KRATIKA SINGH

International Convention Center

Warangal , Telangana , India

Dec, 2025

International Convention Centre

Warangal, Telangana, India

BACHELOR OF ARCHITECTURE

BY

KRATIKA SINGH

211110217



DEPARTMENT OF ARCHITECTURE AND PLANNING

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Submitted by:

Kratika Singh
211110217
B. ARCH
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UNDER THE GUIDANCE OF

Dr. Navneet Munoth

DEPARTMENT OF ARCHITECTURE AND PLANNING
MAULANA AZAD NATIONAL INSTITUTE OF TECHNOLOGY
BHOPAL (MP)-462003

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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 Center, 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

Kratika Singh
211110217

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

Faculty Name
Dr. Navneet Munoth

CERTIFICATION OF EXAMINATION

The Bachelor of Architecture Thesis Viva-Voce examination of Ms. Kratika Singh Scholar No.211110217, was held on 1/12/2025 to 2/12/25.

Dr. Nakul Dhagat
Head of Department

Dr. Vicky Lalramsangi
Thesis Coordinator

ABSTRACT

This thesis explores the design and development of an International Convention Centre proposed at Madikonda, Warangal, in Telangana. The project is planned on a 10-acre site allocated by TSIIC and is intended to serve as a major institutional and economic catalyst for the region. Rather than treating the project simply as a collection of buildings, the study views it as a comprehensive public infrastructure that must respond to its physical setting, local climate, and the growing demand for large-scale conference and exhibition spaces in Tier-2 cities.

The research begins with a detailed examination of the site and its surroundings—looking at terrain, access routes, vegetation, utilities, and existing landscape features. This helps reveal both the possibilities and the limitations of the land. Climate plays an equally important role: sun movement, wind patterns, humidity cycles, and temperature variations were studied to understand how the built form could naturally reduce heat gain and improve comfort. All these observations were supported by climate data, sun path diagrams, wind rose charts, and psychrometric analysis.

To position the project within a broader architectural context, a wide range of literature was reviewed: the evolution of convention facilities, their functional typologies, and the spatial requirements of auditoriums, exhibition spaces, and support zones. National standards -NBC provisions, IS codes, fire safety norms, and accessibility guidelines-were considered throughout the process. Correspondingly, the thesis draws lessons from several major Indian convention centres, including HICC in Hyderabad, IICC Dwarka in Delhi, Minto Hall in Bhopal, and Bharat Mandapam at Pragati Maidan. These case studies provided valuable insight into planning logic, circulation systems, acoustics, structural design, services planning, and material strategies.

Based on the analysis, a programme was developed that includes a 2,500-seat convention hall, adaptable meeting rooms, exhibition galleries, multipurpose halls, administrative and recreational areas, food and beverage spaces, and a 150-key hotel. Parking and service infrastructure were designed according to GO 168 norms. A significant effort was made to ensure smooth movement for different user groups-delegates, VIPs, general visitors, staff, and media-while maintaining security and functional clarity.

सार

यह थीसिस तेलंगाना के वारंगल के माडिकोंडा में प्रस्तावित एक इंटरनेशनल कन्वेंशन सेंटर के डिज़ाइन और डेवलपमेंट की पड़ताल करती है। यह प्रोजेक्ट TSIIC द्वारा दी गई 10 एकड़ की साइट पर प्लान किया गया है और इसका मकसद इस इलाके के लिए एक बड़ा इंस्टीट्यूशनल और इकोनॉमिक कैटलिस्ट बनना है। प्रोजेक्ट को सिर्फ़ इमारतों का कलेक्शन मानने के बजाय, स्टडी इसे एक बड़े पब्लिक इंफ्रास्ट्रक्चर के तौर पर देखती है जिसे इसकी फिजिकल सेटिंग, लोकल क्लाइमेट और टियर-2 शहरों में बड़े लेवल पर कॉन्फ्रेंस और एग्जीबिशन स्पेस की बढ़ती मांग के हिसाब से ढलना होगा।

रिसर्च साइट और उसके आस-पास की डिटेल्ड जांच से शुरू होती है—टेरेन, आने-जाने के रास्ते, पेड़-पौधे, यूटिलिटीज़ और मौजूदा लैंडस्केप फीचर्स को देखते हुए। इससे ज़मीन की संभावनाओं और सीमाओं, दोनों को सामने लाने में मदद मिलती है। क्लाइमेट भी उतना ही ज़रूरी रोल निभाता है: सूरज की मूवमेंट, हवा के पैटर्न, ह्यूमिडिटी साइकिल और टेम्परेचर में बदलाव की स्टडी की गई ताकि यह समझा जा सके कि बनी हुई चीज़ नेचुरली गर्मी को कैसे कम कर सकती है और आराम को बेहतर बना सकती है। इन सभी ऑब्ज़र्वेशन को क्लाइमेट डेटा, सन पाथ डायग्राम, विंड रोज़ चार्ट और साइक्रोमेट्रिक एनालिसिस से सपोर्ट मिला।

प्रोजेक्ट को एक बड़े आर्किटेक्चरल कॉन्टेक्स्ट में रखने के लिए, बहुत सारे लिटरेचर को रिव्यू किया गया: कन्वेंशन फैसिलिटीज़ का डेवलपमेंट, उनके फंक्शनल टाइपोलॉजी, और ऑडिटोरियम, एग्जीबिशन स्पेस और सपोर्ट ज़ोन की जगह से जुड़ी ज़रूरतें। पूरे प्रोसेस में नेशनल स्टैंडर्ड्स - NBC प्रोविज़न, IS कोड, फायर सेफ्टी नॉर्म्स, और एक्सेसिबिलिटी गाइडलाइंस - पर विचार किया गया। इसी तरह, थीसिस कई बड़े इंडियन कन्वेंशन सेंटर्स से सबक लेती है, जिसमें हैदराबाद में HICC, दिल्ली में IICC द्वारका, भोपाल में मिंटो हॉल, और प्रगति मैदान में भारत मंडपम शामिल हैं। इन केस स्टडीज़ ने प्लानिंग लॉजिक, सर्कुलेशन सिस्टम, अकूस्टिक्स, स्ट्रक्चरल डिज़ाइन, सर्विसेज़ प्लानिंग, और मटीरियल स्ट्रेटेजी के बारे में कीमती जानकारी दी।

एनालिसिस के आधार पर, एक प्रोग्राम डेवलप किया गया जिसमें 2,500 सीटों वाला कन्वेंशन हॉल, अडैप्टेबल मीटिंग रूम, एग्जीबिशन गैलरी, मल्टीपर्पस हॉल, एडमिनिस्ट्रेटिव और

रिक्रिएशनल एरिया, फूड और बेवरेज स्पेस, और 150-की होटल शामिल हैं। पार्किंग और सर्विस इंफ्रास्ट्रक्चर को GO 168 नॉर्म्स के अनुसार डिज़ाइन किया गया था। अलग-अलग यूज़र ग्रुप्स - डेलीगेट्स, VIPs, आम विज़िटर्स, स्टाफ़ और मीडिया - के लिए सिक्योरिटी और काम करने में आसानी बनाए रखते हुए, आसानी से आने-जाने के लिए काफ़ी कोशिश की गई।

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CHAPTER I

INTRODUCTION

In contemporary urban environments, Convention Centres have emerged as vital architectural and social infrastructures that support cultural exchange, economic activity, and community interaction. As cities evolve into hubs of global connectivity, the demand for multifunctional spaces capable of hosting diverse events—such as conferences, exhibitions, trade fairs, performances, corporate gatherings, and public ceremonies—has increased significantly. A Convention Centre therefore becomes more than a large assembly hall; it functions as a dynamic platform that fosters collaboration, innovation, and collective engagement.

A well-designed Convention Centre integrates architecture, technology, circulation efficiency, and environmental responsiveness to create a flexible environment that accommodates varying spatial, acoustic, and functional requirements. The architectural challenge lies in achieving this flexibility while maintaining a coherent spatial identity, ensuring comfort for large crowds, and meeting the technical demands of acoustics, lighting, safety, structural load, and building services.

In addition to serving as an event venue, modern convention facilities contribute meaningfully to the social and economic fabric of a city. They support tourism, stimulate local businesses, and provide opportunities for cultural representation and community participation. Their presence often acts as a catalyst for urban development, creating a synergistic relationship between built form, public interaction, and city image.

This thesis explores the design and planning of a Convention Centre that responds to contemporary needs while envisioning a vibrant and inclusive public space. The project investigates aspects of spatial organization, functional zoning, crowd management, site planning, sustainability, and experiential quality. Special emphasis is placed on acoustical performance, landscape integration, barrier-free design, and the incorporation of modern building technologies.

The aim of this thesis is to develop an architectural proposal that balances technical precision with experiential richness—a Convention Centre that is not only an efficient and adaptable event venue but also an enduring cultural landmark reflecting the aspirations, identity, and spirit of its community.

CHAPTER -2

SITE INVENTORY

2.1 Background

The Telangana State Industrial Infrastructure Corporation Limited (hereinafter referred to as the 'Authority') under its core objective of providing integrated industrial infrastructure development for the state of Telangana, 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 (hereinafter referred to as the 'Project') on approximately 10 acres (40,468 sq. m.) of land (hereinafter referred to as the 'Project Site') located at Madikonda, Warangal, Telangana, India, on PPP mode.
The Authority has earmarked about **10 acres (40,468 sq. m**.)of land for the Project, which is envisaged to be an Warangal International Convention Centre (WICC) with other support facilities. This RFP document is for the Project, which is being proposed on approximately 10 acres (40,468 sq. m.) land with about 300,000 sq. f t. of built-up area and corresponding car parking units (as per the development control & regulations). The minimum development obligations are listed as below:

2.2 Project Details

Particulars	Description
Name of the Project	Warangal International Convention Centre (WICC) cum 3-Star Hotel @ IT Park Madikonda, Warangal, Telangana on Public Private Partnership (PPP) Mode Under IALA Warangal.
Nodal Agency	Telangana State Industrial Infrastructure Corporation Limited herein referred to as authority
Land Area	Total land area earmarked by the Authority is approximately 10 acres (40,468 sq. m.)
Project Components	Mandatory Activities: Convention Centre cum Exhibition Hall, Business Hotel, Entertainment and F&B and minimum Car Parking as per the development control regulations mentioned in GO 168. Prohibited Activities: Prohibited activities means use of any built up space for the purposes directly or indirectly, as Residential, Hospital, Warehousing, Car Showrooms, Industrial Activities, Automobile repair/ services/ vehicular servicing shops, LPG Go downs, Petrol Bunk, any trade or activity involving any kind of obnoxious, hazardous, inflammable, non-compatible and polluting substance or process.
Estimated Project Cost	The project cost is estimated at Rs.175 Crores including interest during construction but excluding upfront development premium, and annual rent (during construction).

2.3 Site details

1.4.1 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.

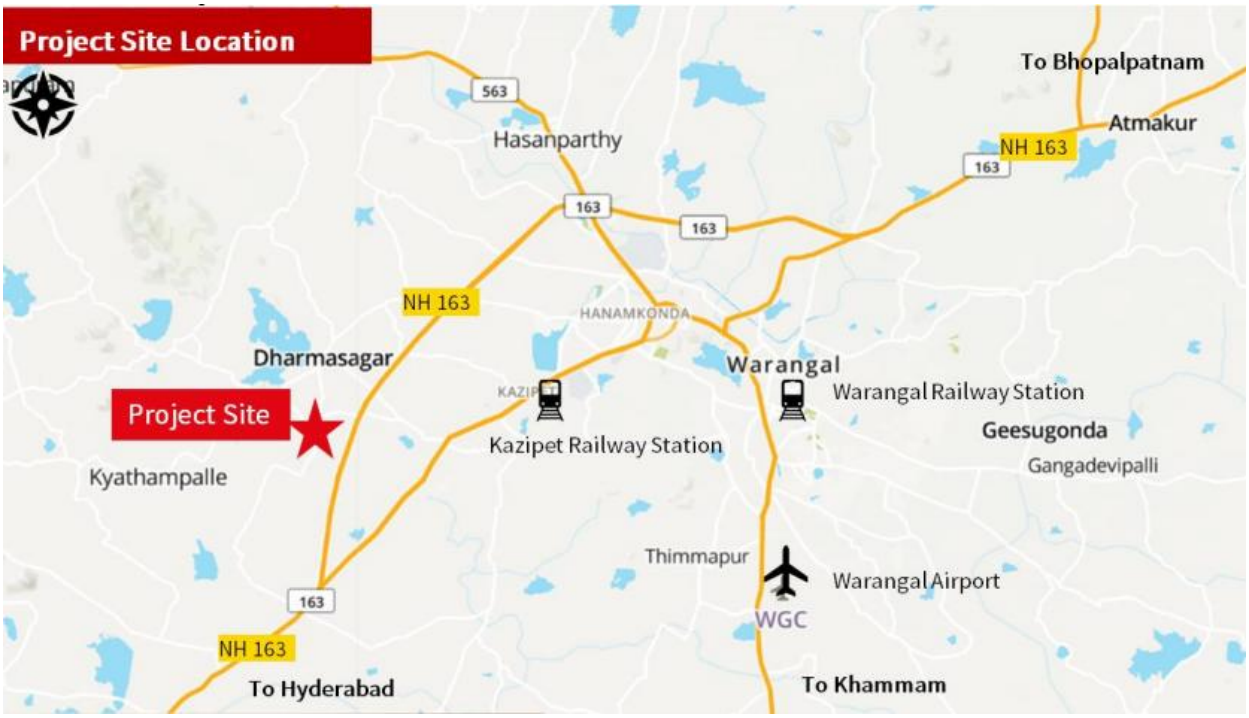


Figure 1

2.3.2 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

2.3.3 ACCESSEBILITY

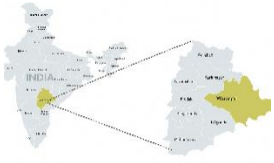
Primary access to the site is from east side of site from national highway NH 163(Warangal Byp Road) with width of 45m.



Figure 2



Figure 3



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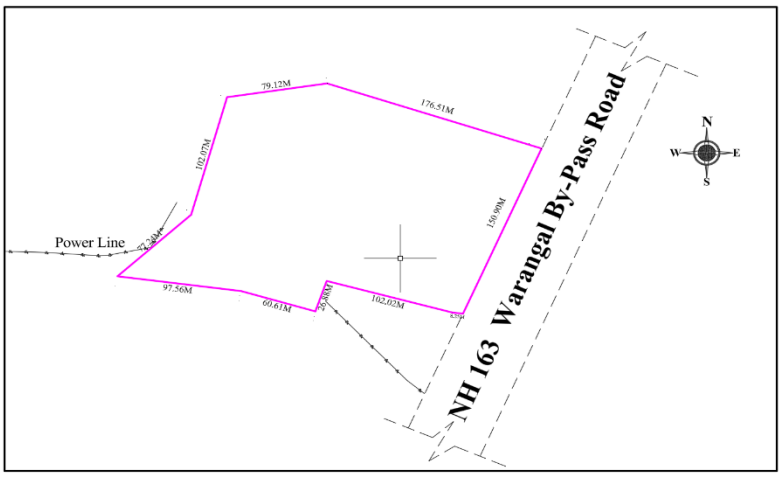

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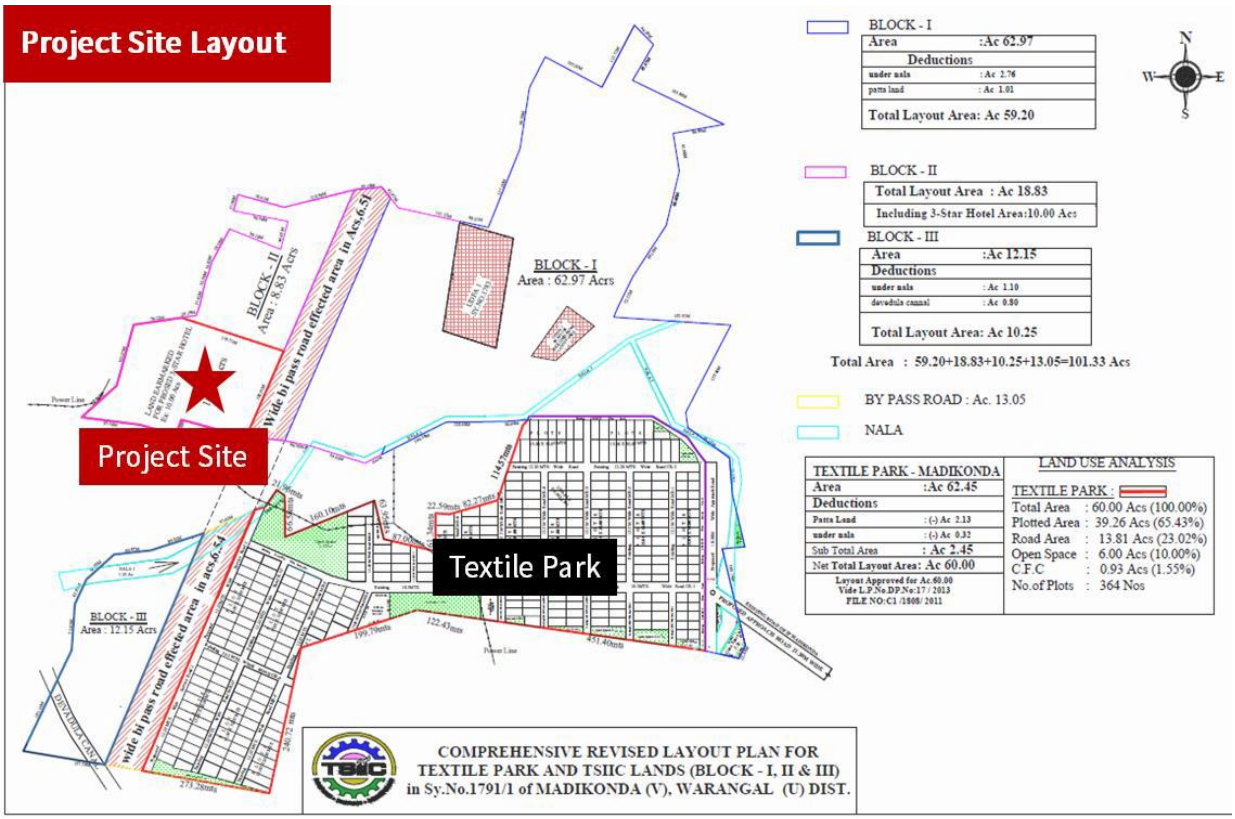
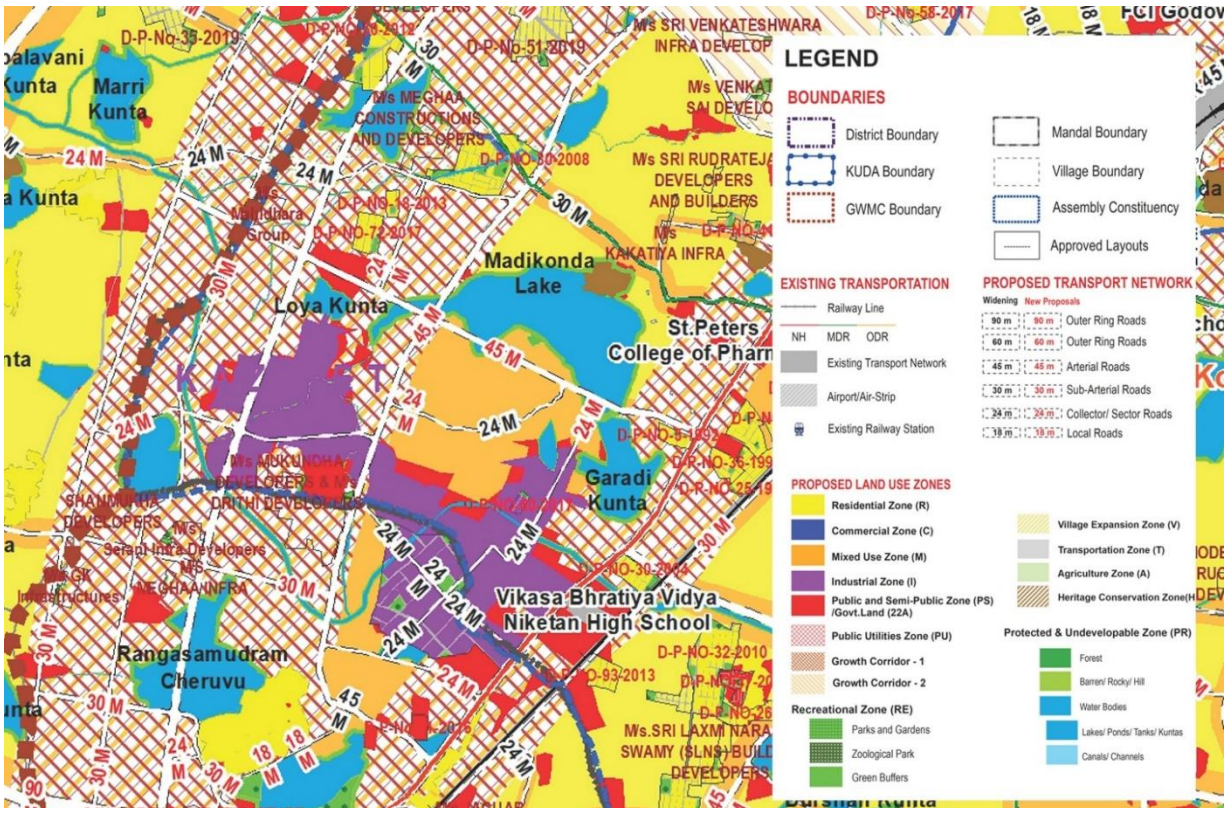


Figure 6

Sl. No.	Description	Area (in sq.ft)
A	**Convention Centre cum Exhibition Centre (2,500 Pax)**	**50,000**
I	Convention Centre	30,000
II	Small Meeting Rooms	2,000
III	Large Meeting Rooms	5,000
IV	Business Centre	5,000
V	Pre-function and Circulation Spaces	8,000
B	**Business Hotel (150 Keys)**	**150,000**
C	**Entertainment and F&B**	**50,000**
	Total	**250,000**
D	Parking (As per GO 168 Surface Parking)	Not specified

2.3.4 EXISTENCE LAND USE

The land area has zoned into the category of Industial Zone (I) by TGIIC.



