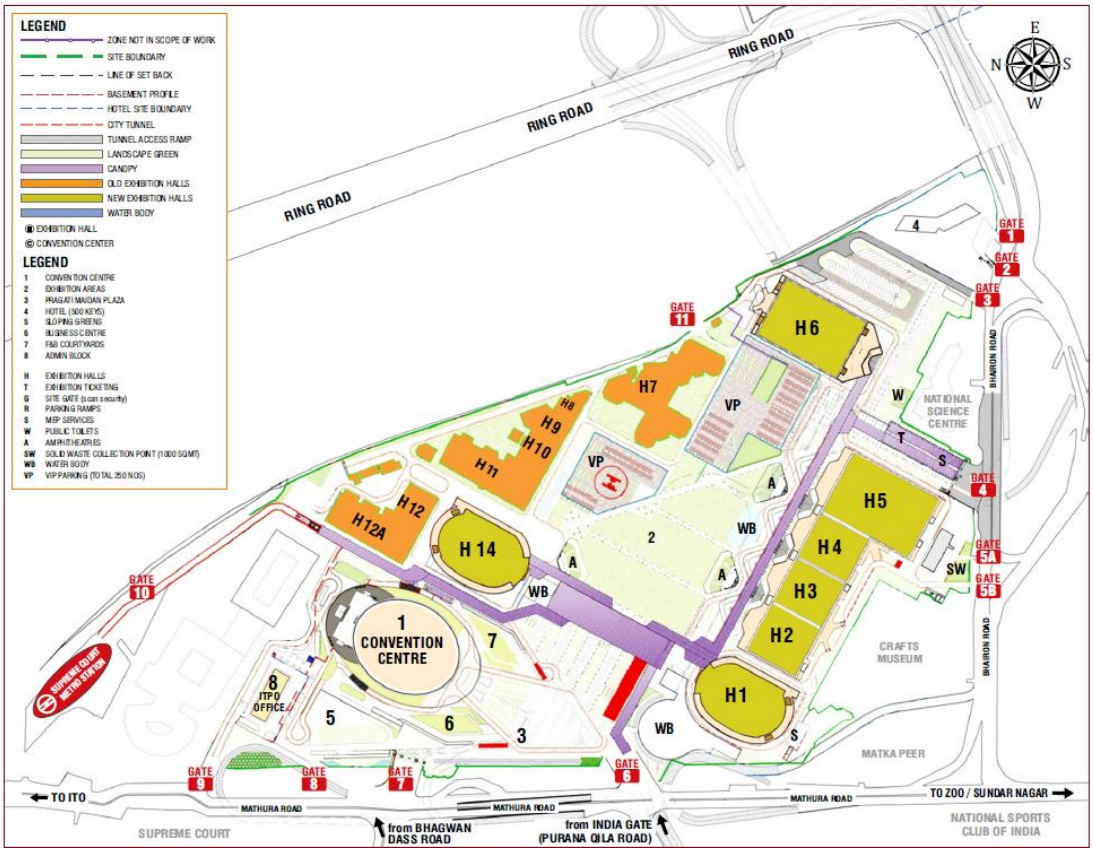


Figure 77: Site Plan

4. CONTEXTUAL RESPONSE & FORM

The building's form is derived from an ordered, axial arrangement around a prominent central/plenary volume. The composition uses a circular/elliptical core for the major auditorium/plenary while ancillary exhibition halls and conference blocks unfold radially. This arrangement allows a clear hierarchy of public functions, simple wayfinding and efficient crowd management for large simultaneous events.

5. SPATIAL ORGANIZATION & PLANNING STRATEGY

- **Hierarchy & Zoning:** Clear separation of public, semi-public and service zones. Main public functions (foyers, exhibition halls, plenary) are placed at podium and ground levels; service, parking and MEP occupy basements and peripheral wings.

- **Flexibility:** Exhibition halls designed as large, column-free plates with demountable partitions and rigging points for varied layouts — trade fairs, banquets, exhibitions or combined usage. Conference suites are stackable and can be combined for larger sessions.

- **Multiple entries:** Several dedicated entry gates and pre-function lobbies enable parallel events, controlled ingress/egress and crowd segregation for VIP / delegation flows.

- **Vertical circulation:** Concentric and radial cores with redundancies (multiple stair banks, lifts and evacuation routes) ensure efficient vertical movement and emergency egress for very large occupancies.

6. FLOOR LEVELS –

- **Level 1 (Ground Floor):**
  Houses premium lounges, dining spaces, and 20 flexible meeting rooms (50–200 seats), forming the base for workshops and bilateral sessions.



Figure 78: Meeting and Seminar Halls

- **Level 2 (Podium Level):**
  Contains auditoria (600 & 900 seats), the G20 Summit Room, leader's lounges, and support facilities, making it the diplomatic and cultural hub.



Figure 79: G20 Summit Room



Figure 80: Amphitheatre

- **Level 3 (Plenary Level):**
  Accommodates the 3,000-seat Plenary Hall and 4,000-seat Multi-purpose Hall, serving as the core for large-scale conventions and ceremonies.

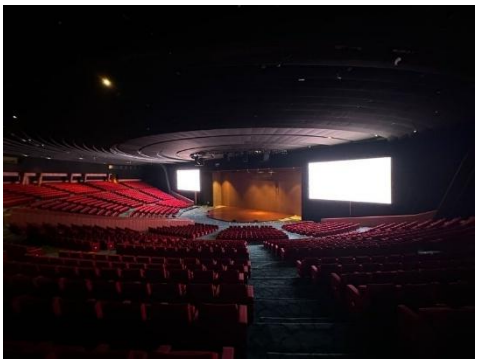


Figure 81: Plenary Hall

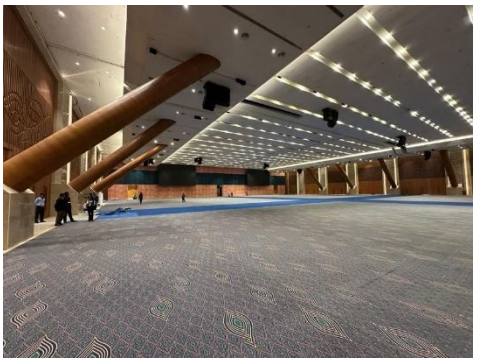


Figure 82: Multipurpose Hall

- **Level 4 (Window to Delhi):**
  Provides open-air prefunction terraces and viewing decks framing the city, used for informal gatherings and symbolic experiences.



Figure 83: Corridor

- **Level 5 (Support Layer):**
  Integrates control rooms and interpreter facilities, enabling advanced technical support for international events.
- **Amphitheatre (Podium & Outdoor):**
  Offers open-air venues ranging from 450 to 3,000 capacity, extending cultural and social functions into landscaped settings.

7. LEVEL-1 (GROUND FLOOR)

Spaces: 20 standard meeting rooms + 4 premium rooms. Standard rooms: 50-seat ×6 (≈60–72 m²), 100-seat ×6 (≈111–121 m²), 200-seat ×4 (≈258–276 m²). Premium rooms: 50-seat ×4 (≈61/121/197 m²).

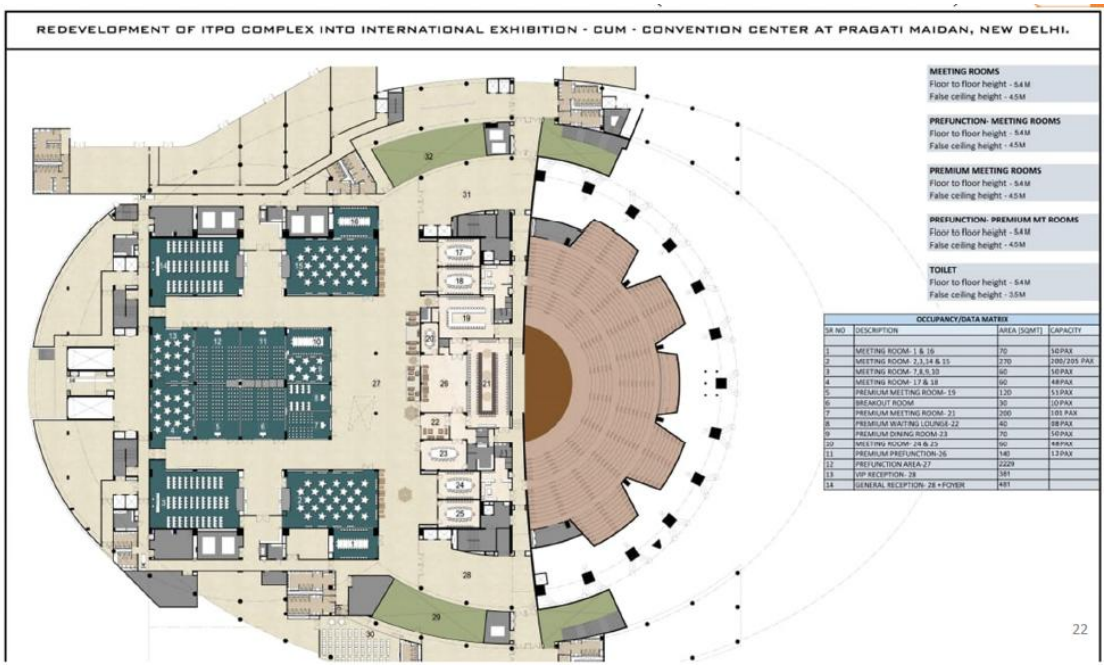


Figure 84: Ground Floor Plan

- Primary “working” level for seminars, workshops and bilateral; rooms are distributed to allow parallel tracks without sound spill over.
- Clear pre-function/foyer bands outside clusters of rooms support registration, coffee breaks and wayfinding.
- Multiple room sizes create a granular capacity ladder (50↔100↔200) so organizers can right-size sessions without waste.
- Typical furniture sets include classroom, U-shape and boardroom; door widths and turning radii accommodate quick flips.
- Built-in AV (screens, VC, ceiling mics) and robust IT/5G backbone allow hybrid sessions without visible cable runs.
- Service corridors behind the meeting-room walls let catering, housekeeping and tech reach rooms without crossing public flows.
- Logical adjacency to ground entries for easy security screening and delegate check-in; accessible routes (ramps/elevators) align with main lobbies.
- Storage “pockets” at foyer ends hold chair/dais carts and branding so public areas stay uncluttered between sessions.
- Acoustic separation is achieved via staggered doors and buffer zones (foyer/coat/baggage), minimizing cross-talk between rooms.
- Premium rooms sit near controlled access points for VIP bilateral, with short, private paths to upper-level leadership spaces.

8. LEVEL-2 (FIRST FLOOR/PODIUM)

Spaces: Auditorium-1: 600 seats (≈793 m²). Auditorium-2: 900 seats (≈992 m²). Summit Room: 165 seats (≈1,153 m²). Leaders’ Lounge: ≈702 m². Open-air Amphitheatre: 3,000 capacity (≈2,250 m²).

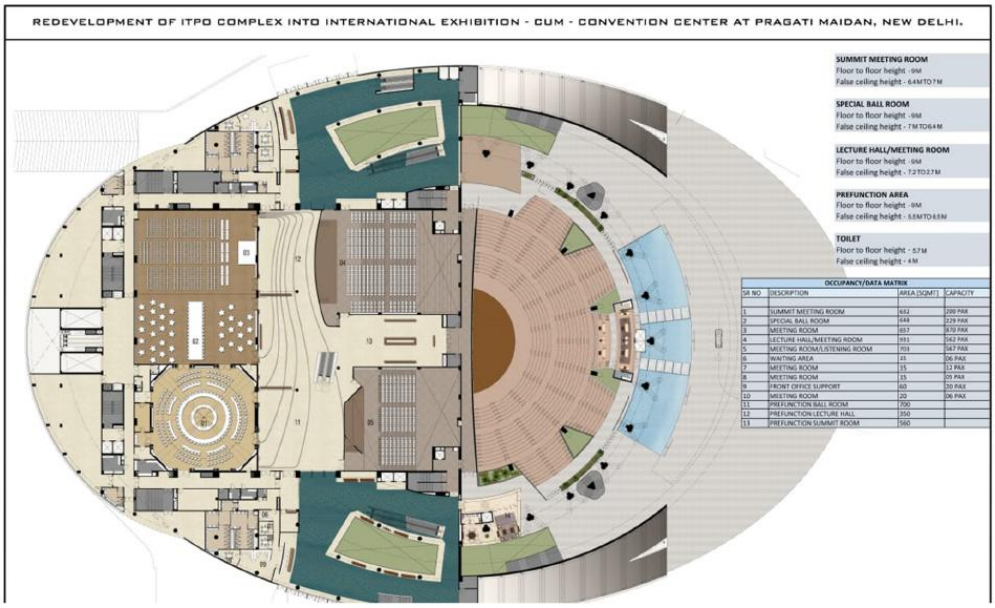


Figure 85: First Floor Plan

- This tier handles keynote-scale talks and leader-level diplomacy while staying one flight above the busy ground-level traffic.
- Auditoria provide fixed, optimized sightlines; back-of-house bands (green rooms, control, dimmer/AV racks) sit directly behind stage.
- The Summit Room functions as a high-spec boardroom for plenary-style negotiations

with integrated interpretation/AV

- A dedicated Leaders' Lounge anchors protocol movement; proximity to secure lifts supports motorcade-to-dais paths.
- Large pre-function galleries accept spill over from both auditoria and the Summit Room, enabling quick turnover between sessions.
- The open-air amphitheatre connects at this level, giving a climate-responsive venue for cultural programs and evening ceremonies
- Arrival sequences are legible: foyer → security/registration islands → pre-function → hall portals; escalators/elevators split VIP/public flows.
- Acoustic lobbies and double-leaf entries limit late-entry noise; coat/bag counters and press risers are positioned for crowd management.
- Stage-adjacent freight/tech access allows last-minute rigging or podium swaps without crossing public concourses.
- Clear, redundant egress stairs discharge to grade and podium plazas sized for safe event clearance.

9. LEVEL-3 (SECOND FLOOR)

Spaces: Plenary Hall: 3,000 seats (≈1,985 m²). Multi-Purpose Hall: 4,000 seats (≈4,884 m²). Combined operation up to ≈7,000 persons; features include hydraulic stage, live audience-polling and 16 interpreter rooms.

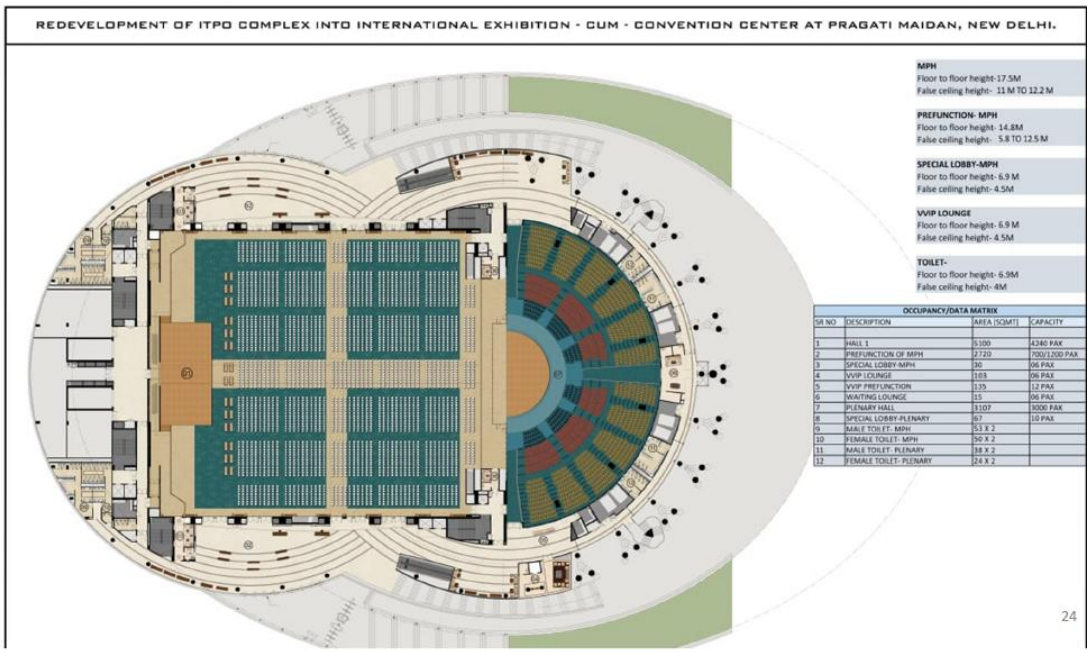


Figure 86: Second Floor Plan

- This is the "power layer" for headline sessions, large ceremonies and arena-style events.
- Plenary has optimized geometry for speech intelligibility; interpreter rooms ring the upper perimeter with direct sight to the dais.
- The Multi-Purpose Hall is a flat-floor, riggable box that flips between banquet, expo, awards, and arena seating formats.
- Structural grid and loading support heavy truss loads, LED walls and temporary stages; overhead catwalks enable safe focusing.
- Back-of-house forms a continuous service spine (loading → marshalling → goods/service lifts → AV/props rooms) for rapid changeovers.

- Wide pre-function terraces handle queuing, sponsor walls and media pens; clear queuing geometry prevents choke points.
- Acoustic treatment (clouds, wall panels, bass traps) and variable drape systems let the same room perform well at 30% or 100% occupancy.
- Seating bowl and dais are dimensioned around camera positions and cable trusses; floor boxes align with lectern/ensemble positions.
- Integrated show control accommodates redundancy (primary/backup consoles, UPS) to meet broadcast-grade reliability.
- Fire/life-safety is expressed in generous exit widths, smoke-extraction strategies and refuge points coordinated with seating blocks.

10. LEVEL-4 (THIRD FLOOR)

An additional upper tier over the main halls.



Figure 87: Third Floor Plan

- Upper galleries and control rooms align with sightlines to the Plenary/MP Hall, giving ideal positions for lighting, follow-spots and broadcast.
- Interpreter/press lounges, commentary booths and VIP viewing rooms are logically placed at this tier for acoustic separation from the floor.
- Catwalk access and plant rooms (air-handling, AV racks, dimmer rooms) sit inboard to shorten service runs to rigging points below.
- Roof terraces and canopied promenades act as decompression and networking space between long sessions.
- Service lifts land here to feed temporary broadcast compounds or roof-mounted equipment without crossing public routes.
- Egress stairs continue through this tier to roof/terrace discharge points compliant with occupant loads set by event mode.
- Wayfinding emphasizes “stack literacy”: clear numbering of halls/galleries and color-coded cores so visitors relocate easily between tiers.
- Envelope/shading at this height balances glare control for control rooms with daylight for public terraces; maintenance catwalks are integral.

11. AREA PROGRAM

The program is layered with **meeting rooms and lounges at ground**, **auditoria and summit spaces at podium**, and **large plenary and multi-purpose halls above**, supported by lounges, interpretation rooms, and outdoor amphitheatres. This hierarchy enables events of varied scales to run simultaneously with clear circulation and service management.

LEVEL - 1 (Ground Floor)
Floor to Floor Height : 5.4 m

S.NO.	DESCRIPTION	Capacity (in pax)	Floor Area (in sqm)	Dimensions (in m) L	B
	PREMIUM COMPLEX				
1	Premium Meeting Room -1		197	9.7	20.3
2	Premium Meeting Room -2		121	12.7	9.5
3	Premium Pre Function		132	10.1	13.1
4	Premium Waiting Lounge		39	6.3	6.1
5	Premium Dining Room		76	10.5	7.2
	MEETING COMPLEX				
1	Meeting Room - 1	36	61	9.7	6.3
2	Meeting Room - 2	50	61	9.7	6.3
3	Meeting Room - 3	50	61	9.7	6.3
4	Meeting Room - 4	50	61	9.7	6.3
5	Meeting Room - 5	36	72	10.4	6.9
6	Meeting Room - 6	200	258	20.2	12.7
7	Meeting Room - 7	200	258	20.2	12.7
8	Meeting Room - 8	100	121	10.4	11.6
9	Meeting Room - 9	100	111	11.4	9.8
10	Meeting Room - 10	100	111	11.4	9.8
11	Meeting Room - 11	50	64	10.1	6.3
12	Meeting Room - 12	50	64	10.2	6.3
13	Meeting Room - 13	50	64	10.1	6.3
14	Meeting Room - 14	50	60	9.6	6.3
15	Meeting Room - 15	100	115	10.3	11.2
16	Meeting Room - 16	100	119	10.3	11.6
17	Meeting Room - 17	100	121	10.4	11.6
18	Meeting Room - 18	200	273	21.0	13.0
19	Meeting Room - 19	200	276	21.2	13.0
20	Meeting Room - 20	50	276	21.2	13.0

SUPPORT FACILITIES
VIP & General Receptions, Help Desk, Cultural Courtyard, Growth Courtyard, Pre Function Areas, Business Centre, F&B Courtyard

LEVEL - 2 (Podium Level)
Floor to Floor Height : 9.0 m

S.NO.	DESCRIPTION	Capacity (in pax)	Floor Area (in sqm)	Dimensions (in m) L	B
	PREMIUM COMPLEX				
1	G20 Summit Room		1,153	38.6	29.9
2	Leader's Lounge		702	26.5	26.5
3	L2 VVIP Lounge		101	14.4	7.0
	MEETING COMPLEX				
1	Auditorium - 1	574	992	37.3	26.6
2	Auditorium - 2	821	793	29.8	26.6
	SUPPORT FACILITIES				
1	Retreat Lounge (Near western-ramp of Podium)		350	37.6	9.3
2	Tea House (Near eastern-ramp of Podium)		350	37.6	9.3
3	Medical Room		56	5.4	10.3

VIP & General Receptions, Pre Function Areas, Cloak Room

LEVEL - 3 (Plenary Level)
Floor to Floor Height varies

S.NO.	DESCRIPTION	Capacity (in pax)	Floor Area (in sqm)	Dimensions (in m) L	B
	MULTI-FUNCTION AND PLENARY HALL				
1	Plenary Hall	3000	1985	71.5	36.00 (radius)
2	Multi Purpose Hall	4000	4884	74.0	66.7
	SUPPORT FACILITIES				
1	L3 VVIP Lounge		80	12.0	6.7
2	Special Lobby (Plenary)		80	8.2	9.8

Pre Function Areas, Reception

LEVEL - 4 (Window to Delhi)
False Ceiling Height : 6.5 - 8 m

SUPPORT FACILITIES
Prefunction, Window to Delhi (open-air)

LEVEL - 5

SUPPORT FACILITIES
Control Room, Interpreter Room

CONVENTION CENTRE - AMPHITHEATRE
(Podium Level)

S.NO.	DESCRIPTION	Capacity (in pax)	Floor Area (in sqm)	Dimensions (in m) L	B
1	Amphitheatre	3,000	2,250	66.5	118 (arc)
2	Jewel Box (Amphitheatre)		76	16.6	4.5

AMPHITHEATRE

1	Amphitheatre Near Hall 2	900 Pax
2	Amphitheatre Near Hall 5	900 Pax
3	Amphitheatre Near Lake	450 Pax

Figure 88: Area Program

12. ARCHITECTURAL & MATERIAL CONSIDERATIONS

Bharat Mandapam balances a civic, monumental expression with durable, maintainable materials suitable for intensive public use. Façade strategies alternate glazed and solid planes to control solar gain while sustaining visual prominence. Sandstone and stone finishes provide a dignified, contextual note; marble and high-quality interior finishes mark VIP and ceremonial spaces. Aluminum rainscreens, high-performance glazing and engineered louvers address durability, maintenance and climate control.

13. CLIMATE RESPONSE & SUSTAINABILITY STRATEGIES

Passive and active strategies are combined: shaded façades and controlled glazing ratios on solar-exposed elevations reduce cooling loads; generous overhangs and colonnaded approaches moderate microclimate at entry plazas. Landscaped forecourts and water bodies act as evaporative cooling elements and social spillover. Centralized HVAC systems are sized for large, highly variable loads; the design allows staged operation to reduce energy use during smaller events.

14. CIRCULATION, CROWD MANAGEMENT & SAFETY

The planning emphasizes wide pre-function lobbies, radial egress routes, clear sightlines and signage capacity. Separate service corridors, multiple loading docks and dedicated delivery

cores permit rapid turnover between events without interrupting visitor movement. Redundant vertical escape routes and pressurized stair cores are provided for occupant safety in high-density conditions.

15. BUILDING SERVICES & ACOUSTICS

The complex integrates substantial MEP infrastructure: high-capacity chilled water systems, redundant power supplies, sophisticated AV/ interpretation and broadcast facilities, and a building management system for operational control. Acoustic design is critical in the plenary and meeting rooms — use of absorptive linings, tuned diffusers and variable acoustic systems enable the halls to host speech-centric conferences as well as musical performances.

16. LANDSCAPE, PUBLIC REALM & FORECOURTS

Landscaping is used as an extension of the program: formal stepped plazas, reflecting pools and shaded promenades function as pre-function holding spaces, ceremonial approaches and outdoor exhibition areas. The public realm design supports queuing, overflow, informal events and contributes to the building's civic identity.

17. INFERENCES

i. **Monumental yet contextual form-making.**
The complex adopts a bold, sculptural massing that references Indian symbolism (conch/lotus/water motifs) while aligning to city axes. As a student, note how a recognisable civic form can be both iconic and context-sensitive - framing views of Lutyens' Delhi and creating a civic landmark.

ii. **Clear hierarchical zoning - large volumes below, tiered functions above.**
Exhibition halls and large column-free volumes are placed at the ground/podium level, with the plenary, multipurpose halls and amphitheatre stacked above. This vertical stacking allows heavy, adaptable exhibition loads at grade and quieter, tiered conference spaces higher up.

iii. **Robust flexibility and modularity.**
Huge column-free halls, movable partitions and independent service cores allow simultaneous events of different scales. Design for modularity so halls can be combined, subdivided or operate autonomously - a key programmatic requirement for MICE buildings.

iv. **Integrated circulation strategy for mass movement.**
Ramp-based forecourts, generous foyers, escalators/elevators and multiple gate entries distribute crowds efficiently. Prioritise legible primary and secondary routes, ramped access for large flows, and distinct arrival sequences for public, delegates and VIPs.

v. **Strong urban and landscape integration.**
The scheme ties into surrounding axes and public spaces; extensive landscaping, retention of mature trees and planted terraces create a biophilic buffer. Treat landscape as an extension of program - plazas, shaded walks and terraces become overflow and social spaces.

vi. **Cultural narrative woven into architecture and interiors.**
Public art, themed galleries and crafted finishes narrate national identity. Use culturally resonant motifs and curated exhibitions in foyers to give visitors a sense of place and to programmatically enrich circulation spaces.

vii. **High-performance structural and envelope systems.**
Long spans and large column-free volumes rely on engineered steel/concrete solutions; facades combine insulated glazing with traditional stone panels. Coordinate structural strategy early - it governs span, acoustics, ceiling heights and integration of services.

viii. **Advanced MICE-grade technology & services.**
Integrated AV, multi-language interpretation booths, LED displays, robust IT/5G infrastructure and a central BMS are essential. Plan service distribution (rigging, cable trunks, control rooms) so technology becomes an invisible but fully accessible layer.

ix. **Sustainability as integral, not an afterthought.**
Energy-efficient HVAC, large solar PV, rainwater harvesting, STP and waste composting demonstrate measurable resource savings. Embed passive strategies (shading, planted roofs, thermal mass) alongside active systems to reduce operational loads in large complexes.

x. **User comfort, acoustics and weather protection.**
Shaded atriums, overhangs and covered amphitheatre protect occupants; acoustic treatment and sightline design are critical for plenary and performance halls. Prioritise human comfort in circulation and seating - daylight control, ventilation and acoustic separation matter as much as capacity.

xi. **Serviceability, safety and circulation for vehicles.**
Separate service routes, generous backstage areas, large parking capacity and controlled drop-off plazas keep operations smooth. In large venues, operational logistics (deliveries, waste, emergency access) must have dedicated, unobstructed paths.

xii. **Amenity-rich, hospitality-oriented public realms.**
Onsite VIP lounges, business centres, catering kitchens and permanent exhibition spaces convert the venue into a full-service destination. Design concourses and support areas to function as both service corridors and engaging public spaces.

xiii. **Scalability for future programming and growth.**
The campus approach allows phased expansion and retrofitting of halls or technologies. When designing, provide flexibility for future reinterpretation - structural grid, service depth and zoning should permit change without wholesale rebuilding.

xiv. **Student takeaway - balance symbolism with rigorous program logic.**
Bharat Mandapam shows how monumental civic gestures can coexist with meticulous programmatic, technical and environmental planning. For your convention centre design, combine a strong conceptual gesture with clear zoning, flexible halls, resilient structure, integrated services and landscape-led urban integration.