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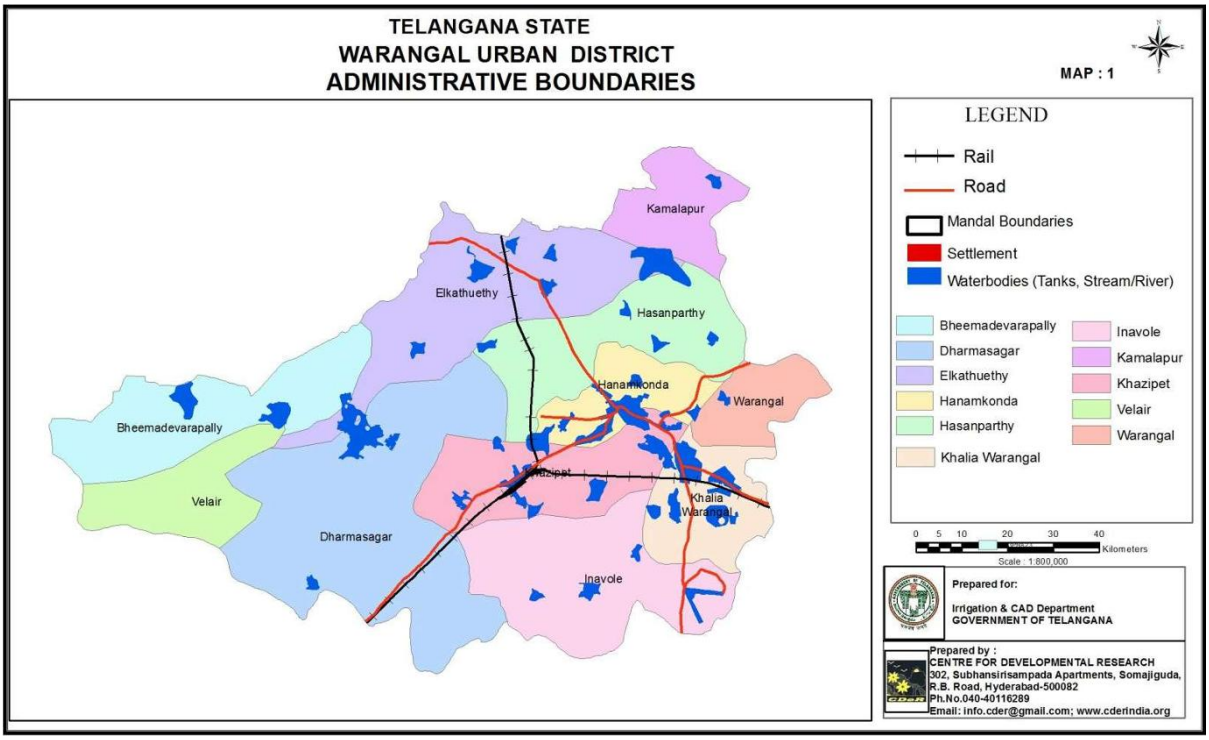


Figure 8

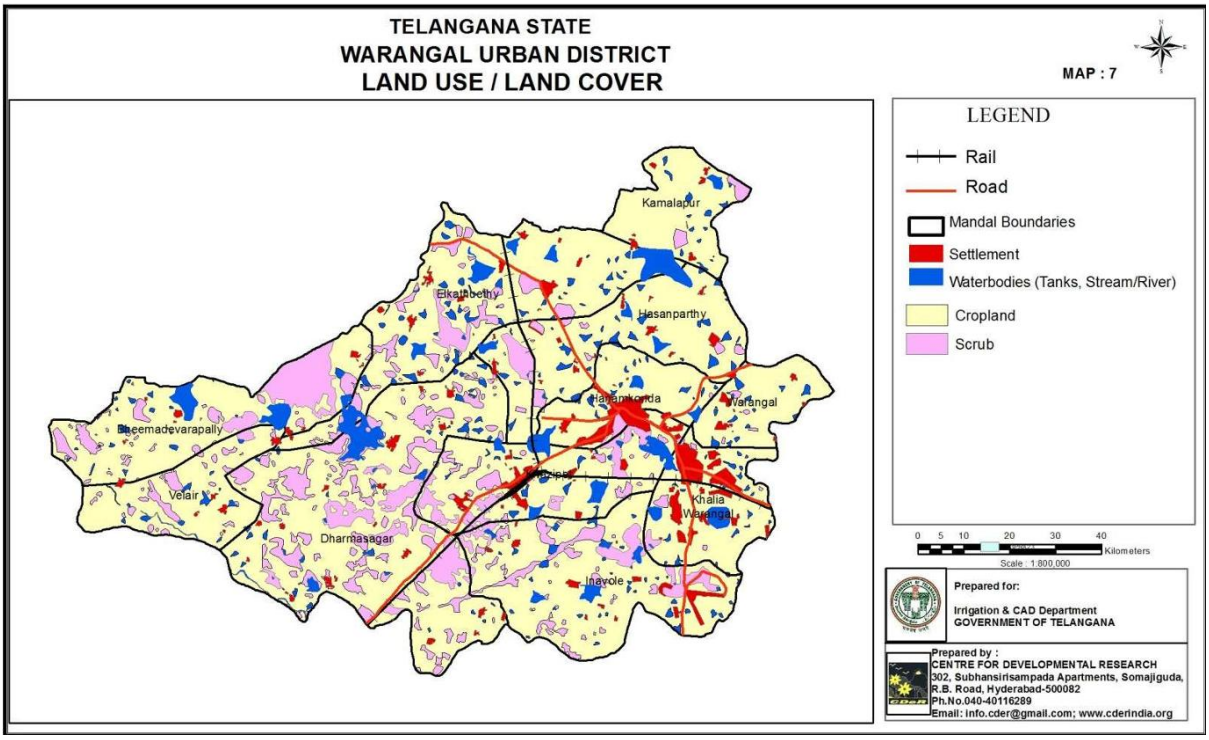


Figure 9

2.3.5 UTILITY AND INFRASTRUCTURE

Electricity



Figure 10

Drainage



Figure 12

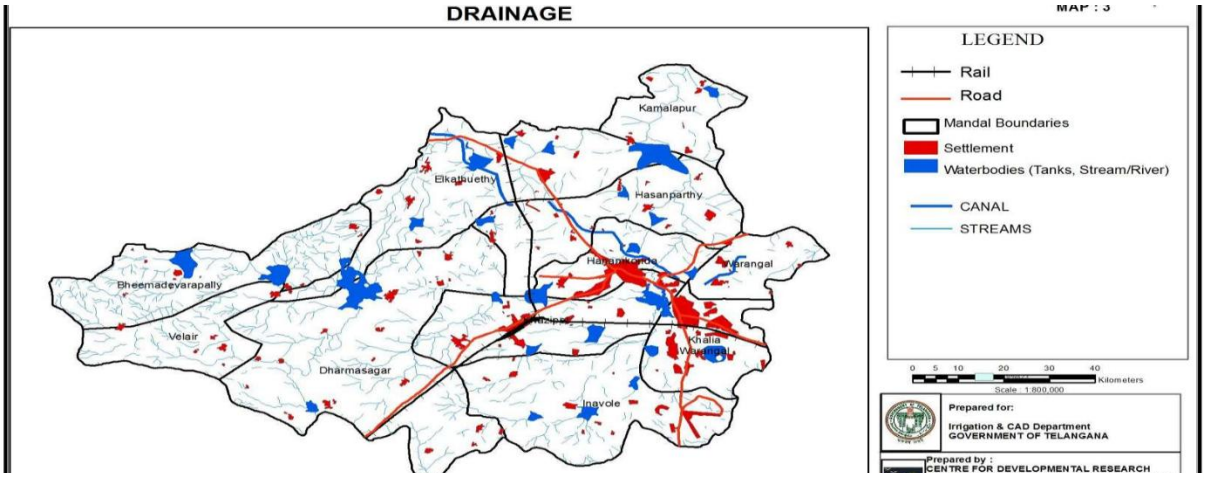


Figure 11

Water Supply

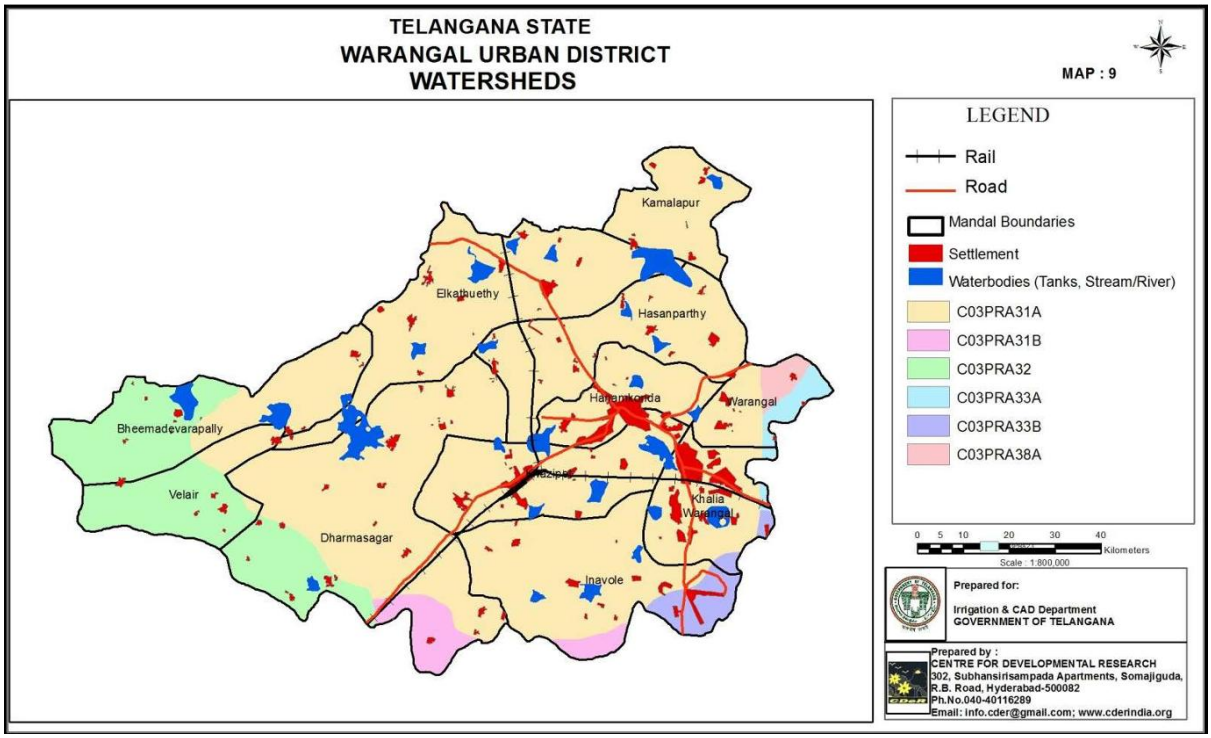


Figure 13

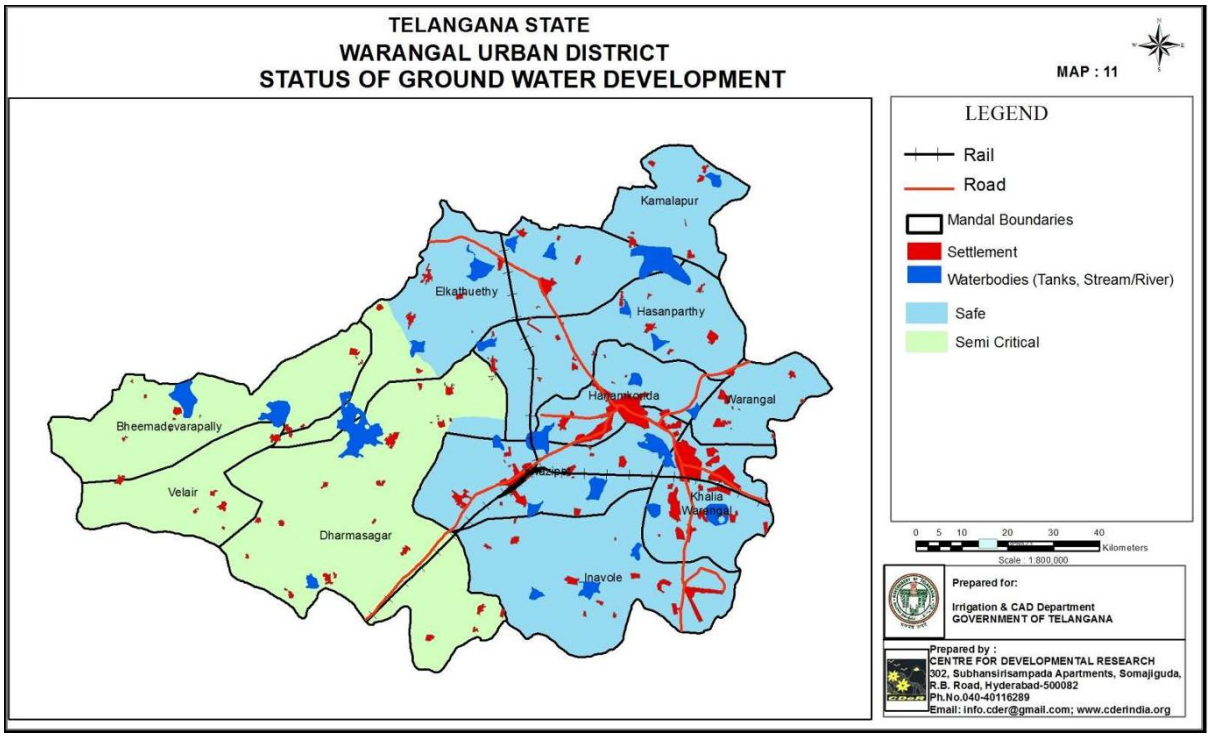


Figure 14



Figure 15

Site Context

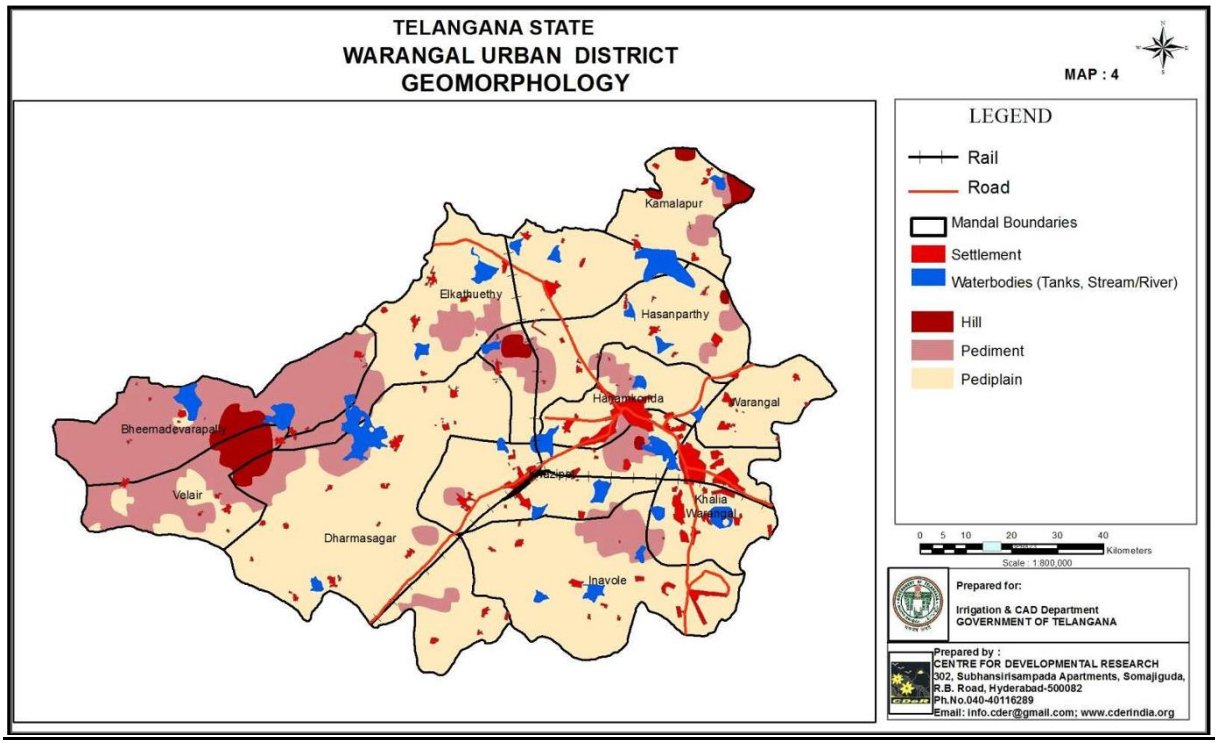


Figure 16

The immediate surroundings of the site, within a 500-meter radius, include 10 acres of landscaped greenery featuring plants, trees, and shrubs. Key site attributes such as land use, ground conditions, existing artificial features, proximity to key infrastructures, and the height of surrounding buildings have been considered.



Figure 17



Figure 17



Figure 19



Figure 20



Figure 21



Figure 22

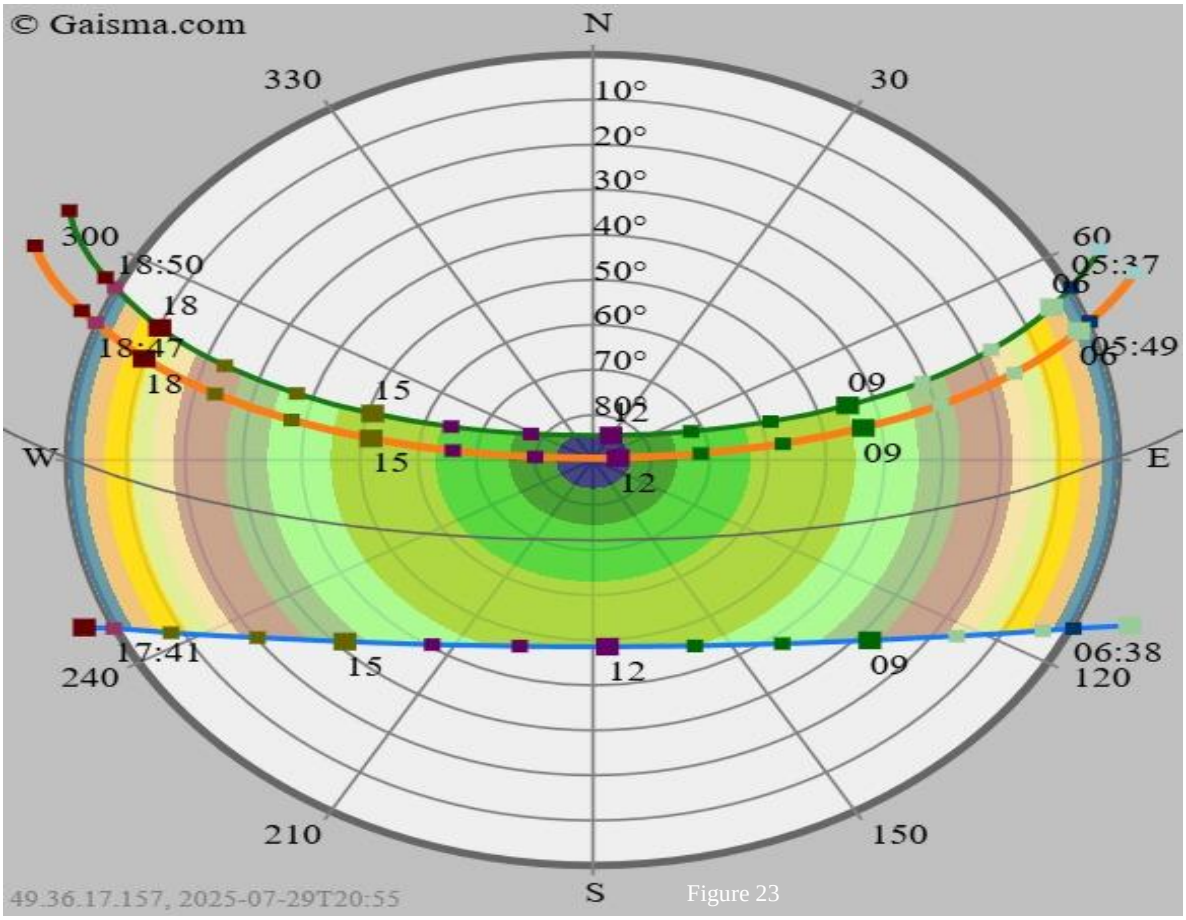


Figure 23

Stereographic Projection of sun path over site

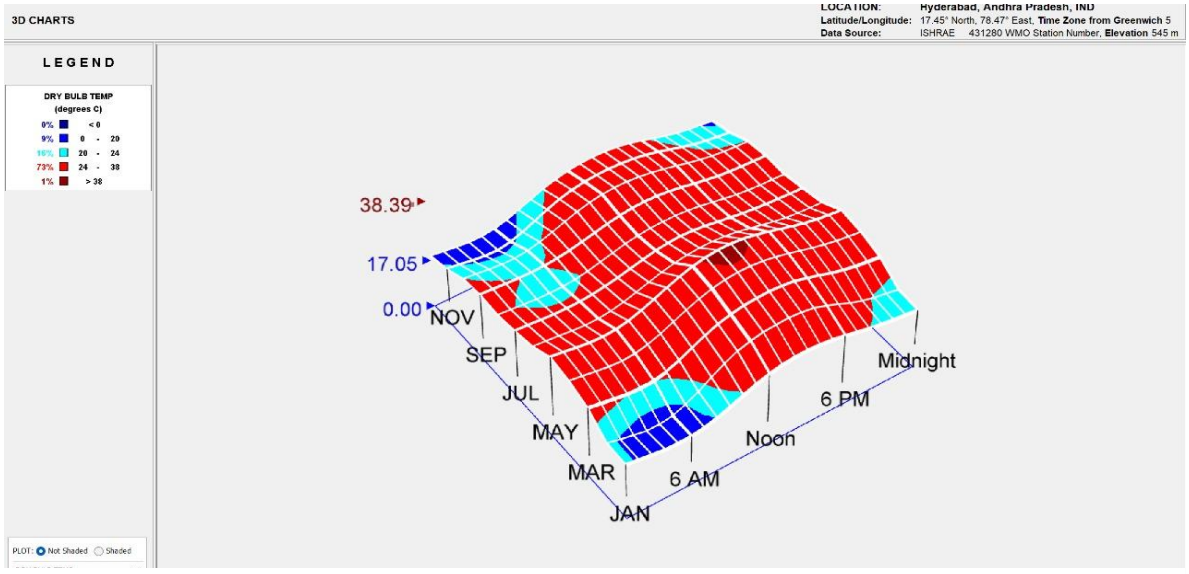


Figure 24

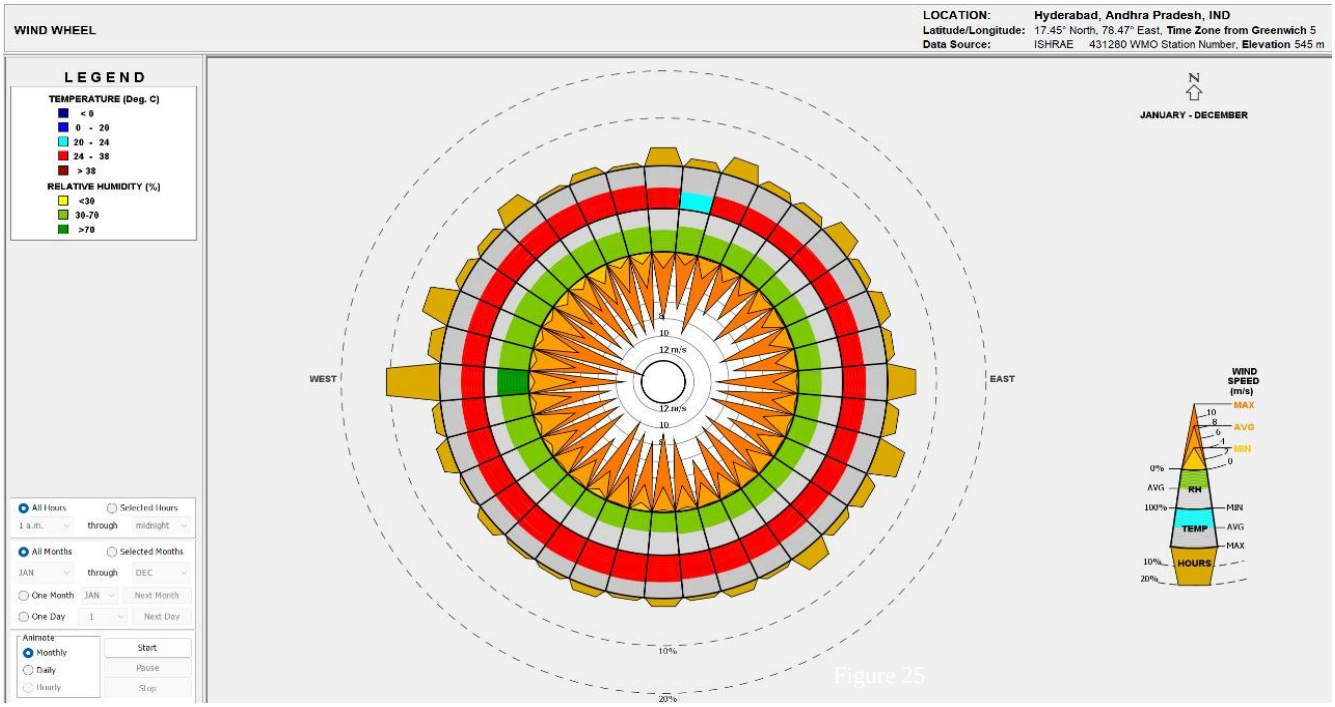
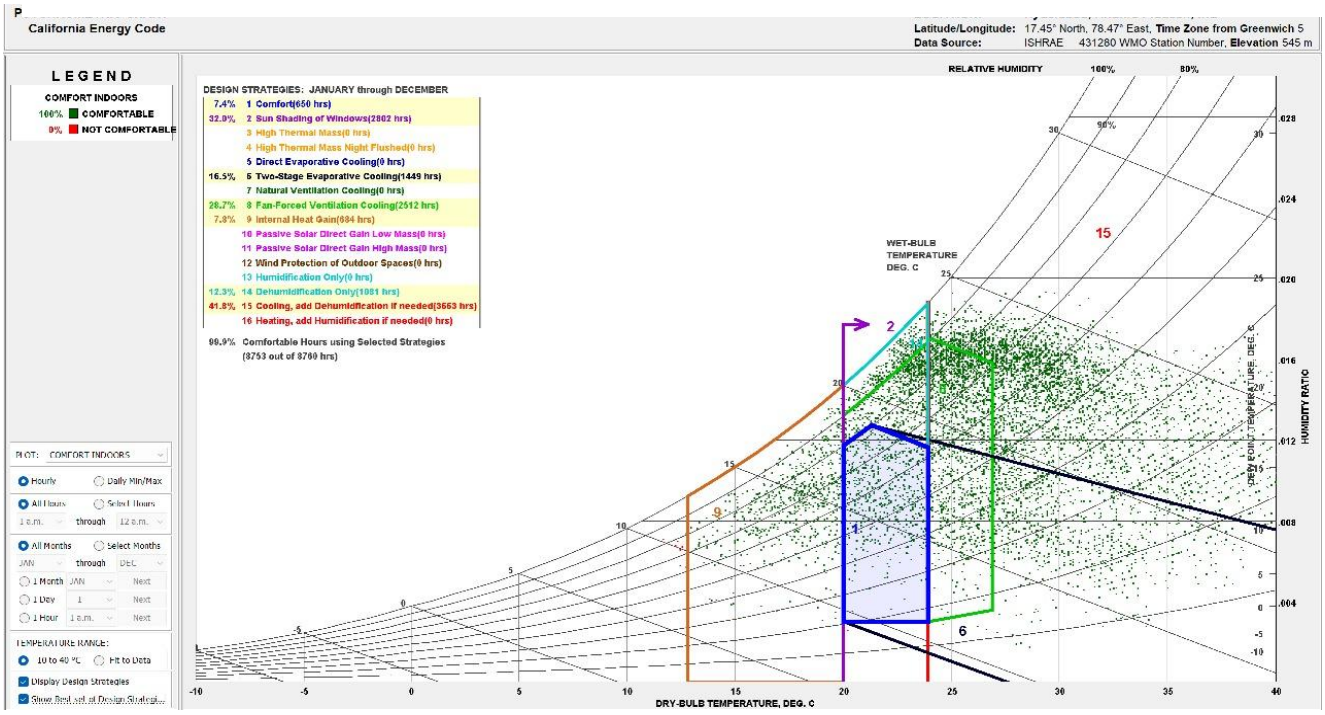


Figure 25

Wind Rose Diagram



Isometric Chart with Best Possible Design Strategies

Psychrometric Chart (Blue highlighted hours are comfortable as per ASHRAE 55 using PMV

2.4 Existing Features & Constraints

- **Vacant Status:** No significant built-up structures; “clean site” minimizes demolition cost.

- **Potential Constraints:** Power line corridor may traverse a portion of the property (to be verified and adjusted in site utilization plan).
- **Adjacent Water Body:** Dharmasagar canal may serve as an amenity feature and buffer, but also requires safety and landscape integration.

2.5 Key Site Opportunities & Constraints Summary

Opportunities:

- Direct NH-163 frontage for visibility and branding.
- Flat terrain and clean site, easing large span construction.
- Adjacent to Dharmasagar canal, offering landscape/campus amenity (with safe fencing).
- Expandability: bordering parcels and industrial land offer long-term growth.
- Alignment with urban development and PPP policy priorities.

Constraints:

- Power line corridors (to be mapped/offset).
- Proximity to waterbody requires ecological/safety buffer.
- Site utilization subject to detailed statutory and environmental regulation (height, setback, coverage).

2.6 Climate & Sustainability Considerations

- **Climate:** Composite – hot summers, substantial monsoon, mild winters.
- **Design Response:**
    - Wind/solar orientation for natural cooling
    - Ample landscape for microclimate and passive cooling
    - Rainwater harvesting and sustainable site drainage.
    - Use of native drought-tolerant species in planting palette
- 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 Köppen 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.

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.

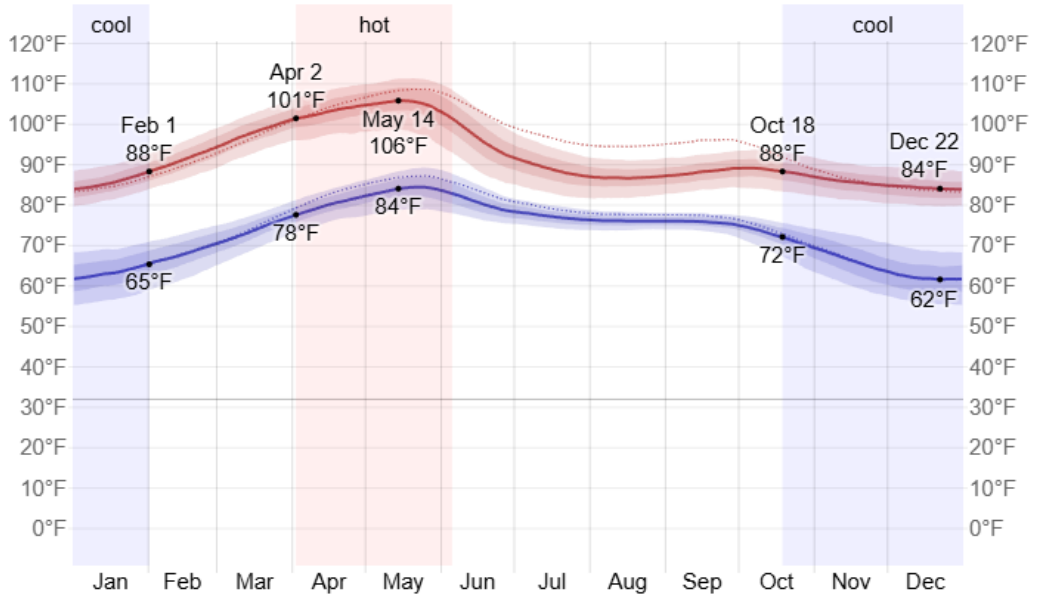


Figure 27

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

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.

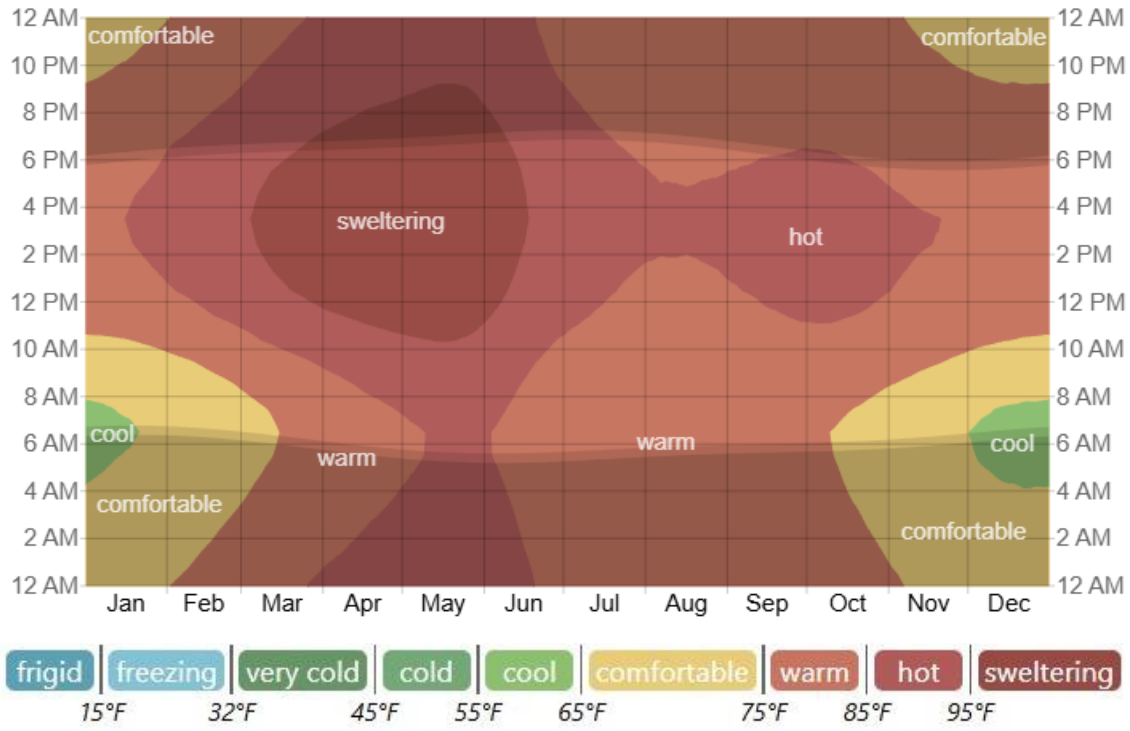


Figure 28

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

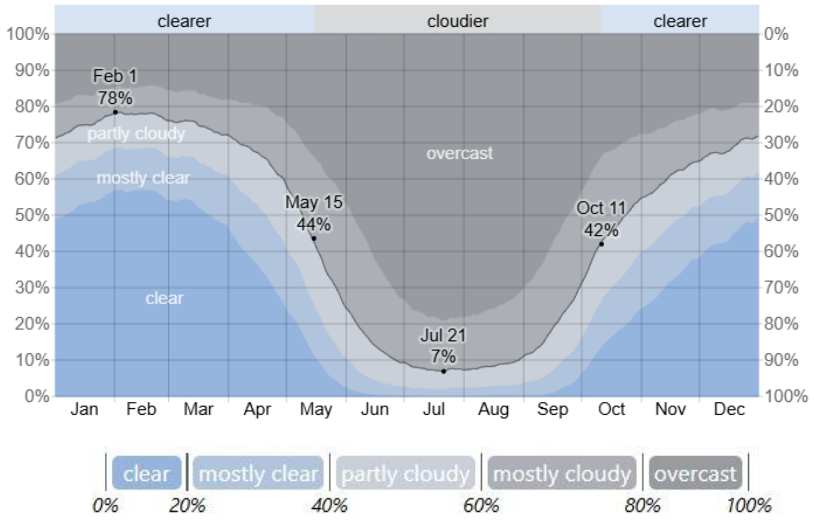


Figure 29

is overcast or mostly cloudy 92% of the time.

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%

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.

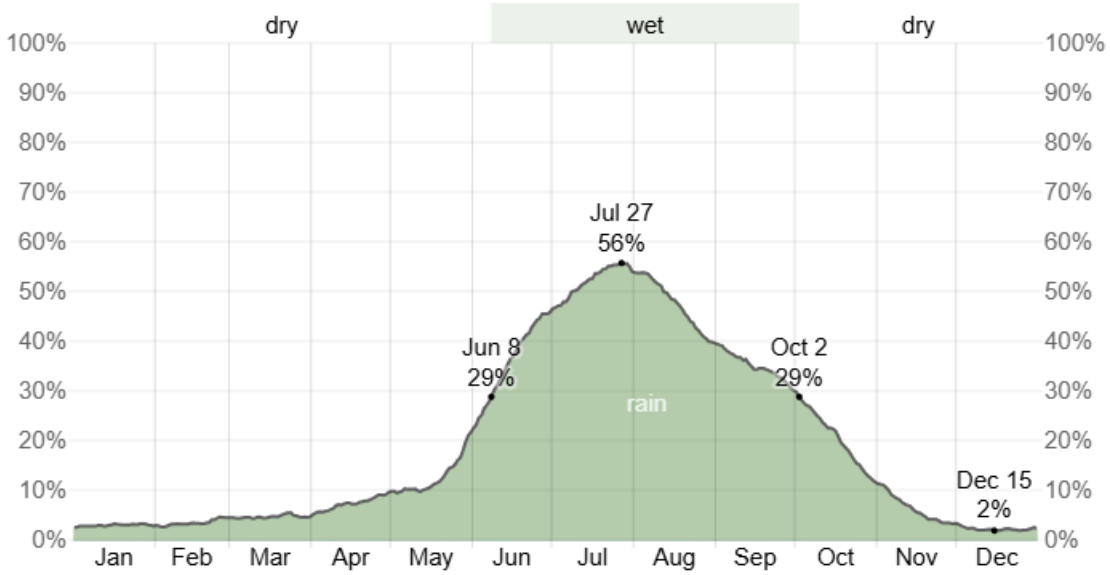


Figure 30

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

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.

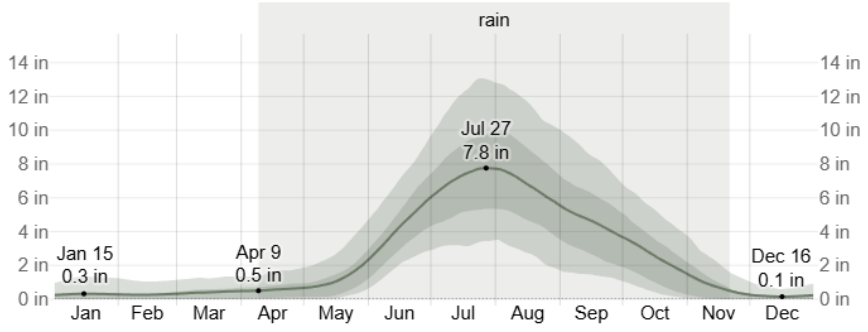


Figure 31

	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″

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.

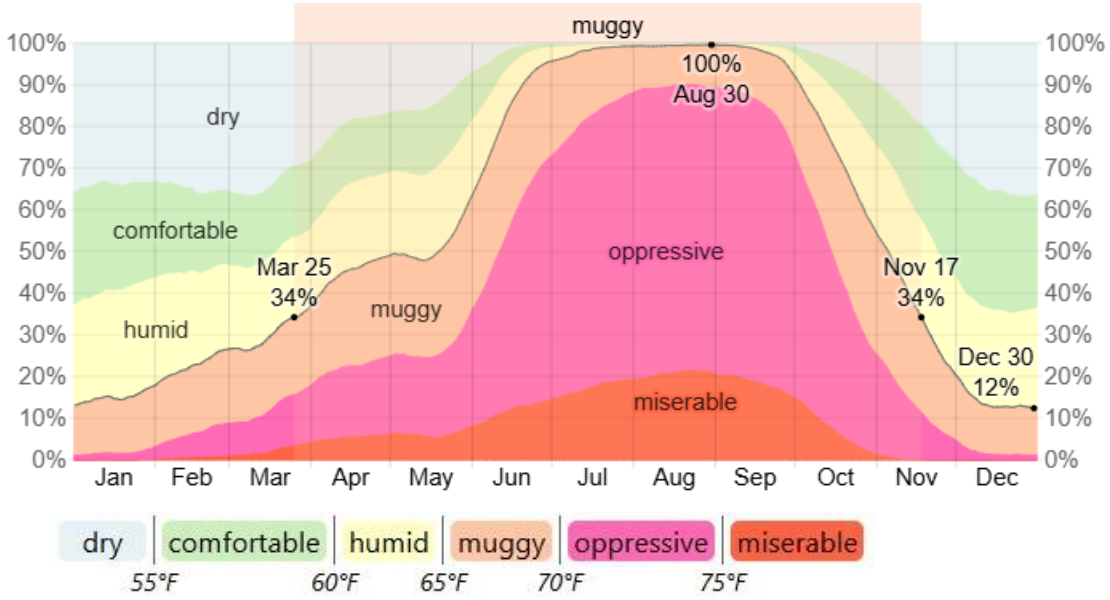


Figure 32

	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

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.

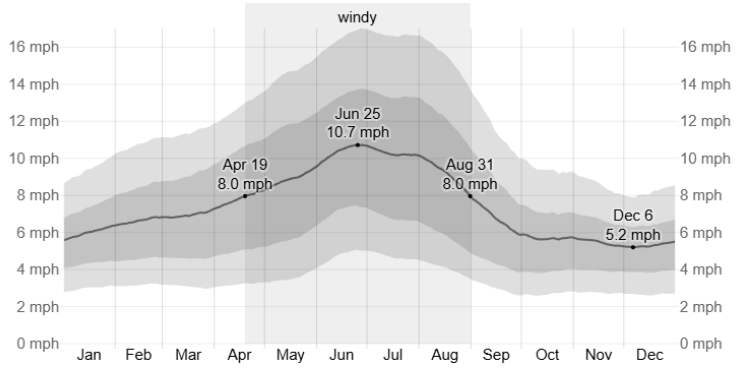


Figure 33

	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

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.