35.2. IHC (INDIA HABITAT CENTRE), NEW DELHI, INDIA

Architect: Joseph Allen Stein-Stein, Doshi & Bhalla Architects
Client: Indian Habitat Centre Society
Type of Structure: Multi-purpose Building
Project Year: 1989-1992
Site Area: 38849.8 sqm
Built Up Area: 54,389 sqm



Figure 89: Indian Habitat Centre, Delhi

1. INTRODUCTION

The India Habitat Centre (IHC) is a large complex that accommodates 30 to 40 institutions dealing with diverse issues related to habitat and environment. The 9-acre campus of IHC comprises of office workspaces, conference facilities, library, exhibition areas, auditorium and a variety of restaurants. Through this project architect Joseph Allen Stein has demonstrated that it is possible to attain humanist values even in large-scale projects having densities over 1000 persons per acre. The Indian Habitat Centre, a stunning work of architecture, was painstakingly created to serve as an outstanding location for having meaningful debates and deliberations spanning all disciplines. This innovative building cleverly combines social, commercial, and work areas, fusing them together in an excellently integrated urban physical form that transcends traditional limits. Its vast area is home to an intriguing tapestry of connected regions that seamlessly weave diverse spheres of intellectual exchange, teamwork, and vibrant social interactions. The Indian Habitat Centre, with its grandeur and splendor, epitomizes architectural genius and provides a nurturing environment that encourages innovation, creativity, and holistic growth.

2. ACCESSIBILITY

There are three free ways to visit the site. The north side's Lodhi Road serves as a pedestrian entry. Roads in the west and south act as Direct Access roads to various portions of the complex, and vehicular entry is permitted.

3. CONNECTIVITY

- International Airport: 15 km;
- Domestic Airport: 12 km;
- New Delhi Railway Station: 07 km;
- Old Delhi Railway Station: 16 km;
- Lodhi Corner: 200 m;
- Connaught Place: 05 Km;
- India Gate: 03 Km;
- Diplomatic Enclave: 05 Km;
- Jor Bagh Metro Station: 1.6 Km;
- J.L.N. Metro Station: 1.5 Km;
- Jawaharlal Nehru Stadium: 1 km.

4. SURROUNDINGS

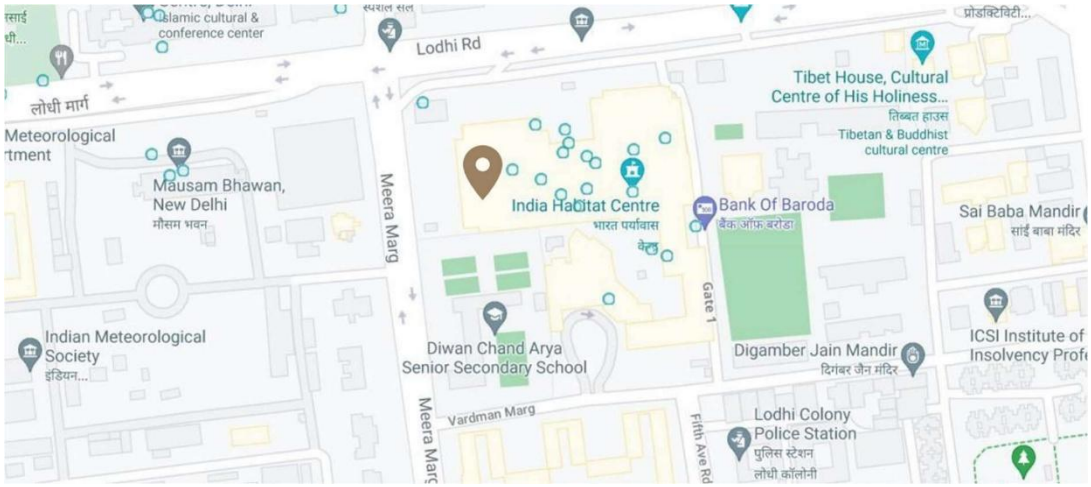


Figure 90:Site Surroundings

The main road leading to AIIMS and ITO is 1 km away from the site.
India Gate is 3 km away and Connaught Place is 5 km away.

5. CONTEXTUAL RESPONSE

In comparison to the other buildings in the Lodi Estate, the IHC building is much larger in scale and has a very different character due to its unique program. Despite the larger scale, the IHC building shows respect for the character of the surroundings by foregoing overindulgence. In its simplicity, the building's demeanor shows humility while seeking beauty without ostentation. The larger scale of the IHC building also prompted Stein to transform his design approach from 'building in a garden', that he mastered in the nearby India International Centre (1962), to a new approach of 'garden in a building'.

Shaded gardens at ground level between the building blocks act as an oasis of quietness and greenery amidst the traffic and bustle of the city. The introverted nature of the IHC building is further reflected in the fenestration designs as the outer façades have narrow vertical slits while the inner façades have wide horizontal ribbon windows. Despite its introversion to the chaos of the city, the IHC complex is accessible on foot from all sides. Free pedestrian

access along with interconnected garden courtyards create an open pedestrian continuum that helps linking and unifying the neighborhood



Figure 91: IHC View

Frontage is present on three sides of the site, all bounded by roads. The fourth side is flanked by Bal Bharti School. Along Lodhi Road, the neighborhood is primarily institutional, and as one goes farther inside, it becomes residential.

6. CLIMATE RESPONSIVENESS

Humid subtropical climate; depending on the weather, typical temperatures range from 19 to 32 degrees; summers are hot, winters are relatively chilly, and monsoon season brings the most rain.

The design of IHC, to a great extent, relies on non-mechanical means for climate control. In order to reduce solar heat gain, the building volumes are organized around shaded courtyards. These courtyards are covered by sun-screen pergolas suspended from a space frame structure. The sun-screen pergolas contain angled panels designed to block the summer sun while letting in the winter sun. As a result, the courtyards have acquired a unique microclimate which is conducive for repose. Moreover, the pergolas shade not only the courtyards below but also the inner façades of the building volumes.

Other passive climate-control measures include projecting out the top two floors for self-shading, use of cavity walls and a controlled use of glass. To ensure adequate daylighting, the floor plates have been limited to a width of 15 meters so that no individual is more than 7.5 meters away from a window.



Figure 92: IHC Terrace View

7. CULTURAL APPROPRIATENESS

The IHC complex hosts a variety of public and private sector enterprises under one roof. In this light, the complex has been designed in a way so as to encourage easy interchange of information amongst professionals working in diverse habitat-related fields. The building volumes are organized around shaded atrium-like courtyards that are interlinked to form a series of pleasant civic spaces. Seat walls are spread throughout these courtyards to further accentuate the communal setting. Moreover, to evade the tyranny of motor vehicles, all traffic has been directed into two levels of basement parking.

8. ARCHITECTURAL VISION AND IMPLEMENTATION

The complex's status as an oasis of peace and greenery in the midst of the city's tumult served as the inspiration for the design.



Figure 93: IHC Delhi

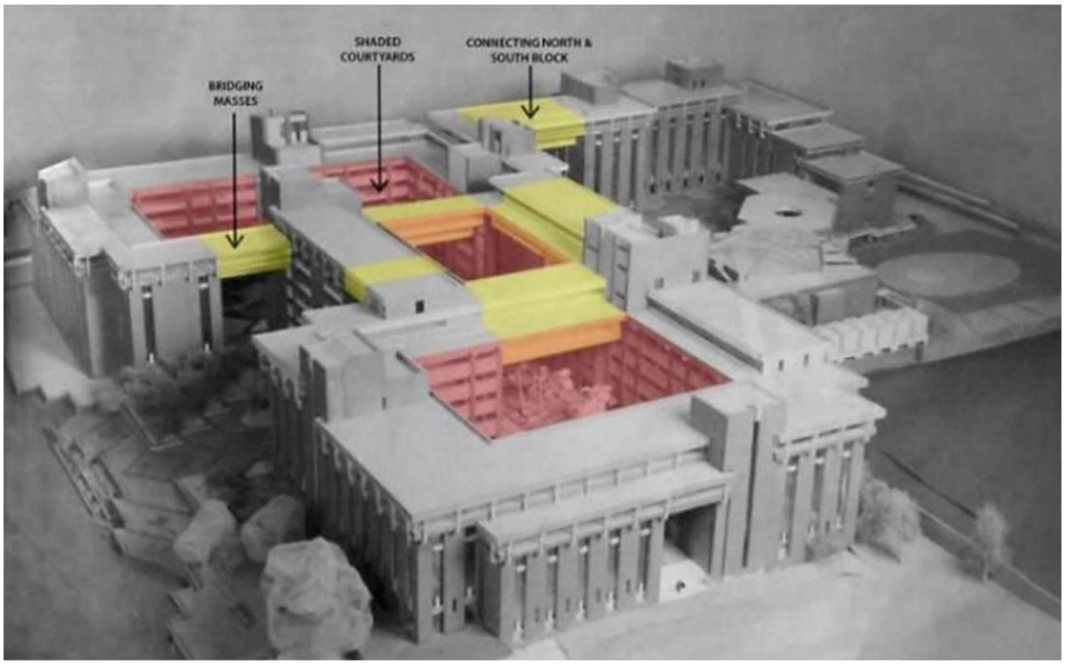


Figure 94: IHC Courtyard

9. BUILDING PROGRAM

IHC is planned as a fairly dense Complex with institutional and office workstations, conference rooms, a library, and a variety of member-only amenities.40000 square metres of office space. 1000 people can be accommodated in conference rooms that can be configured to hold anything between 30 and 450 people. The dimensions of the office spaces are roughly 14.15 m x 14.15 m and 33.1 m x 14.75 m. The exhibition area is 700 m2. Amphitheatre with a capacity of 250, auditorium with 420 seats. Parking for 933 automobiles and 2000 motorcycles landscaped courts take almost 25% of the overall space.



Figure 95: IHC Landscaping

10. RESPONSE TO SITE

There is little public activity and free-flowing traffic in the neighborhood. Because it is an inward- looking complex, public activities are dispersed throughout the area.

In the complex, there are two main blocks-

- The seven-story office building in the North block along the main road is made of offices. Lower floors are open to the public.

- The Lodhi Housing Colony's south block contains amenities like an auditorium, a theatre, a library, and member and guest rooms. Due to the housing, the height gradually drops from the north to the south block.

11. SITE PLAN

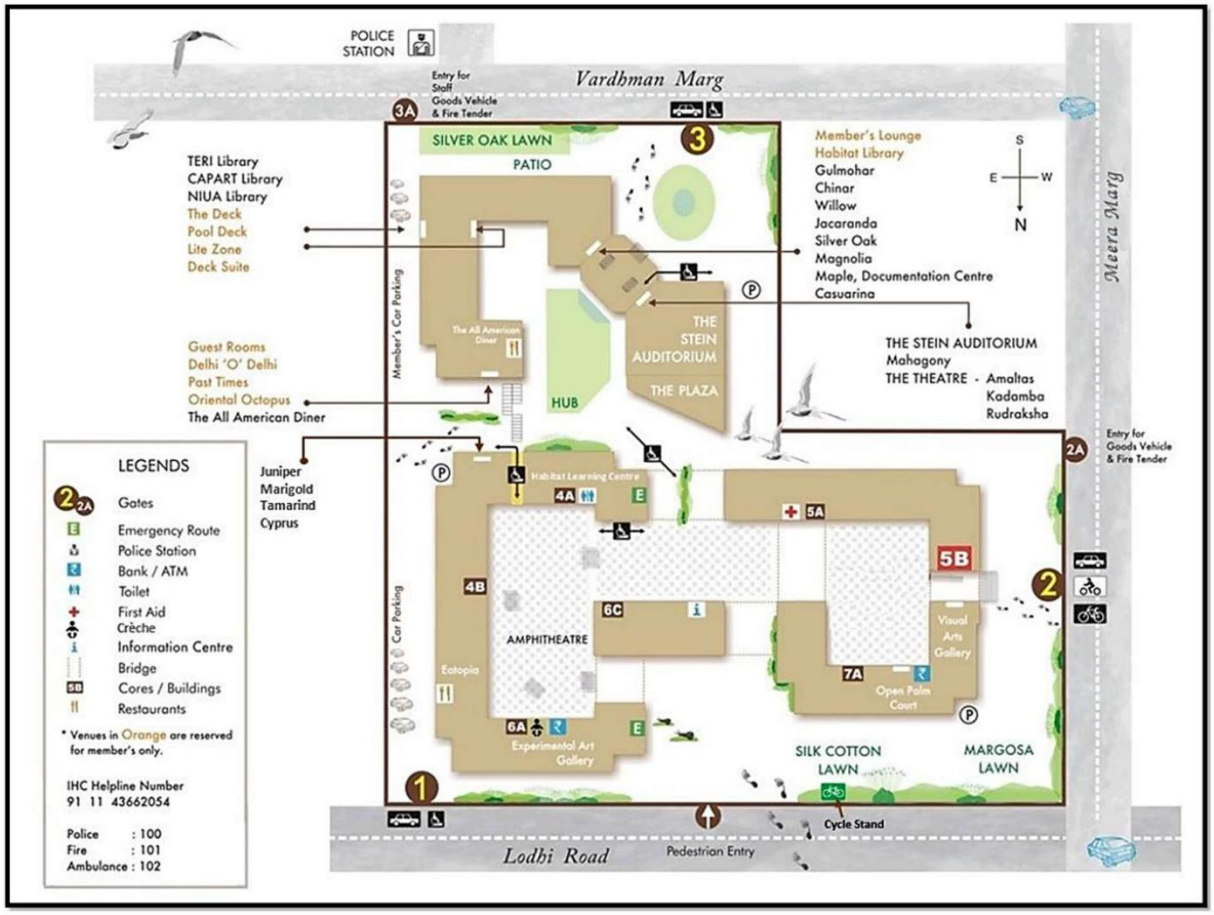


Figure 96: IHC Site Plan

Gate No.1:
Use Core 4A from basement parking for | Rooms Block | Restaurants | Fitness Centre | Amphitheatre

Gate No.2:
Use Core 5A, 5B, or 7A from basement parking | Exhibition Hall | Emerald Garden

Gate No.3:
Use Core 4A from basement parking | Convention Centre | Cultural Venues | Outdoor

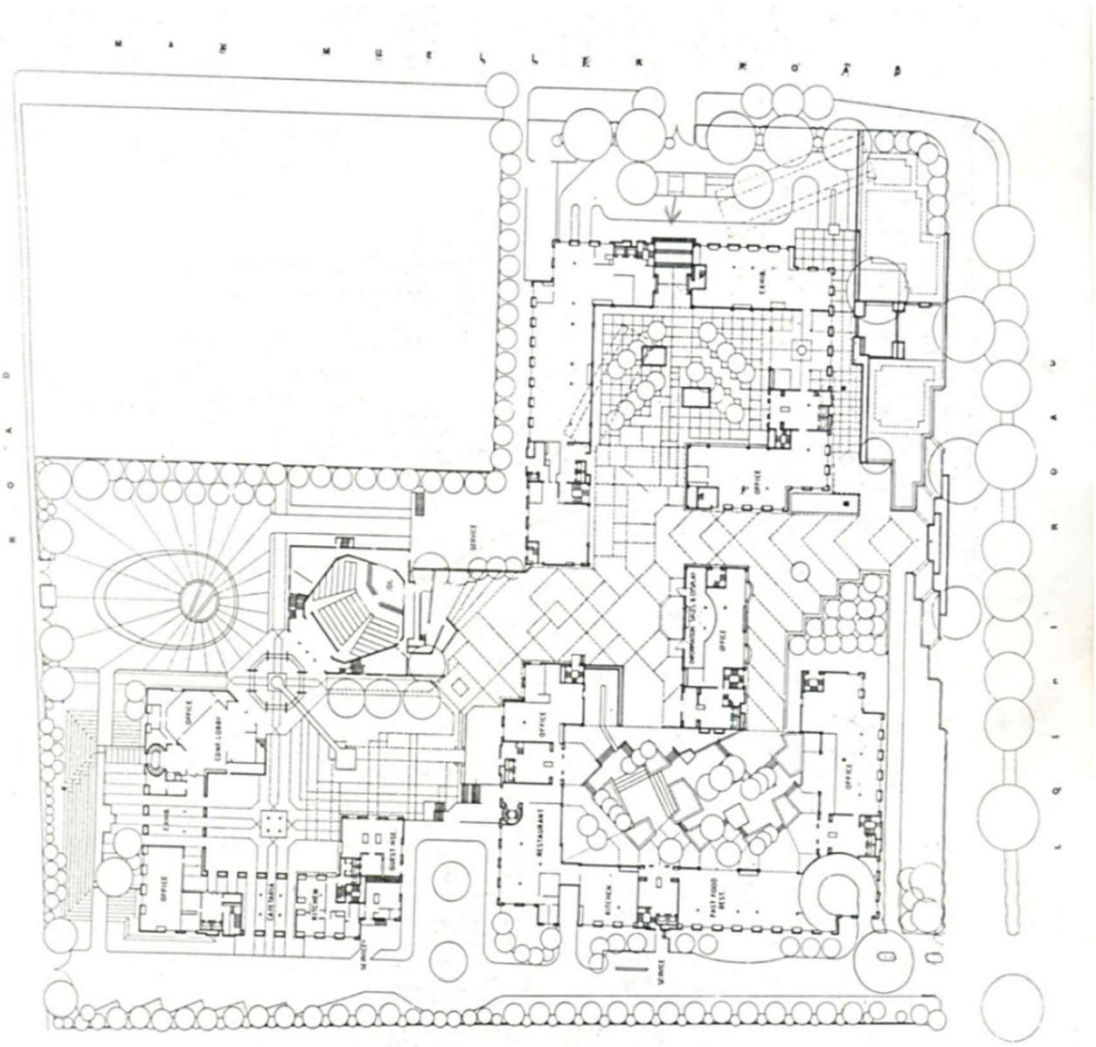


Figure 97: IHC Site Plan 2

12. SECTION OF OFFICE BLOCK

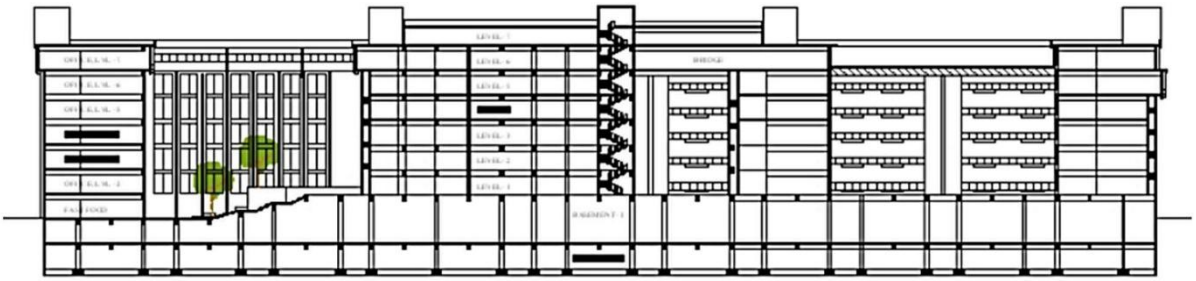


Figure 98: IHC Typical Section



Figure 99: IHC Spatial Planning

13. SITE LAYOUT & AMENITIES

North and South are the two portions that make up the complex. The north block has been built close to a designated vehicle drop-off since it offers amenities that are accessible to the general public. The central feature of the south blocks is the courtyards. The two blocks are connected by a sizable fairground that acts as a spillover space for public events. Several stacked programs share the cores, which are spaced out at regular intervals.

14. AREA STATEMENT

Area	Capacity	Area (in m²)
AUDITORIUM BLOCK		
Auditorium	537	558
Audi dome	350	385
Basement theatre		194
a) Mahagony	25	
b) Kadamba	30	
c) Rudraksha	30	
d) Amaltas	120	
FUNCTION ROOM BLOCK		
Magnolia	100	128
Casuarinas	60	127
Silver oak 1	100	120
Silver oak 2	70	73
The silver oak room (1+2) + foyer + patio		465
Silver oak lawn		554
15 + 16		1020
Chinar	25	28
Willow	50	52
Gulmohar	120	245
Jacaranda (1+2) + foyer		338
Mahogany	25	40
THE EXHIBITION HALL		325
THE EXHIBITION COURT	150	191
HABITAT VISUAL ART GALLERY	350	
OUTDOOR VENUES		
THE AMPHI THEATRE	300	27
MARGOSA LAWN	160	468
SILK COTTON GARDEN	85	243
EMERALD GARDEN	80	252
CASCADE COURT		1132
PALM COURT		1455
THE HUB	650	
THE PLAZA	450	360

Table 30: Area Statement

15. SPATIAL ORGANIZATION

The Habitat Centre is laid out as a collection of 4 to 7-story buildings centered on interconnected shaded Courtyards. The bill form is built around vertical gardens, climate-controlled courts, and covered overhead sunscreens.

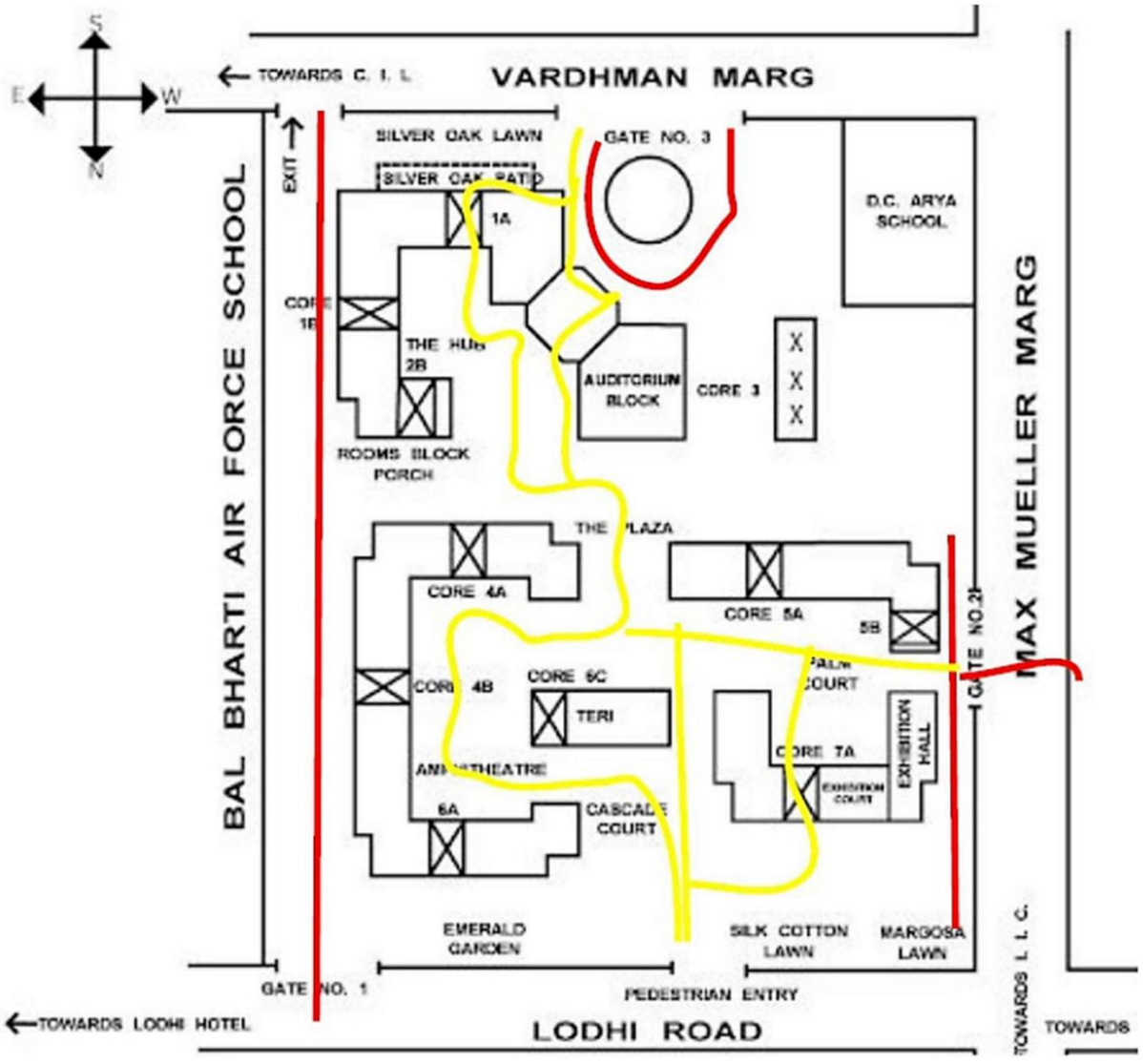


Figure 100: Circulation Plan

Spaces are divided according to their level of publicity. The public and any other locations that are anticipated to see a lot of traffic have been positioned close to the entrance. Courtyards provide access to the offices. The semi-public area is connected to the public space by landscaped grounds.

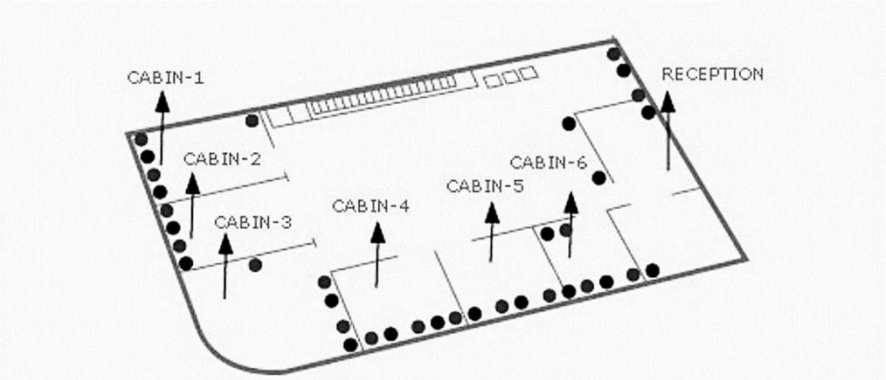
a. Office

General office spaces are offered as open areas without internal walls and are mostly found in the blocks next to the main streets. The office space is served with an A.H.U. room, two lifts, one staircase, adjustable electric and telephone connections, ducts, and bathrooms for both sexes.

Aside from those offered in the central court, all office spaces have the option of offering their own wet rooms. Office areas are roughly 14.15 m x 14.15 m and 33.1 m x 14.75 m in size. The basements are mechanically ventilated, and the entire structure is air-conditioned. Ceiling, drops to 3.0 meters. The height from floor to floor is 3.75 m.

b. The Business Centre

Six cabins or six workstations are available for rental at the Documentation Centre for varying lengths of time. A basement equipped with a sophisticated corporate documentation centre makes the perfect space for an international conference.



	AREA FT2	BOARDRM
Workstations		6
Cabin One	90	3
Cabin Two	90	4
Cabin Three	140	5
Cabin Four	73	3
Cabin Five	73	3
Cabin Six	72	5

Figure 101: Business Center Zoning

c. Convention Centre

- The following are available from the convention centre:
- A number of rooms with different capacities, as well as multimedia and audiovisual tools.
- There is room for 20 concurrent sessions.
- Integrated archiving system.
- Built-in means of projecting.
- Centre for documentation and secretariat.
- Extravagant feasts and creative theme parties.
- Calendar of cultural and entertaining events.