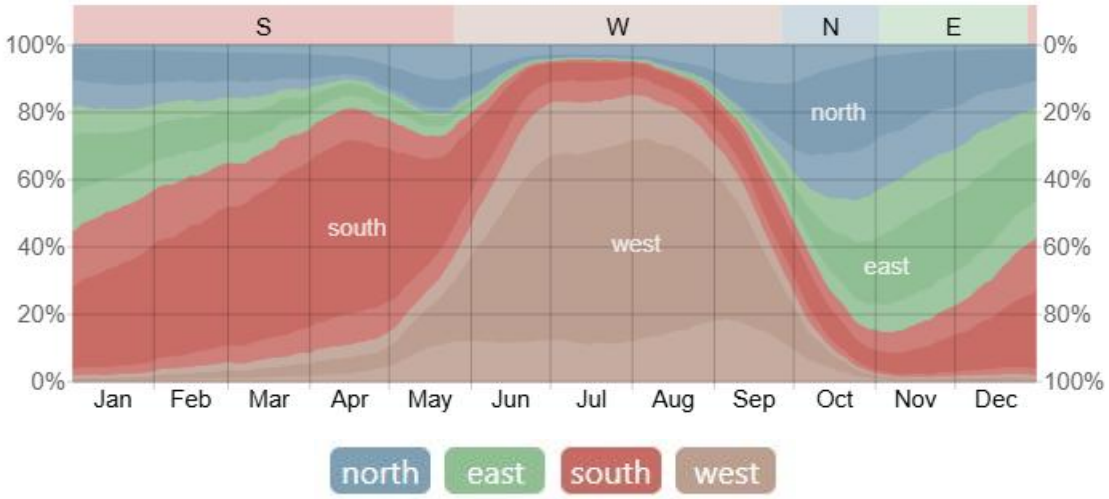


Figure 34

Streetscape



Figure 35

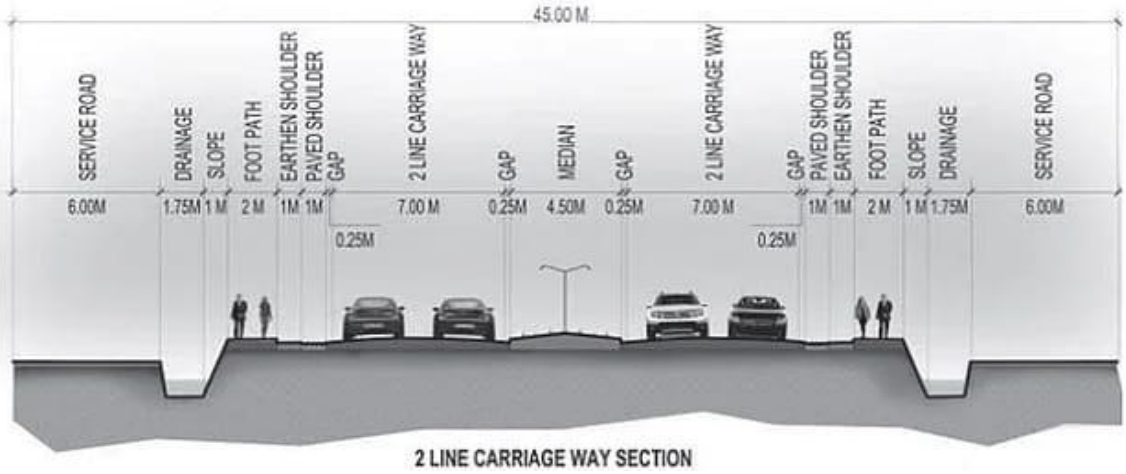


Figure 36

Topography

Mostly flat land and slopes towards east side of site



Figure 37

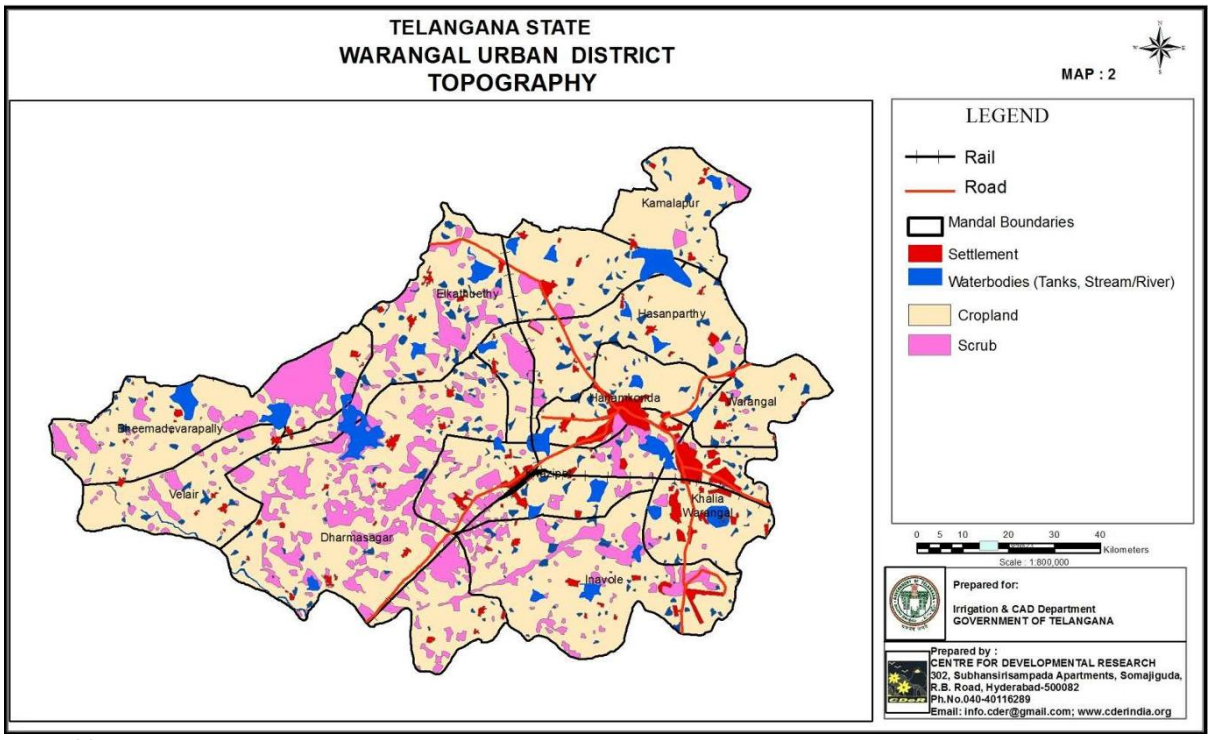


Figure 38

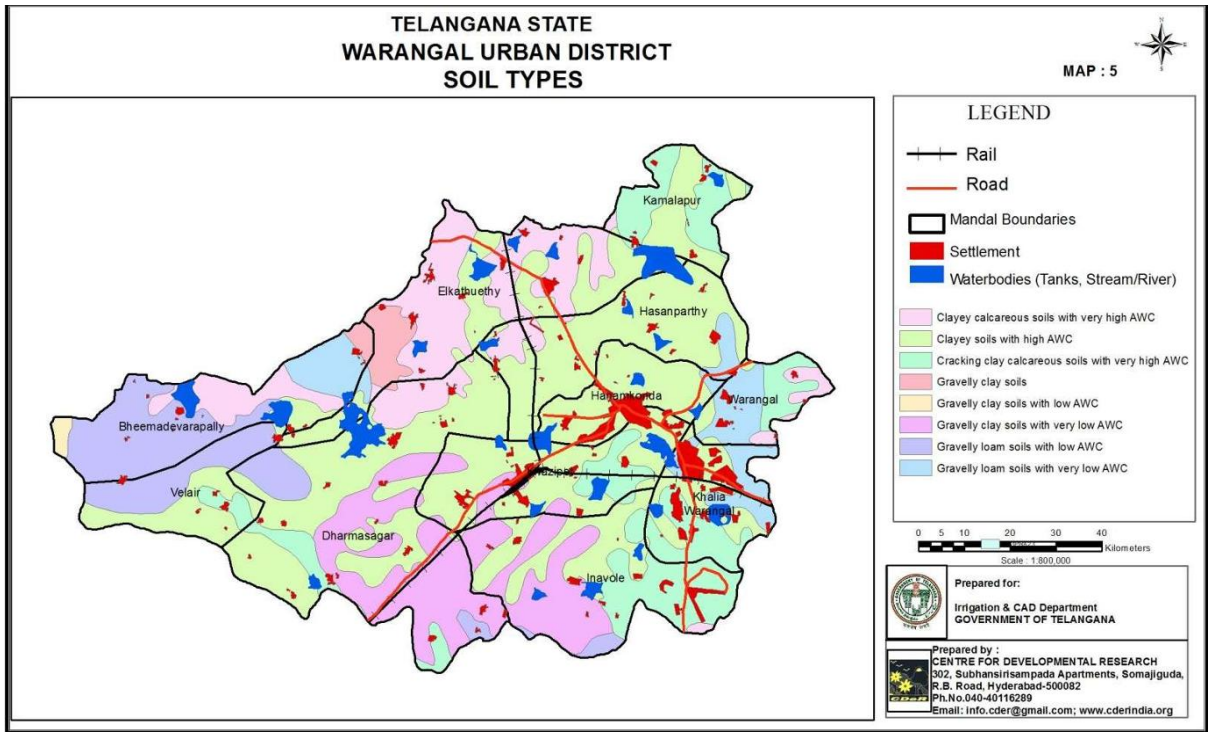


Figure 39

Vegetation

Attribute	Asian Palmyra Palm	Neem Tree
Common Name	Asian Palmyra Palm / Toddy Palm / Ice Apple Tree	Neem Tree
Scientific Name	*Borassus flabellifer* 	*Azadirachta indica* 
Region	Tropical Asia	Native to Warangal & Indian subcontinent
Trunk Radius	~30–50 cm (Diameter: 60–100 cm)	~30–45 cm (Diameter: 60–90 cm)
Average Height	20–30 m (up to 30 m in ideal conditions)	Around 15–20 m
Foliage Type	Evergreen	Evergreen (may shed in drought)
Leaf Shape	Fan-shaped	Compound leaves
Leaf Size	1.5–2 meters long	Medium-sized leaflets
Crown Spread	6–10 meters wide	10–15 meters wide (dense, rounded canopy)

Soil Type



Figure 40

Sandy Loam Soil

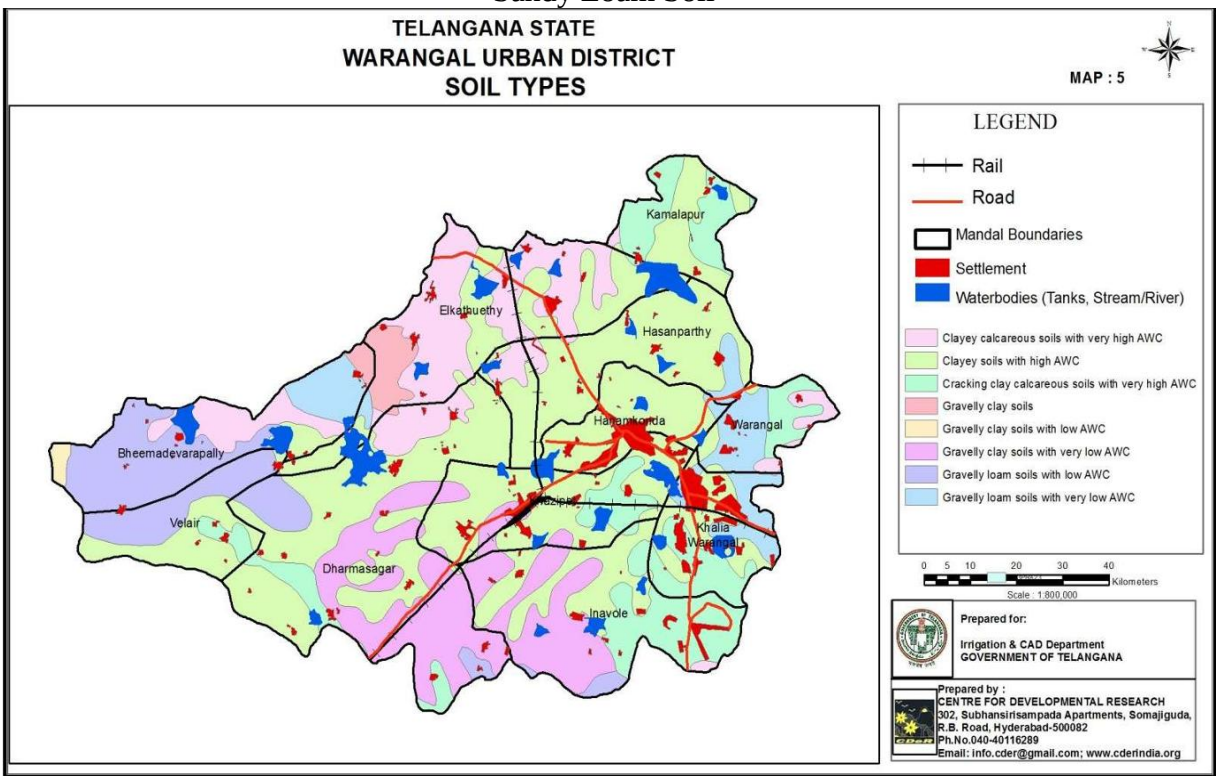


Figure 41

Views of Site



Figure 42



Figure 43



Figure 44

2.7 Tender Details

1.3.2 The Authority shall endeavour to adhere to the following schedule:

Sl.	Event Description	Date / Timeframe
1.	Notice Inviting Tender	28 Dec 2022



2.	Last Date for Receiving Queries on RFP Document	03 Jan 2023
3.	Pre-Bid Conference	05 Jan 2023 10:30
4.	Authority's Responses to the Queries	06 Jan 2023
5.	Bid Due Date	21 Jan 2023 up to 1600 Hours
6.	Bid Opening Date	23 Jan 2023 1630 Hours
7	Financial Bid Opening	Will be intimated in due course

1.3.3 All queries on the RFP document shall be addressed to

The Chief Engineer,
Telangana State Industrial Infrastructure Corporation (TSIIC)
6th Floor, Parishrama Bhavan, Basheerbagh, Hyderabad – 500 004
Telangana State
Phone: 040- 23237625 Extn. 711

1.3.4 Pre-Bid Conference will be held on date mentioned in Clause1.3.2. above. Venue of the Pre-Bid Conference is given below:

Parisrama Bhavanam,
6th Floor, 5-9-58/B,
Fateh Maidan Road,
Basheerbagh,
Hyderabad - 500 004

Figure 45

Literature Survey

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.

-Lawson Fred, Congress, Convention and Exhibition facilities: planning design and Management

2.8 Convention Centre

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.
The term Convention is widely used in much discipline. A '**Convention**' word in general can be defined as

- A large formal assembly of a group with common interests, such as a political party or trade union
- The persons attending such an assembly
- (U.S. politics) an assembly of delegates of one party to select candidates for office
- (Diplomacy) an international agreement second only to a treaty in formality
- A telecommunications convention
- Any agreement, compact, or contract
- The most widely accepted or established view of what is thought to be proper behavior, good taste etc.

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

- 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.

2.9 Exposition Centre

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.

2.9.1 Types of Exposition Centers

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. Organised and facilitated by governments and bringing together countries and international organisations (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,
Specialised Expos,
Horticultural Expos,
The Triennale di Milano





Figure 46

2.10 Historical background

Convention centers and Exhibition spaces evolved from the open-air amphitheaters of the Greek Agoras and Roman Forums, which were initially intended for large commercial fair. The first convention centers can be traced back to mid-19th century Britain. Commonly known as exhibition halls, the centers were designed to bring together people to discuss and explore their mutual interest of a subject. These imposing Victorian buildings often covered several acres and were multi-functional incorporating lecture halls, libraries, galleries, theatres and exhibition areas

The Crystal Palace, Hyde Park

Among the first historical convention centers constructed was The Crystal Palace in London's Hyde Park. Providing 92,000 m2 of exhibition space, the building was erected in 1851 to house The Great Exhibition a grand show case of modern industrial technology and design.
Organized by Prince Albert and inventor Henry Cole, the Great Exhibition was an international platform for world powers to demonstrate their technological and cultural

achievements. Although countries all around the world could contribute, British exhibits - from working machinery to scientific and surgical instruments - took center stage, promoting Britain's position as a great industrial power. In 1854 the Crystal Palace was dismantled and re-built in Sydenham, an area of south London which by association became known as Crystal Palace. Ravaged by fire in 1936, the building was eventually pulled down.

2.11 Types of conventions

Convention centers are expansive venues designed to host events such as conferences, trade shows, and conventions. These venues vary in scale, from global to regional events, and play a vital role in stimulating local economies, promoting networking, and facilitating business and knowledge exchange.

Table 1. Different types of Convention Centres

Types	Usage	Example
Exhibition Centers	Designed for trade shows, exhibitions, and fairs with large, open spaces to accommodate booths and displays.	Pragati Maidan, New Delhi
Conference Centers	Focused on hosting meetings, conferences, seminars, and workshops with flexible meeting rooms, auditoriums, and break-out spaces.	India Habitat Centre, New Delhi
Multi-purpose Convention Centers	Versatile spaces for a range of events like conventions, exhibitions, concerts, and sporting events, customizable to different event requirements.	Bharat Mandapam, New Delhi
Specialized Convention Centers	Cater to specific industries or events, such as medical conventions or technology expos, with tailored facilities for those needs.	Bombay Exhibition Centre, Mumbai

2.12 Users

	Spaces	Users
Public Use	**Entrance Hall**	Delegates, performers, and staff.
	Registration Centre	People taking part in various conventions
	Toilets	All occupants.
	Exhibition Halls	All occupants
	Parking	Anyone visiting Convention center.

Semi- Public Use	**Auditorium/Plenary Hall**	Performers, delegates, and local people.
	Conference Rooms	Delegates and staff
	Seminar Rooms	Delegates and staff.
	Public amenities	Delegates
Private Use	**Administrative offices**	Staff of the convention centre
Service Areas	**Parking**	Staff
	The Kitchen	Staff

2.13 Components of the project:

Exhibition Spaces: In its broadest sense, an exhibition is a display, show or demonstration of
something of beauty, value or particular interest to a targeted audience.
Exhibition halls should have the space, freedom and flexibility to create an exhibition environment. In any exhibition halls, proper considerations should be given to the movement of people and also to the moving pattern.
On the other hand, outdoor exhibition spaces are usually located to immediate vicinity of the exhibition halls. Outdoor exhibition areas can be developed as a flat ground or as an amphitheater.
Conference Spaces or **Auditorium Halls**: Conference halls or Auditoriums are mainly allocated in the exhibition spaces to hold conferences and/or seminar during the exhibition period. Proper attention must be provided in designing entry and exit routes.
Multipurpose Halls: Multipurpose Halls can be used for conferences, exhibitions, meetings, symposiums and several other events. Multipurpose Halls can also be used as Banquet and/or Event Halls and sometimes also as Galleries.
Other Important spaces of a Convention Center include:

- Recreational Spaces.
- Gallery.
- Restaurants.
- Administrative Spaces.
- Parking Spaces.
- Landscaped Areas.

2.14 Major design considerations:

2.14.1 Access and Entrance:

- Separate access is required for visitors, staff, goods and service vehicles and emergency

requirements. It is usually desirable to provide alternative entry for public which is independent from that used by conference visitors. This not only facilitates management

and security, but also enables two or congress events or exhibitions to be run independently in parallel.

- Easily identifiable entrance and exit, and clear external signage, which may need to be illuminated.
- Sufficient unloading/loading space to accommodate multiple events.
- Level ground floor with loading docks of sufficient size for all services including client vehicles. Large coach drops off and collection points adjacent to main entrance, with sufficient turning space and height, accessible under cover.
- Doors of sufficient width and height or demountable/retractable walls to permit truck access (trucks delivering exhibit and staging equipment pose particular problems).
- Floor loadings to permit truck access.
- Easily identifiable and weather protected entrance and reception area for attendees. Clearly identified disabled access.
- In larger venues, security systems and monitoring at loading docks. Separate entry for venue staff.
- Storage space (for several days) for pre-congress consignments including exhibitors' displays materials.

2.14.2 Access for the disabled:

- Specific provisions include allocation of parking spaces, identification of routes, provision of ramps, toilets and facilities designed for wheelchair and other disabled users in each main area

2.14.3 Parking:

- Coach parking bays off street.
- Sufficient undercover parking for attendees.
- All parking, including venue staff parking, should be secure. Direct access to venue lobby.
- Clear directions for exiting car park.
- Parking requirements for cars and other vehicles will depend on some extent on the proximity and conditions for use of alternative facilities, such as municipal car parks, as well as on the availability of public transport.

2.14.4 Service Vehicles:

- Plenty of space for parking while unloading/loading goods and equipment with a dedicated car park for vehicles delivering goods or equipment.
- Parking for trucks with sufficient height and turning space where staging, audio visual or other equipment needs to be packed in or out within short period of time.
- Long-term parking for trucks used for transporting production equipment and exhibitors'

displays.

2.14.5 Horizontal and Vertical Arrangements:

- The single floor organization provides easy access among the rooms and between the conference areas and other functional elements. This plan imposes few structural or mechanical constraints, permits total freedom in the planning of the rooms, allows for access from the refreshment break areas to outdoor terraces and patios.
- Vertical stacking of auditoria and/or main halls is more economical in the use of land, and enables space below tiered floors to be more efficiently used. Unit costs of

construction are higher and vertical transportation of people and goods may present difficulties.

2.14.6 Circulation:

- Linear arrangement of spaces with beginning, middle and end.
- A loop where the essentially linear storyline leads naturally back to the beginning.
- An arrangement of core and satellites where each theme or detailed treatment of a subject leads back to a central introductory or orientational areas.
- A more complex scheme combining linear, loop and core-satellite arrangement of spaces.
- Comb which refers to a circulation pattern in which there is a main circulation path and optional alcoves which a visitor may enter or bypass.

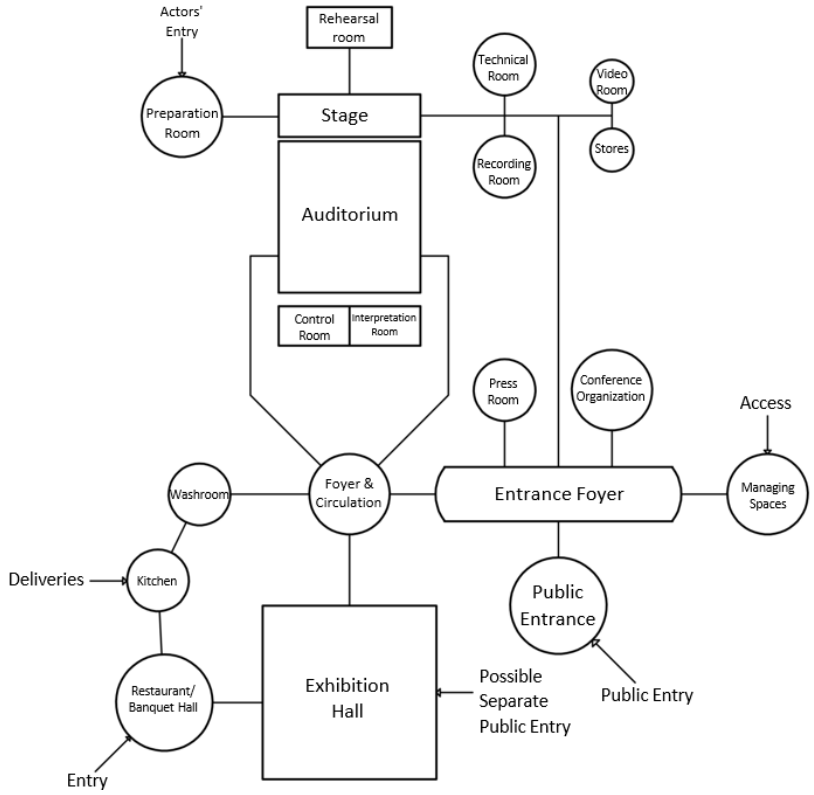


Figure 48

2.15 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
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
Delegate 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.

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.

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.

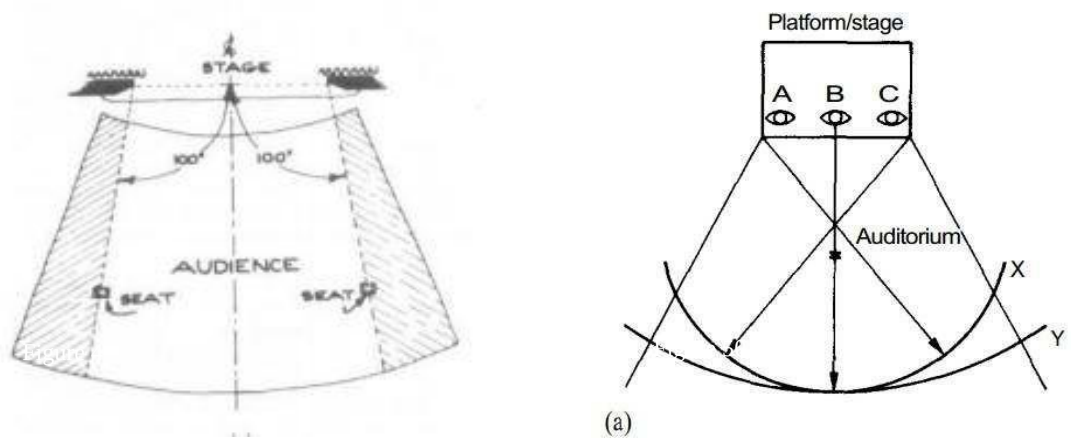
Staff flow

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.

2.16 Auditorium design

The auditorium is the heart of building, where the primary activity of experiencing and presenting performances take place. Audience seating is arranged to view the stage and the stage is a platform from which the performer can be communicate to the audience. The relationship between the two is very crucial for the success of convention centers. Mostly auditorium is designed to fulfill no of purposes. The objective of designer will be to use 100% usage of space. Auditorium should be designed in such a way that every member should be able to see and hear the performance of stage.

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



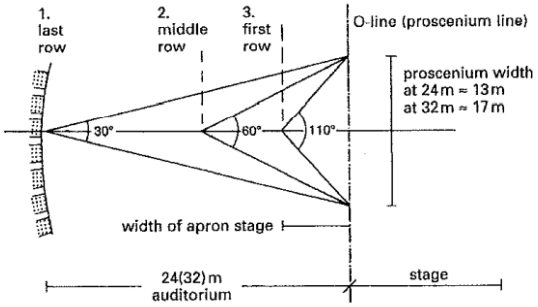
(a)

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

2.16.1 Audience requirements

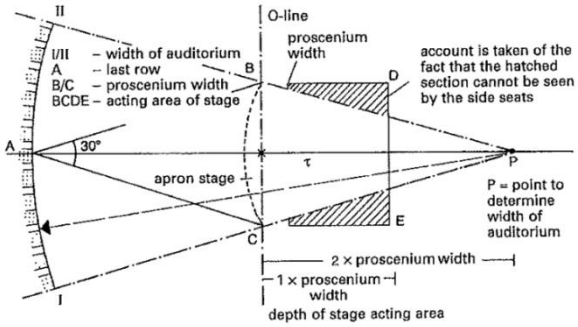
Every member of the audience should be able to see and hear clearly whatever is happening on every part of the stage or platform. The greater the encirclement of the audience of the platform or stage, the more people can be accommodated within the aural and visual limitations up to 180° encirclement.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

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:
1. Good view, without moving head, but light eye movements of approx. 30°.
2. Good view with slight head movements and light eye movements of approx. 60°.
3. 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.



7 Proportions of traditional auditorium plan

Figure 51



8 Auditorium width

Figure 52

4. Full head and shoulder movement allows an angle of view of 360°.
Proportions of the classic auditorium Opera, multi-purpose theatre, and traditional playhouse -7 0: 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 recognisable).
Auditorium width is determined by the spectators at the side being able to see the stage adequately -8.
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

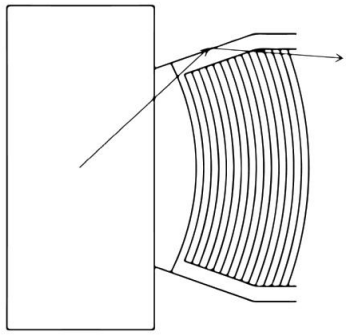


Figure 53
Angled side wall allows better side wall reflection

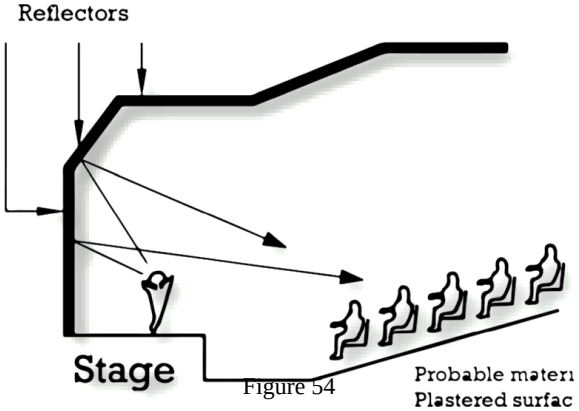


Figure 54

objective in attending the show is to receive the utmost sensory stimulation toward the maximum emotional and intellectual experience.

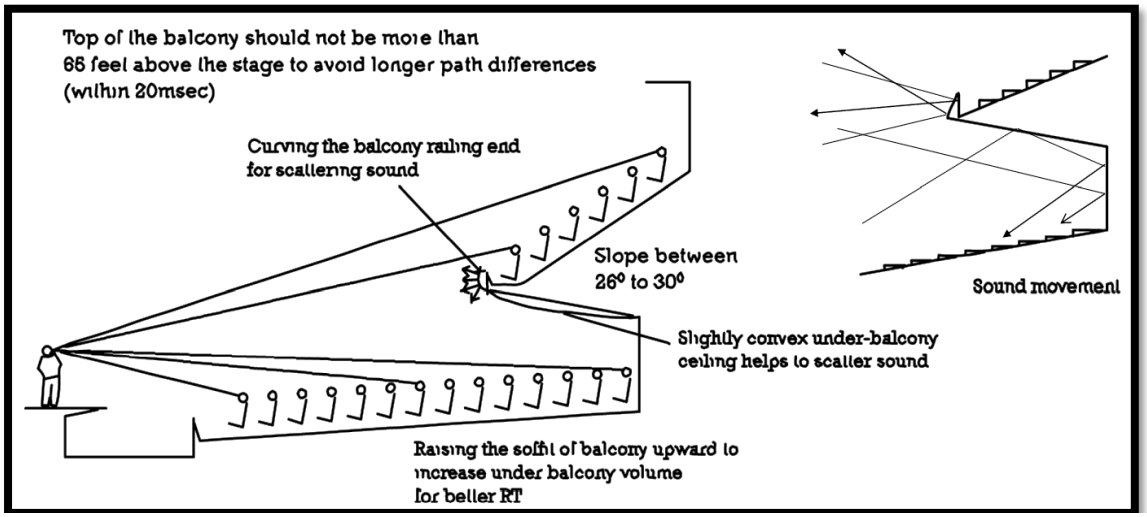


Figure 55

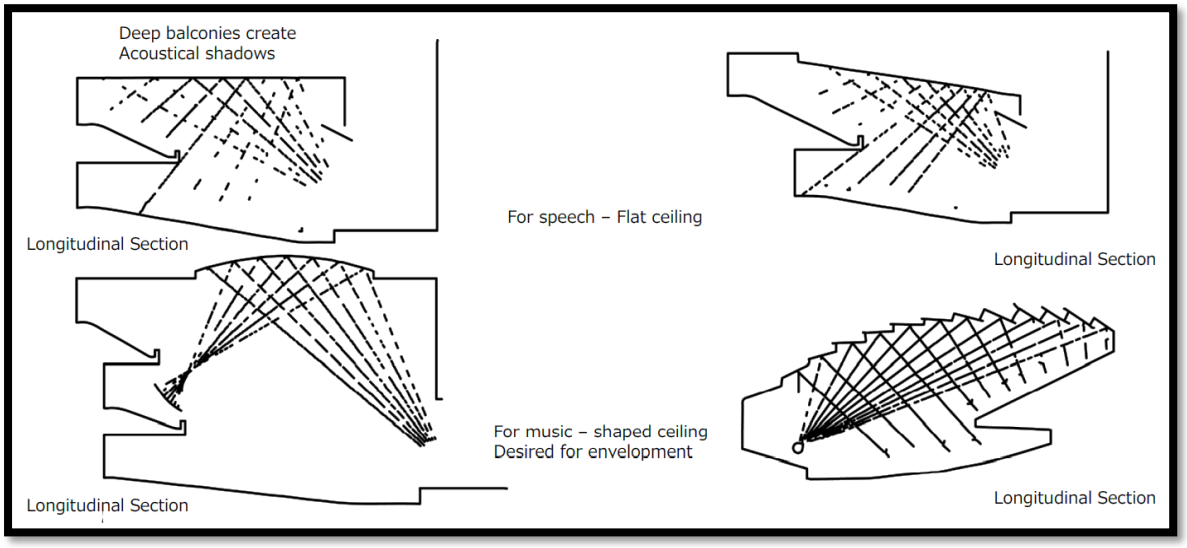
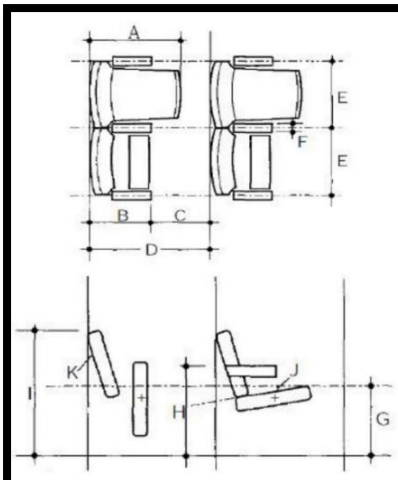


Figure 56



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 1 : Dimension of auditorium seats

Figure 57

Visual Limitations

- For drama= 20m
- For Opera= 30m
- For dance= 20m
- For conference = 20m

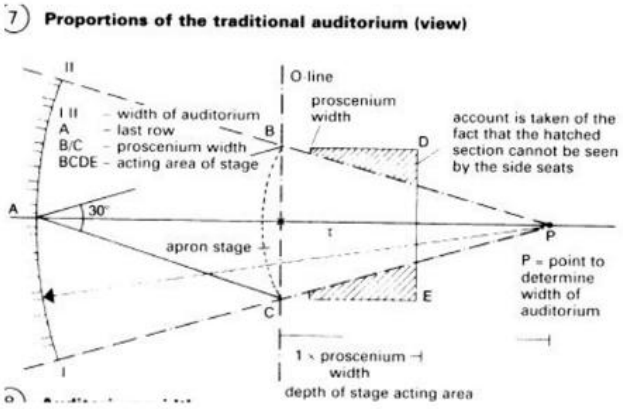
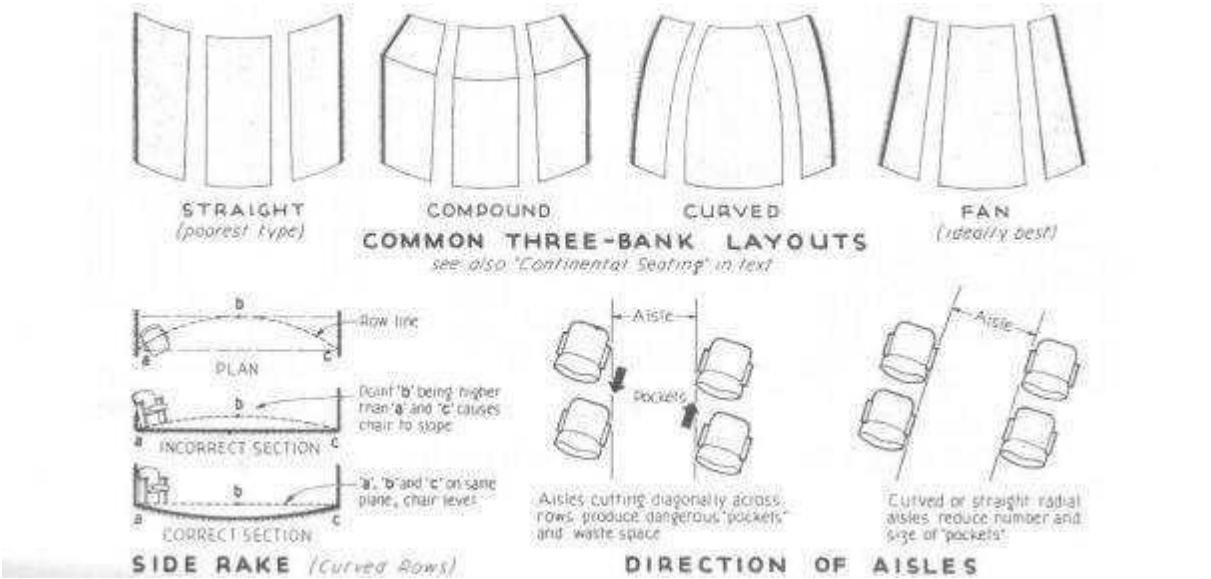


Figure 58

Figure 59



2.16.2 **Seating**

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.

- minimum Dimension of seating with arms =500mm Without arms =450mm
- Seat height = 430-450 mm
- Angle of inclination= 7-9 degree with horizontal Back Height = 800-850mm
- Angle of inclination = 15-20 degree
- Seat Depth= 600-720 mm, reduced to 425-500mm when the seat is tipped Other Factors affecting seating is,
- Acoustics: Upholstery to satisfy the acoustic requirements, usually the level of absorbency when unoccupied
- Ventilation & heating: Air supply or extract under a seat
- Upholstery: Thickness of padding should provide comfort & avoid fatigue, material of padding and finish must satisfy fire regulations

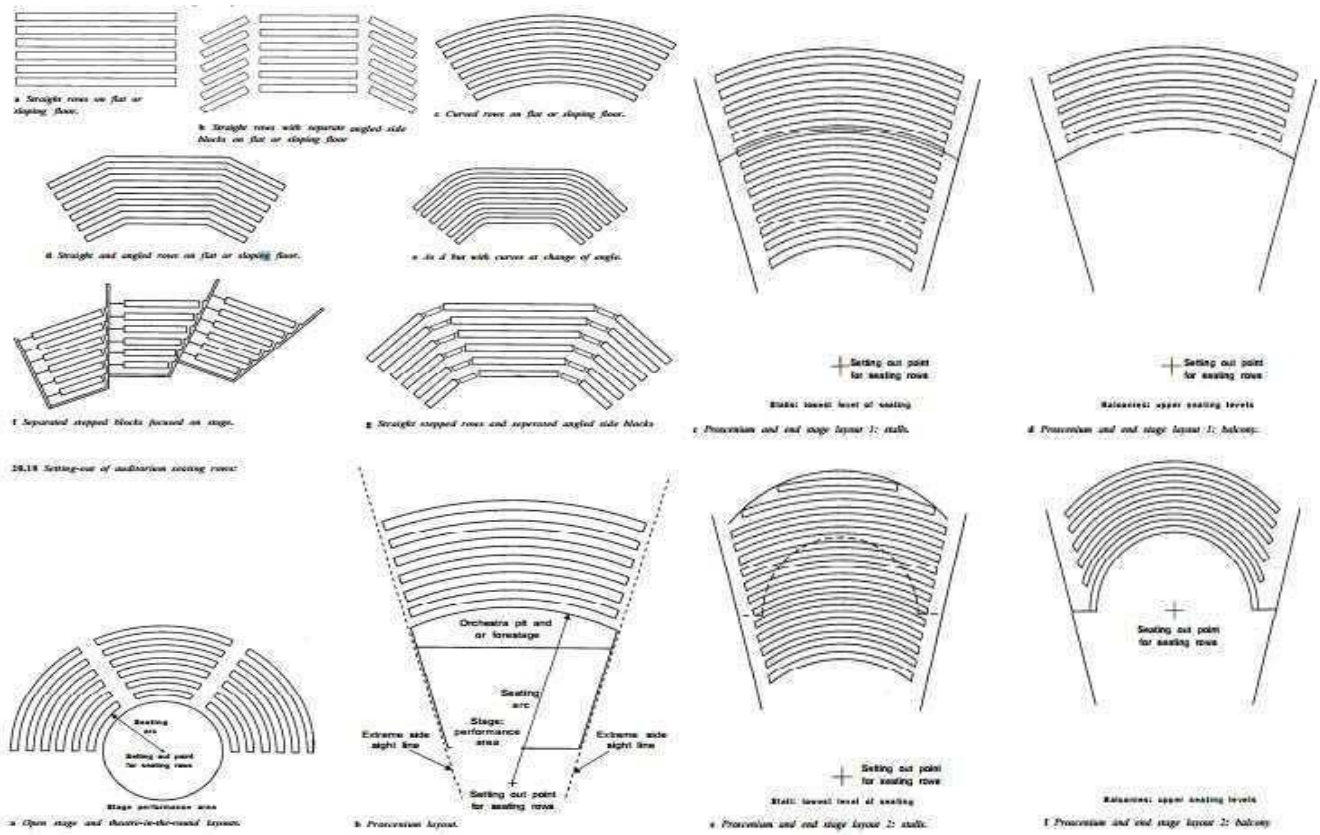


Figure 60

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 emphasised blocks of seats.

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.

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

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.

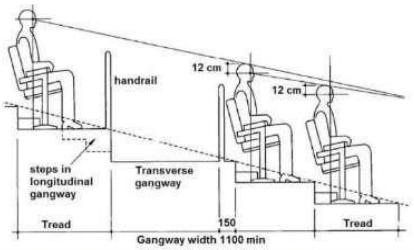


Figure 10 : Graphic representation of vertical sightlines at a transversal gangway

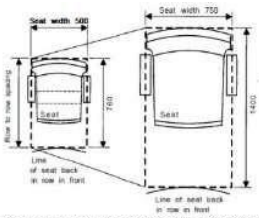


Figure 9 : Seating density, from 0.38 m² to 1.0.5 m² per person

Figure 61

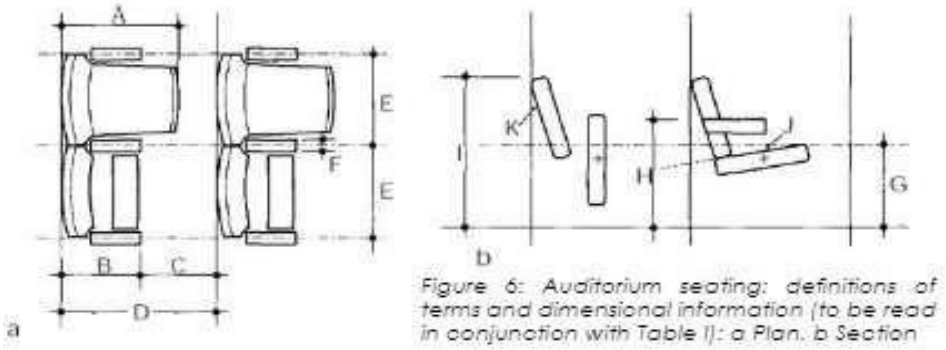


Figure 6: Auditorium seating: definitions of terms and dimensional information (to be read in conjunction with Table I): a Plan. b Section

Figure 62

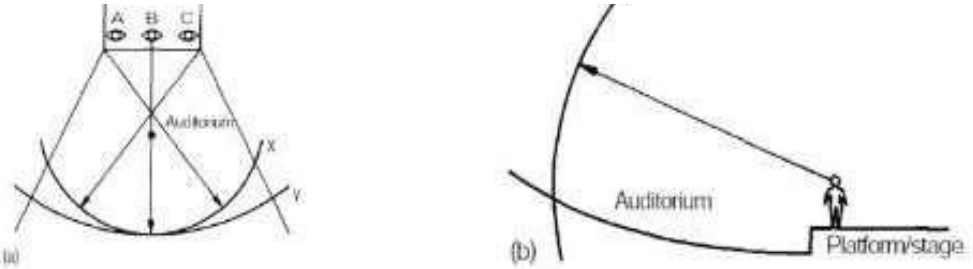


Figure 5: Visual and aural limitations: (a) Plan: for a performer at centre stage B there is an arc Y beyond which visual and aural perceptions are impaired. However, for performers nearer the sides of the stage at A and C produce more restrictive curves X. (b) Section: Similarly, visual and aural limits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

2.16.3 **Sightlines**

Horizontal sightlines

It is obtained from spectator's psychological perception & viewing angle.

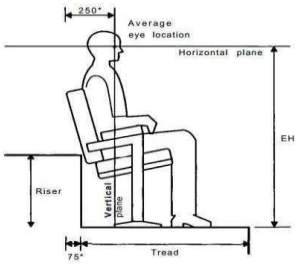
- Good view without head movement= 30 degree
- Good view with head movement = 60 degree
- Maximum perception angle = 110 degree
- With full head & shoulder movement= 360 degree

So, fan shape less than 100 degree is preferable due to Sightlines & Acoustic reason in Auditorium.

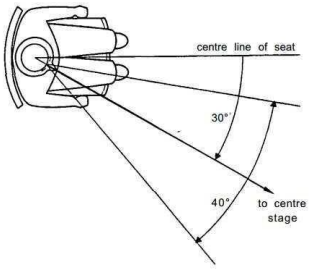
Vertical sightlines

The longitudinal section is a parabolic stepped floor as a theoretical rake produced by the sightline calculation. This gives every member of the audience similar viewing conditions. This may be reduced to a single angle or series of angles when applied as described the rake will also be steep. This is satisfactory for a single tier of seating with no balconies and is especially appropriate for open-stage formats.

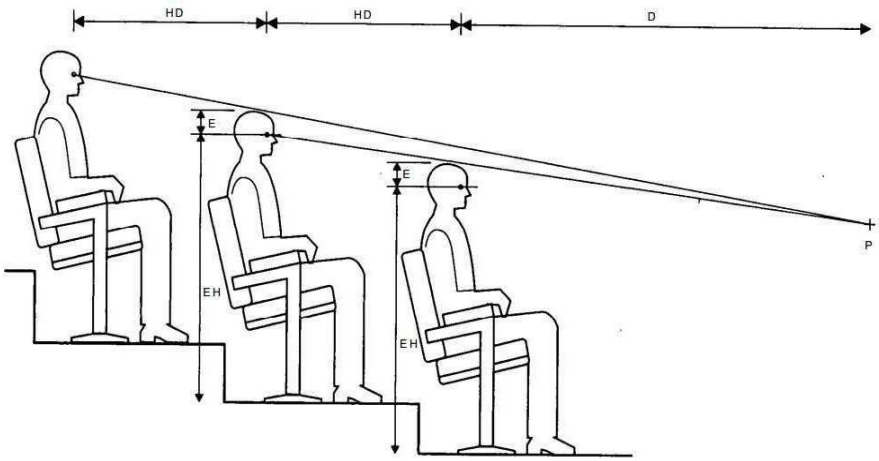
Figure 63



20.22 *Position of eye in relation to seat and stepped floor. Dimensions vary according to upholstery thickness, and inclinations of both seat and back. Working dimensions are starred **



20.25 a *The maximum comfortable amount the head can be turned from the seat centreline is 30°.*



20.21 *Graphic representation of vertical sightlines, P lowest and nearest point on stage clearly visible by audience, HD horizontal distance between eyes in successive audience rows, EH average audience eye height above floor, E height between eye and top of head, D distance from eye of person in front row to P*

Figure 64

2.16.4 **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.