Figure 102: IHC Convention Centre

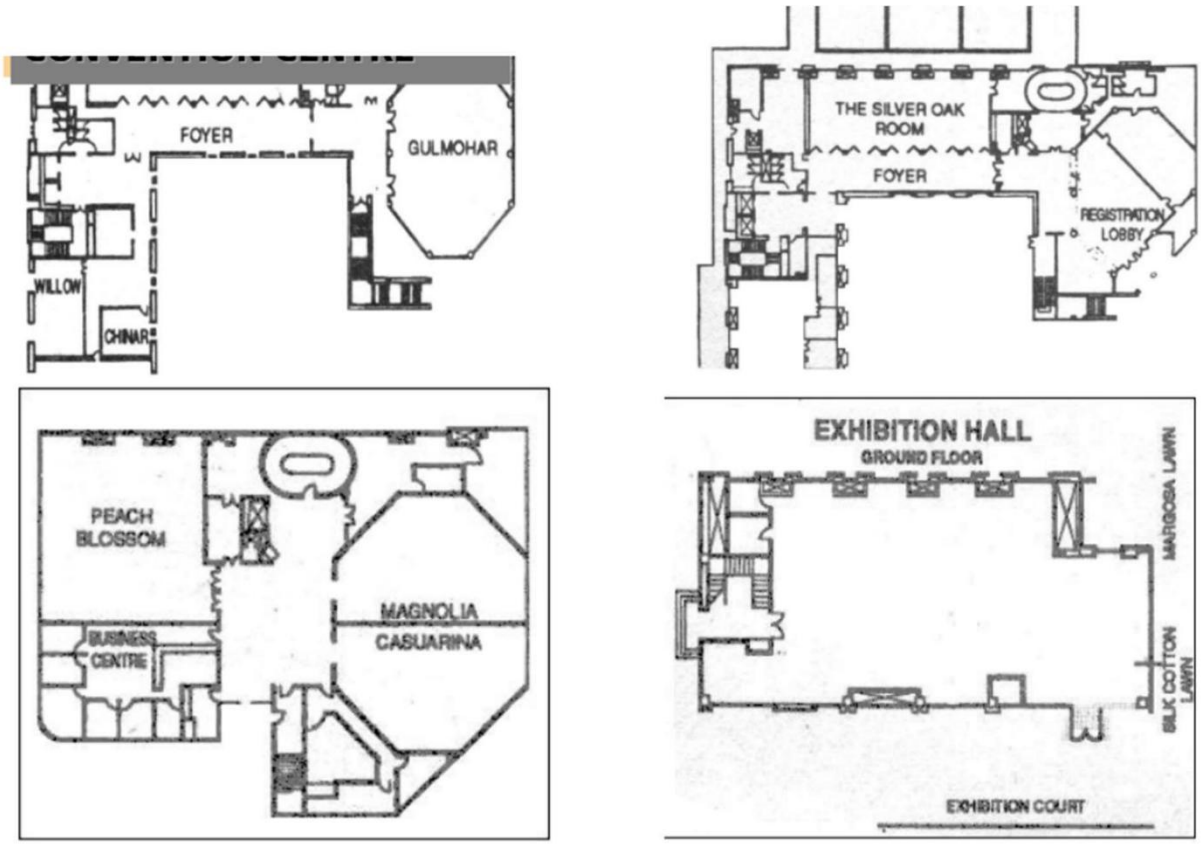


Figure 103: Convention Centre partial Arrangement

- 2000 two-wheelers and 1000 vehicles can park under cover.
- In addition to the following meeting rooms, a 535-seat theatre is available.



Figure 104: IHC Convention Center

16. FACILITIES PROVIDED IN CONVENTION CENTRE

a. Jacaranda

Elegantly carpeted, jacaranda could be used be one large space or further divided into independent units for corporate meetings, seminars, workshops, and parties.

Jacaranda 1 – 1290 sq. ft
Jacaranda 2 – 1290 sq. ft.
Jacaranda 1 –2
Foyer – 3700 sq.ft.



Figure 105: Jacaranda

b. Gulmohar

A fixed seating hall equipped with state of-the-art, multimedia facilities & each table equipped with a set of mikes, ideal for seminars, corporate presentations, and product launches Casuarinas – 1520 sq. ft.



Figure 106: Gulmohar

c. Chinar & Willow

These rooms are ideal for small functions such as conferences, board meetings, presentations, workshops, seminars, and parties, and can be used separately or in conjunction with the foyer.



Figure 107: Chinar & Willow

d. Silver Oak

Silver Oak, one of Habitat's finest halls, also has outdoor attachments in the form of a patio and garden space. The hall's ideal location on the ground floor level allows for versatile use of space for everything - from exhibitions, conferences, seminars, and so on, to the finest banquet parties in the evening. The hall could even be divided into two distinct sections, increasing its adaptability even further.



Figure 108: Silver Oak

e. Juniper & Marigold

Juniper & Marigold are large carpeted space ideal for corporate meetings, seminars, workshops, and fine parties. The hall, which is ideally located on the ground floor, allows for the versatile use of space.



Figure 109: Jumiper & Marigold

17. HABITAT LIBRARY AND RESOURCE CENTRE



Figure 110: IHC Library

A combined facility focusing on habitat, environment, and associated topics has become a national resource. Many institutions in the centre need library and documentation services. Reports, clippings, research papers, photographs, audio-visuals, and computer-generated displays are significant sources of information pertaining to habitat in the centre, along with written documentations, particularly those of an unpublished nature. These sources are particularly important for unpublished writings. The library on the second level features a patio where you may read outside and lots of natural light. Additionally, there are computer cabins for browsing the internet. There are several forms of formal and informal seating available.

18. OUTDOOR VENUES

The beautifully landscaped surroundings of India Habitat Centre offer brilliant outdoor party and performance venues that can add that extra sparkle to any event.

Venues	Area	Seating
The Hub	650	---------
Margosa Lawn	5200	160
Silk Cotton Garden	2700	85
Emerald Garden	2800	80
Cascade Court	12583	----------
Palm Court	16170	----------
The Plaza	4000	450
Silver Oak Garden	6000	---------



Figure 111: Outdoor Venues

a. Visual Art Gallery



Figure 112: Visual Art Gallery

Within the sanctuary of the Habitat Visual Arts Centre, artistic visionaries find sanctuary, a sanctuary where their captivating creations find resonance and reach a wide audience. This revered institution serves as a sanctuary for creativity, fostering an environment that not only celebrates artistic genius but also nurtures the growth and recognition of emerging talents. Immersed in the tapestry of the Habitat Centre's ethos, the Visual Arts Centre ignites the imagination, serving as a conduit between the realms of artistic mastery and the eager minds thirsty for inspiration.

b. Seating Auditorium

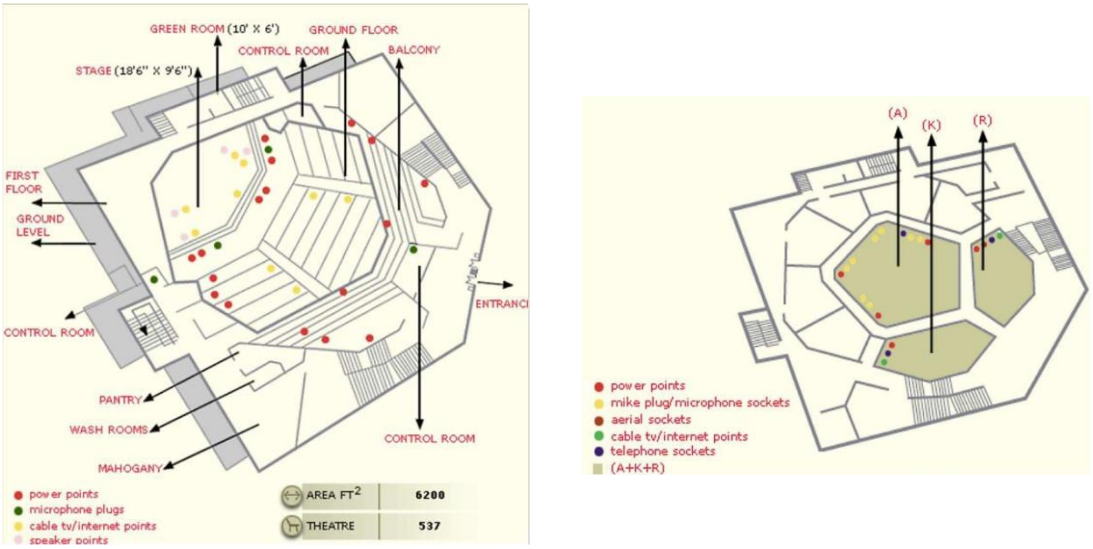


Figure 113: Seating Auditorium

There is a three-language translation system in the main auditorium. Because they may choose among the chairs themselves, it is easy to utilize. There is also the choice of volume control. In addition to control rooms and a projection room on the first floor, the primary theatre contains a Mahogany room, a modest meeting area with a kitchenette and lavatory nearby. The green room does not require toilets.

Additionally, there are offices and a coffee cafe on the ground floor. Platforms with two seats have a level difference of 1-6, enabling for unobstructed views. This theatre has balcony seats as well. The double wall technique muffles noise from outside. This auditorium has a 6200 square foot floor surface with a seating capacity of 537 persons.

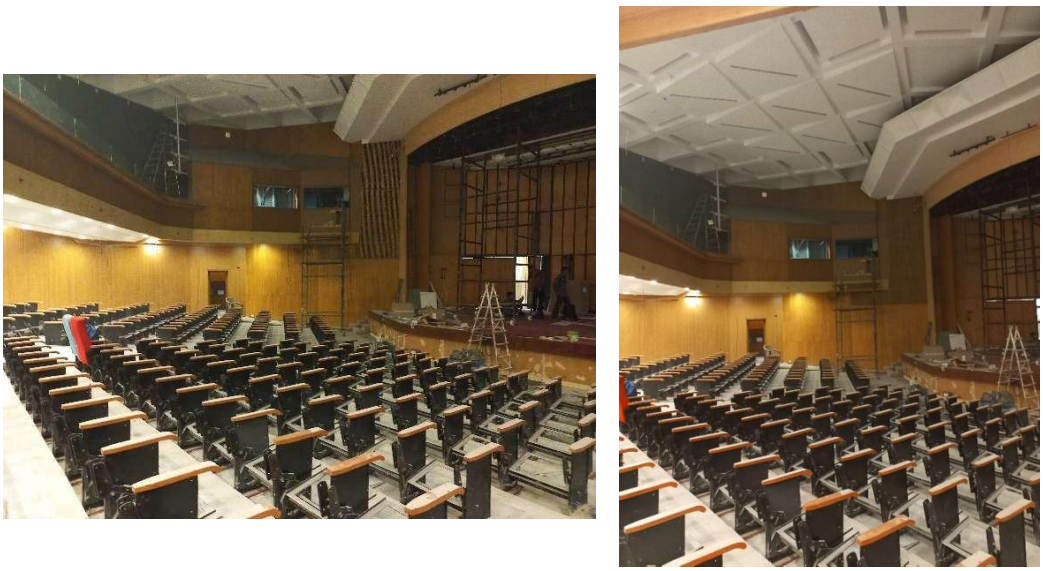


Figure 114: Auditorium Interior

19. ARCHITECTURAL FEATURES

a. Local Materials and Construction

The structural frame of IHC has been fabricated from reinforced cement concrete cast in situ. Popularised by Le Corbusier in India, in situ concrete takes advantage of the availability of relatively cheap manual labour in the country. Variegated courses of Lakhori bricks envelop the building's outer façades while brushed stone aggregate plaster has not been completely discarded as it clads the building's inner façades.

b. Facade

- The exterior and interior court facades are very carefully designed.
- The exterior facades display a consistent, nearly classic appearance with less glazing and more brick Masonry was preferred by HUDCO
- The internal facades contain light hanging gardens, and the façade is characterized by strip windows.
- The outside elevations include a visibly strong, finely detailed "base," a "middle," which is uncomplicated, and a "cornice," which is a full floor that cantilevers out on brackets, on top.
- In order to serve as the building's foreground, the exterior faces have been given a more formal appearance.
- There are numerous window boxes all over the facades, where plants will further soften the wall surfaces.



Figure 115: IHC Gate View

c. Bridges

Buildings are arranged in groups around partially covered courts and connected by bridges at the fifth and sixth floors and higher to create expansive entranceways to different zones and courts. These multi- level bridges connect the various building zones and offer office space. The bridges complete the character of the enclosed courts by creating framed views and panoramas.



Figure 116: Connection Bridges

d. Finishes

The building's exterior was initially envisioned as having brushed aggregate (grit), which was meticulously manipulated to produce a black base that got lighter as the building was viewed against the sky. Due to a lack of trained labour, this could not be implemented.



Figure 117: IHC Finishes and Materials



Figure 118: IHC Finishes

The exterior uses brick to better represent a habitat. Exposed brickwork in cantilevered corridors with exposed R.C.C., ceramic tiles in the colours green, red and grey are used in extensions to indicate verticality as well as in the interiors of lift lobbies and lifts to create the impression of flow.

e. Shading Devices

- The courtyard is intended to serve as an illustration of moderate climate adjustment. In order to protect the courtyards from the tropical sun in the summer and allow in the sun in the winter, a system of open to sky-shaded canopies was installed over the enormous asphalt courts. An apparatus for shading like this lightens the demand on the air conditioning system.
- A flat nylon ceiling screen with a permeable steel frame has been installed over three courts to provide effective sun protection.
- The solar screens serve as a roof for the outdoor rooms that house the courts and exclude the majority of the summer sun while letting in most of the winter sun. An apparatus for shading like this lightens the demand on the air conditioning system.
- The courtyard is bordered by a 1.2m deep galvanised steel tube structure that is fastened to concrete overhangs at each end.
- The shading element is provided by shade casting leaves of PVC coated nylon fabric that are roughly 1.6x1.4m in size and are fixed at the prescribed angles within this framework.



Figure 119: Shading frames

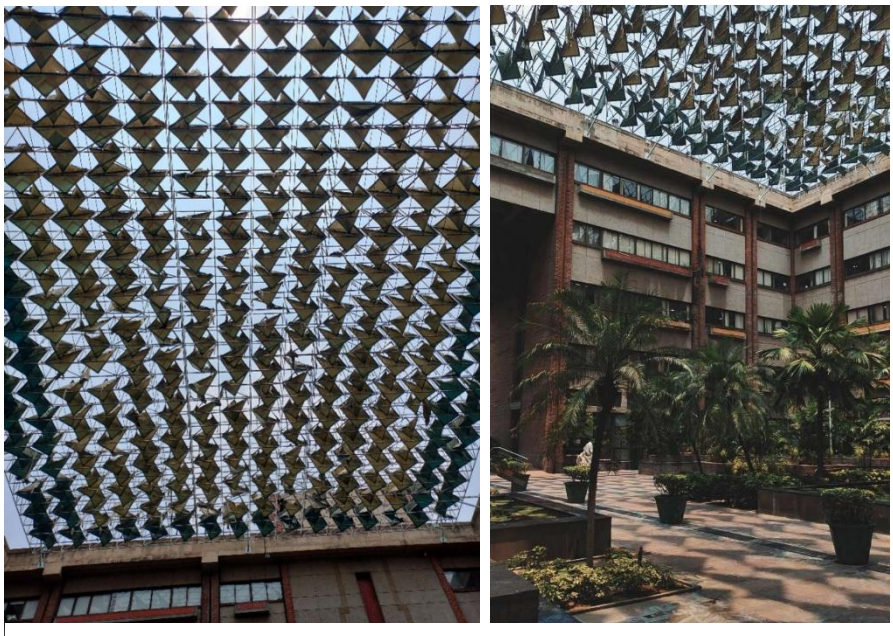


Figure 120: Shading

f. Landscaping

- Each interior courtyard has been planned to provide the spaces a unique identity and to be suitable for the kinds of uses or activities that can be expected.
- A variety of paving designs, the utilisation of water, a play of levels, and vegetation.
- Palm trees have been planted to create a refreshing environment inside.
- At key locations, sculptures have been positioned to add interest.
- Ponds are available to reduce the stiffness of tough materials.
- Stepped planters serve as sitting space too.
- The building's roof is also constructed as a succession of terraces that have all been transformed into roof gardens.
- In order to serve as a foreground for the structure, the exterior spaces have a more formal appearance.
- There are numerous window boxes all over the facades, where plants further soften the wall surfaces.



Figure 121: Lotus Flora





Figure 122: Stepped Planters

20. BUILDING SERVICES

- With two basements totaling 18,000 square meters each and a built-up area of 53,000 square meters, the structure can accommodate 933 automobiles.
- Everything is centralized. Offices and parking for cars and motorcycles are located on the upper basement. The lower basement is split in half, with half being utilised for parking and the other half for utilities such as air conditioning, electrical panels, D.G. sets, water storage, and water supply.
- Sprinkler systems are installed in all usable spaces, the entire structure is air-conditioned, the basements are mechanically ventilated, and the complex has its own water filtration facility.
- To stop fire from spreading along vertical shafts, pressure is applied to fire escape staircases and lobby areas.

- With the exception of those found in the inner cores, every office space has the option of offering their own wet areas. Power and phone connections are flexible and can be combined with the partitions thanks to a floor grid.
- Computerized building management systems have been created to ensure that all systems, including the watering of window boxes and the identification of errors, operate as efficiently as possible.



Figure 123 : Service plant

a. Air Conditioning

- Chilled water system has been used with a capacity of 2700 tons, 100 A.H.U. and 100F.C.U. (for guestrooms) generators.
- 2 nos. of 100 kva for air conditioning
- 2 nos. of 500 kva for emergency lighting
- 1 no. of 125 kva for building management works.

b. Fire Fighting

- 12.5 million liters of storage space for both raw and treated water in the basement and 3.5 lacs of space for lighting fires on the upper ground. It is fuelled by three 10-hp bore wells and municipal water supplies.
- The hydro pneumatic system is used to distribute the water once it has been first filtered and softened.

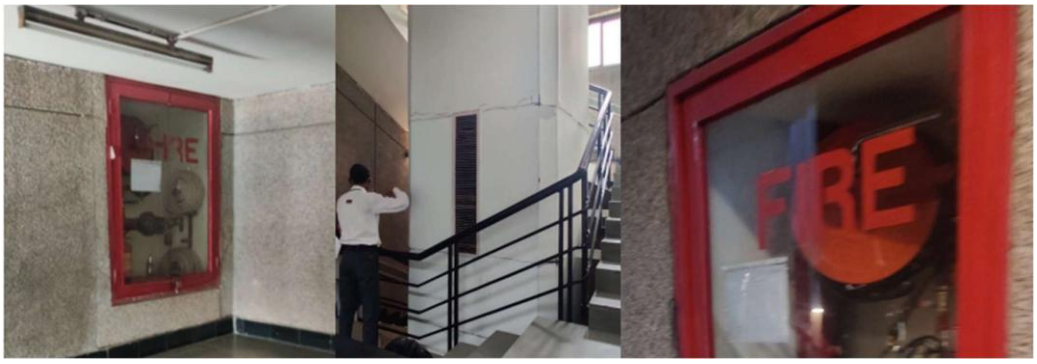


Figure 124 : Fire Fighting

c. Plumbing

- Both basements have sprinkler systems, automatic fire detectors on the top floors, and carbon dioxide spreading systems for electrical sub-stations.

- Sprinkler, hydrant, diesel, and (operate with diesel in case of power loss) pumps are all located in the fire pump room.
- With this jockey pump, pressure is maintained in the event of a slight leak. Fire escape stairs and lobby areas are pressurized to stop the spread of fire.

d. Parking

- The ground floor or public level now solely has landscaped courts, with the parking relegated to the basement.
- To prevent parked cars from clogging the road, the main parking is in two basements, while space for critical chartered buses and private cars is immediately outside the site.
- The 36000 m2 underground parking lot can accommodate 933 cars and roughly 2000 two- wheelers.
- Upper basement: 10546 square metres.
- Lower basement level: 16306 square metres.
- This represents 30% of the project's total gross area. All automobiles and scooters are directed to the lower levels.



Figure 125: Basement parking

21. INFERENCES

a. The Indian Habitat Centre is an example of a modern architectural design that incorporates clean lines, geometric shapes, and cutting-edge materials. The design adopts a minimalist philosophy, emphasizing simple aesthetics and usability.
b. Open areas and sizable courtyards at the IHC create a pleasant atmosphere for guests. These areas promote conversation, unwinding, and involvement with the environment.
c. The atrium in the center of the Indian Habitat Centre is its beating heart. This expansive, well-lit atrium acts as a focal point and meeting place for guests. The atrium's layout encourages movement, connectivity, and a feeling of openness.
d. North and South are the two portions that make up the complex. The north block has been built close to a designated vehicle drop-off since it offers amenities that are accessible to the general public. The central feature of the south blocks is the courtyards. The two blocks are connected by a sizable fairground that acts as a spillover space for public events. The cores are shared by numerous stacked programs and are spaced at regular intervals.
e. The complex has outdoor dining areas, beautiful gardens, and lush vegetation. These components create an oasis in the middle of the city, boosting the aesthetics and generating a sense of connection to nature.
f. The Center is laid out as a collection of 4–7 storey buildings centered on interconnected courtyards. Access to office spaces is provided from inside the courts. Landscaped Court takes up 25% of the entire space.
g. The IHC uses sustainable design concepts to lessen its impact on the environment. Energy-efficient systems, natural ventilation, rainwater collection, and the use of eco-friendly materials when practical are a few examples of these elements.
h. The architectural features and cultural allusions used in the design of the Indian Habitat Centre pay homage to the country's rich cultural identity while also evoking a sense of place.
i. The IHC's design provides smooth movement and connectivity across all of the complex's areas. Pathways, bridges, and corridors that are strategically arranged make for simple travel and encourage visitor interaction.
j. Functionality and adaptability are highlighted in the Indian Habitat Centre's architecture. The complex's flexible spaces can accommodate a variety of events like exhibitions, conferences, concerts, workshops, and social gatherings.
k. The arrangement of 6-7 storey building blocks around climate-controlled courtyards has energized the environment inside the complex.
l. The outer façade treatment uses specific bricks to create a highly robust and powerful visual effect, whilst the interior facades are very light, delicate, and support light hanging gardens. Flexible interior areas were made possible by the building's R.C.C. framed construction, which was thoughtfully designed.
m. Only foot movement is permitted inside the blocks, therefore the area is exceedingly clean. Vehicle traffic is limited to the site's perimeter. In order to enable for the rest of the site to be landscaped, parking has been preserved in the basement.
n. The IHC is renowned for hosting cultural performances and activities on its famous rooftop amphitheater. The amphitheater offers a singular vantage point with views of the city skyline, providing audiences with an immersive experience.

36. DESK APPRAISAL

36.1. HYDERABAD INTERNATIONAL CONVENTION CENTRE

Location: Izzathnagar, Kothaguda, Hyderabad, Telangana, India
Site Area: 15 Acres (6000 sqm)
Year of Completion: 2006
Architects: EMAAR Group
Owner/Client: Joint venture by EMAAR (Dubai) and Andhra Pradesh industrial infrastructure corporation limited
Ground Coverage: 29%
Built-up Area: 27000 sqm
Spaces: Specialized meeting rooms, breakout rooms, plenary halls, exhibition hall, conference room, theatre, restaurants & VIP lounges.



Figure 126: Hyderabad International Convention Centre

1. INTRODUCTION

Hyderabad International Convention Centre is in the heart of the business and IT hub of Hyderabad. The world-class service and abundant flexible space make it the meeting planners' choice for hosting a major convention, trade shows, meeting and special events.
Hyderabad international convention Centre (HICC) is the first state-of-the-art convention facility, the first of its kind in South Asia. HICC is also the winner of the Best Convention Centre National Tourism Award by Incredible India for three consecutive years. Novotel hotel adjacent to HICC is a 5-star Hotel room with 287 room's, built to suit the easements of business travelers. It is a Green Globe Certified Convention Centre.

2. ACCESSIBILITY

HICC and Novotel complex is in the north-west of Hyderabad city

- 3km from Hi-tech city
- 5km from National highway
- 11 km from Golconda fort.
- 15km from Hussain Sagar Lake
- 32.5 km from Rajiv Gandhi International airport
- 18km from Begumpet domestic Airport
- 17km from Nampally railway station



Figure 127: Site Plan

3. SITE AND ITS SURROUNDINGS

Site topography: It is flat land with slope towards the lake.
Site population: permanent -500 staff members.

- Novotel hotel is present within the site.
- The site shares part of its boundary with a lake which has lush green trees around it.
- HITEX exhibition Centre is located right next to the HICC.
- Surrounding area has a lesser built structure and consist of low rise to midrise buildings.
- The proximity of information Centre helps the guests from outside the city to know about the city monuments, history, craft, culture, etc.

4. SITE CIRCULATION

- People arrive by individual cars, public transport or in groups by coach.
- Trucks and service vehicles
- Entry/Exit Gates for guests of the convention Centre and hotel, hotel staff, visitors during large events and convention Centre staff are separated.

5. CIRCULATION PATTERN

- The main driveway has 3 loops of turning radius 11.5m.
- Entry for guests and staff is segregated.
- Large coach drop-off and collecting point areas adjacent to the main entrance
- Footpaths for pedestrian circulation and well-identified internal signages.
- The main driveway is designed in such a way to enjoy pleasing views of the lake, hotel, and conventional centre.
- Loops after constant intervals lead to better road connectivity.
- Security guard offices at the gates with security devices.
- Entry/exits of the site are not easily locatable
- It lacks proper external signages

6. PARKING FACILITIES

- There is segregation of guest parking and staff parking.
- The coach parking bay is off the street.
- Direct access to venue lobby
- Parking space for guests is not sufficient.
- No long-term parking for trucks
- Disabled access is not identified

7. ZONING OF SPACES

- The convention Centre is close to service entry.
- **Parking:** Common between both hotel and convention Centre.
- **Service area:** Close to HICC and remains away from the hotel.
- **Clubhouse and swimming pool:** Away from the convention Centre crowd and gets privacy as it is pan of the hotel.

8. THE ORIENTATION OF THE BUILDING

- In summers. few parking spots and the foreground get some shade.
- In March and September foreground remains shaded most of the time.

9. GROUND FLOOR

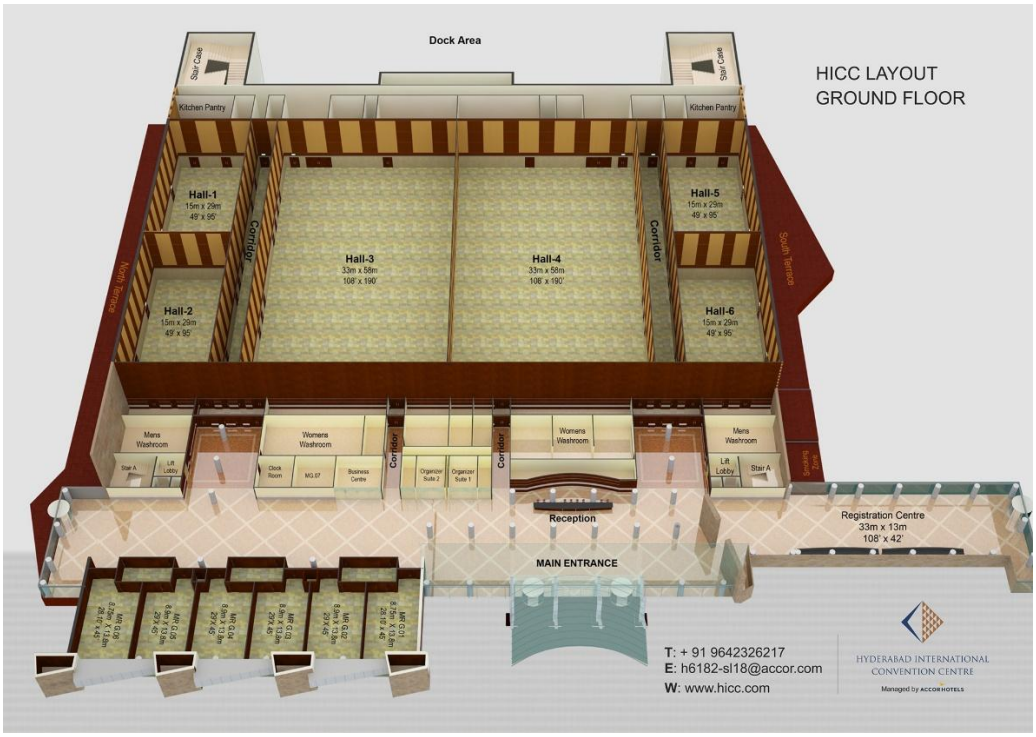


Figure 128: Ground Floor Plan

Venue	Theatre Back Projection	Theatre Front Projection	Classroom Back Projection	Classroom Front Projection	Cluster Back Projection	Cluster Front Projection	U-Shape	Board Room	Area in Square Metres	Area in Square Feet	Ceiling Height in Metres	Ceiling Height in Feet	L X B (Metres)	L X B (Feet)
GROUND FLOOR														
Organizer's Suite 1									56	602	2.9	9.5		
Organizer's Suite 2									62	667	2.9	9.5		
Registration Centre									429	4616	3.2	10.5	33 X 13	108 X 42
Convention Hall - 1	250	300	125	150	125	150			442	4760	12.5	42	15 X 29.5	49 X 96
Convention Hall - 2	250	300	125	150	125	150			442	4760	12.5	42	15 X 29.5	49 X 96
Convention Hall - 3	1350	1500	750	850	600	725			1914	20600	12.5	42	33 X 58	108 X 190
Convention Hall - 4	1350	1500	750	850	600	725			1914	20600	12.5	42	33 X 58	108 X 190
Convention Hall - 5	250	300	125	150	125	150			442	4760	12.5	42	15 X 29.5	49 X 96
Convention Hall - 6	250	300	125	150	125	150			442	4760	12.5	42	15 X 29.5	49 X 96
Corridor 'A' or Corridor 'B'									283	3046	12.5	42	4.8 X 59	16 X 192
Hall - 1&2 or Hall - 5&6	700	800	400	425	350	400			885	9522	12.5	42	15 X 59	49 X 192
Convention Hall - 1&2 + Corridor or Hall - 5&6 + Corridor	850	950	575	625	450	525			1168	12568	12.5	42	19.8 X 59	65 X 192
Convention Hall 1-3 or Hall 4-6	2400	2800	1300	1450	1050	1250			3074	33076	12.5	42	53 X 58	173 X 190
Convention Hall - 3&4	3000	3500	1700	1900	1400	1700			3857	41500	12.5	42	66.5 X 58	216 X 190
Convention Hall 1 - 4 or Hall 3-6	4000	4600	2200	2400	1750	2100			5017	53982	12.5	42	86.5 X 58	284 X 190
Convention Hall 1 - 6	4850	5800	2750	3000	2200	2650			6177	66464	12.5	42	106.5 X 58	348 X 190
Meeting Room G.01		80		50		40	30	25	125	1345	2.9	9.5	8.75 X 13.1	29 X 43
Meeting Room G.02		80		50		40	30	25	127	1367	2.9	9.5	8.9 X 13.1	29 X 43
Meeting Room G.03		80		50		40	30	25	125	1345	2.9	9.5	8.9 X 13.1	29 X 43
Meeting Room G.04		80		50		40	30	25	127	1367	2.9	9.5	8.9 X 13.1	29 X 43
Meeting Room G.05		80		50		40	30	25	125	1345	2.9	9.5	8.9 X 13.1	29 X 43
Meeting Room G.06		80		50		40	30	25	127	1367	2.9	9.5	8.75 X 13.1	29 X 43
Meeting Room G.07									75	800	2.9	9.5	12.2 X 6.2	40 X 20

NOTES:

The above seating capacities are considering the stage sizes as below.
For Hall : 1, 2, 5 or 6 stage size is 20' x 16'
For Hall : 3 or 4 stage size is 40' x 24'
For Hall : 1-3, 4-6, 1-4, 3-6 or 3&4 stage size is 48' x 24'
For Hall : 1-6 stage size is 80' x 32'
The seating capacity of any / all the halls may vary in case of customised AV (or) stage requirements.

Table 31: Area statement

10. FIRST FLOOR

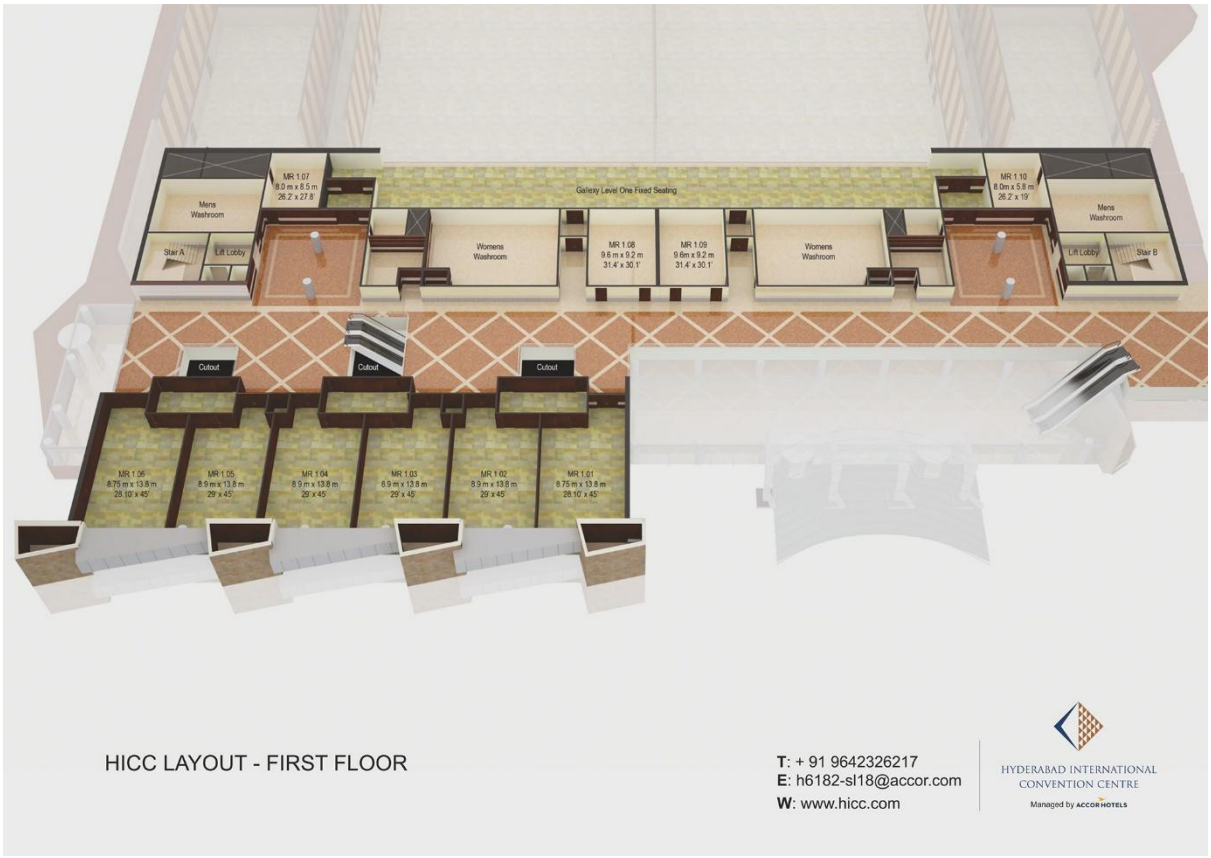


Figure 129: First Floor Plan

Venue	Theatre Back Projection	Theatre Front Projection	Classroom Back Projection	Classroom Front Projection	Cluster Back Projection	Cluster Front Projection	U-Shape	Board Room	Area in Square Metres	Area in Square Feet	Ceiling Height in Metres	Ceiling Height in Feet	L X B (Metres)	L X B (Feet)
Meeting Room 1.01		80		50		40	30	25	127	1367	2.3	7.5	8.75 X 13.1	29 X 43
Meeting Room 1.02		80		50		40	30	25	125	1345	2.3	7.5	8.9 X 13.1	29 X 43
Meeting Room 1.03		80		50		40	30	25	127	1367	2.3	7.5	8.9 X 13.1	29 X 43
Meeting Room 1.04		80		50		40	30	25	125	1345	2.3	7.5	8.9 X 13.1	29 X 43
Meeting Room 1.05		80		50		40	30	25	127	1367	2.3	7.5	8.9 X 13.1	29 X 43
Meeting Room 1.06		80		50		40	30	25	125	1345	2.3	7.5	8.75 X 13.1	29 X 43
Meeting Room 1.07								12	46	400	2.3	7.5	5.8 X 8.0	19 X 26
Meeting Room 1.08								14	88	947	2.3	7.5	9.2 X 9.6	30 X 31
Meeting Room 1.09								14	88	947	2.3	7.5	9.2 X 9.6	30 X 31
Meeting Room 1.10								12	46	400	2.3	7.5	5.8 X 8.0	19 X 26

Table 32 : Area Statement

11. SECOND FLOOR

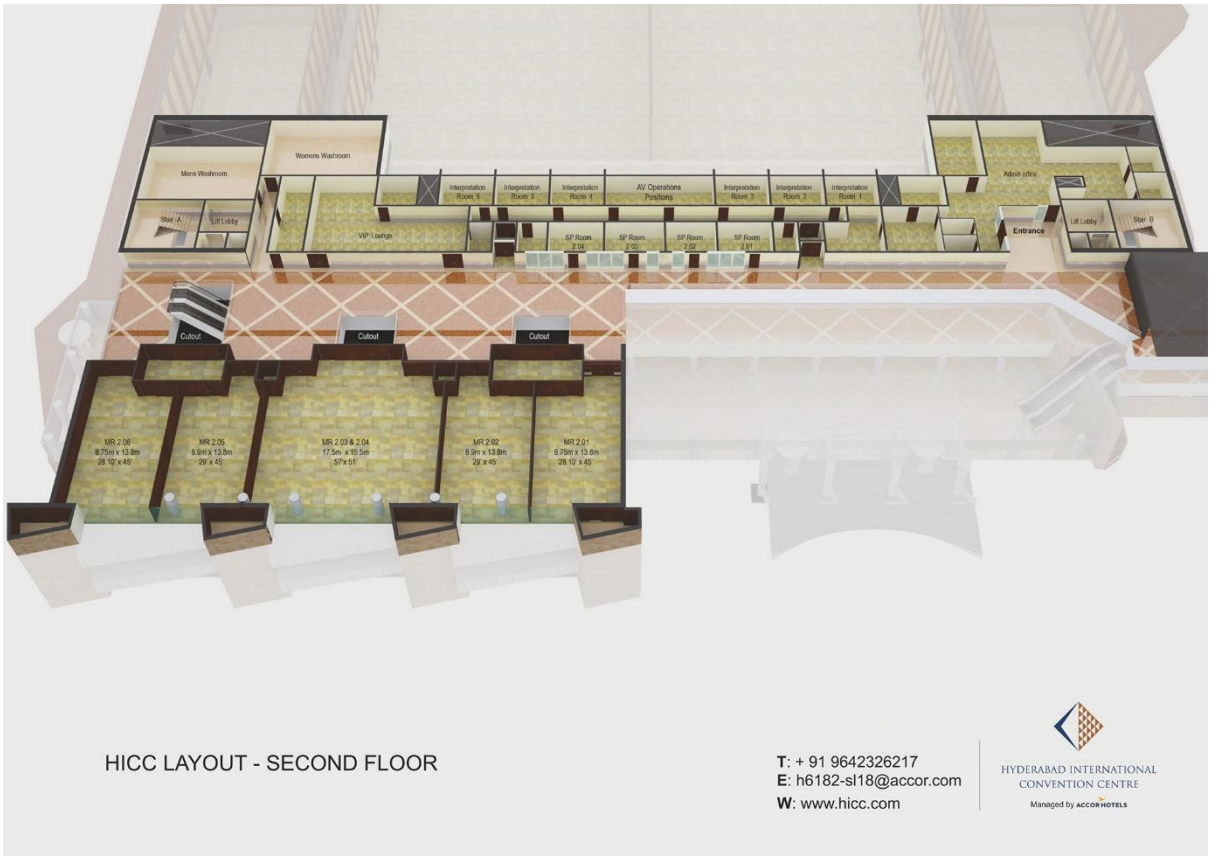


Figure 130: second Floor Plan

Venue	Theatre Back Projection	Theatre Front Projection	Classroom Back Projection	Classroom Front Projection	Cluster Back Projection	Cluster Front Projection	U-Shape	Board Room	Area in Square Metres	Area in Square Feet	Ceiling Height in Metres	Ceiling Height in Feet	L X B (Metres)	L X B (Feet)
Meeting Room 2.01		80		50		40	30	25	125	1345	2.3	7.5	8.75 X 13.1	29 X 43
Meeting Room 2.02		80		50		40	30	25	127	1367	2.3	7.5	8.9 X 13.1	29 X 43
Meeting Room 2.03 & 2.04		180		120		104	54	44	274	2948	2.3	7.5	17.9 X 15.3	58 X 50
Meeting Room 2.05								20	125	1345	2.3	7.5	8.9 X 13.1	29 X 43
Meeting Room 2.06								20	127	1367	2.3	7.5	8.75 X 13.1	29 X 43
V I P Lounge		54		36		36	27	18	115.8	1247	2	7		
"Speaker's Preparation Booth 1 or 2 or 3 or 4(each)"									23.7	255	2.3	7.5	4.1 X 5.8	13 X 19

Table 33: Area Statement

12. PLANNING OF THE COMPLEX

a. Porch:

- It allows the users to pause before entering or after exiting the building, also used for sitting.
- The porch is only accessible by pedestrians.

b. Entrance gate and security cheek:

- Separate gate for entry and exit with revolving doors are very useful. They prevent a person from bypassing security checkpoints.
- Accessible for differently-shied users too.
- Spacing for luggage scanning is provided.
- Separate emergency exits are planned.

c. Reception and Pre-function lobby:

- After the entrance gate, there is a large atrium with the reception in front Escalators are close to the gate for ease in vertical circulation.
- Visible grid of columns and beams with glass panels in between allows ample light to enter the pre-function area of the building.
- The registration area has 12 desks

d. VIP Lounge:

- The VIP lounge is furnished with a wooden finish to give it a rich look.
- The glass used for these areas is bullet-proof because of security reasons.

e. Convention Area:

- The main hall was designed to be pillar-free and to be subdivided into a further of six smaller halls with the help of partition walls which are suspended from the top.
- The main convention hall can accommodate up to 6150 guests. The Centre is well equipped with audiovisual facilities retractable seating, etc. to have multiple sessions/events run simultaneously.
- Various types of configurations in the seating style help to have different types of events in a perfect hall manner. Types of seating include classroom style, banquet style, theatre style, etc.

f. Gallery seating:

- A capacity of 690 people can be accommodated at the first-floor gallery.
- Gangway in between is 1.2m wide

g. Kitchen:

- The kitchen is directly attached to the plenary hall on one side and the service corridor on another side.

h. Food preparation:

- Vegetable preparation pantry is separated from the non-veg pantry.
- Storage of dry food is available in a separate room.
- There are 5 stores with storage facilities, cold storage, utensil storage, etc.
- Pastry and dessert preparation take place separately
- Meat /fish preparation area also has a cold storage facility close to it. There are 3 tandoors/ ovens with a meat preparation table
- A separate wash area is provided inside the pantry itself with a work table
- Another area for Salad and starter preparation is there too.

i. Loading and Unloading:

- There are 5 dock bays for loading/ unloading material on the rear side. The service area is also utilized for the temporary storage of materials.
- The service corridor is 2m wide where stacks of chairs and tables are stored temporarily the gates at the center are 5m wide for proper circulation of loading, unloading, and services.

13. MATERIALS AND FLOORING:

a. Acoustic Panels:

- The acoustic panels at HICC are made from a combination of teak wood and silk fabric.
- Teak is a durable, high-quality wood that also offers a visually appealing finish.
- Silk fabric adds a refined, luxurious texture to the panels.
- These panels serve both aesthetic and functional purposes.
- Their primary function is to improve sound absorption and minimize reverberation within the convention centre.

a. Carpet Tiles (1'6" X 1′6″):

- Carpet tiles used in HICC measure 1'6" x 16", balancing design and practicality.
- The tile size offers design flexibility, allowing for creative patterns and layout variations.
- These tiles enhance the aesthetic appeal of the interior spaces.
- Functionally, they contribute to safety, offering better grip and reducing the risk of slips and falls.
- The modular nature of the tiles also allows for easy maintenance and replacement when needed.

14. INFERENCE

a. **Site and Accessibility:** The site is well connected to public transportation networks, ensuring easy access for both visitors and staff.

b. **Strategic Location and MICE Potential:** The presence of a hotel within the premises and the proximity to the HITEX Exhibition Centre contribute to making HICC one of South Asia's leading MICE (Meetings, Incentives, Conferences, and Exhibitions) destinations, capable of accommodating diverse event types.

c. **Microclimate and Built Morphology:** A nearby waterbody aids in regulating the microclimate, especially during extreme weather conditions. Additionally, the integration of green foliage and water features between built forms contributes to a pleasant and comfortable atmosphere.

d. **Column-Free Hall and Flexibility:** The convention centre's most remarkable feature is its air-conditioned, column-free hall with a clear height of 12 meters, offering ample space and flexibility. This hall can be subdivided into six independent sections, allowing multiple events to run simultaneously.

e. **Versatile Infrastructure:** HICC offers state-of-the-art infrastructure, including advanced IT facilities, adaptable meeting rooms, and unobstructed internal spaces, making it suitable for a wide range of events and conferences.

f. **Thoughtful Spatial Zoning:** The planning adopts a clear horizontal and vertical zoning strategy, organizing the space efficiently into dedicated areas for delegates, main halls, services, and administrative functions.

g. **User-Centric Ground Floor Design:** The ground floor features a spacious entrance lobby equipped with necessary infrastructure, such as registration counters, dining facilities, and reception areas, catering to various operational needs.

h. **Business-Oriented First Floor:** The first floor is designed with business users in mind, incorporating boardrooms, business centres, and multipurpose rooms that can accommodate various professional requirements.

i. **Safety and Interior Aesthetics:** The interior design includes acoustic panels made from teak and silk fabric, enhancing both sound quality and visual appeal. Fire-resistant carpet tiles further contribute to safety while maintaining a refined aesthetic.

36.2. ICE KRAKOW CONGRESS CENTRE, KRAKOW, POLAND

ICE Krakow Congress Center is located in Krakow. It is modern conference and cultural centre. Taking almost 5 years to construct and was a key investment in the Malopolska Region. Three main meeting/ICE can accommodate up to 3200 people, and since opening in October 2014 became the site of numerous congresses, concerts, shows and exhibitions. The functional building has innovative architecture and a prestigious location with a view of the Wawel Castle.

Location - Kraków, Polska**,** Poland
Area - 36720 m²
Architect - Krzysztof Ingarden
Built in - 2014
Budget - $100M +



Figure 131: Ice Krakow Congress Centre, Krakow, Poland

1. INTRODUCTION

ICE Krakow Congress Centre, the modern, top-class congress and concert center, was designed by Ingarden and Ewy Architects in cooperation with the Japanese architect Arata Isozaki and Associates - the result of an open international competition won by the team in 2007.
The building is dedicated to cultural events - music, ballet, and theatre performances as well as congresses - and comprises three main halls with 1,791-1,915, 600, and 300 seats, respectively, and a multifunctional conference area with a floor space of 1,800 square feet that benefits from a system of mobile partitions allowing the free arrangement of this space plus ancillary rooms and areas including offices, artists' dressing rooms, and a commercial area.

2. CONCEPT

Commenting on the 2007 verdict announcing the winning design, the president of the jury in the international architectural competition, Luxemburg architect Bohdan Paczowski, admitted that the choice between the works selected for the final round reflected the traditional division into the partisans of the romantic and classicist tendencies in art, and that it was finally the champions of the romantic current who determined the selection of the best design.

I believe that Bohdan Paczowski very truthfully and precisely grasped and emphasised one of the most significant and distinctive features of our project, as what we included in our bid – besides the accurately designed functional and technological planes – was precisely the dream of developing free and open spaces, defined with curved lines and surfaces, with unconventional flows and divisions, fluently forming the interior and the external form of the Congress Centre building.

3. SPACES

The ICE Krakow Congress Centre offers a variety of spaces designed to accommodate different types and sizes of events.

a. Auditorium Hall | S1

A multi-functional half-vineyard-type Auditorium Hall, with seating partially surrounding the stage, is ideally suited to conferences, concerts and congresses. Perfect for hosting events of a varying scale: concerts with seating for 1915 viewers congresses and conferences with an audience of up to 1915 viewers, symphonic concerts with seating for 1791 viewers.
The technology of the multi-segment stage with seven independently adjustable modules allows organizers to arrange the space of the hall according to their expectations and needs.

Hall Arrangement



Figure 132: Big Stage Row Layout



Figure 133: Small Stage Row Layout

b. Theatre Hall | S2

A multi-functional rectangular hall (shoebox) equipped with a box-type (or proscenium) stage (stage portal, adjustable proscenium, a curtain and backstage). The number of seats can be modified, and the maximum capacity of the hall is 600 seats. The foldable stand on the lowest level means the space can be opened for exhibitions and banquets. The Theatre Hall has excellent acoustics with customisable parameters; the extensive technical facilities allow organisers to install additional elements of sound and lighting systems, as well as scenography.

Hall Arrangement

1. With proscenium



Figure 134: With Proscenium Arrangement

2. Without proscenium



Figure 135 : Without Proscenium Arrangement

3. Stand with 2 first rows



Figure 136 : Stand with 2 First Row Arrangement

c. Chamber Hall | S3

The Chamber Hall, located on the 3rd level of the ICE Kraków Congress Centre, is a hall with a flat floor and 400 seats. The space can be divided into two independent parts with an acoustic wall. The hall is equipped with two independent director booths and booths for simultaneous interpretation; as a result, two independent seminars can be held at the same time.

Hall arrangement

1. Theatre flat



Figure 137: Theatre Flat

2. Classroom



Figure 138: Classroom

3. Sitting banquet arrangement



Figure 139: Banquet Seating Arrangement

d. Conference Hall Complex | S4

The Conference Hall Complex, adjacent to the Chamber Hall, is filled with natural daylight and command's beautiful view over the Royal Castle on Wawel Hill. It has a conference space of approx. 500 m2, which can be divided on demand into up to 10 smaller rooms with a system of acoustic walls. The Conference Hall Complex includes rooms for organisers, restrooms and a hall with buffet. A sound system is available on request.

Hall arrangement

1. Theatre



Figure 140: Theatre

e. Hybrid Studio | S5

The S5 Hybrid Studio is an excellent space for the professional production of any marketing, advertising, publicity and training materials. A multifunctional and ultramodern recording studio is available in the ICE Krakow Congress Centre. The latest technological solutions and a professional team guarantee the success of the materials created. We will help you organise your events, presenting you with a new dimension of events. Together, we will push the boundaries of standard possibilities and combine the offline and online worlds with the best technological solutions.



Figure 141: Hybrid Studio

f. Foyer

The bright and spacious foyer is located on the eastern side of the building (with view over Wawel Castle and the Kazimierz district), occupying three levels: F0 – 1000 m², F1 – 1000 m² and F2 – 650 m². It can be used as a representative public space for venue's guests, as well as an exhibition space with the option of arranging sponsor and exhibition stands during congresses. The entire space has extensive access to utilities. The foyer can be adapted in various ways, and it provides multiple branding opportunities (e.g., lighting, stairs and railings wrapping, hanging banners etc.).