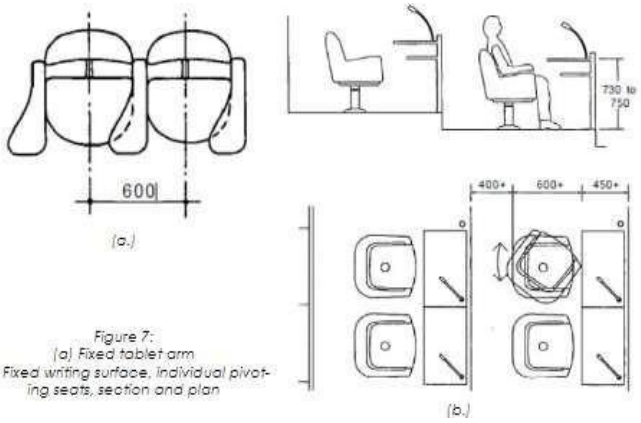
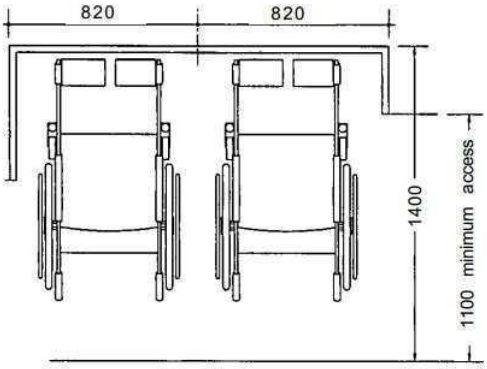


Figure 7:
(a) Fixed tablet arm
(b) Fixed writing surface, individual pivoting seats, section and plan

Figure 65

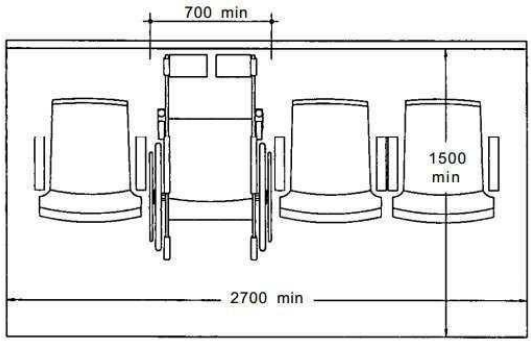
2.16.5 **Wheelchair** location

Regulations require a minimum of six places for wheelchair users, or 1/100th of the audience capacity, whichever if the greater. Their location as discrete areas can be at the rear, front, side or within the seating; Wheelchairs can be centrally positioned by forming a bay off a



20.27 *Designated wheelchair area, required dimensions*

Figure 66



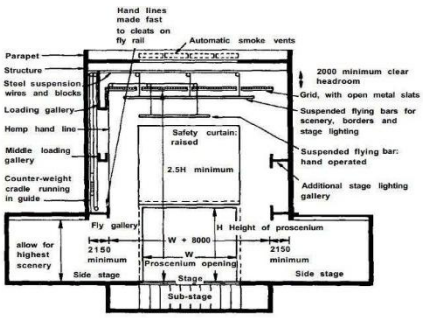
20.28 *Plan of a box designed for a wheelchair plus loose chairs*

Figure 67

cross-gangway.

2.16.6 **Fly** tower

Where there is a space dedicated for use as a stage, then it is essential to provide this with means of suspension overhead. This suspension to be used for both scenic and lighting instruments. The grid above the stage from where the suspensions come should provide clear walking space above the personnel to move about over the floor area. The received wisdom is to place the pulleys supporting the suspension bridge at high points.



20.50 *Section showing double-purchase flying system and side stages*

Figure 68

2.16.7 Other Spaces

Changing Room requirements

- It should have discrete access
- Be equipped with secure hanging space
- Have mirrors with good lighting over vanity tables Have separate toilets & showers
- Have audio/video feed from performance areas Be equipped with phones and power outlets

Rehearsal Rooms

- Enclosed space without natural light close to the dressing room
- Sound system, Lighting
- There should be at least one stage for the rehearsal of performances

Storage room

- 20-25% of playing area

Workshops for making scenery

- Should be exclude from main hall due to fire & limited space options
- 4-5 times the area of main stage

Technical utilities

- Transformer room
- Medium & low voltage switch room Power batteries
- HVAC plants
- Fire sprinkler system

Cloakrooms

- Minimum 4m2 per 100 people

2.17 Frequency and Flexibility of Change

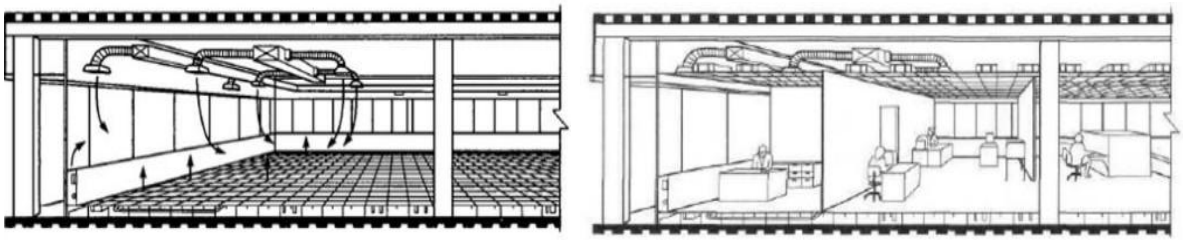
Another key feature of sustainability is recycling. Buildings are relatively permanent, while the organisations and activities within them are continuously changing. Flexibility is hence very important for a building to be used to its maximum potential Frequency of change depicts the flexibility expected. 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.

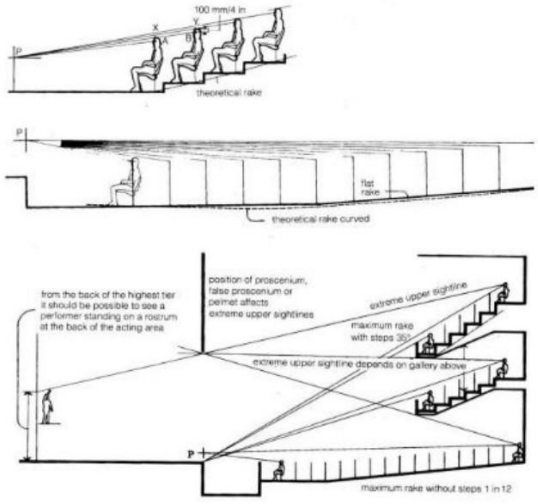
Building services: The heating, ventilation, and cabling infrastructure of a building, which have a life span of 15 years or less before the technology, becomes obsolescent.
Scenery: The fitting- out components of a building, such as ceilings, lighting, finishes which adapt a building to a specific organisation's 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.

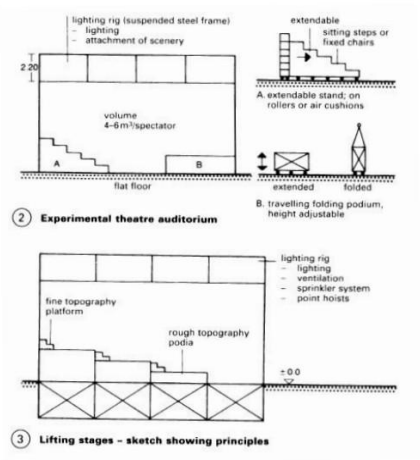
Figure 69



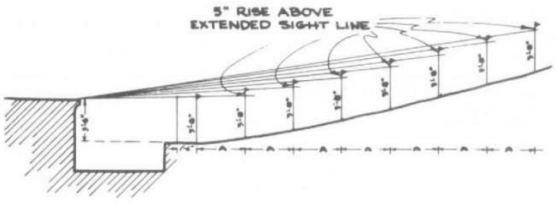
Visual Standards



Seating angle is not uniform. It is determined by the viewing angle of audience members. [Source: Neufert]



Flexible seating in a blackbox theatre. Either the levels can module to become seating or it can remain flat, employing removable seats and chairs - arranged specific to the event. [Source: Neufert]



The viewing angle determines the auditorium width and wings division on the stage. [Source: Neufert]

Figure 70

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

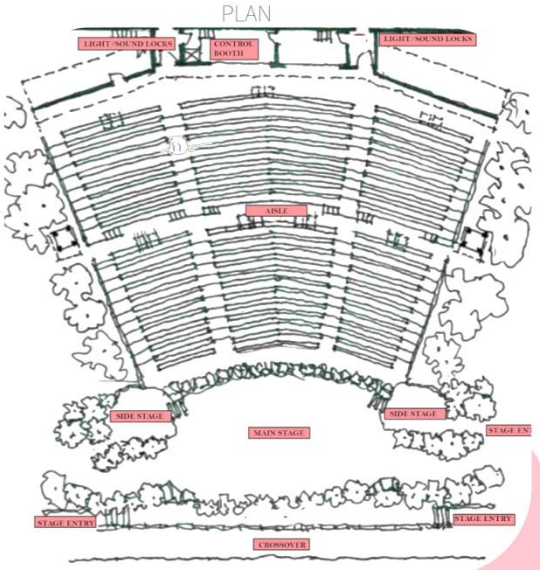


Figure 71 OAT Plan

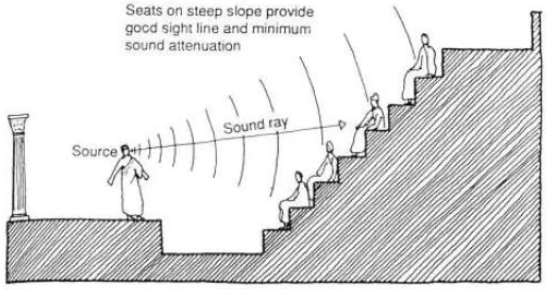
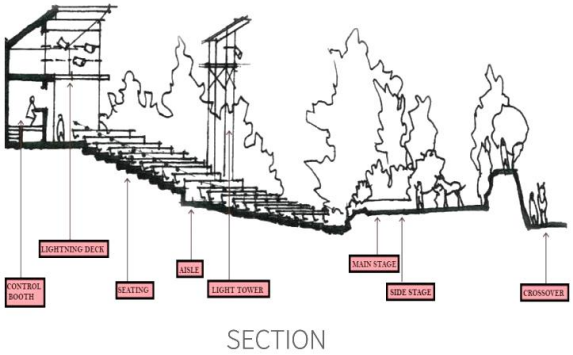


Figure 72



Shape - When the cavea 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 amphitheatre 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.

2.18 **Art gallery**

Basic types of layouts

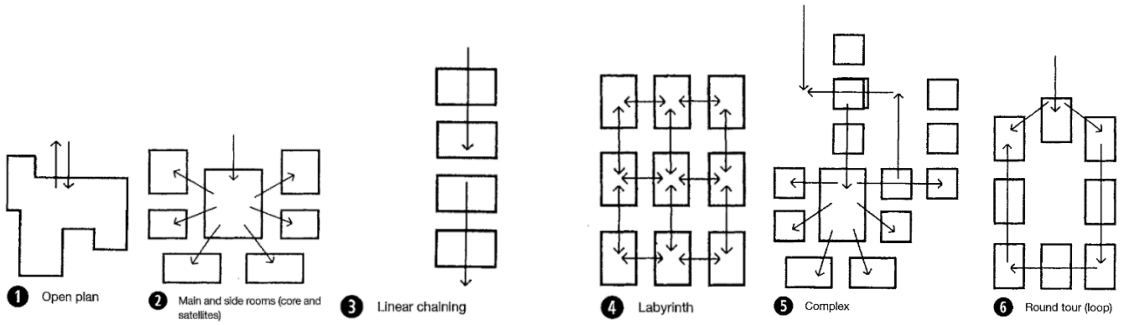
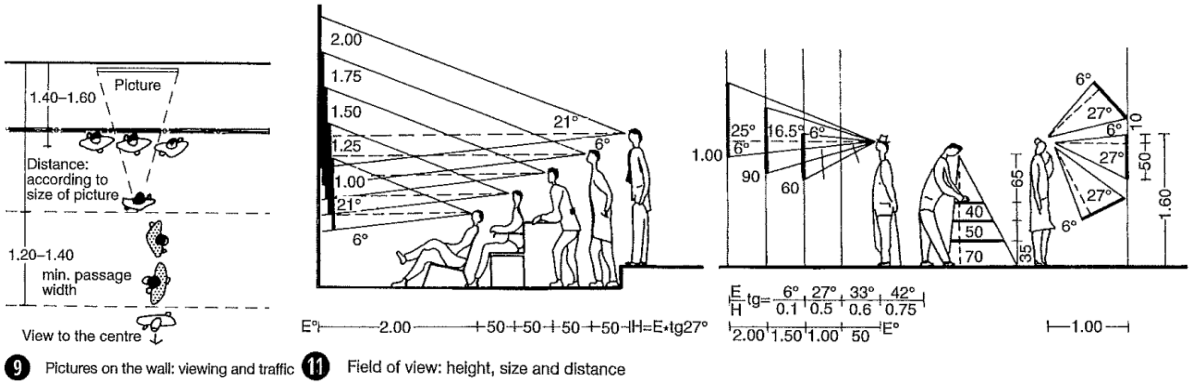


Figure 73 Types of gallery layout

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

Figure 74



2.19 **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.

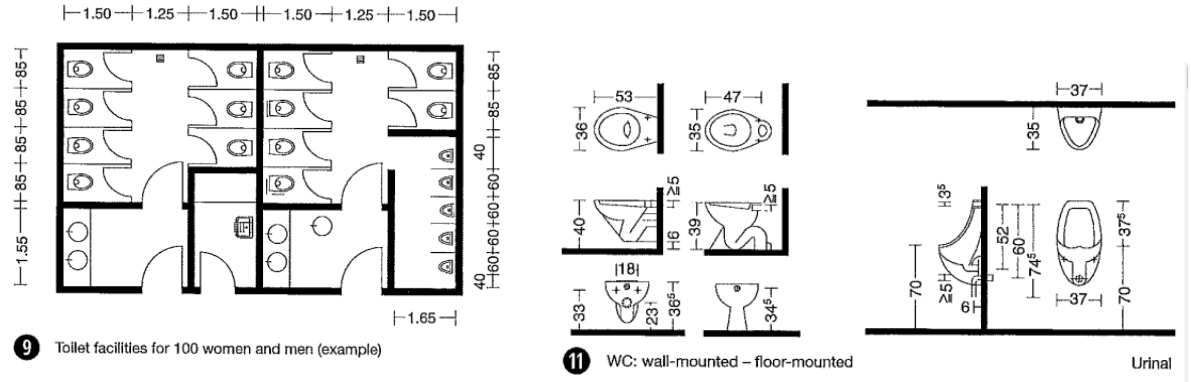
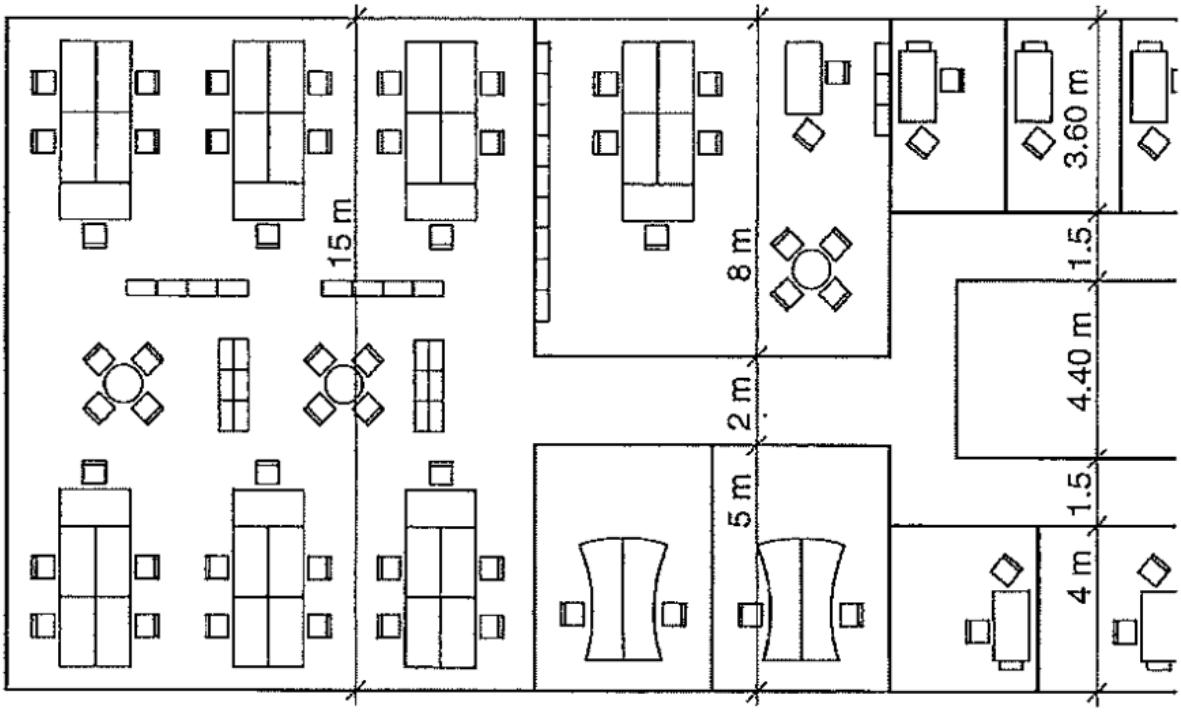


Figure 74 Toilet Design

2.20 **Admin**

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



6 Possible arrangements of various office depths in a 15 m wide plan

Figure 75

Workplace Seating layout

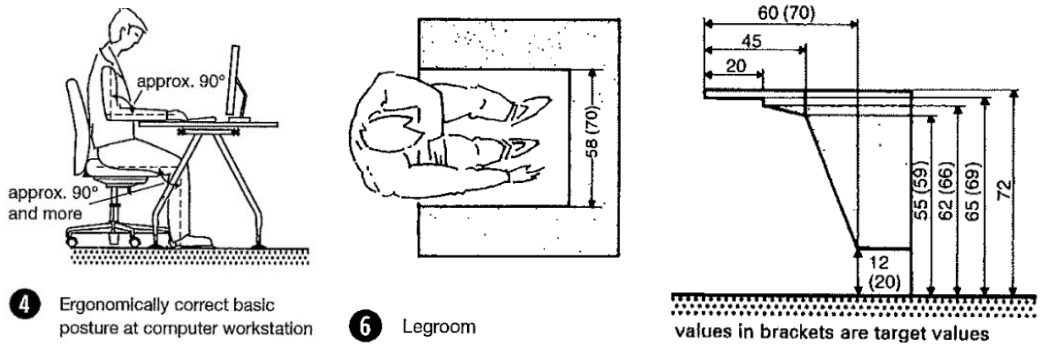


Figure 76

2.21 **Restaurant**

Different space standards required for waiter and diner are:

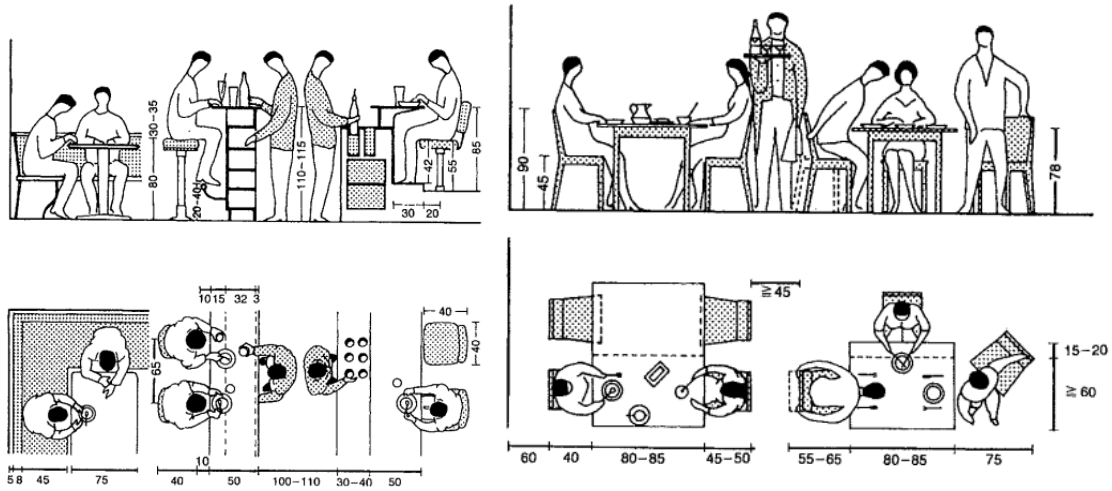


Figure 77 Space standards for restaurants

Seating layout

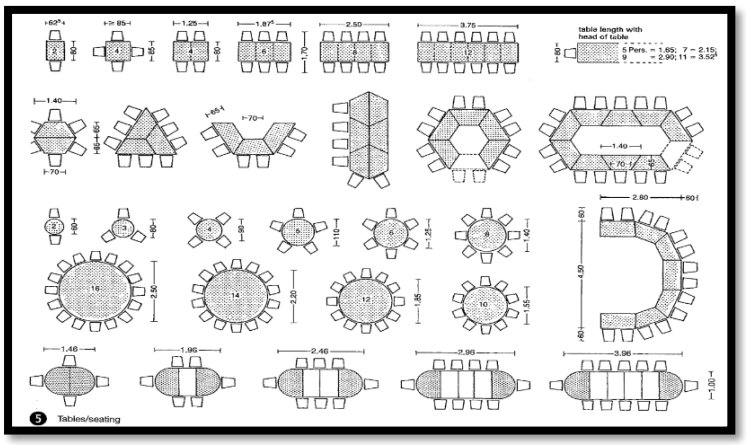
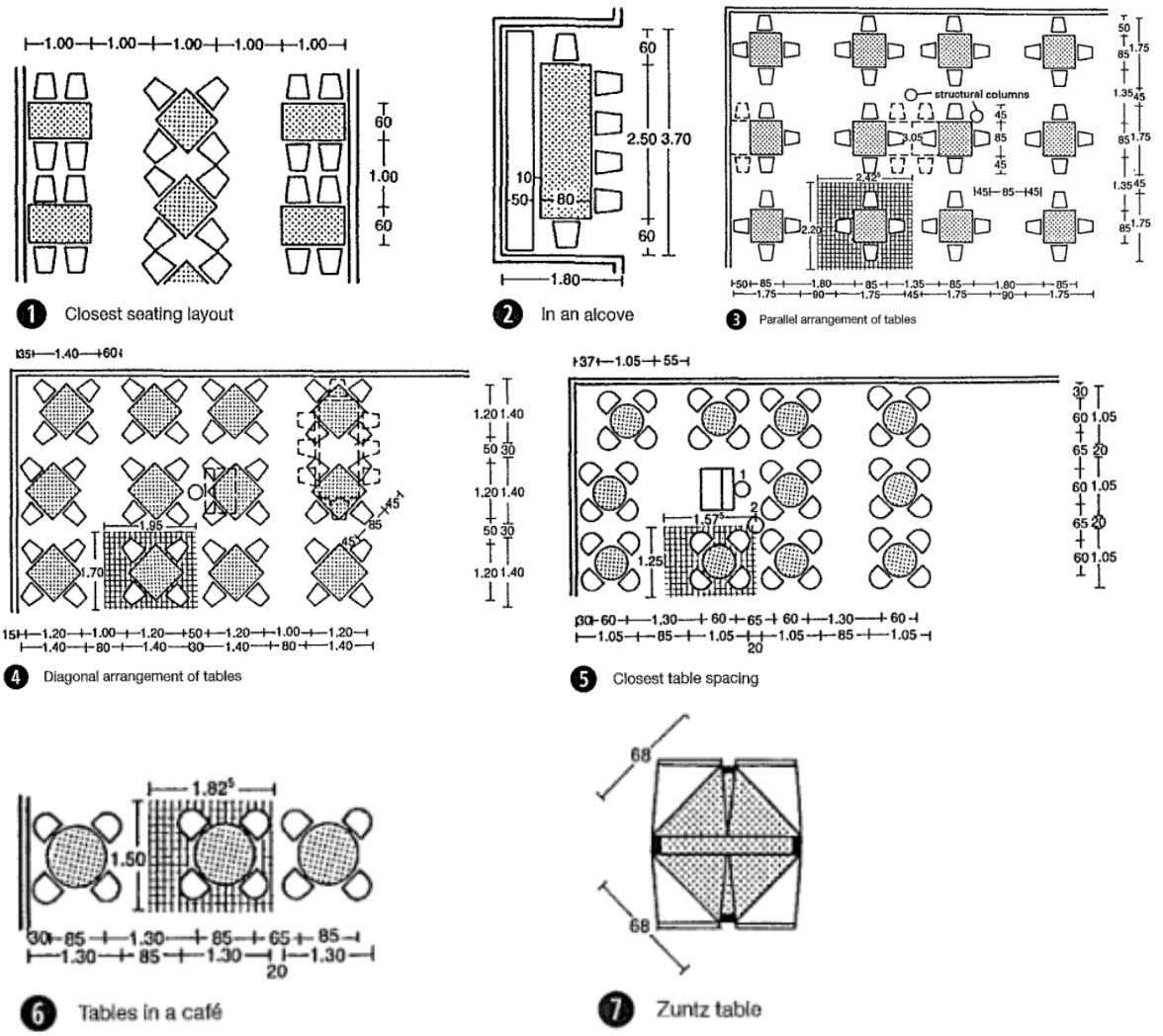