Figure 142: Foyer

4. SECTIONS

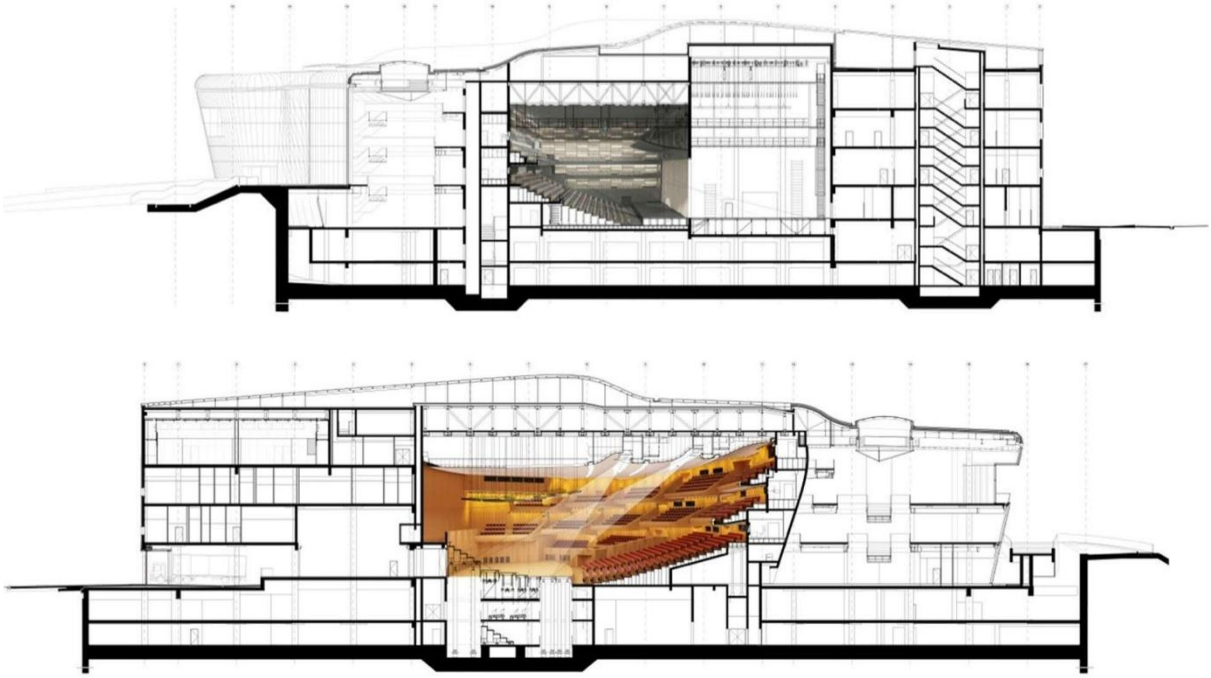


Figure 143: Sections

5. SITE PLAN

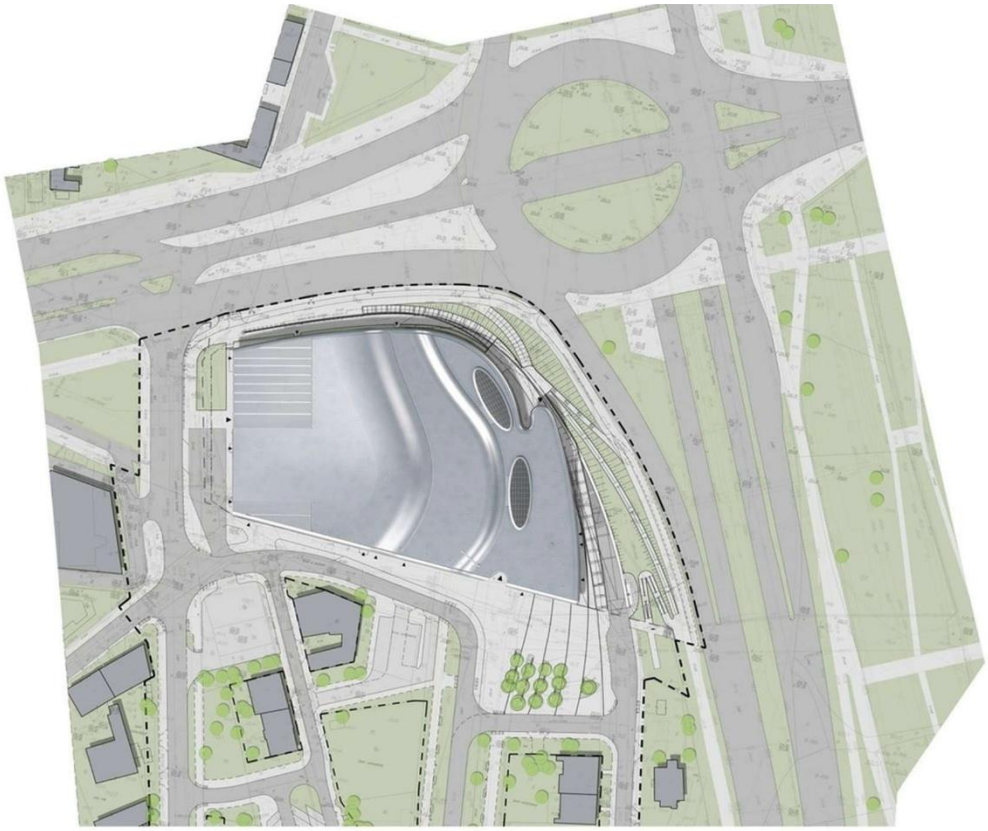


Figure 144: Site Pan

6. PLANS

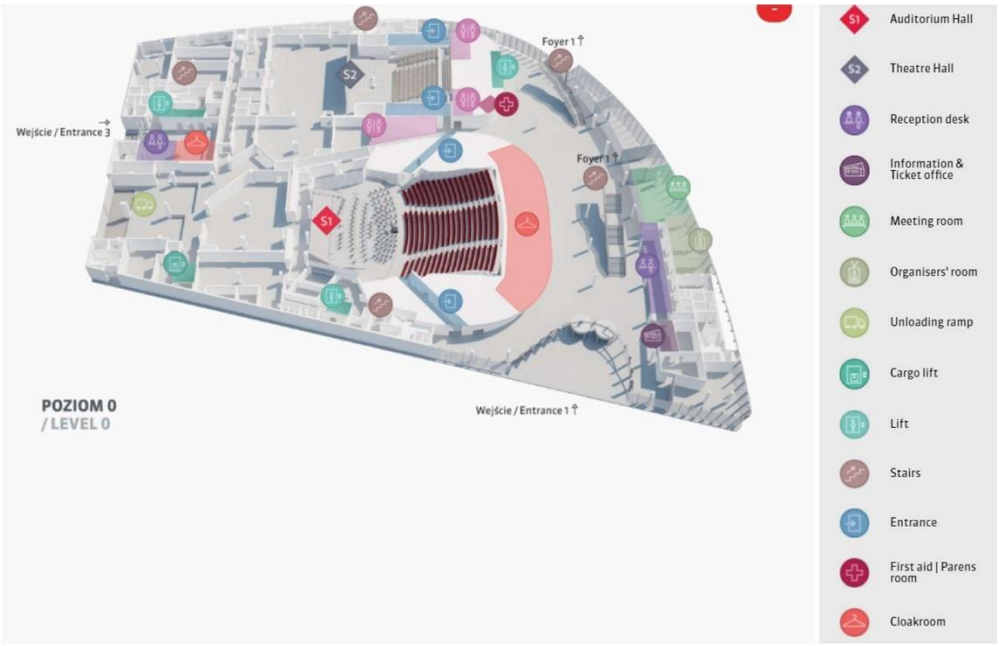


Figure 145: Level 0 Plan

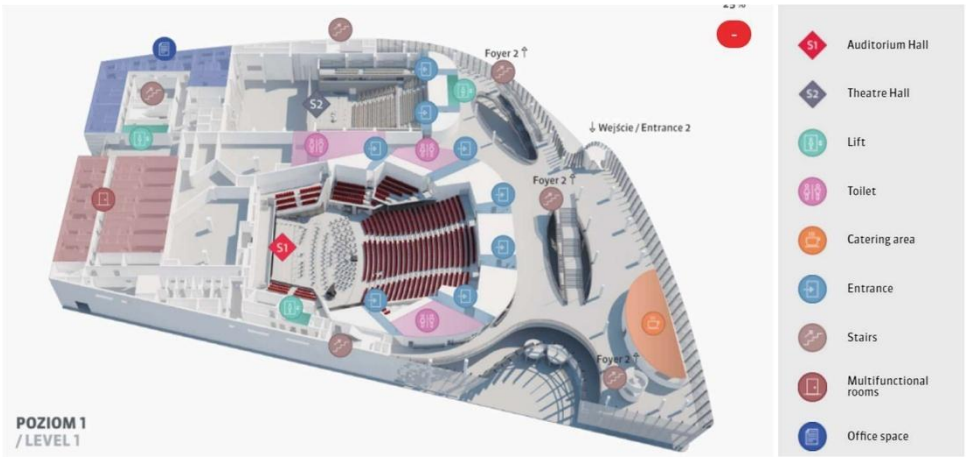


Figure 146: Level 1 Plan

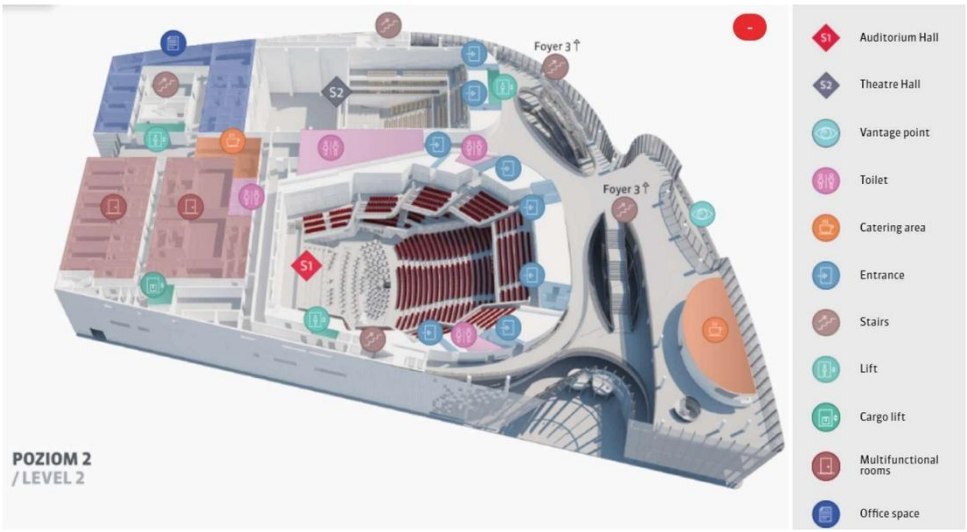


Figure 147: Level 2 Plan

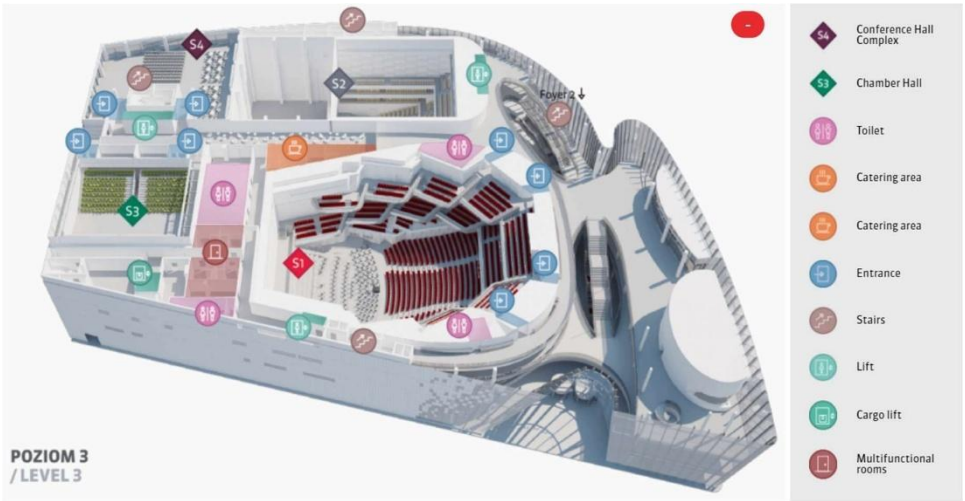


Figure 148: Level 3 Plan

7. STRUCTURE

The aluminum roof, visible in its entirety from the Wawel Terrace, was formed into cascades flowing down towards the Vistula which visually diminishes the scale of the building from the side of the river and City Centre. The walls of the building are a composition of glass, ceramics, and aluminium. To open the building to a view of the city, its eastern side is glazed, while the sides and back of the building are covered with an array of ceramic tiles in colours corresponding to the colour-scheme applied to the interior, with red being a reference to the colour of the main hall, graphite to the colour of the second hall, white as the colour of the foyer, and silvery aluminium which is used for the roof finish.
In the architect's conception, such a multi-element and colourful composition is to reflect the movements and dynamics of the Dębniki district developing on the right bank of the Vistula and which only found itself within the Kraków city limits in 1909. The size of the building is thus a proposed means of defining the scale of development in this part of the city, along Konopnickiej Street, south of the Congress Centre.

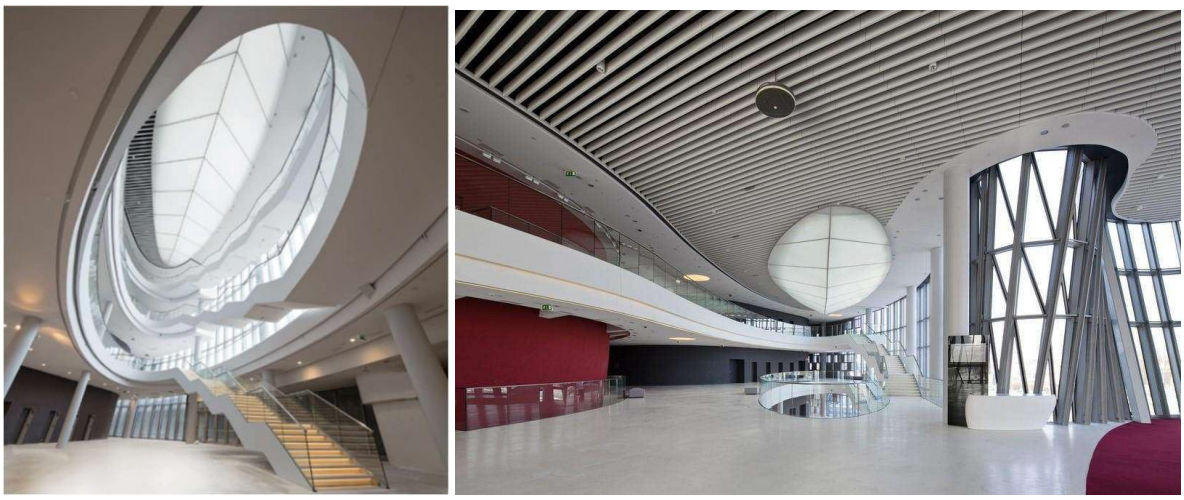


Figure 149: Structure

8. MATERIALS

Glass and titanium–zinc sheets are the fundamental materials used for the exterior shell and are complemented with individually designed ceramic tiles and stone slabs such as granite, limestone, and sandstone, whose selection makes reference to the original materials-components that evolved the history of Wawel Hill architecture.



Figure 150: Materials

9. INFERENCES

a. The ICE Krakow Congress Centre's architecture adopts an organic shape with flowing lines and curved surfaces. The architecture evokes a sense of harmony with the surrounding nature and makes reference to the neighboring Vistula River's natural flow.
b. Large glass panels are used to create a sense of transparency and let natural light illuminate the internal spaces of the building. Transparency is used to connect the internal and exterior environments, resulting in a welcoming and open setting.
c. A variety of events can be held at the ICE Krakow Congress Centre. Conferences, concerts, exhibitions, or theatrical performances can all be held there thanks to its adaptable interior areas. This promotes adaptability and guarantees that the venue can accommodate various needs.
d. The surrounding environment was thoughtfully planned to enhance the convention center's architectural form. Opportunities for engagement and relaxation are provided by landscaped areas, green spaces, and outdoor gathering places.
e. The addition of vegetation improves the aesthetic appeal overall and fosters a relaxing atmosphere.
f. The convention center has a distinctive and dynamic roof structure that resembles the motion of waves or folding cloth, adding aesthetic interest and forming a compelling focal point. By providing shade and weather protection, the roof structure also serves a practical purpose.
g. The ICE Krakow Congress Centre's interior areas are planned to maintain a steady stream of visitors. Clear circulation routes and strategically arranged entrances and exits make it simple to move around the structure.
h. Acoustic issues play a significant role in the construction of the convention center because of its emphasis on hosting concerts and shows. To ensure high-quality audio experiences, the interior areas are acoustically designed using sound-absorbing materials, appropriate sound diffusion, and tunable acoustics.
i. Modern technology infrastructure is available at the ICE Krakow Congress Centre to support the needs of contemporary events. To improve event experiences, cutting-edge lighting, sound systems, audiovisual equipment, and communication technology are seamlessly included into the design.
j. To reduce its environmental impact, the congress center's design includes sustainable elements. In keeping with modern design techniques, energy-efficient technologies, the utilization of natural light, and environmentally friendly construction materials all help to lower energy use and promote sustainability.
k. The ICE Krakow Congress Centre's architecture takes Krakow's unique culture into account. The structure perfectly combines contemporary design with the surrounding area's historical environment to reflect the city's rich heritage and modern aspirations.
l. The ICE Krakow Congress Centre contributes to the venue's usability, appeal, and integration with the surroundings, making it both aesthetically pleasing and practical.

37. COMPARATIVE ANALYSIS

PARAMETER	BHARAT MANDAPAM, NEW DELHI	INDIA HABITAT CENTRE, NEW DELHI	HYDERABAD INTERNATIONAL CONVENTION CENTRE	ICE KRAKOW CONGRESS CENTRE KRAKOW, POLAND
SITE AREA	Pragati Maidan – 123 Acres Bharat Mandapam – 12.5 Acres	9 Acres	15 Acres	9 Acres
GROUND COVERAGE	35%	25%	29%	35%
BUILDING PROGRAM	Exhibition halls, VIP lounges, plenary hall, conference rooms, multifunctional hall, seminar rooms, G20 summit rooms, auditoriums & 2 food courts.	Exhibition hall, conference room, auditorium, theatre, amphitheatre, art galleries, library & resource centre, restaurants & art installations.	Specialized meeting rooms, breakout rooms, plenary halls, exhibition spaces, banquet halls, auditoriums, theatres, restaurants & VIP lounges.	Auditorium hall, theatre hall, chamber hall, conference halls, multifunctional rooms, exhibition spaces.
SITE ZONING	Multiple entries into the site allowing conflict-free circulation of logistical, service & visitor movement. The complex is designed as a series of nodes addressing functions like convention, exhibition, cultural performances and administrative functions cohesively.	Site is accessible from three adjoining roads with segregated vehicular & pedestrian movement. All programs are planned around central open courtyards & cultural zones connected by courtyards & bridges.	HICC is divided into three distinct zones for optimal segregation of service areas, conference areas and exhibition areas. First Zone: Exhibition Spaces. Second Zone: Conference & Plenary Spaces. Third Zone: Service Spaces.	Clear functional zoning: Representation/public foyers with separate backstage, exhibition and service areas. The zoning ensures conflict-free logistics, accessibility, VIP access & seamless functioning during simultaneous events.

EXHIBITION SPACES & PLENARY HALL	Multifunctional hall 4,864 sq.m for 4,000 persons. Plenary hall 1,869 sq.m for 3,000 persons.	700 sqm of exhibition space.	Plenary hall having area of 6480 sqm capacity of 5000 delegates & it can be partitioned into 6 smaller halls.	Multi-level foyers totalling 26,500 sq.m for exhibition/programme zones. Main plenary hall (1791–1915 seats) for 6000 participants.
AUDITORIUM	Two auditoriums having an area of 733 sqm & 892 sqm each for 600 & 900 persons respectively. Amphitheatre 2250 sqm for 3000 persons.	Auditorium of 575 sqm area and a capacity of 595 persons. Amphitheatre having a capacity of 250 persons.	Theatre having a capacity of 2500 persons.	Multi-functional half-ringened auditorium: 1,791 (large stage) to 1,915 (small stage) seats. Theatre Hall (proscenium) with movable proscenium & with 600 seats. Chamber Hall: 400 pax, acoustically divisible into 2 rooms, director + interpretation booths.
CONFERENCE ROOMS	20 meeting rooms with different seating layouts and capacities (16 general & 4 premium). G20 Summit Room.	Total capacity of 1000 in various configurations holding 30 to 450 people.	The second floor is equipped with state-of-the-art conference rooms that provide a premium setting for high level discussions.	5000 sq.m naturally lit conference complex, divisible into up to 10 rooms with possible partitions, including interpretation booths, buffet/hospitality, integrated AV solutions.
FOOD COURT	2 food courts.	Cafeteria, restaurants and private dining rooms with exclusive VIP lounge.	Exclusive VIP lounge.	Distributed buffet/catering in foyers and conference rooms, supported by banqueting/hospitality. Hall-wide cloakroom for participants.

PARKING	Parking capacity of more than 5000 vehicles on surface as well as in basements.	Parking for 933 cars & 2000 two-wheelers.	A spacious parking base accommodating over 1000 cars along with designated areas for attendants.	Approx. 600 underground parking and major stations hub. Adjacent underground parking and major stations hub.
LANDSCAPE	Extensive formal plazas, gardens and water features. The landscaped areas serve the purpose of multifunctional public space & as a civic stage and help moderate the microclimate.	Interconnected shaded courtyards and terrace gardens for passive cooling. Landscaped green courts with unique sculptures relevant to the context while keeping vehicular movement to the periphery.	Manicured gardens and forecourts focus on centralised landscape areas with water-bodies and tree-lined edge finishes rather than standalone gardens.	Amphitheatre-inspired landscape with ~350 sqm. Angled site contextual landscaping integrating multifunctional green areas and roof terraces. Multifunctional landscape areas act as extensions of the interior foyers.

Table 34 Comparative Analysis

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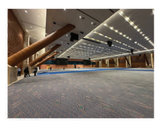
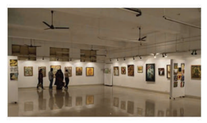
WARANGAL INTERNATIONAL CONVENTION CENTRE

SWAPNIL TRIPATHI
211110045



CASE STUDIES- COMPARATIVE ANALYSIS

WARANGAL INTERNATIONAL CONVENTION CENTRE

PARAMETER	LIVE CASE STUDIES		DESK APPRAISAL		INFERENCES
	BHARAT MANDAPAM NEW DELHI	INDIA HABITAT CENTRE NEW DELHI	HYDERABAD INTERNATIONAL CONVENTION CENTRE	ICE KRAKOW CONGRESS CENTRE KRAKOW, POLAND	
SITE AREA	 Pragati Maidan – 123 Acres Bharat Mandapam – 12.5 Acres	 9 Acres	 15 Acres	 9 Acres	**Monumental Scale and Grandness:** The convention centre is designed with expansive foyers, towering facades, and large-span halls that create a sense of grandeur. This monumental scale not only accommodates massive gatherings but also symbolizes civic pride and national identity, making the complex a landmark destination. **Hierarchical Spatial Layering:** The spatial planning follows a hierarchy, where large halls like exhibition spaces, plenary halls, and auditoriums are clearly separated from smaller functions such as conference rooms, boardrooms, and lounges, ensuring smooth functioning at different scales. **Flexibility and Reconfigurability:** Flexibility is achieved through column-free spans, movable partitions, and divisible auditoria, allowing spaces to adapt for simultaneous events or varying program sizes. **Legible Arrival and Circulation:** The arrival and circulation sequence is designed to be legible, with a clear progression from foyer to atrium to main halls, supported by ramps, escalators, and wayfinding systems to handle large crowds efficiently. **Separation of Public and Service Flows:** Public circulation is kept independent from service flows, with separate routes, loading docks, and service cores, ensuring smooth operations without disturbing visitors. **Integration with Landscape and Context:** The building is integrated with its landscape through plazas, terraces, and retained vegetation, creating public gathering spaces and microclimatic benefits while blending the complex with its urban context. **Acoustic and Sightline Control as Design Drivers:** Acoustic quality and sightline clarity are treated as major design priorities, with hall geometries, seating arrangements, and material choices tailored to enhance sound performance and visibility. **Robust MICE-Grade Technical Infrastructure:** The centre is equipped with robust technical infrastructure suited for MICE events, including AV rigs, interpretation booths, cable and rigging provisions, and centralized control rooms embedded into the architectural planning. **Universal Accessibility and Safety:** Universal accessibility and safety are integral, with barrier-free ramps, elevators, wide concourses, accessible parking, and fire evacuation systems ensuring inclusivity and secure use of the facility. **Amenity-Rich Public Realms:** Public realms are enriched with amenities such as VIP lounges, business centres, catering kitchens, and cafes, placed along main circulation routes to support comfort and networking during long events. **Sustainability Measures Embedded:** Sustainability measures are embedded through water recycling, energy-efficient HVAC, daylight control, photovoltaic panels, and other strategies that reduce operational loads and environmental impact. **Material and Cultural Expression:** Material and cultural expression is achieved by referencing local crafts, motifs, and materials in façade and interior treatments, giving the complex a contemporary identity rooted in Indian tradition. **Campus Strategy for Scalability:** The campus follows a multi-building strategy, separating event, administration, and hospitality functions, while also allowing phased expansion and flexibility in future growth.
GROUND COVERAGE	35%	25%	29%	35%	
BUILDING PROGRAM	Exhibition halls, VIP lounge, plenary hall, conference rooms, multifunctional hall, seminar room, G20 summit room, auditorium & 2 food courts.	Exhibition hall, conference rooms, auditorium, theatre, amphitheatre, 6 restaurants, library & resource centre, 6 art galleries, VIP lounges.	Specialized meeting rooms, breakout rooms, plenary halls, exhibition hall, conference room, auditorium, theatre, restaurants & VIP lounges.	Auditorium hall, theatre hall, chamber hall, conference hall, hybrid studio, foyer.	
SITE ZONING	Multiple entries into the site allowing conflict-free circulation of public, staff & services. The complex is strategically zoned to house different functions like conferences, exhibitions, cultural performances and administrative functions cohesively.	Site is accessible from three adjoining roads with separate entries for pedestrian, vehicles & VIP. Peripheral movement of vehicles. Built zones into 2 blocks – office & cultural masses connected by courtyards & bridges.	HICC is divided into three distinct zones for optimal organization and functionality: **First Zone:** Public Zone- Delegates visiting the Centre **Second Zone:** Halls, **Third Zone:** Service Spaces.	Clear functional zoning: Representational public foyers oriented to the front (wawel), performance/conference volumes behind, and service/back-of-house to rear. Public circulation separated from service routes.	
EXHIBITION SPACES & PLENARY HALL	Multifunctional hall 4,884 sqm for 4,000 persons. Plenary hall 1,985 sqm for 3,000 persons.  	700 sqm of exhibition space. 	Plenary hall having area of 6480 sqm capacity of 5000 delegates & it can be partitioned into 6 smaller halls. 	Multi-level foyers totalling ≈2,650 m² for exhibitions/sponsors. Main plenary hall configurable (1,791–1,915 seats) for concerts and congresses.  	
AUDITORIUM	Two auditoriums having an area of 793 sqm & 992 sqm each for 600 & 900 persons respectively. Amphitheatre 2250 sqm for 3000 persons.  	Auditorium of 575 sqm area and a capacity of 535 persons. Amphitheatre having a capacity of 250 persons.  	Theatre having a capacity of 2500 persons. 	**Multi-functional half-vineyard auditorium:** 1,791 (large stage) / 1,915 (small stage) seats. **Theatre Hall:** proscenium / without proscenium / with foldable stand (2 front rows) configurations, up to 600 pax. **Chamber Hall:** flat-floor, 400 pax, acoustically divisible into 2 rooms; director + interpretation booths.  	
CONFERENCE ROOMS	20 meeting rooms with different seating layout and capacities (16 general & 4 premium). G20 Summit Room.  	Total capacity of 1000 in various configurations holding 30 to 450 people.  	The second floor is equipped with state-of-the-art conference rooms that provide a premium setting for high level discussions.  	500 m² naturally lit conference complex, divisible into up to 10 rooms with acoustic partitions; includes organisers' suites, buffet/hospitality, integrated AV systems. 	
FOOD COURT	2 food courts.	Cafeteria, restaurants and private dining rooms with capacity of 1500.	Exclusive VIP lounges.	Distributed buffet/catering in foyers and conference areas. Backstage/organiser catering. Halls convertible for banquets/exhibition hospitality.	
PARKING	Parking capacity of more than 5000 vehicles on surface as well as in basements.	Parking for 933 cars & 2000 two-wheelers.	A spacious parking base accommodating over 1000 cars ensures convenient access for attendees.	Two-level underground car park for ~330 cars. Adjacent street/ground parking and major transit hub.	
LANDSCAPE	Extensive formal plazas, gardens and water features form the public forecourt and event spill-out areas. Landscape acts as a civic stage and helps moderate the microclimate. 	Interconnected shaded courtyards and terrace gardens knit the complex together. Landscape creates calm, climate-controlled social spaces while keeping vehicular movement to the perimeter.  	Functional planting and entrance forecourt focus on arrival, vehicular circulation and lake-edge buffering rather than large civic plazas. 	Architectural landscape: flowing exterior forms, cascading roof and multi-level glazed foyers frame views to Wawel and the river. Forecourt and riverside areas act as extensions of the interior foyers. 	

NAME- SWAPNIL TRIPATHI
SCHOLAR NO.- 211110045
YEAR- 5th
SEMESTER- 9th
DATE- 1 Dec, 2025
THESIS GUIDE- PROF. ARSHI PARASHAR
THESIS CO-ORDINATOR- PROF. VICKY LALRAMSANGI
STAGE- REVIEW 4

SITE ANALYSIS

WARANGAL INTERNATIONAL CONVENTION CENTRE

PROJECT BRIEF-

WARANGAL INTERNATIONAL CONVENTION CENTRE (WICC) CUM 5-STAR HOTEL-

Authority: Telangana State Industrial Infrastructure Corporation Ltd. (TSIIC)

Objective: Develop integrated convention and hospitality infrastructure in Warangal.

Project Model: Public Private Partnership (PPP) under IALA Warangal.

Expected Impact: Stimulate the city's economy, promoting business events, and enhancing the city's reputation.



CLIMATE ANALYSIS-

Type of Climate- Hot & Dry Climate

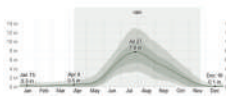
TEMPERATURE-

Summers are extremely hot, with average highs of 101–105°F (38–41°C). Winters are mild and cooler, with average lows of 62–68°F (16–20°C).

SEASON	MONTHS	TEMPERATURE (°F)	CLIMATE DESCRIPTION
Summer (Hot Season)	April – June	97°F to 105°F (High), 77°F to 84°F (Low)	Very hot, dry, and harsh. May is the hottest month with extreme heat, high humidity, heavy rainfall, cloudy skies.
Monsoon	July – September	81°F to 90°F (High), 73°F to 77°F (Low)	
Autumn (Cool Season begins)	October – November	91°F to 88°F (High), 68°F to 72°F (Low)	Pleasant days, cooler nights, start of winter chill.
Winter (Coolest Season)	December – February	84°F to 91°F (High), 62°F to 69°F (Low)	Mild days and cool nights. December is the coldest month.
Spring (Warming Season)	March	97°F to 99°F (High), 74°F (Low)	Warm and dry, temperatures rising towards summer.

PRECIPITATION-

Rainy Season: April to November (peak monsoon June–September).
Annual Rainfall: ~741 mm (29.2 inches).
Wettest Month: July (~168 mm / 7.4 inches).
Driest Month: December (~2.5 mm / 0.1 inches).



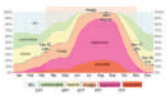
WIND DIRECTION-

Prevailing Winds: South to North (Late Dec. – Late May)
West to East (Late May – Late Sep.)



HUMIDITY-

Highest muggy condition: August – 30.8 days (≥100% of the month).
Lowest muggy condition: December – 4.2 days (≈12% of the month).
Muggy period: March 25 – November 17 (7.8 months)
Average muggy days throughout the year: ~17 days per month.



LOCATION ANALYSIS-

SITE DESCRIPTION-

Site Location: Sy. No. 1791/1 of Madikonda (V), Warangal (U) District

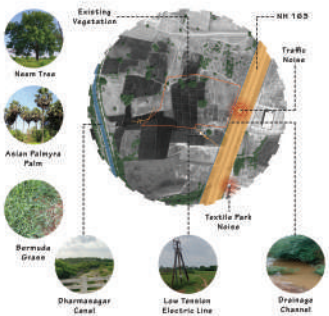
Project Coordinates: 17.957890 N, 79.447151 E

Project Site : ~10 acres (40,468 sq.m)

Built-up Area: Min. ~500,000 sq.ft. (27,871 sq.m) with supporting facilities.

SITE CONNECTIVITY-

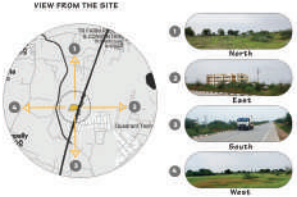
Site Connectivity	Approximate Distance
Kazipet Junction (Nearest Railway Station)	~8 km
Kazipet Bus Stand (Nearest Bus Station)	~10 km
Warangal International Airport (Nearest Airport)	~24 km
Warangal Railway Station	~20 km
Warangal District Bus Stand	~22 km
Hyderabad City	~140 km
Hyderabad International Airport	~181 km
Landmark	**Approximate Distance**
Textile Park	Opposite (Immediate Neighborhood)
V City Multimalls	~8.7 km
TK Farm Resort & Convention	~2.8 km
Dharma Sagar Reservoir	~7 km



SITE INVENTORY-

PHYSICAL & SPATIAL ANALYSIS	
Topography:	The site terrain is regular and mostly flat, with gentle slopes.
Contours:	Highest Contour - 356 m Lowest Contour- 352 m
Prime Access:	NH 163 (From East of Site)
Visibility & Frontage:	Excellent visibility and frontage along abutting roads; contiguous site.
Site Surroundings and View:	
North	Vacant land
South	Vacant land
East	NH 163 Access Road
West	Dharmasagar Canal

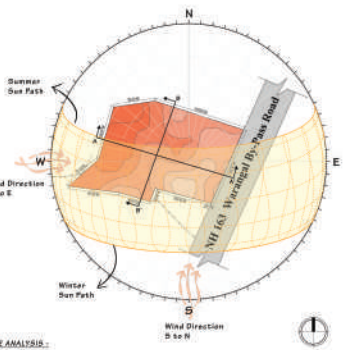
VIEW FROM THE SITE



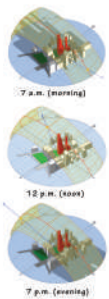
ENVIRONMENTAL ANALYSIS	
Existing Vegetation on Site:	Tree: Asian Palmyra Palm Neem Tree Grass: Bermuda Grass (also known as Doob Grass)
Water Bodies:	Dharmasagar Canal is ~200 m to the west.
Type of Soil:	Sandy Loam Soil
Noise:	
East (front):	Highway (primary continuous line-source noise: traffic, horns)
Opposite East:	Textile park (daytime plant/machinery noise)
North/South:	Vacant (assume future mid-level traffic/construction)
West:	Canal (quiet; occasional human activity)

INFRASTRUCTURE AND UTILITIES ANALYSIS	
Water Supply:	Dharmasagar Canal, ~200 m to the west, fed by Dharmasagar reservoir (7 km away), can serve as a site water source.
Electricity:	A low-tension electric line passes along the west and south corners, providing site power access.
Drainage:	A drainage channel runs along NH-163 in front of the site (east entrance), and the natural eastward slope directs runoff into it.

SITE ANALYSIS-



SHADOW PATTERN-

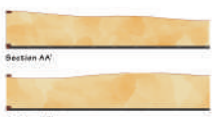


SLOPE ANALYSIS -

Site naturally drains eastward due to gentle slope.



SITE SECTIONS -



Valley

BYE-LAWS DATA-

DEVELOPMENT PARAMETERS (AS PER G.O. MS. NO. 423, ANDHRA PRADESH)-

Site Area: 10 Acres (40,468 Sq.m.)

Permissible F.A.R.: 2.0
Permissible Built-up Area: 40,468 x 2
= 80,936 Sq.m.

Ground Coverage: 40%
= 40,468 x 40%
= 16,187.2 Sq.m

Minimum Built-up Area Requirement: 23,225.76 Sq.m.

Convention Centre: 4,645.15 Sq.m.
Business Hotel: 13,935.46 Sq.m.
Entertainment / F&B: 4,645.15 Sq.m.

Setback Requirements:

Front Setback: 9 m
Side Setback: 6 m
Rear Setback: 6 m

Means of Access (MOA):

Minimum Frontage: 9 m
Accessible Road: NH163 (60 m wide)

SITE APPRAISAL-

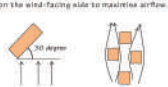
ASSETS	CONSTRAINTS	POTENTIALS	RISKS
Strategic location: Prominent frontage on NH-163, delivering high visibility and direct road connectivity to Warangal and surrounding towns.	**Climatic constraint:** Very hot summers (peak > 40°C) and a humid monsoon season increase HVAC demand and limit comfortable outdoor use.	**Economic integration:** Leverage nearby IT/industrial clusters to stimulate demand, partnerships, and local employment.	**Competitive pressure:** Established convention facilities in Hyderabad present strong competition for major and international events.
Economic adjacency: Immediate proximity to IT, textile and industrial parks provides easy access to business users and job opportunities.	**Limited air access:** Warangal airport is ~3.1 km away, reducing convenience for international delegates and large-scale global events.	**Urban positioning:** Use the project to strengthen Warangal's profile as a Tier-II city with internationally competitive MICE infrastructure.	**Seasonal operability:** Extreme heat and monsoon rainfall constrain outdoor programming and may reduce year-round usability.

INFERENCES-

1. ORIENTATION- The building is oriented along a SW–NE long axis, ensuring that:

Sunlight: Main facades face SE and NW, avoiding direct low-angle glare from full east/west exposure while allowing effective, strategic shading.

Wind: Prevailing wind flows from S to N. Buildings have been oriented at 30° to the prevailing wind, and the forms are staggered on the wind-facing side to maximise airflow.



2. THERMAL MASS- Use heavy external and internal walls along with roofs having a time lag greater than 8 hours to stabilize indoor temperatures and reduce heat gain.

3. SHADED OPEN SPACES- Incorporate courtyards and shaded walkways to improve comfort and encourage outdoor use.

4. FOUNDATION- Loamy soil suggests the use of pile foundations for better stability and load transfer.





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STAGE- REVIEW 4

CONCEPT & FORM EVOLUTION

WARANGAL INTERNATIONAL CONVENTION CENTRE

INITIAL FORM INSPIRATION-



MOUNTAIN IN WARANGAL (BAW DURING SITE VISIT)



BATHUKAMMA FESTIVAL



RAMAPPA TEMPLE



THOUSAND PILLAR TEMPLE



STACKED STONES



PLINTH

First Image: The mountain image represents Warangal's historic identity as Orugallu or Ekashila Nagaram, meaning the "city of one stone."

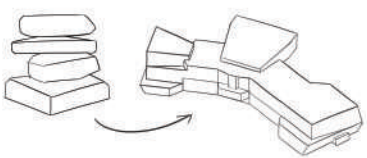
Second Image: The Bathukamma festival shows women making colorful, tiered floral arrangements as an offering to Goddess Gauri, symbolizing community, devotion, and celebration.

Both inspirations highlight the idea of ***stacking and layering*** – stones in the mountain, flowers in Bathukamma.

This concept of stacked forms is also seen in the plinth designs of Kakatiya temples like the Ramappa Temple and the Thousand Pillar Temple.

These stepped, layered bases reflect the strength, stability, and craftsmanship of ***Kakatiya architecture.***

Merging these references creates a design language of ***stacked stones*** – combining cultural symbolism with architectural heritage.



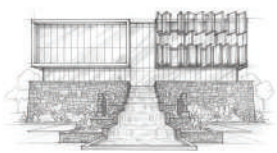
CONTRAST AS DESIGN LANGUAGE:

The design of the International Convention Centre draws inspiration from the cultural and architectural character of Warangal while presenting a modern global identity.

The site elements - sculptures, stepped water features, indigenous planting, and locally sourced materials reflect the region's heritage and ground the project in its context.

In contrast, the built form adopts contemporary materials such as glass and a kinetic facade system, creating a dynamic, modern expression suited for an international venue.

The stacked-stone concept bridges this contrast, ensuring that the building remains visually connected to its surroundings while still standing out as a landmark.



DESIGN ELEMENTS-

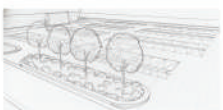


SCULPTURE



Water Element: Inspired by the 1000 Pillar Temple, introduced in the sculpture garden to create a serene and reflective environment.

Sculptures in the garden: Inspired by Kakatiya art, adding cultural identity and a strong visual focus.



Visual Buffer: A visual buffer made of layered shrubs and trees is introduced along the edges of parking areas to screen vehicles from view and ensure a pleasant, unobstructed entry experience.

ART & CRAFTSMANSHIP-



POCHAMPALLY IKAT TEXTILE



CHERIYAL SCROLL PAINTINGS

Pochampally Ikat carpets: Intricately hand-woven textiles that soften interiors, improve acoustics by absorbing sound, and add vibrant patterns that bring visual warmth to the space.

Cheriyal scroll paintings: Traditional narrative art adorning walls, depicting mythological and folk stories, while celebrating Telangana's cultural heritage and enriching the interior with a local identity.

VERNACULAR MATERIAL-



SANDSTONE



BLACK GRANITE



BASALT STONE



NEEM TREE (AZADIRACHTA INDICA)

Using locally sourced sandstone, black granite and basalt stone reflects Warangal's architectural heritage, as seen in its forts and temples, while ensuring the building harmonizes with the regional landscape.

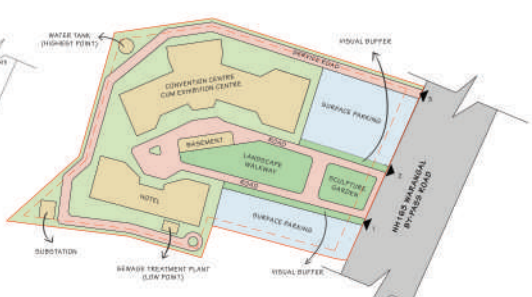
Locally available neem trees (Azadirachta Indica) are integrated into the landscape strategy to provide effective shading, microclimate improvement, and a strong ecological connection to the region.

SITE ZONING-



Site is divided into functional zones: Convention Centre cum Exhibition Centre, Hotel, Surface Parking, Landscape walkway, Sculpture Garden, and Utilities (STP, Water Tank, Substation).

Clear circulation is shown with entry, exit, service entry/exit, and internal connections through roads and pathways.



AREA STATEMENT		
	sqm.	acre
Area	40468	10
FAR	2	
Max. Ground Coverage	40%	
Permissable Ground Coverage	16187.2	4
Permissable Built-Up	80936	20
Min. Built-Up	23225.76	5.74

Min. Built-Up (Convention Centre)	4645.15 sqm
Min. Built-Up (Business Hotel)	13935.46 sqm
Min. Built-Up (Entertainment F&B)	4645.15 sqm

ENTRY & EXITS-

1. Entry
2. Exit
3. Service Entry/Exit

SCALE: 1:1500

ZONING JUSTIFICATION-

STP (Sewage Treatment Plant):
1. Located at the lower point of the site.
2. Ensures natural flow of wastewater through gravity, reducing pumping cost and energy consumption.

Water Tank:
1. Placed at the highest point of the site.
2. Utilizes gravity for efficient water distribution across the complex, ensuring adequate pressure without extra pumping.

Substation:
1. Positioned on the western edge near the power line.
2. Minimizes cabling distance and cost, while also keeping the utility zone away from main public areas for safety and aesthetics.

Surface Parking:
1. Located near the entry points to avoid congestion inside the site.
2. Major parking zones are placed on the east and south side, acting as a buffer against road noise and Textile Park disturbances.

Entry/Exit & Circulation:
1. Separate service entry ensures smooth movement of goods and staff without disturbing visitors.
2. Different entry and exit points reduce traffic conflict, providing smooth vehicular flow during peak hours and events.

Convention Centre cum Exhibition Centre:
1. Placed on the north-western side of the site, ensuring easy accessibility from all directions while maintaining close proximity to the hotel for seamless visitor movement.
2. The facility integrates the Convention Centre, Exhibition Halls, entertainment zones, and food & beverage areas into a cohesive layout, allowing smooth circulation and creating an active public environment throughout the day.

Landscape Walkway:
1. A unique landscape walkway is designed at the centre of the site so provide a pleasant and comfortable pedestrian experience.
2. Its central placement enables effortless connectivity between the Convention Centre, the hotel, surface parking areas, and the Sculpture Garden, creating a unified movement spine across the campus.

Hotel-
1. Located near the south-western side of the site, with proximity to the convention centre.
2. Placement near the periphery allows direct service access without disturbing public areas.

Sculpture Garden:
1. Located in front of the drop-off point, serving as a visual focal element for arriving visitors.
2. Creates a strong first impression and enhances the arrival experience.
3. Functions as an immediate public recreational space with seating and interaction zones.
4. Inclusion of a water element improves the microclimate by cooling the surroundings.
5. Adds sensory and aesthetic value through reflection, sound, and visual quality.

Landscape:
1. Dense plantation along the east & north (road/Textile Park side) to block noise, dust, and provide privacy.
2. Water features have been introduced in the Sculpture Garden and at the hotel and convention centre drop-offs to improve user comfort and contribute to a better microclimate.
3. Landscape used as visual focal points (arrival/drop-off, plazas) and to guide pedestrian circulation across the site.

Visual Buffer:
1. A 5.6-metre-wide visual buffer made of layered shrubs and trees is introduced along the edges of parking areas to screen vehicles from view and ensure a pleasant, unobstructed entry experience.

NAME- SWAPNIL TRIPATHI
SCHOLAR NO.- 2111110045
YEAR- 5TH
SEMESTER- 9TH
DATE- 1 Dec. 2025
THESIS GUIDE- PROF. ARSHI PARASHAR
THESIS CO-ORDINATOR- PROF. VICKY LALRAMSANGI
STAGE- REVIEW 4

Parking Calculations:		
Total Build-up Area	22916.302	
2 ECS per 100 sqm (NBC)		
Total ECS required (22916.302/50)	458	
Total ECS Provided	462	
Surface Parking	**260 ECS**	
Four Wheelers	220	80%
Two Wheelers	62	20%
Bus	3	
Basement Parking	**202 ECS**	
Four Wheelers	166	70%
Two Wheelers	72	30%



Area Calculations:		
	sqm.	**acre**
Area	40468	10
FAR	2	
Max. Ground Coverage	40%	
Permissable Ground Coverage	16187.2	4
Permissable Built-Up	80936	
Min. Built-Up	23225.76	

	sqm.	
Built-Up (Convention Centre + Exhibition Centre)	22916.302	
Built-Up (Business Hotel)	41832.48	G+9
Achieved Ground Coverage	8827.192	22%
Achieved Built-Up	64748.8	1.60

Note

Scale 1:500

All the dimensions are in m.

Warangal International Convention Centre

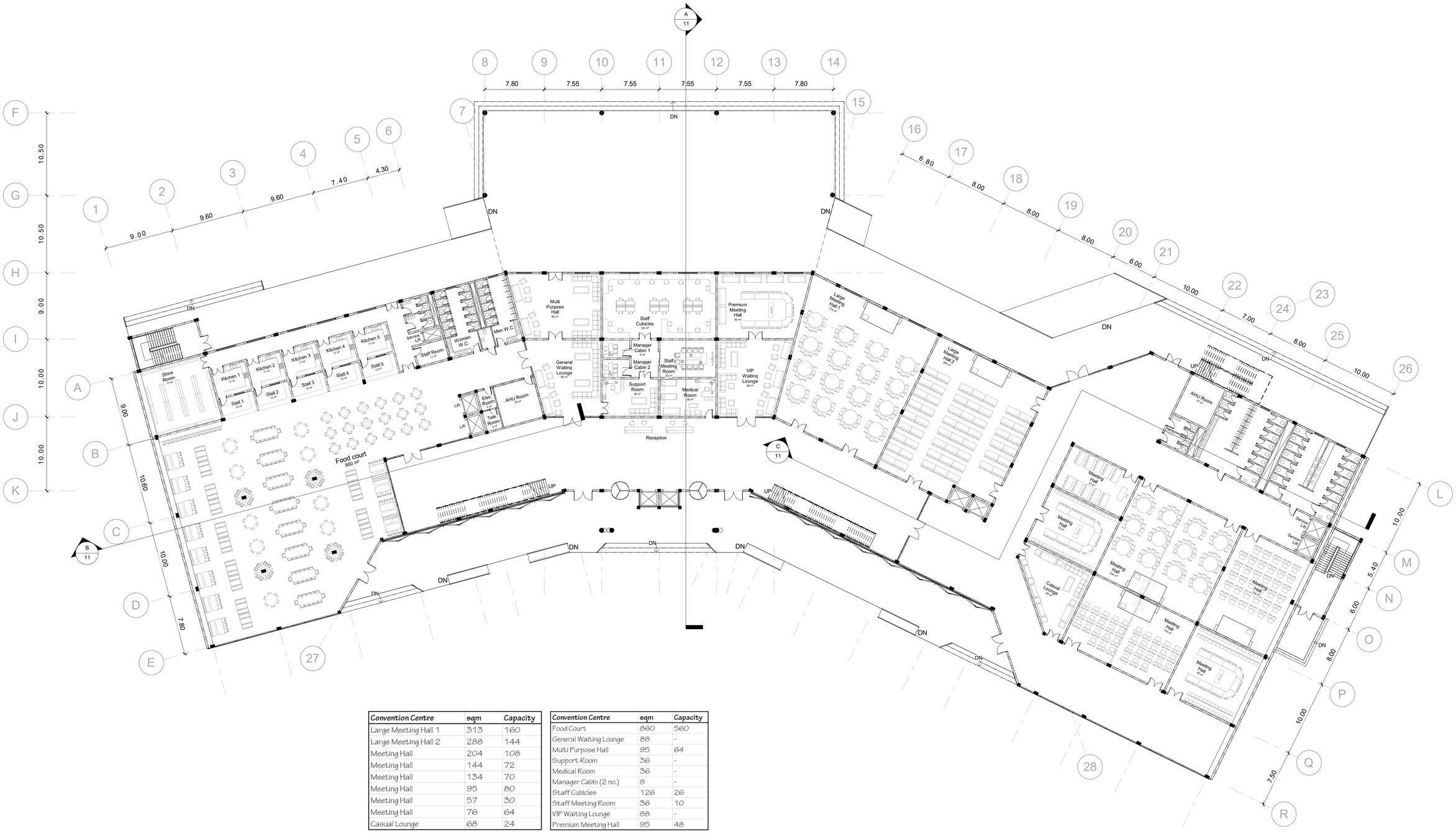
Site Plan

Remarks

Name	Swapnil Tripathi
Scholor No.	211110045
Semester	9th Sem
Thesis Guide	Prof. Arshi Parashar
Date	1 December, 2025

Sheet No.

1



Convention Centre	sqm	Capacity
Large Meeting Hall 1	313	160
Large Meeting Hall 2	288	144
Meeting Hall	204	108
Meeting Hall	144	72
Meeting Hall	134	70
Meeting Hall	95	80
Meeting Hall	57	30
Meeting Hall	76	64
Casual Lounge	68	24

Convention Centre	sqm	Capacity
Food Court	860	560
General Waiting Lounge	88	-
Multi Purpose Hall	95	64
Support Room	36	-
Medical Room	36	-
Manager Cabin (2 no.)	8	-
Staff Cubicles	126	26
Staff Meeting Room	36	10
VIP Waiting Lounge	88	-
Premium Meeting Hall	95	48

Note

Scale 1 : 250

All the dimensions are in m.

Warangal International Convention Centre

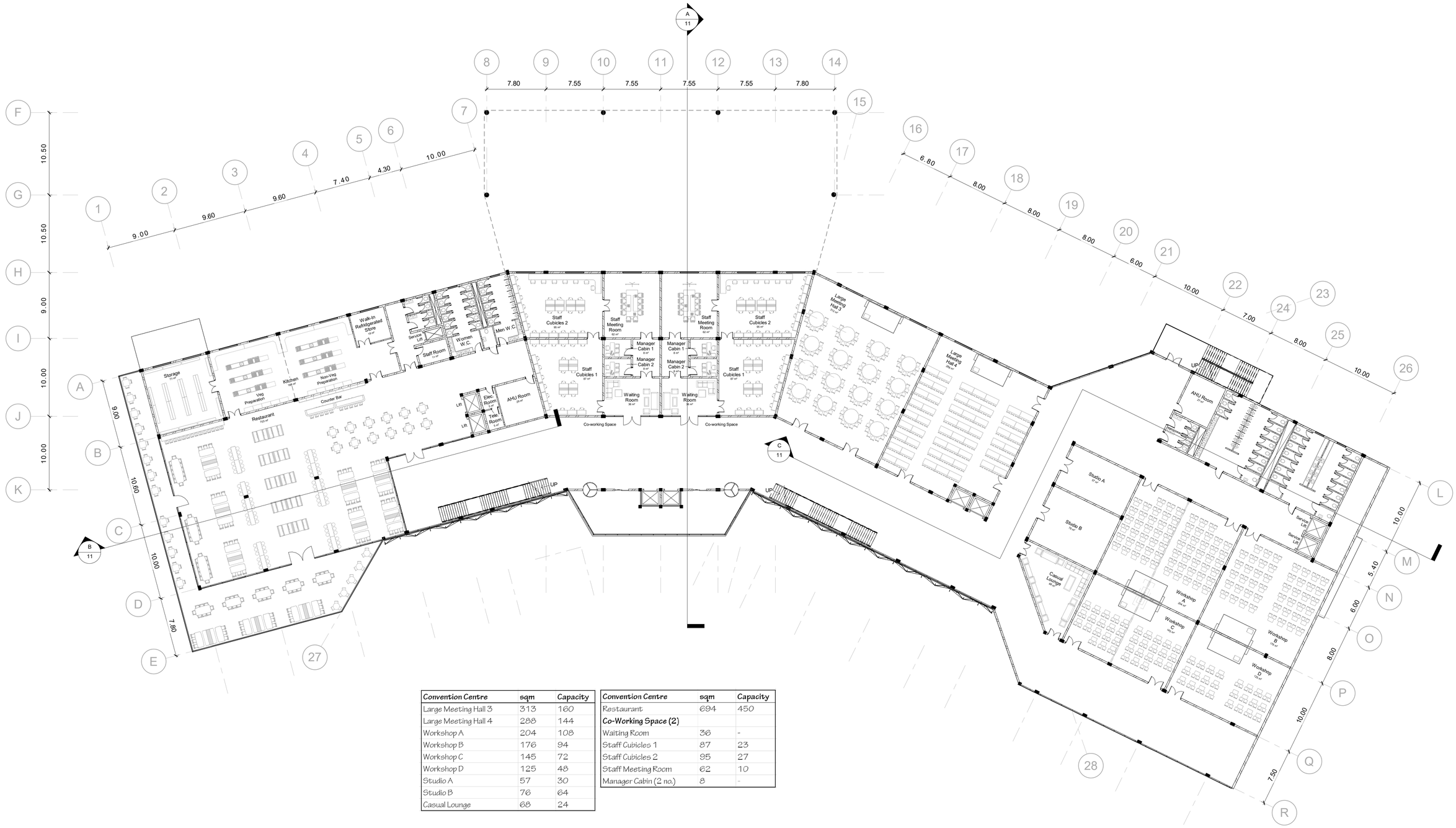
Ground Floor Plan

Remarks

Name	Swapnil Tripathi
Scholor No.	211110045
Semester	9th Sem
Thesis Guide	Prof. Arshi Parashar
Date	1 December, 2025

Sheet No.

5



Convention Centre	sqm	Capacity
Large Meeting Hall 3	313	160
Large Meeting Hall 4	288	144
Workshop A	204	108
Workshop B	176	94
Workshop C	145	72
Workshop D	125	48
Studio A	57	30
Studio B	76	64
Casual Lounge	68	24

Convention Centre	sqm	Capacity
Restaurant	694	450
Co-Working Space (2)		
Waiting Room	36	-
Staff Cubicles 1	87	23
Staff Cubicles 2	95	27
Staff Meeting Room	62	10
Manager Cabin (2 no.)	8	-

Note

Scale 1 : 250

All the dimensions are in m.

Warangal International Convention Centre

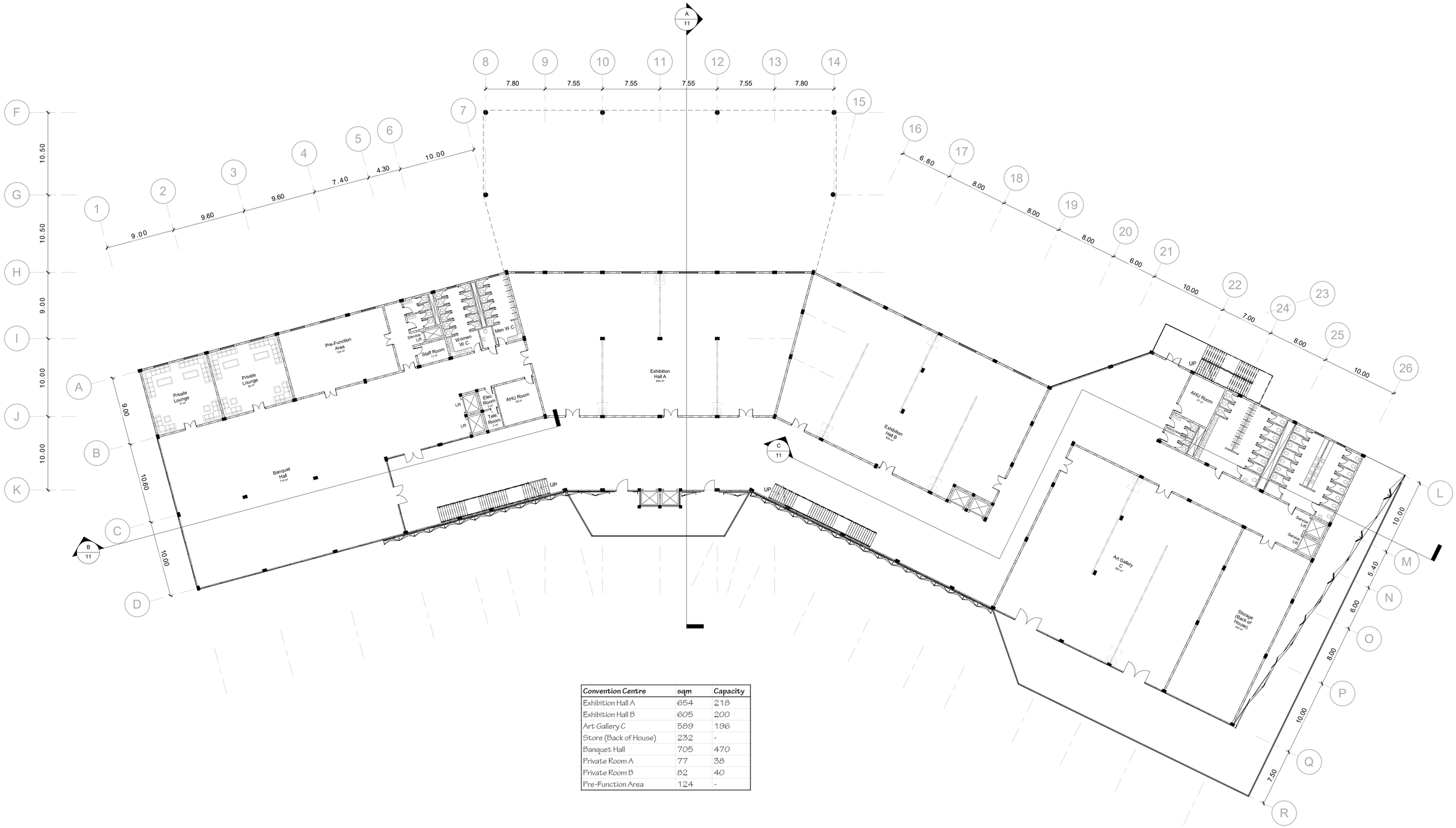
First Floor Plan

Remarks

Name	Swapnil Tripathi
Scholor No.	211110045
Semester	9th Sem
Thesis Guide	Prof. Arshi Parashar
Date	1 December, 2025

Sheet No.