Figure 18 Seating Layout

Restaurant layout

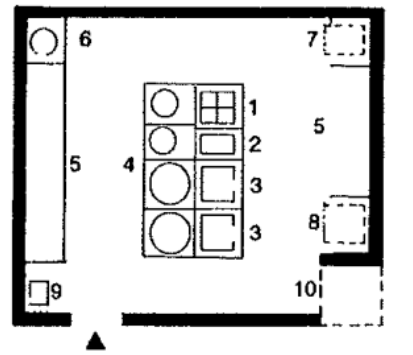
The different layouts of restaurant are:

Figure 80



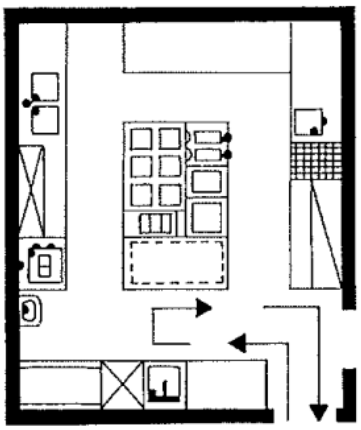
Restaurant Kitchen

Figure 82



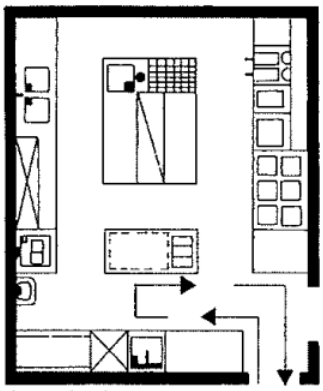
1 cooker
2 deep fat fryer
3 griddle
4 water boiler
5 work surface
6 cooker
7 double-deck oven
8 convectomat
9 hand basin
10 storage area

1 Basic organisation of the hot kitchen → 2 – 3



1. production in block

2 Kitchen for restaurant with 60–100 places



2. production in line

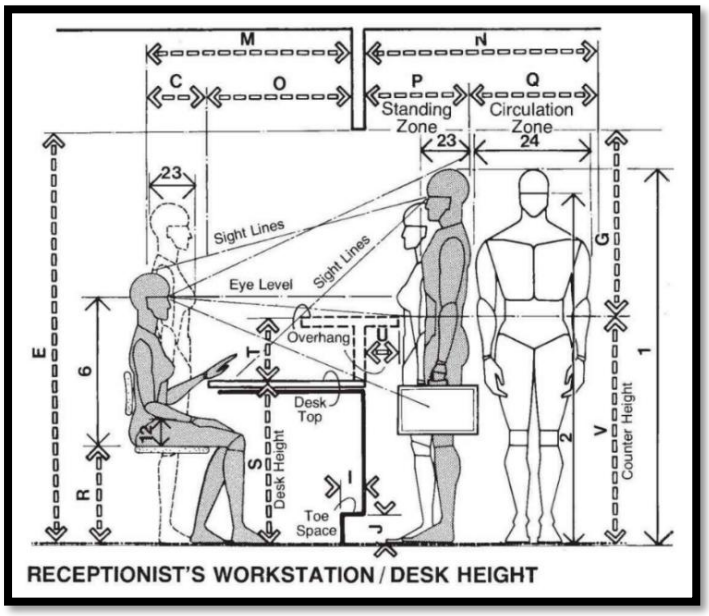
Reception and waiting

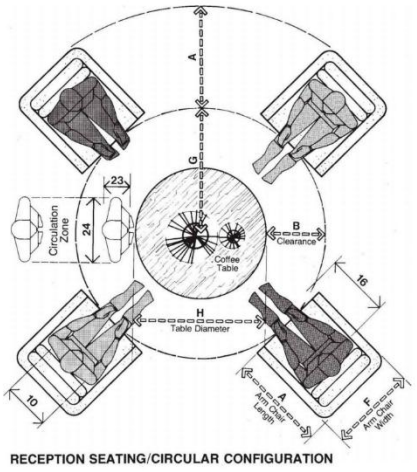
In convention centers, reception and waiting areas should ensure efficient flow, comfort, and accessibility. Standards typically include:

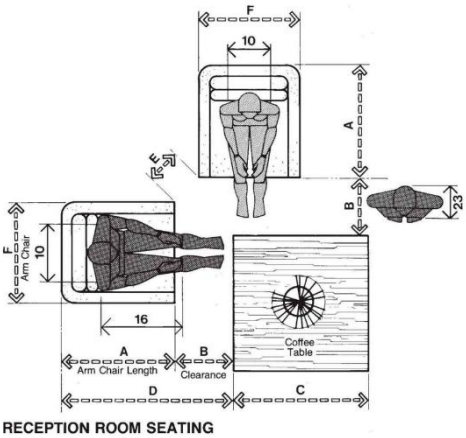
- Space Allocation: Sufficient space for queuing and seating to avoid congestion.
- Accessibility: Compliance with ADA (or local equivalent) for barrier-free access.
- Lighting: Adequate natural and artificial lighting for comfort and ambiance.
- Acoustics: Sound-absorbing materials to reduce noise.
- Signage: Clear, visible signs for navigation.
- Furniture: Ergonomic and durable seating.
- Technology: Integration of digital screens for information and entertainment.

	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

Figure 83





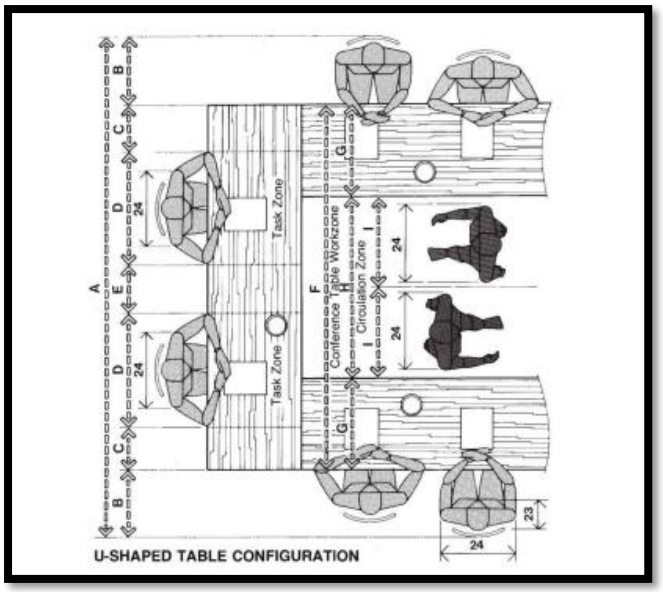


	in	cm
A	28–32	71.1–81.3
B	15–18	38.1–45.7
C	30–48	76.2–121.9
D	43–50	109.2–127.0
E	9–12	22.9–30.5
F	28–36	71.1–91.4
G	33–42	83.8–106.7
H	36–48	91.4–121.9

Figure 84

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 85

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.

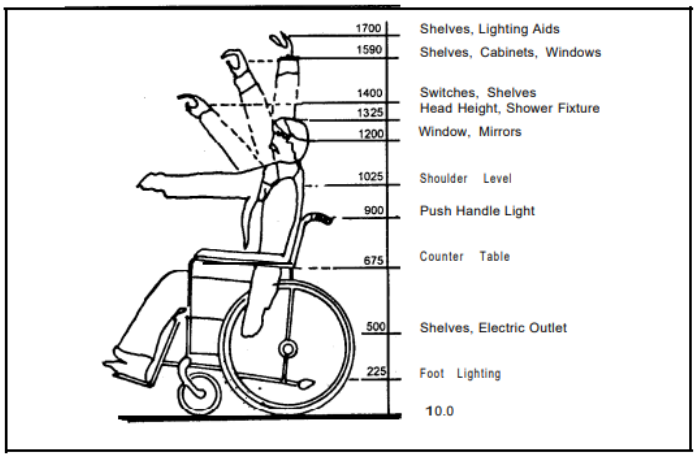


Fig.-9. Typical Dimensions for Essential uses with in easy reach

Figure 86

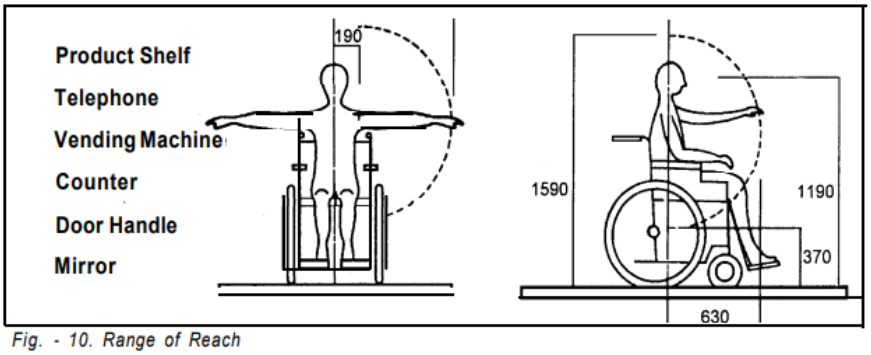


Fig. - 10. Range of Reach

Figure 87

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.

Ramps

Prevent the installation of steep ramps.
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.

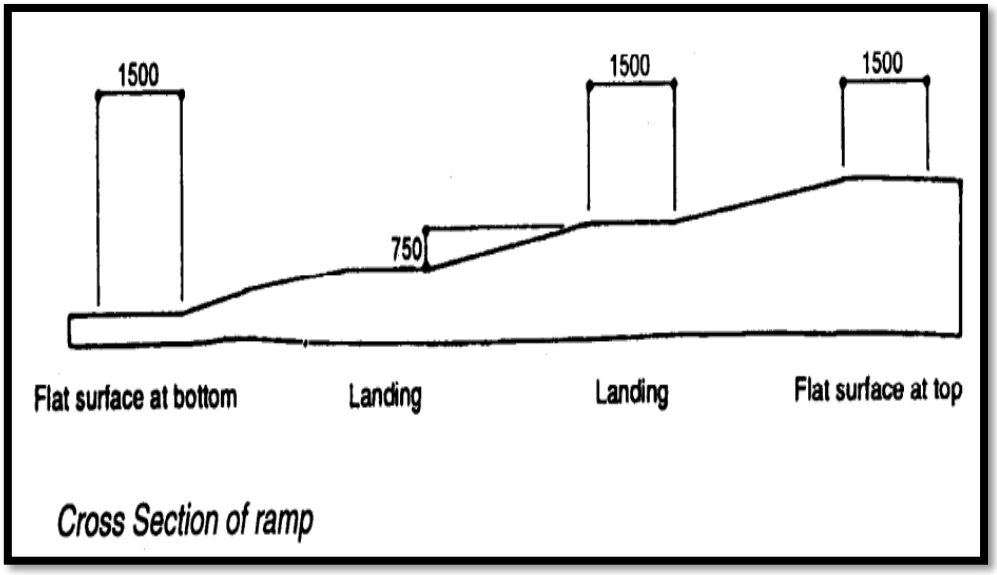


Figure 88

Theatre

- Applies to wheelchair spaces in auditoria, assembly halls, theatres, and similar facilities.
- Accessible seating space should be provided in a variety of locations to give persons with physical disabilities a choice.

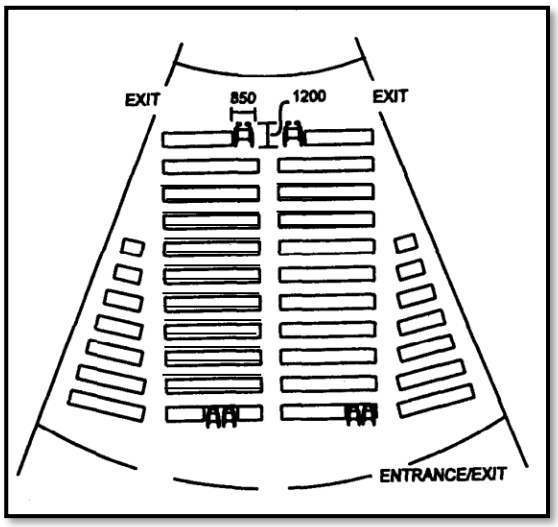
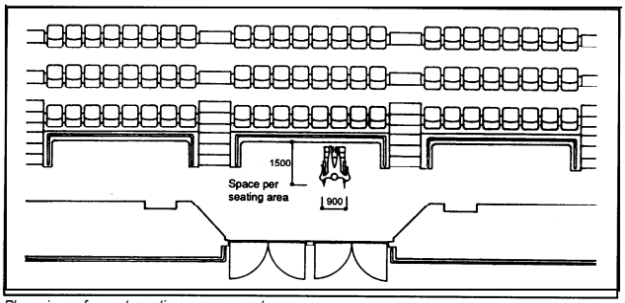


Figure 89



Plan view of guest seating arrangement

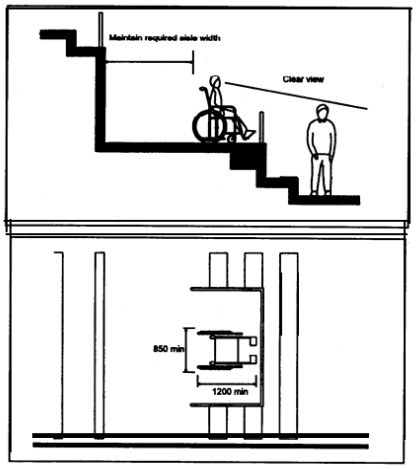


Figure 90

2.22 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 than1.25 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

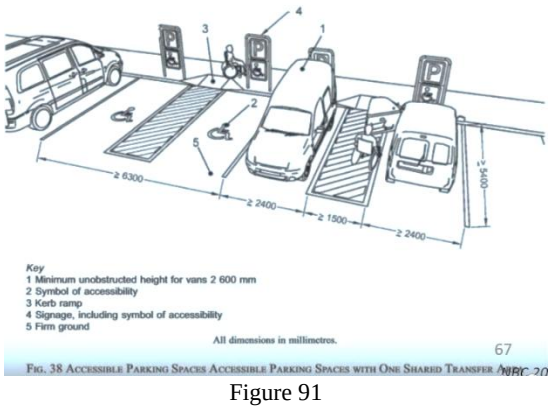


Figure 91

Designated parking for physically handicapped
The minimum size of the parking space for a car shall be 3.9m x 5.4m
If two parking spaces share a transfer are: 6.3 m

Figure 92

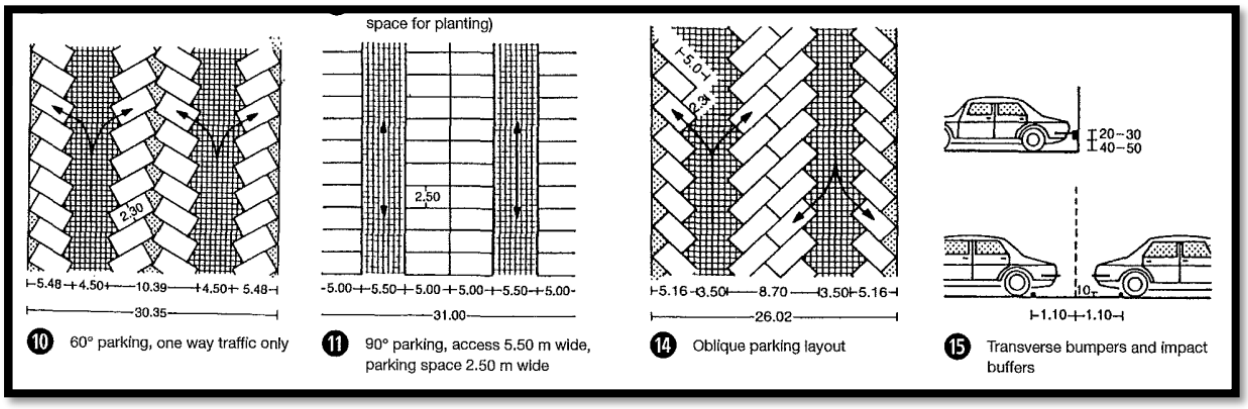
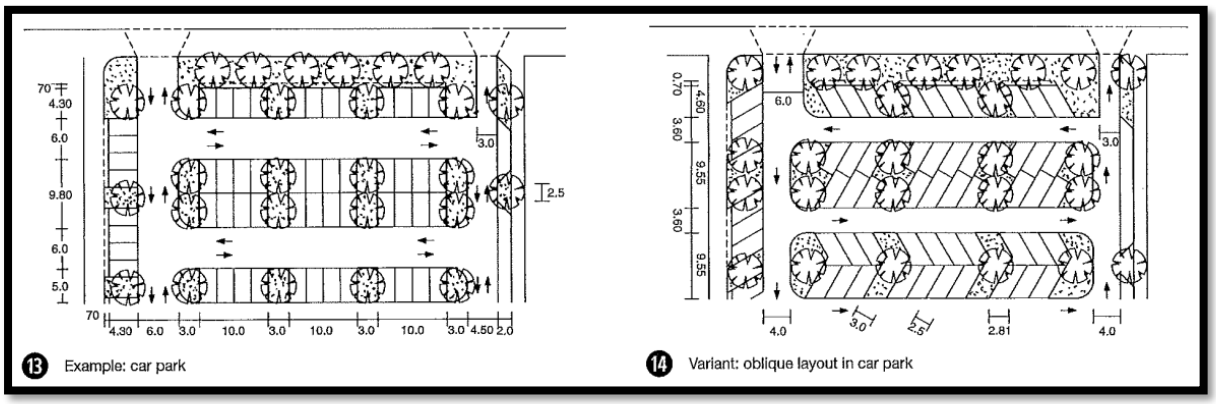


Figure 93



Parking for handicapped people

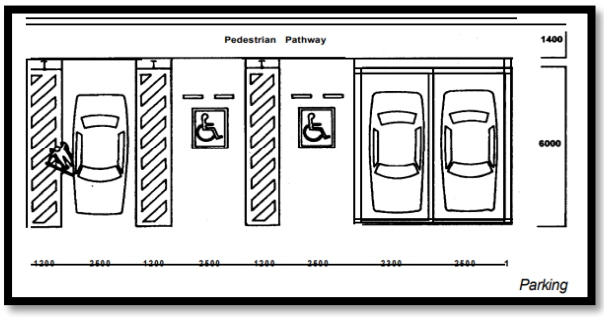


Figure 94

For parking of vehicles of handicapped people, the following provisions shall be made:

a) Surface parking for two care spaces shall be provided near entrance for the

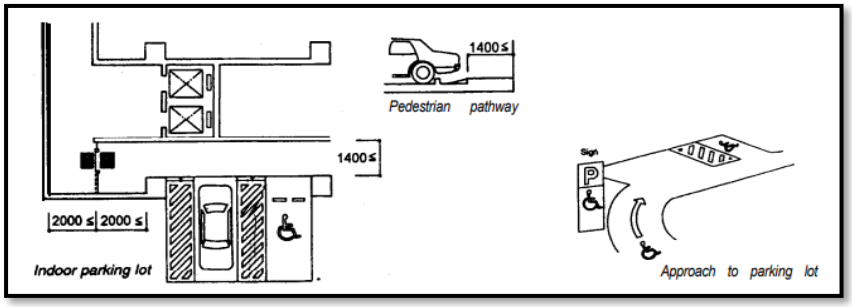


Figure 95

physically handicapped persons with maximum travel distance of 30 M from building entrance.
b) The width of parking bay shall be minimum 3.60 Meter.
c) The information stating that the space is reserved for wheel chair users shall be conspicuously displayed.
d) 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.

2.23 Signage



Figure 96

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.

3.16 Socio – cultural facilities

Table 3.15 Development Controls for 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.

Figure 97

2.24 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

Figure 98

Capacity of 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:

Table 4.3 Occupants per unit Exit width

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

Figure 99

Minimum Width Provisions for Passageway Corridors:

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

c) Assembly buildings like auditorium theatres and cinemas. 2.00 m

Ramps

Ramps with Gradients

a. Where ramps with gradients are necessary or desired, they shall conform to the following requirements.

b. 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.

c. 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

Note: *On sides where no habitable rooms face, a minimum space of 9.0 m. shall be left for heights above 27.0 m.*

Figure 100

2.25 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:

Table 4.5 Size of Ventilation Shaft

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

Figure 101

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

ii. 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.

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

iii. Skylight

Joint Open-Air Space

2.26 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			

Figure 102

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. 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 must be provided at the sewer connection.

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

Conference Hall, Dance Halls, Theatres, Concert Halls, Cinemas, Auditoria, Snack Bars, Cafes, and banqueting rooms (for capacity above 50 dinners).

Note:

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.

2.27 Site development

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

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.

Parking

For parking of vehicles of differently-abled people, the following provisions shall apply:

a) 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.

b) The width of parking bay shall be minimum 3.6 meter.

c) The information stating that the space is reserved for wheel chair users shall be conspicuously displayed.

d) 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.

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
b. Stepped Approach
c. Exit/Entrance Door
d. Entrance Landing

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.

Stair-ways

One of the stair-ways near the entrance/exit for the differently abled shall have the following provisions:
a) The minimum width shall be 1350 mm.
b) 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.
c) Maximum number of risers on a flight shall be limited to 12.
d) Handrails shall be provided on both sides and shall extend 300 mm on the top and bottom of each flight of steps.

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.

Desirable Lift size

i. Clear internal width 1100 mm

ii. Clear internal depth 2000 mm

iii. Entrance door width 900 mm

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.

Harvesting provisions in various Building categories:

All buildings in a city contribute to the rainwater runoff during the monsoon and hence such runoff can be harvested for water reuse recharge.