6



Convention Centre	sqm	Capacity
Exhibition Hall A	654	218
Exhibition Hall B	605	200
Art Gallery C	589	196
Store (Back of House)	232	-
Banquet Hall	705	470
Private Room A	77	38
Private Room B	82	40
Pre-Function Area	124	-

Note

Scale 1 : 250

All the dimensions are in m.

Warangal International Convention Centre

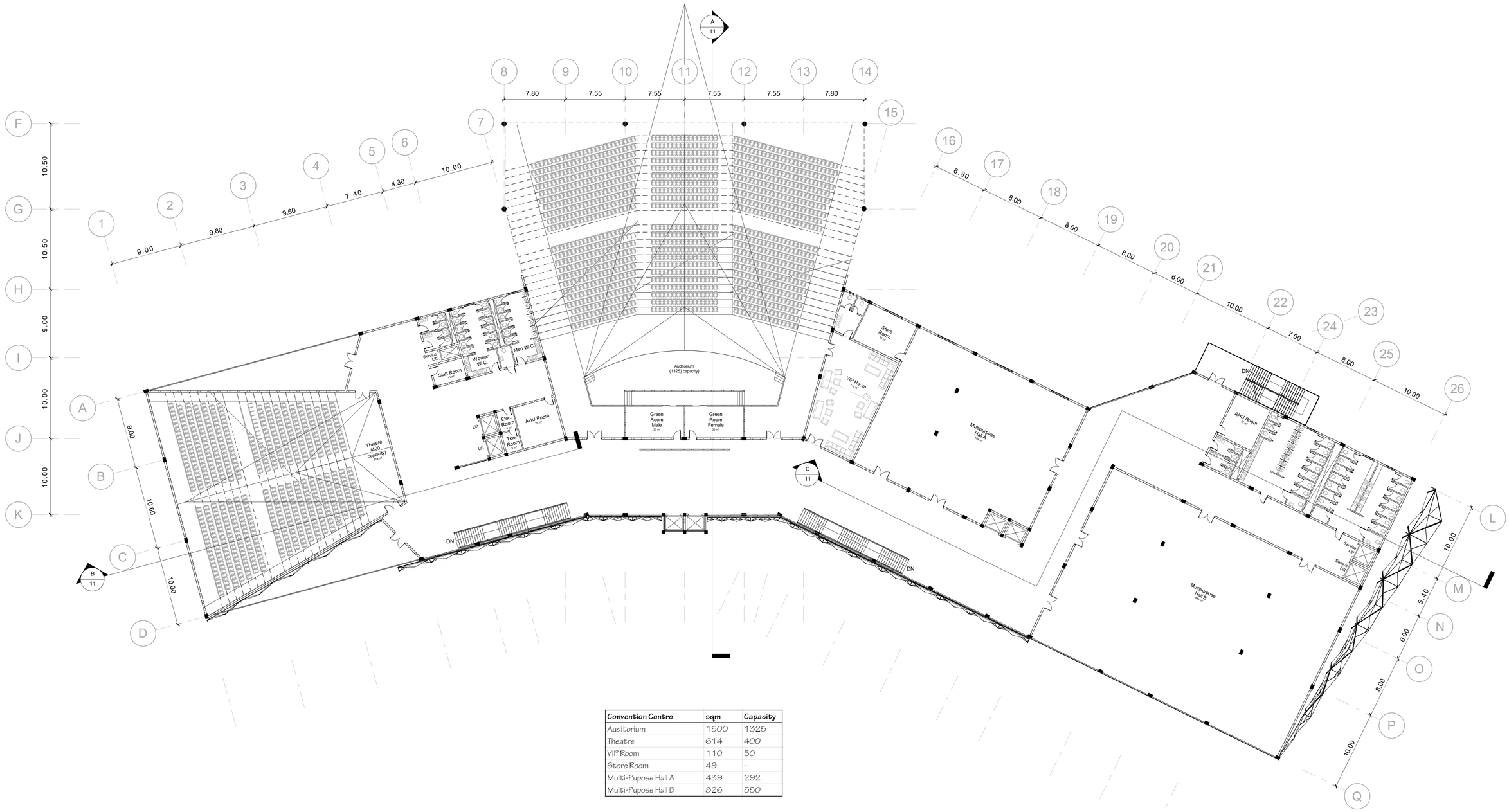
Second Floor Plan

Remarks

Name	Swapnil Tripathi
Scholor No.	211110045
Semester	9th Sem
Thesis Guide	Prof. Arshi Parashar
Date	1 December, 2025

Sheet No.

7



Convention Centre	sqm	Capacity
Auditorium	1500	1325
Theatre	614	400
VIP Room	110	50
Store Room	49	-
Multi-Pupose Hall A	439	292
Multi-Pupose Hall B	826	550

Note

Scale 1 : 250

All the dimensions are in m.

Warangal International Convention Centre

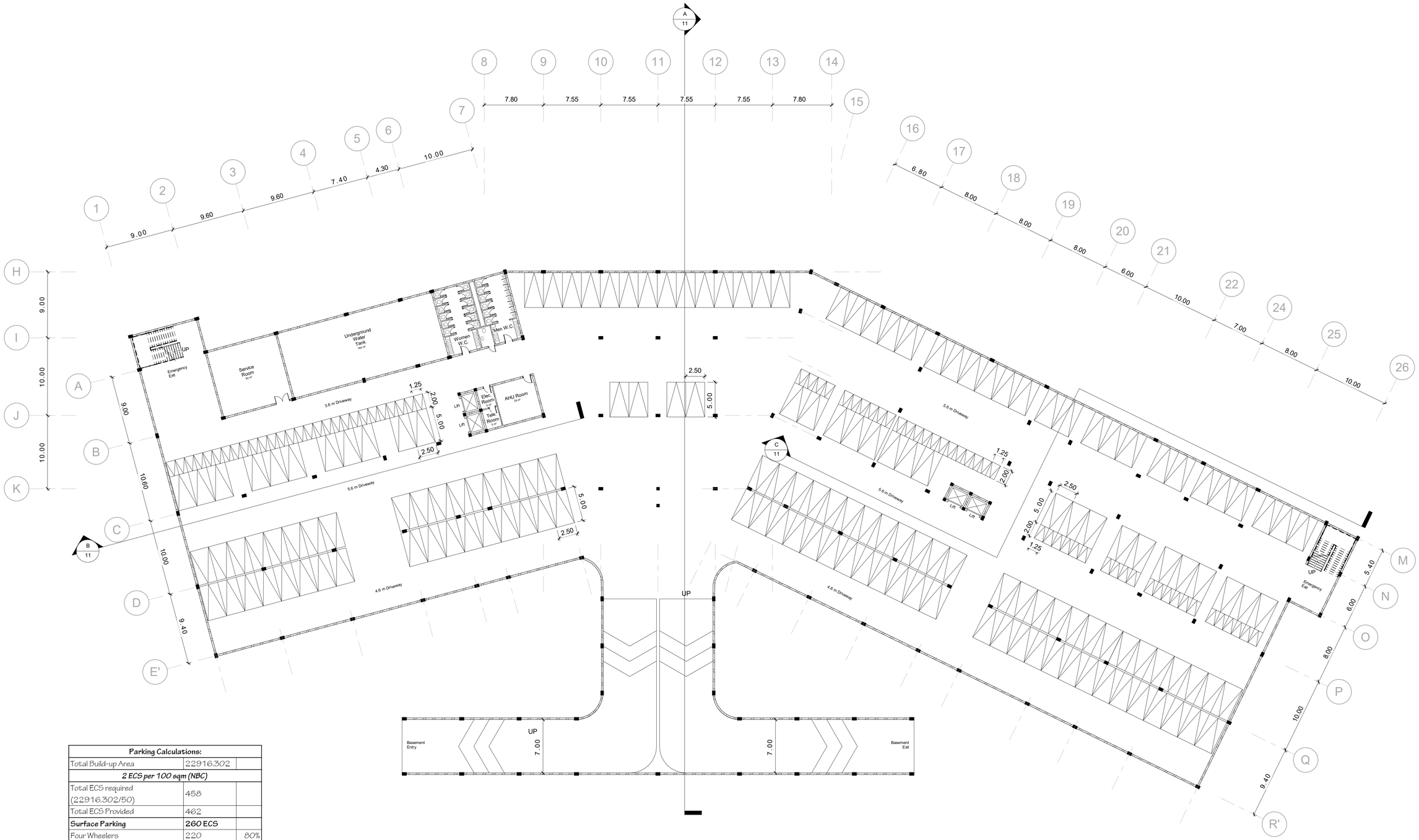
Third Floor Plan

Remarks

Name	Swapnil Tripathi
Scholor No.	211110045
Semester	9th Sem
Thesis Guide	Prof. Arshi Parashar
Date	1 December, 2025

Sheet No.

8



Parking Calculations:		
Total Build-up Area	22916.302	
2 ECS per 100 sqm (NBC)		
Total ECS required (22916.302/50)	458	
Total ECS Provided	462	
Surface Parking	**260 ECS**	
Four Wheelers	220	80%
Two Wheelers	62	20%
Bus	3	
Basement Parking	**202 ECS**	
Four Wheelers	166	70%
Two Wheelers	72	30%

Note

Scale 1 : 250

All the dimensions are in m.

Warangal International Convention Centre

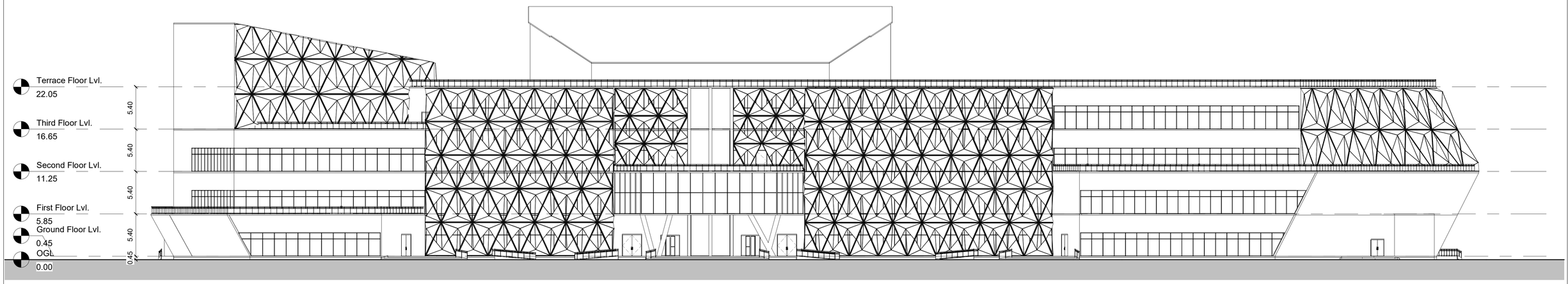
Basement Plan

Remarks

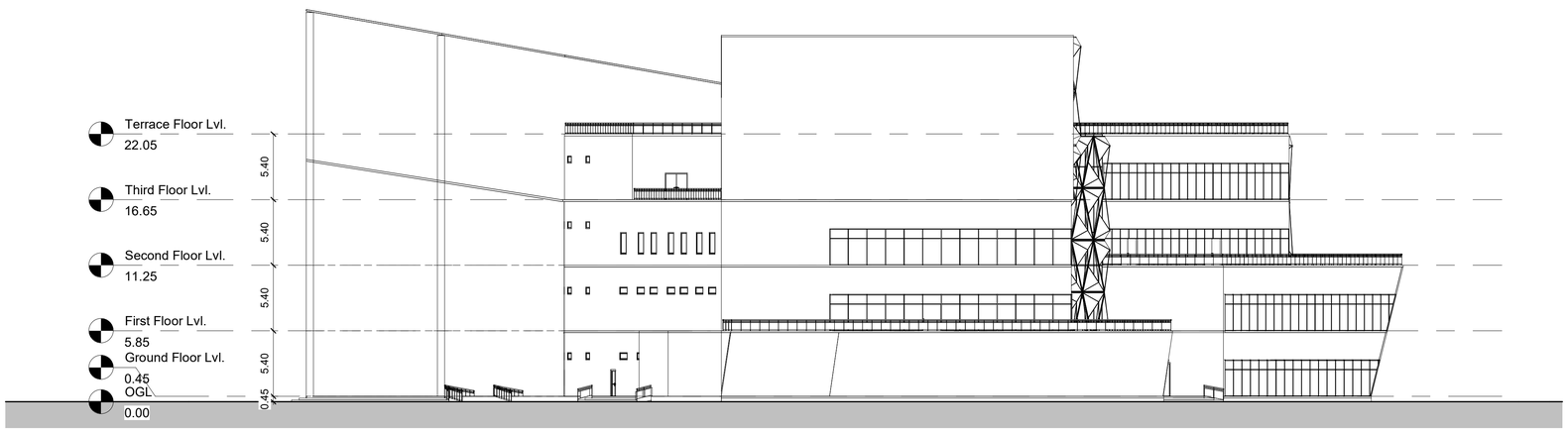
Name	Swapnil Tripathi
Scholor No.	211110045
Semester	9th Sem
Thesis Guide	Prof. Arshi Parashar
Date	1 December, 2025

Sheet No.

9

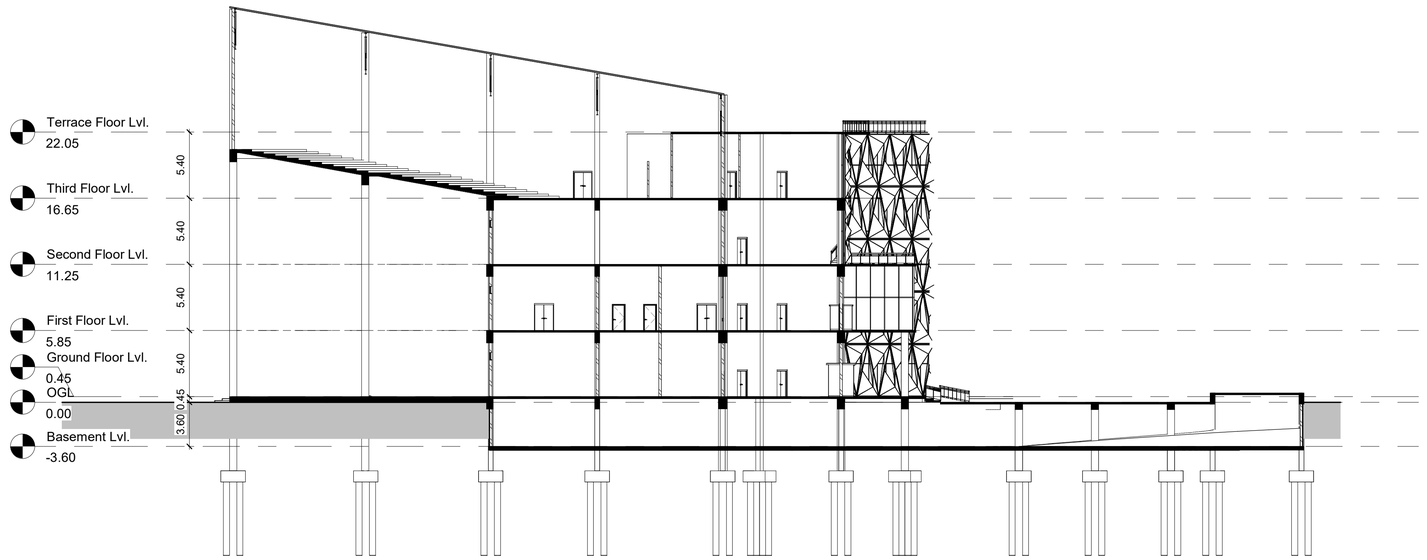


A Front Elevation
1 : 250

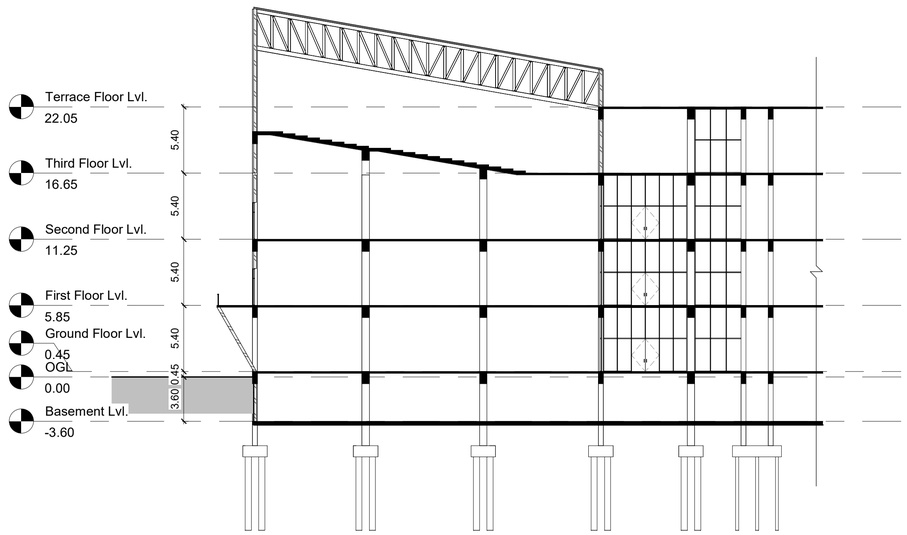


B Side Elevation (West)
1 : 250

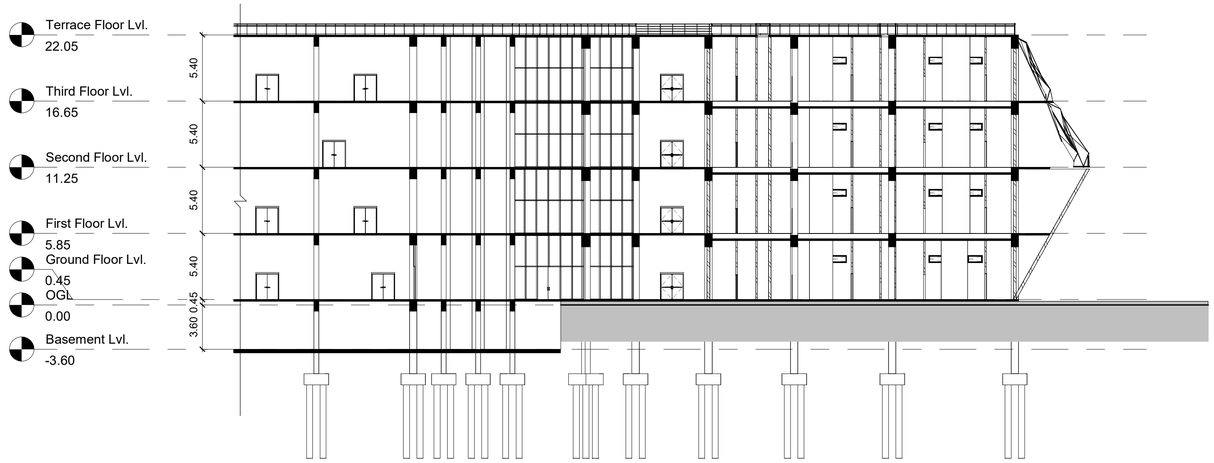
Note		Remarks		Sheet No.
Scale 1 : 250 All the dimensions are in m.	Warangal International Convention Centre Elevations		Name: Swapnil Tripathi Scholor No.: 211110045 Semester: 9th Sem Thesis Guide: Prof. Arshi Parashar Date: 1 December, 2025	10



A Section 1
1 : 250



B Section 2
1 : 250



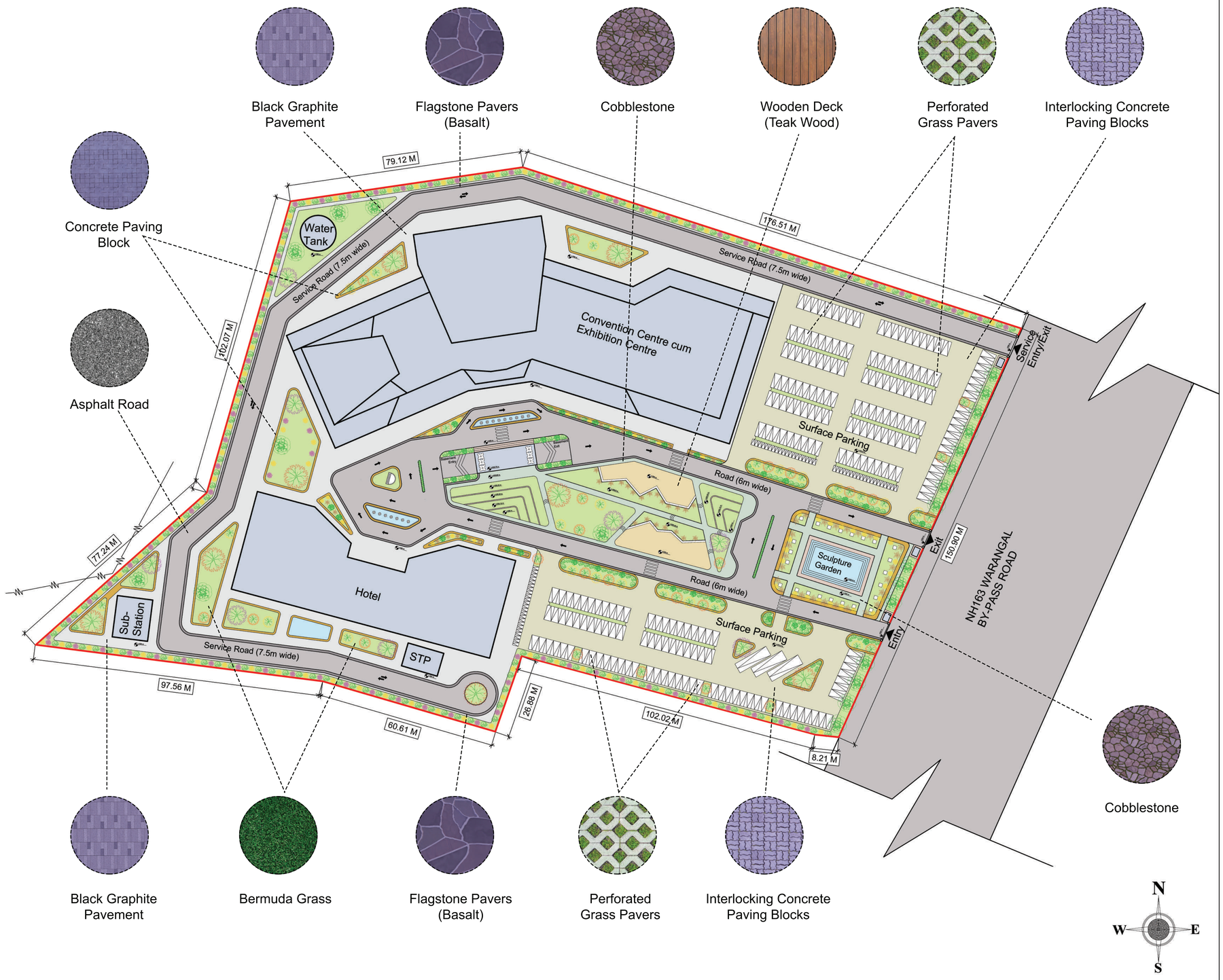
C Section 3
1 : 250

Note		Remarks		Sheet No.
Scale 1 : 250 All the dimensions are in m.	Warangal International Convention Centre Sections		Name: Swapnil Tripathi Scholor No.: 211110045 Semester: 9th Sem Thesis Guide: Prof. Arshi Parashar Date: 1 December, 2025	11

NATIVE TREES						
S. No	Local name	Botanical name	Description	Height & Spread (m)	Legend	Image
1	Neem	*Azadirachta indica*	Extremely drought-tolerant, low maintenance. Excellent avenue & shade tree.	H: 12–20, S: 8–12		
2	Asian Palmyra	*Borassus flabellifer*	Iconic vertical element. Very drought hardy, good for entrance framing.	H: 15–25, S: 2-3		
3	Palash	*Butea monosperma*	Native, bright seasonal flowers (Mar–Apr). Deciduous, low water needs.	H: 8–12, S: 6–10		
4	Tamarind	*Tamarindus indica*	Deep-rooted, tolerant of semi-arid climate. Good large canopy for plazas.	H: 10–20, S: 8–15		
5	Jamun	*Syzygium cumini*	Fruit tree that attracts birds. Tolerates Deccan conditions and good for biodiversity.	H: 10–18, S: 8–12		
6	Pongamia / Karanja	*Pongamia pinnata*	Nitrogen-fixer, drought hardy, good for roadside/parking shade.	H: 10–15, S: 6–10		

FLOWERING TREES						
S. No	Local name	Botanical name	Description	Height & Spread (m)	Legend	Image
1	Amaltas	*Cassia fistula*	Bold yellow racemes in late spring. Drought tolerant once established.	H: 10–15, S: 6–10		
2	Jarul	*Lagerstroemia speciosa*	Long flowering season (summer). Good for plazas and avenue mixing.	H: 6–12, S: 5–8		
3	Gulmohar	*Delonix regia*	Spectacular summer bloom. Performs well in Deccan if soil moderately deep.	H: 8–12, S: 10–15		
4	Parijat / Harsingar	*Nyctanthes arbor-tristis*	Small scented flowering tree. Good near seating for fragrance.	H: 3–6, S: 2–4		

SHRUBS						
S. No	Local name	Botanical name	Description	Height & Spread (m)	Legend	Image
1	Kamini	*Murraya paniculata*	Fragrant white flowers. Excellent formal hedge or low screen.	H: 1.5–3, S: 1–2		
2	Ixora (Jungle geranium)	*Ixora coccinea*	Mass flowering shrub for beds & colour. Needs less water once established.	H: 0.5–1.5, S: 2–4		
3	Chandni	*Tabernaemontana divaricata*	Evergreen, fragrant, good formal hedges and foundation planting.	H: 0.5–1.2, S: 0.5–1		
4	Tanner's cassia	*Cassia auriculata*	Drought-tolerant flowering shrub. Good for low-maintenance beds.	H: 1–3, S: 1–2		
5	Adhatoda / Vasaka	*Adhatoda vasica*	Dense evergreen medicinal shrub. Good screening and edge planting.	H: 1–2, S: 1–1.5		
6	Clerodendrum spp.	*Clerodendrum inerme / C. splendens*	Attractive for pollinators. Colorful flowers can be used as specimen or mixed beds.	H: 1–3, S: 1–2		



Note

Scale 1:700

All the dimensions are in m.

Warangal International Convention Centre

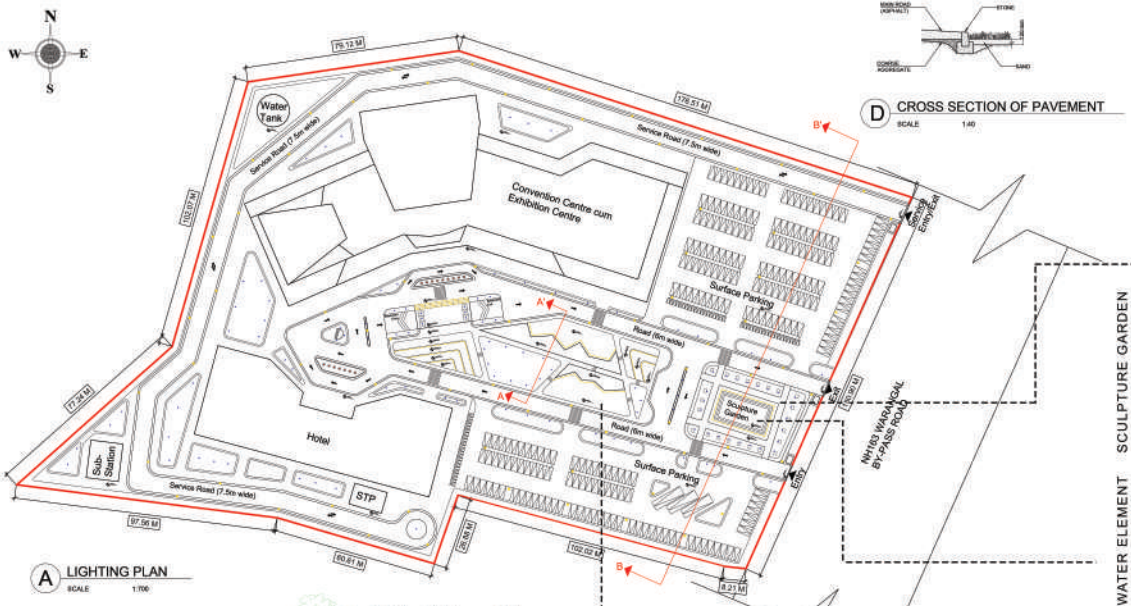
Landscape (Softscape and Hardscape)

Remarks

Name	Swapnil Tripathi
Scholor No.	211110045
Semester	9th Sem
Thesis Guide	Prof. Arshi Parashar
Date	1 December, 2025

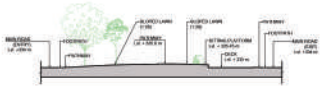
Sheet No.

12 A



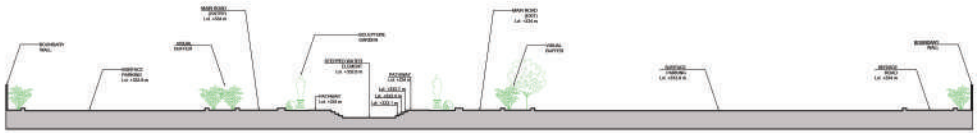
A LIGHTING PLAN

SCALE 1:700



B SECTION AA'

SCALE 1:300



C SECTION BB'

SCALE 1:300

D CROSS SECTION OF PAVEMENT

SCALE 1:40

S. No.	Type of Light	Description	Location	Legends	Image
1	Step/ Stair Lights	Recessed or surface-mounted lights on risers or side walls for safe stair visibility	Staircases, stepped landscape		
2	Street Post Lantern light	Decorative tall poles with lantern-style heads offering ambient lighting.	Main entry court, vehicular access, driveways.		
3	Lit Lights	Ground-mounted lights that cast illumination upwards to highlight features	Trees, stone features, walls, signage		
4	Submersible Fountain Lights	Waterproof LED fixture placed underwater upwards to highlight water movement and create dramatic night effects.	Illuminate fountain jets or pools.		

SCULPTURE GARDEN



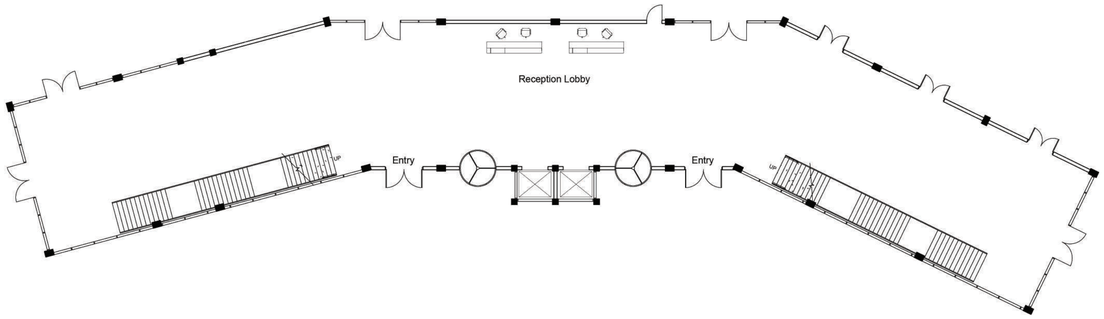
STEPPED WATER ELEMENT



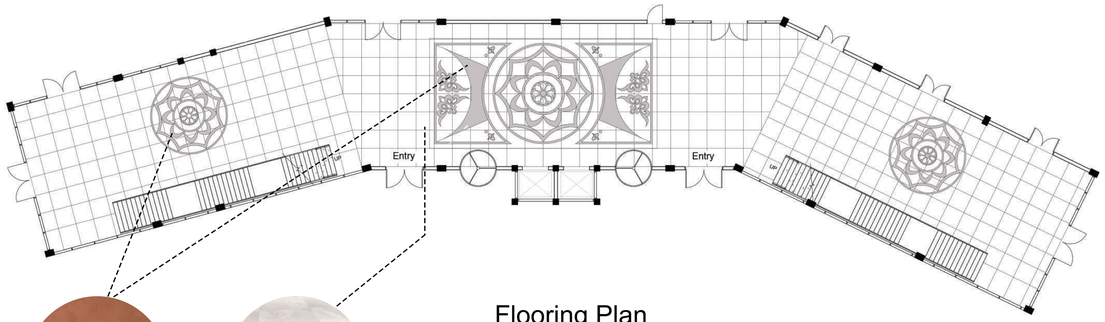
LANDSCAPE WALKWAY



Note					
Scale As Mentioned	Warangal International Convention Centre	Remarks	Name	Swapnil Tripathi	Sheet No.
All the dimensions are in m.	Landscape (Lighting Plan, Section & Details)		Scholar No.	211110045	12 B
			Semester	9th Sem	
			Thesis Guide	Prof. Arshi Parashar	
			Date	1 December, 2025	



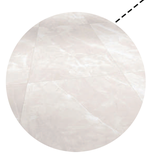
Floor Plan



Flooring Plan

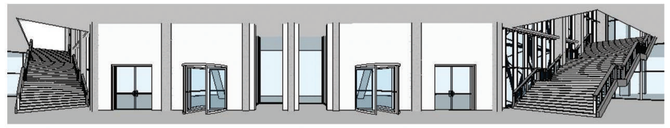


Red Oxide
Flooring

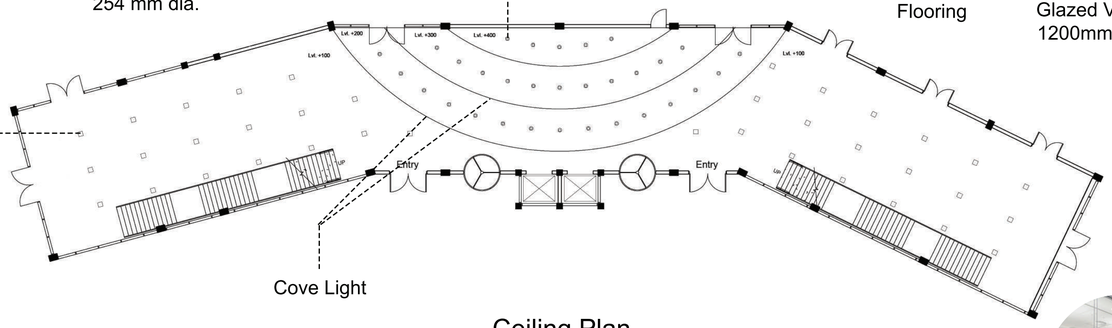


Kajaria - Emali Beige
Glazed Vitrified Tiles
1200mm * 1200 mm

Views





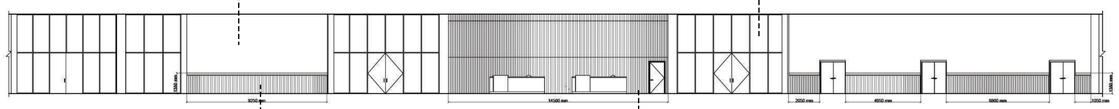


Ceiling Plan

Asian Paint Wall Paint
Air Breeze 9436



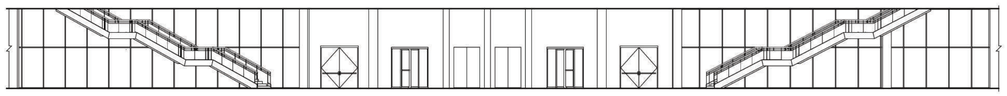
Glass Panel



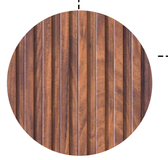
Elevation 1



Euro Pratik
Wooden Fluted Panel
Cassa Panel 3384
2400mm * 120 mm



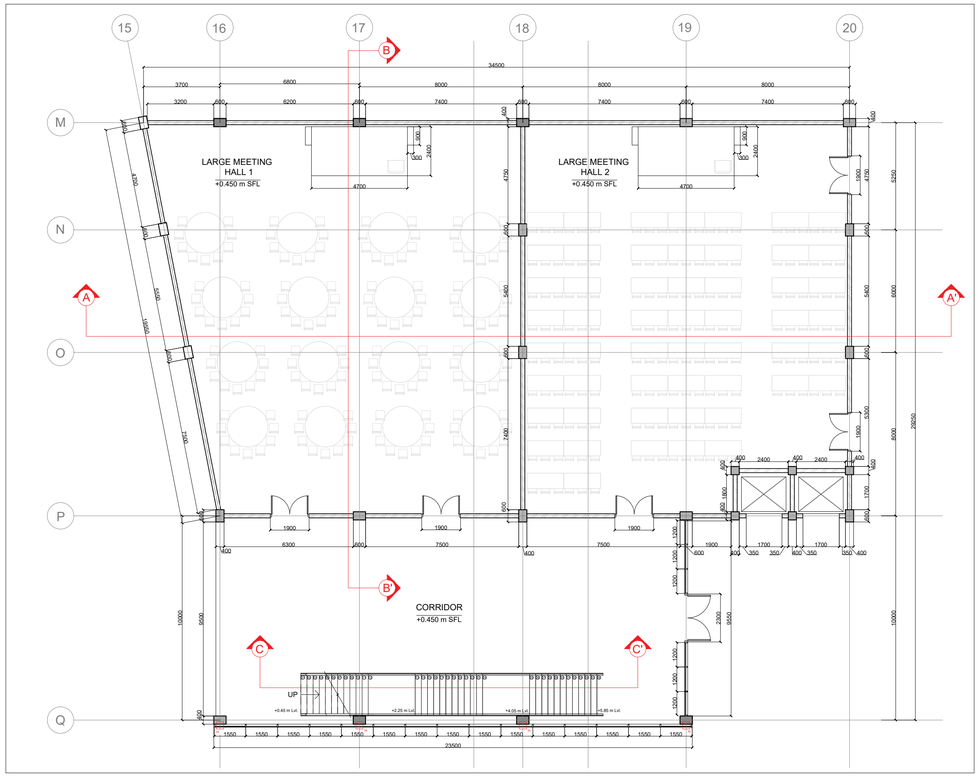
Elevation 2



Euro Pratik
Wooden Fluted Panel
Cassa Panel 3455
2400mm * 120 mm

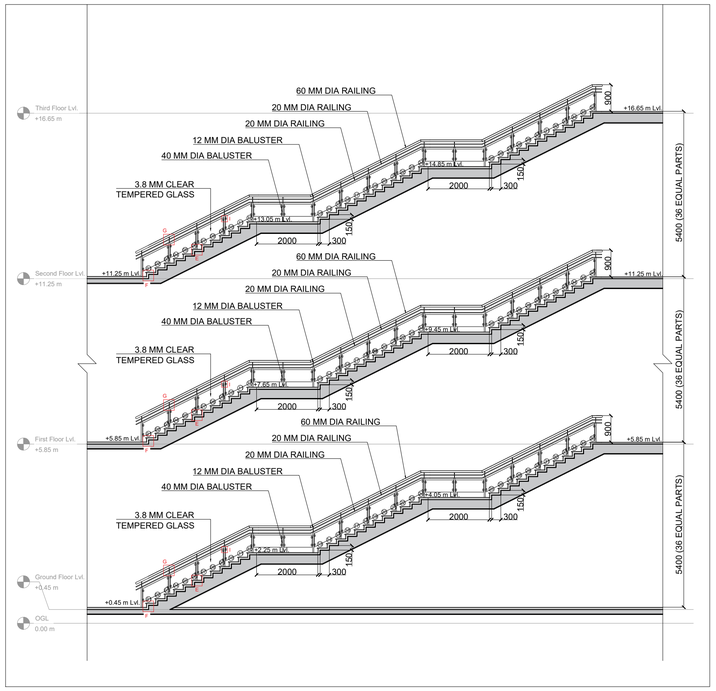


Note	Warangal International Convention Centre	Remarks		Sheet No.
Scale 1 : 200 All the dimensions are in m.	Elective - Interior Design		Name: Swapnil Tripathi Scholor No.: 211110045 Semester: 9th Sem Sec.: A Date: 1 December, 2025	13



A BRICKWORK LAYOUT

SCALE 1:150



D SECTION CC'

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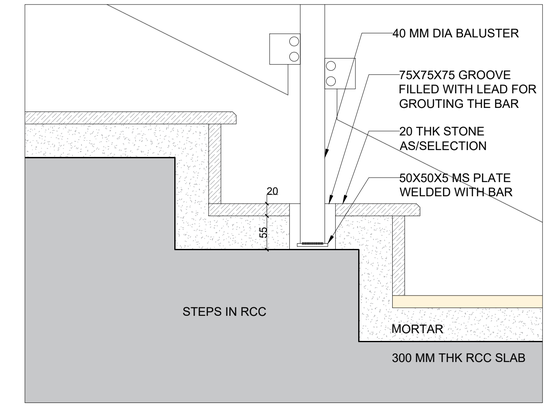
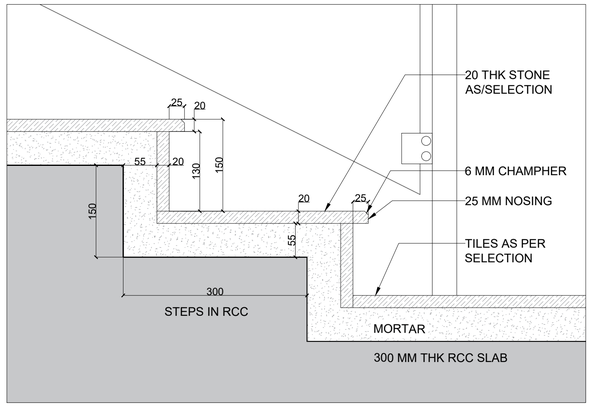


E DETAIL AT E

SCALE 1:5



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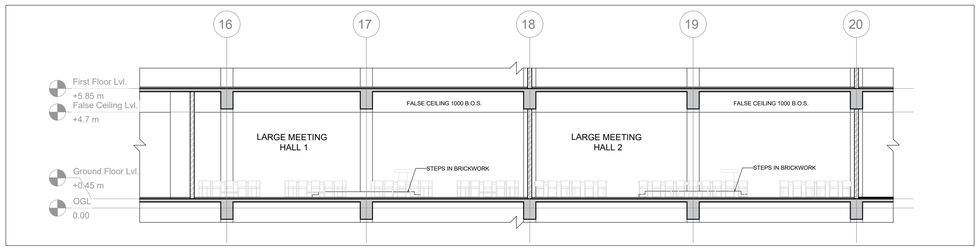

B SECTION AA'

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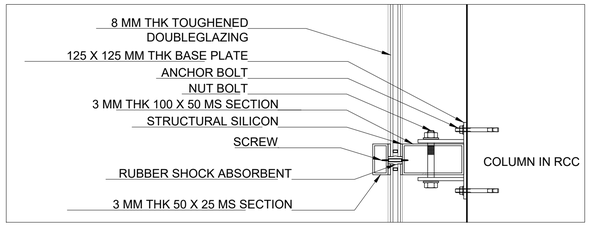
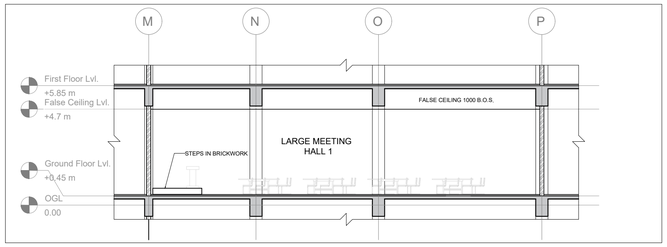


H DETAIL AT H

SCALE 1:5



C SECTION BB'

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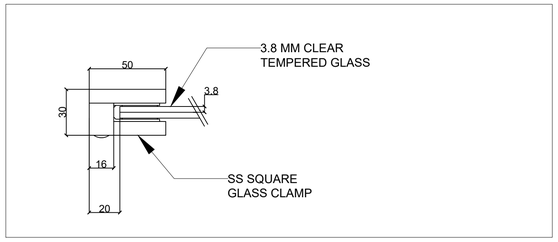
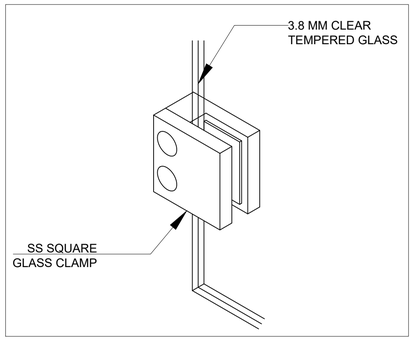


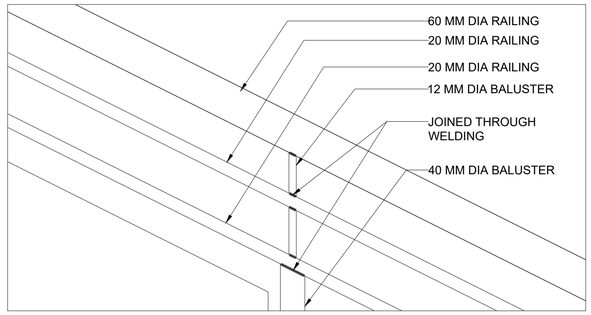
I DETAIL AT I

SCALE 1:2



I SS SQUARE GLASS CLAMP

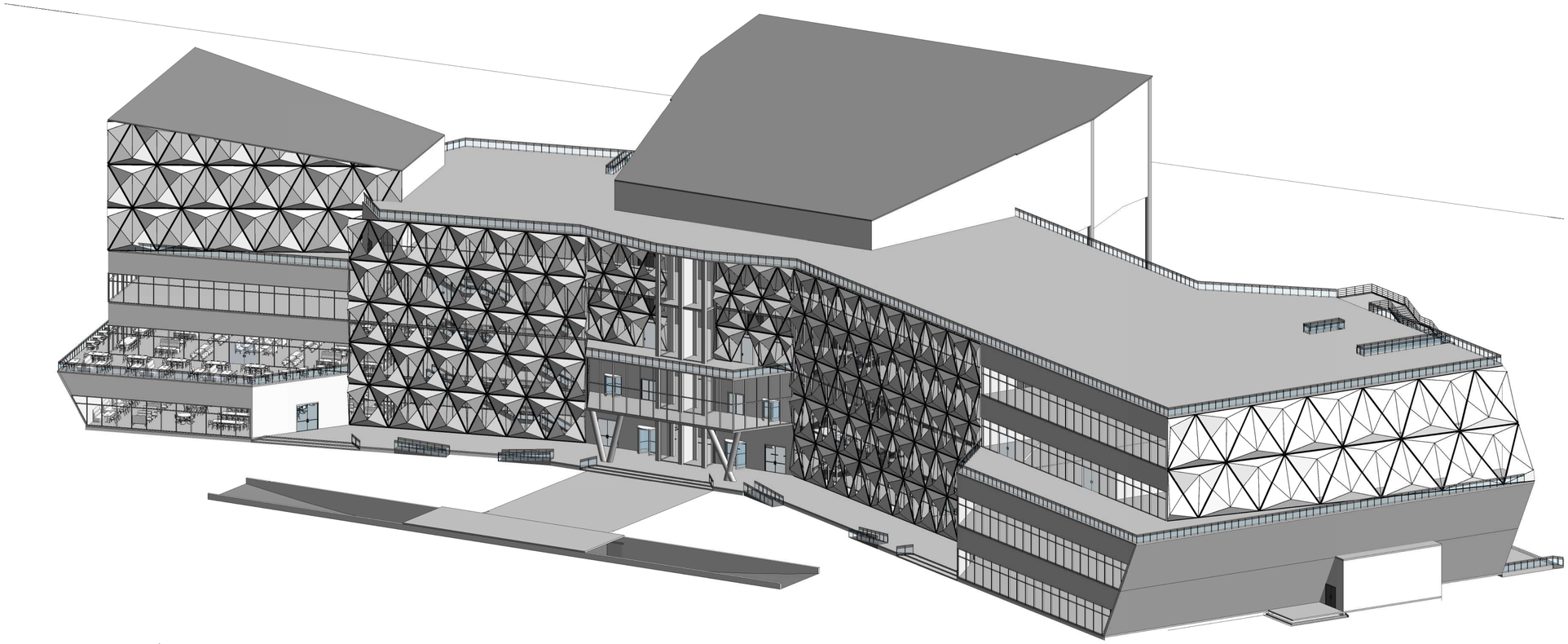
SCALE 1:2

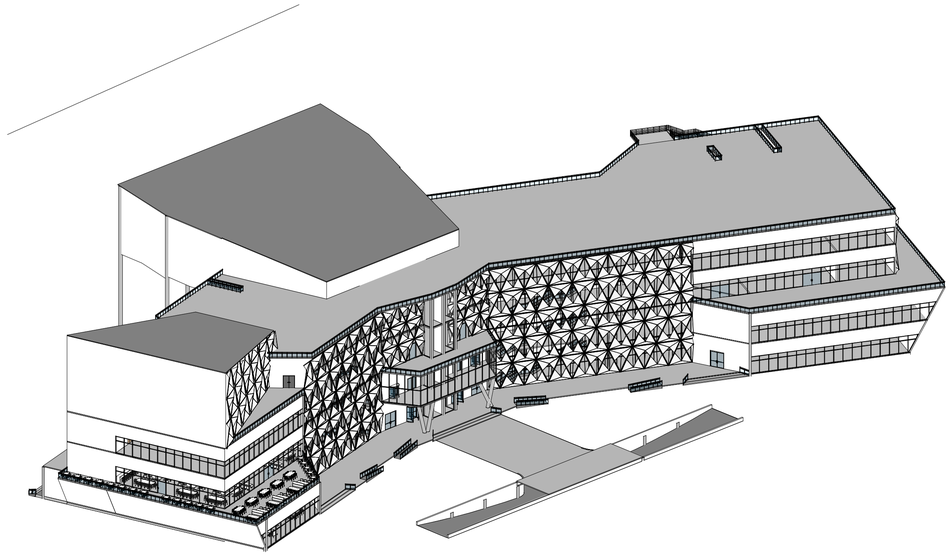


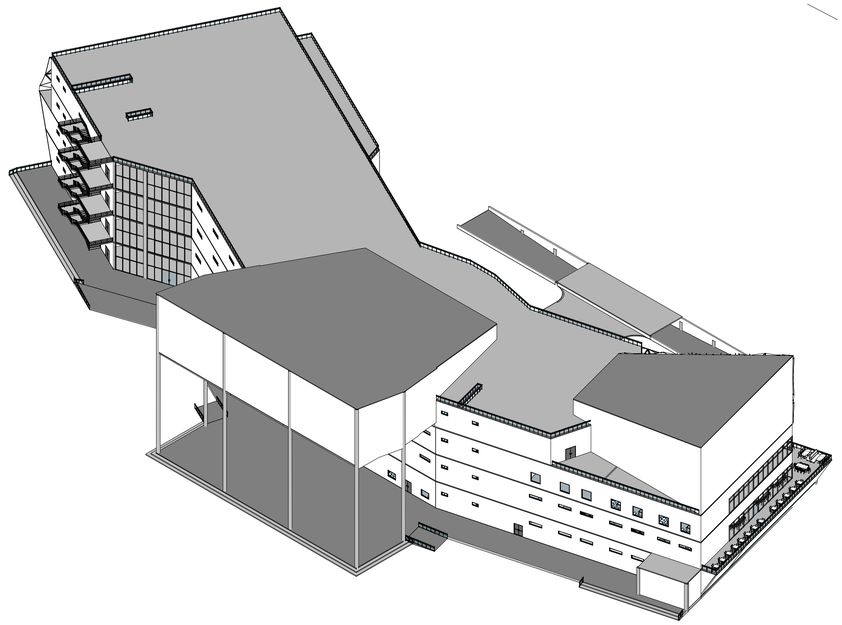
G DETAIL AT G

SCALE 1:5

Note		Remarks		Sheet No.
Scale As Mentioned All the dimensions are in m.	Warangal International Convention Centre Working Drawing		Name: Swapnil Tripathi Scholor No.: 211110045 Semester: 9th Sem Thesis Guide: Prof. Arshi Parashar Date: 1 December, 2025	14







Note		Remarks		Sheet No.
Scale All the dimensions are in m.	Warangal International Convention Centre 3D View		Name: Swapnil Tripathi Scholor No.: 211110045 Semester: 9th Sem Thesis Guide: Prof. Arshi Parashar Date: 1 December, 2025	15











Note

Warangal International Convention Centre

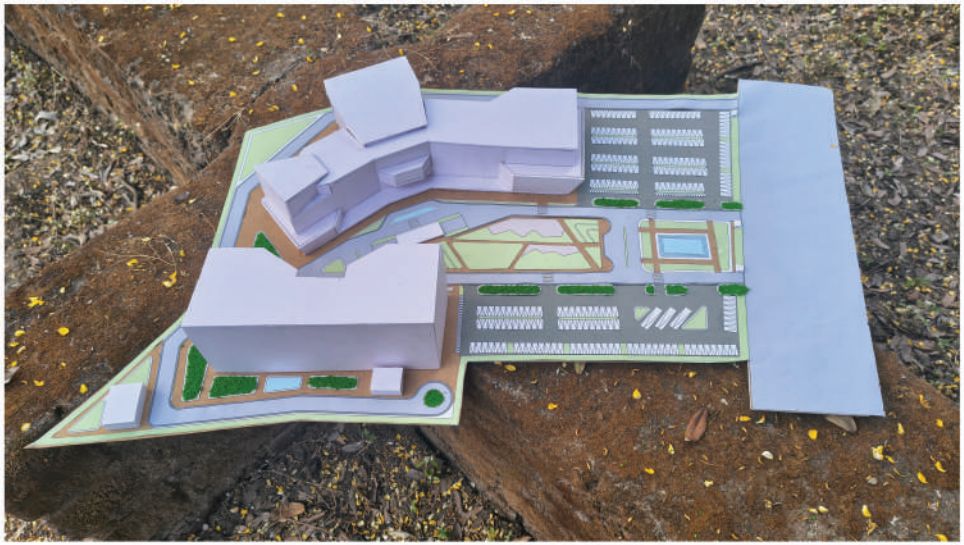
Renders

Remarks

Name	Swapnil Tripathi
Scholar No.	211110045
Semester	9th Sem
Thesis Guide	Prof. Arshi Parashar
Date	1 December, 2025

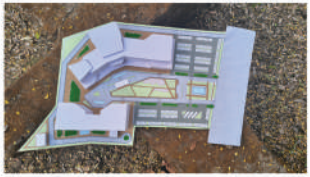
Sheet No.

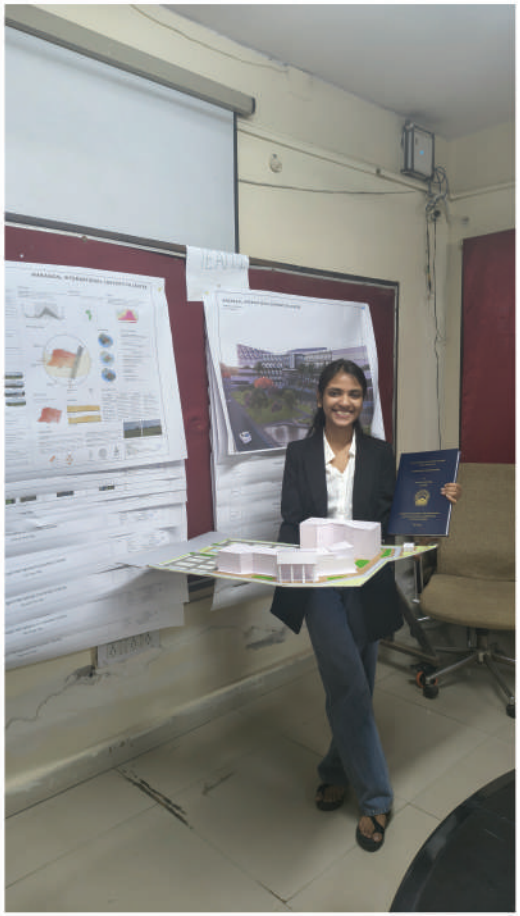
16











Note	Warangal International Convention Centre Physical Model	Remarks	Name: Swapnil Tripathi Scholar No.: 211110045 Semester: 9th Sem Thesis Guide: Prof. Arshi Parashar Date: 1 December, 2025	Sheet No. 17