The indicative provisions of rainwater harvesting in various buildings types are:

Rain Water Harvesting Provisions for Open spaces in cities

Enforcement and Monitoring

Table 9.1 Provisions for Rainwater harvesting by building types

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

*Note: The number of recharge bores to be provided in different plot sizes shall be accordance to Sl No 2 of Table Nos. 14.1 - 14.3 of **Chapter 14**.*

Figure 103

2.28 Green Buildings and Sustainability Provisions

Provisions and Applicability

The green building provisions on various plot sizes are indicated in the table below:

Provisions for Sanction

1. Water Conservation and Management
   - i. Rain Water Harvesting
   - ii. Low Water Consumption Plumbing Fixtures
   - iii. Waste Water Recycle and Reuse
   - iv. Reduction of Hardscape

2. Solar Energy Utilization
   - i. Installation of Solar Photovoltaic Panels (detailed at section 10.2.3 below)
   - ii. Installation of Solar Assisted Water Heating Systems

3. Energy Efficiency (Concept of passive solar design of buildings)

i. Low Energy Consumption Lighting Fixtures (Electrical Appliances - BEE Star and Energy Efficient Appliances)

ii. Energy Efficiency in HVAC systems.

iii. Lighting of Common areas by solar energy LED devices.

4. Waste Management

i. Segregation of Waste

ii. Organic Waste Management

5. Roof Top Solar Energy Installations

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

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.

Figure 104

Figure 19 Definitions

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.

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 litres 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

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

Auxiliary System:

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

Sustainable Waste Management

Zero Waste is a concept of waste management and planning approaches that emphasize waste prevention as opposed to end waste management.

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

Sustainability of Building Materials

Use of Factory made pre-fab/pre-cast and recycled components with Green benefits:

a) Panels, hollow slabs, hollow blocks, etc. conservation of materials, less water requirement.

b) 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)

c) Fly ash/ AAC (Autoclaved aerated light weight concrete) panels/ CLC (Cellular lightweight concrete) panels- ensures thermal comfort (significant reduction in air conditioning requirement)

d) Use of bamboo & rapidly growing plantation timbers- environmental benefits.

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 toder 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.

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

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.

Provision of lifts

i. Provision of the lifts shall be made for all multi-storeyed building having a height of 15.0 m. and above.

ii. All the floors shall be accessible for 24 hrs. by the lift. The lift provided in the buildings shall not be considered as a means of escape in case of emergency.

iii. Grounding switch at ground floor level to enable the fire service to ground the lift car in case of emergency shall also be provided.

iv. The lift machine room shall be separate and no other machinery be installed in it.

Lift Enclosure/Lift:

General requirements shall be as follows:

i. Walls of lift enclosures shall have a fire rating of two hours. Lift shafts shall have a vent at the top of area not less than 0.2 2 sq m

ii. Lift motor room shall be located preferably on top of the shaft and separated from the shaft by the floor of the room.

iii. Landing door in lift enclosures shall have a fire resistance of not less than one hour.

iv. The number of lifts in one lift bank shall not exceed four. A wall of two hours fire rating shall separate individual shafts in a bank

v. Lift car door shall have a fire resistance rating of 1 hour

vi. For buildings 15.0 m and above in height, collapsible gates shall not be permitted for lifts and solid doors with fire resistance of at least one hour shall be provided.

Fire Lift

Following details shall apply for a fire lift in addition to above requirements:

a) To enable fire service personnel to reach the upper floors with the minimum delay, one or more of the lifts shall be so designed so as to be available for the exclusive use of the fireman in an emergency and be directly accessible to every dwelling/lettable floor space on each floor.

b) The lift shall have a floor area of not less than 1.4 sq.mt. It shall have a loading capacity of not less than 545 kg. (8 persons lift) with automatic closing doors.

c) The electric supply shall be on a separate service from electric supply mains in a building and the cables run in a route safe from fire, that is within a lift shaft. Lights and fans in the elevator having wooden panelling or sheet steel construction shall be operated on 24-volt supply

d) In case of failure of normal electric supply, it shall automatically switch over to the alternate supply. For apartment houses, this changeover of supply could be done through manually operated changeover switch. Alliteratively, the lift should be so wired that in case of power failure, it comes down at the ground level and comes to stand still with door open.

Basement

As provided in Chapter-4 and Building Bye-Laws.

i. The access to the basement shall be either from the main or alternate staircase providing access and exit from higher floors. Where the staircase is continuing the same shall be enclosed type serving as a fire separation from the basement floor and higher floors. Open ramps shall be permitted if they are constructed within the building line subject to the provision of the (iv).

ii. In case of basement for office enough exit ways and access shall be provided with a travel distance not more than 15.0 m. The travel distance in case of dead-end shall be 7.5 m.

iii. The basement shall be partitioned and in no case, compartment shall be more than 500 sq m and less than 50 sq m area except parking. Each compartment shall have ventilation standards as laid down in Bye-Laws separately and independently. The partition shall be made in consultation with Chief Fire Officer

iv. The first basement (immediately below ground level) can be used services/parking/other permissible services. Lower basement, if provided, shall exclusively be used for car parking

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.

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 labelled.

Air-conditioning

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.

Fire Dampers

These shall be located in air ducts and retum 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.

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 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.

Figure 105

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 1 : Dimension of auditorium seats

Figure 106

Means of escape

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 meo sured from the gangway, for continental seating 15 m from any seat.

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.

Stairs:

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

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

Figure 107

Conference Rooms

A conference hall or conference room is a room provided for singular events such as business conferences and meetings. Sometimes other rooms are modified for large conferences such as arenas or concert halls. Conference rooms can be winning dowels for security purposes.

Types of Seating

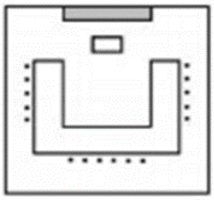
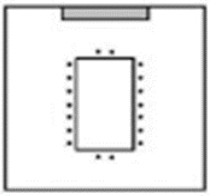
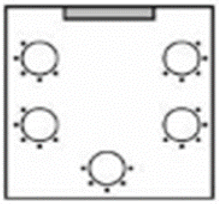
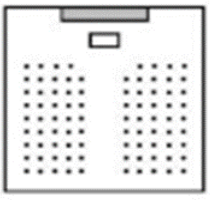
	Type	Description	Layout
1.	U shaped	• Seating around three sides of the room. • It is good for presentations from front. • Presentation space in the middle of the room. • Can be used for up to 50 persons. • Per seat area is 3.25m².	
2.	Boardroom style	• Centrally located table. • Classic layout ideal for debate and discussion. • Seating capacity 5-30 persons. • Per seat area is 3.71m².	
3.	Cabaret style	• All delegates facing front-center on round tables. • Large space in the middle of the room. • Ideal for small-group work. • Per seat area is 1.57m².	
4.	Theater style	• Used for product launches, presentations, displays. • Used to present to large numbers of delegates. • Can be used for 100-250 persons. • Per seat area is 0.83 m².	

Figure 108

Space Standards

Type	Dimension
A	1210-1520
B	100-150
C	510-610
D	150-255
E	460-610
F	790-910

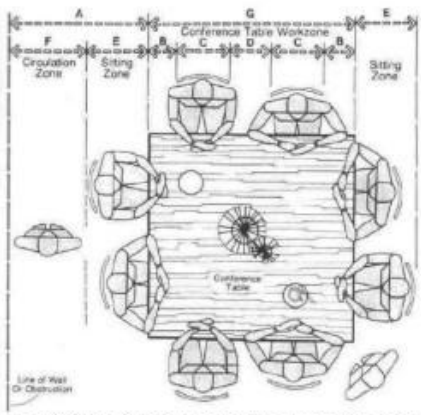


Figure 22: Seating standards for a conference table

Figure 109

Fire safety norms by the National Building Code of India

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.

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.

Capacity of exits

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.

Doorways

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

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 2.2 m.

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.

Horizontal exits

For buildings more than 24 m in height, refuge area of 15 m^2 or an area equivalent to 0.3 m^2 per person to accommodate the occupants of two consecutive floors.

Vertical circulation:

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

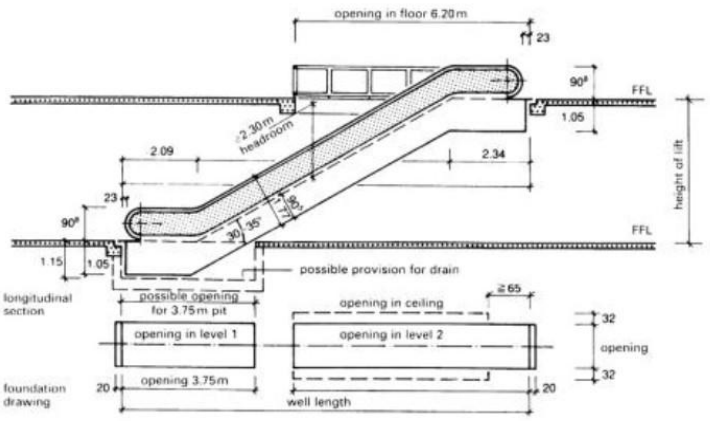


Figure 35: Cross section of an escalator

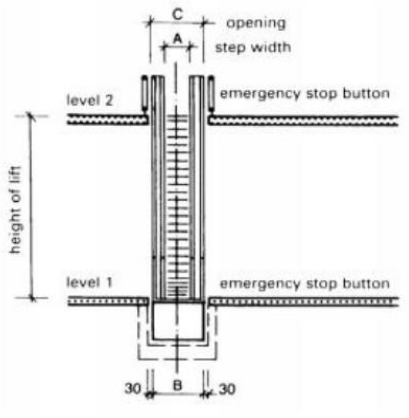


Figure 36: Escalator width

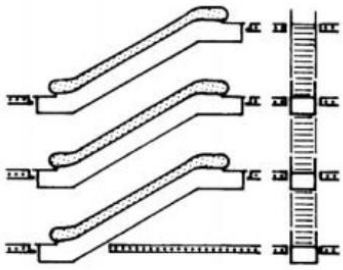


Figure 37: Superimposed

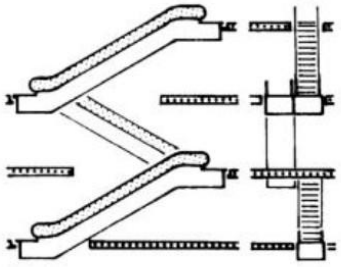


Figure 38: Crossover

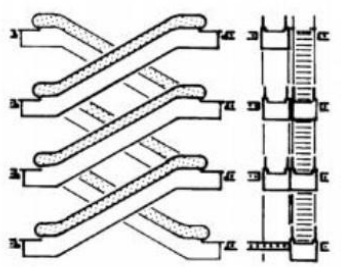


Figure 39: Double crossover

Figure 110

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.

Elevators:

Location:

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.

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.

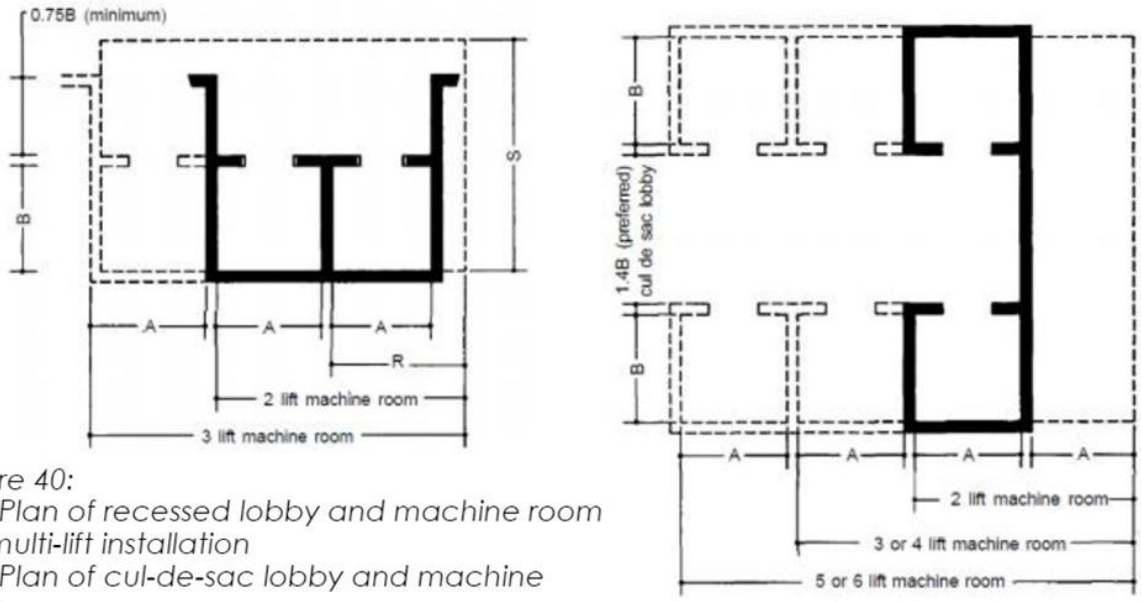


Figure 40:
(a.) Plan of recessed lobby and machine room for multi-lift installation
(b.) Plan of cul-de-sac lobby and machine room

- **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

Figure 111

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 manoeuvring wheel chairs must be provided.

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	

Parking:

Surface parking:

Parking stalls should be built to accommodate the larger cars frequently used, although not necessarily the very largest. Parking spaces may be parallel, perpendicular, or angled (30, 45, or 60 degree) to the driving lane, or aisle as per ECS for surface car parking as per DDA is 23 m^2.

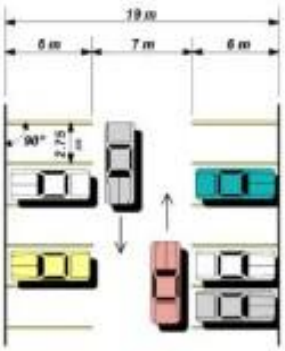
Type	Description	Layout	Advantage/Disad-vantages
Perpendicular	• Effective in low turn-over rate or long term parking areas. • Most efficient and economical since it accommodates the most vehicles per linear meter.		**Advantages:** • Works well with either one- or two-way aisles • Handles the most vehicles per square meter of pavement **Disadvantages:** • Requires widest area • Two-way traffic can create visibility problems

Figure 112

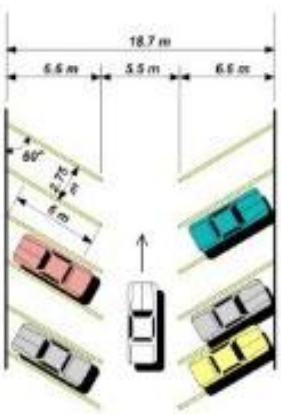
Angled - 60 degree	• This parking area configuration is ideal for a fast turnover rate or predominantly short term use. • This is often offset by difficulties of inefficient circulation patterns and one-way aisles.		**Advantages:** • Easy maneuvering in and out of parking spaces • Good visibility • Lends 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 113

Basement parking:

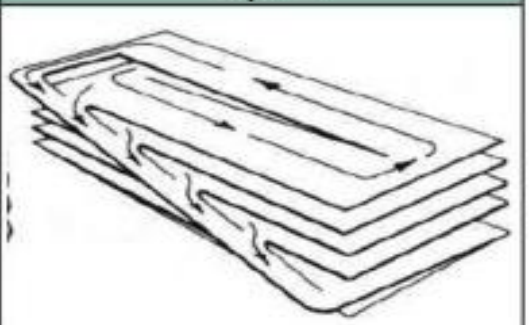
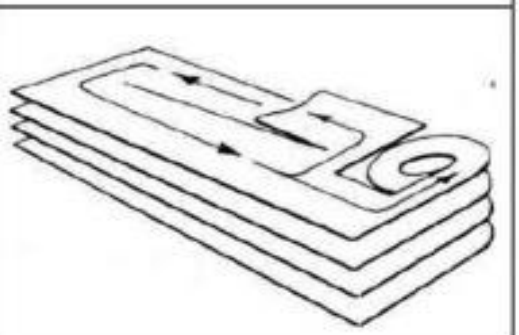
a) Every basement shall be in every part at least 2.4 m in height from the floor to the underside of the roof slab or ceiling.

b) Adequate ventilation shall be provided for the basement.

c) The access to the basement shall be separate from the main and alternative staircase providing access and exit from higher floors.

d) Area per ECS for basement car parking as per DDA is 32 m².

Ramp systems:

Type	Description	Layout
Clearway ramp systems	• Interfloor travel path completely separated from potentially conflicting parking–unparking movements. • Provide safest movement with least delay • Preferred for self park design	
Adjacent ramp systems	• Part or all of ramp travel is performed on access aisles • Requires less area per parking stall • Twofold use of travel paths • More susceptible to traffic movement delays	

Ramp Design:

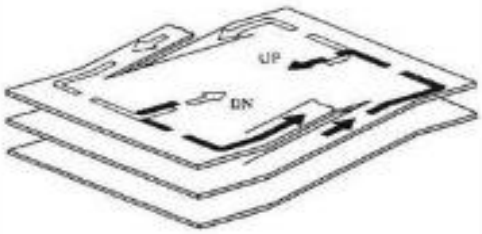
Type	Description	Layout
Opposed ramp design	• Vehicles rotate in the same direction • Up and down ramps in opposite direction • Required ramp surfaces to be opposed	
Parallel ramp design	• Up and down ramp slope in the same direction • Ramp surfaces are parallel • Vehicles must rotate in opposite direction • Cheaper to construct	

Figure 114

2. Case Study

2.29 Hyderabad International Convention Centre (HICC), India

Location	Adjacent to HIGHTEC City, Izzat Nagar, Hyderabad
Architect	Emaar Group
Area	60000 sq.m (14.82 Acres)



Figure 115



Figure 116

2.29.1 Introduction

The **Hyderabad International Convention Centre (HICC)**, located in Hyderabad, India, is a

Figure 7 Hyderabad Convention Centre

prominent example of contemporary architecture designed to accommodate large-scale events with an

emphasis on sustainability and energy efficiency. Opened in 2006, it stands as a significant landmark in India's convention infrastructure, showcasing innovative design and environmental consciousness. It's a Green Globe certified Convention Centre.

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

2.29.2 Concept and Approach

The HICC was conceptualized to serve as a world-class venue for conferences, exhibitions, and other events, aiming to bolster Hyderabad's position as a global destination for business and cultural gatherings. The design approach centers on creating a versatile and technologically advanced facility while integrating elements that enhance energy efficiency and reduce environmental impact.

The architectural design of HICC incorporates a blend of modern aesthetics with functional efficiency. The center features a sleek, contemporary façade characterized by clean lines and geometric forms. The building's layout is optimized to provide a flexible space that can be adapted for various event requirements. The design philosophy emphasizes openness and accessibility, with large, column-free spaces that facilitate seamless movement and interaction.

- Pillar-less internal hall of net 6480 sq. metres that can hold a 6000-delegate plenary and can be partitioned into 6 smaller halls
- Best Meeting & Conference Venue with a spacious pre-function foyer area
- 37 breakout rooms, including specialized meeting rooms, speaker preparatory room, boardrooms, VIP lounge
- 12.5 metre high ceiling, roof cat walkers and truss to withhold heavy suspension
- Service pits every 6 metres, with power, water, internet etc.
- In-house 5-star banqueting service

Ceiling Height Clear ceiling height of 12.5m with rooftop catwalk and truss to withhold heavy suspension.

5-Star hotel Adjacent to Novotel Hyderabad Convention Centre, a 5-Star hotel with 288 rooms, assuring a premium quality banquet experience.

Rigging Beam Each beam has a suspension capacity of one tonne.

Service Pits & Power Supply Service pits at every six metres with power, water, and internet supply. 100% power back-up.

Breakout venues and registration area 37 breakout venues come with 16-seater registration area.

Loading Dock Secure and managed loading dock with tailor-made capacities.

VIP Lounge and Organizer Suite Separate lounge for VIP delegates and suites with private workspace for event organizers.

HICC is connected to Novotel Hyderabad Convention Centre: an international, eco-certified business hotel. It has 287 rooms and is equipped with meeting rooms, restaurants, a business centre, spa, and a health club.

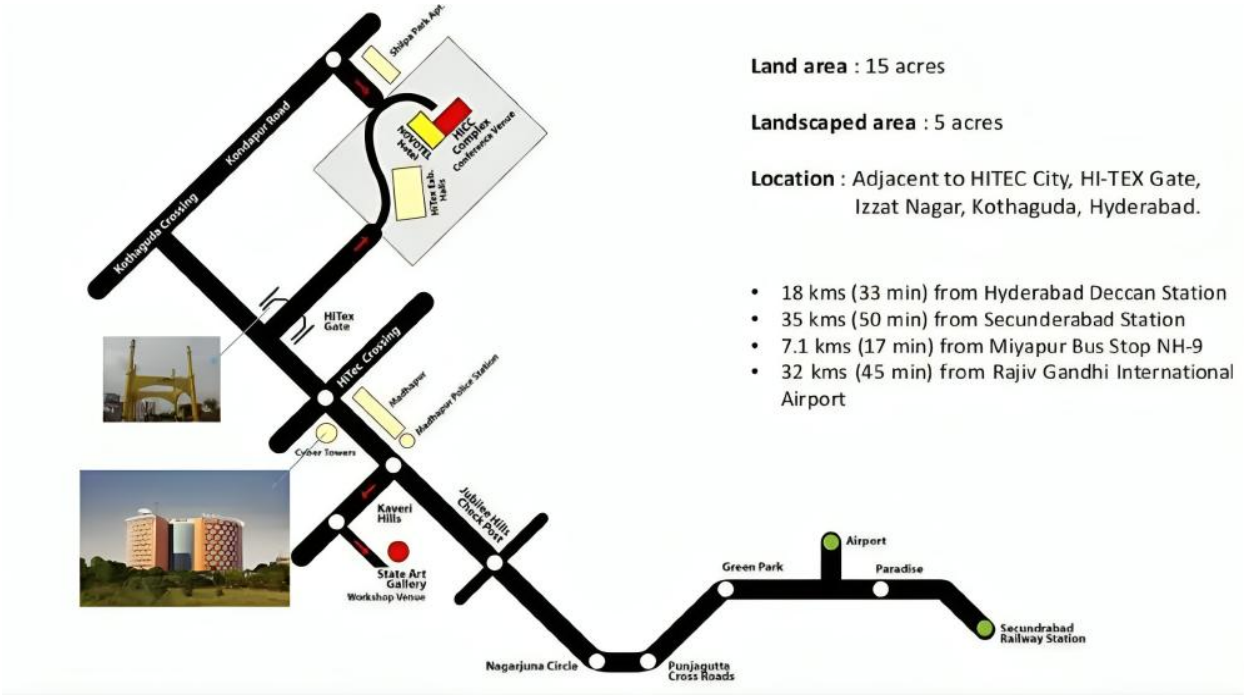


Figure 117

2.29.3 Proximities

18 Kms from Hyderabad Deccan Station
35 Kms from Secunderbad Station
7.1 Kms from Miyapur Bus Stop NH-9
32 Kms from Rajiv Gandhi International Airport

2.29.4 Accessibility

- 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

2.29.5 Parking

It can park 300 cars at surface and there is provision 1000+ car parks.
In addition, there is 25 parking for bus & 500 two wheelers.



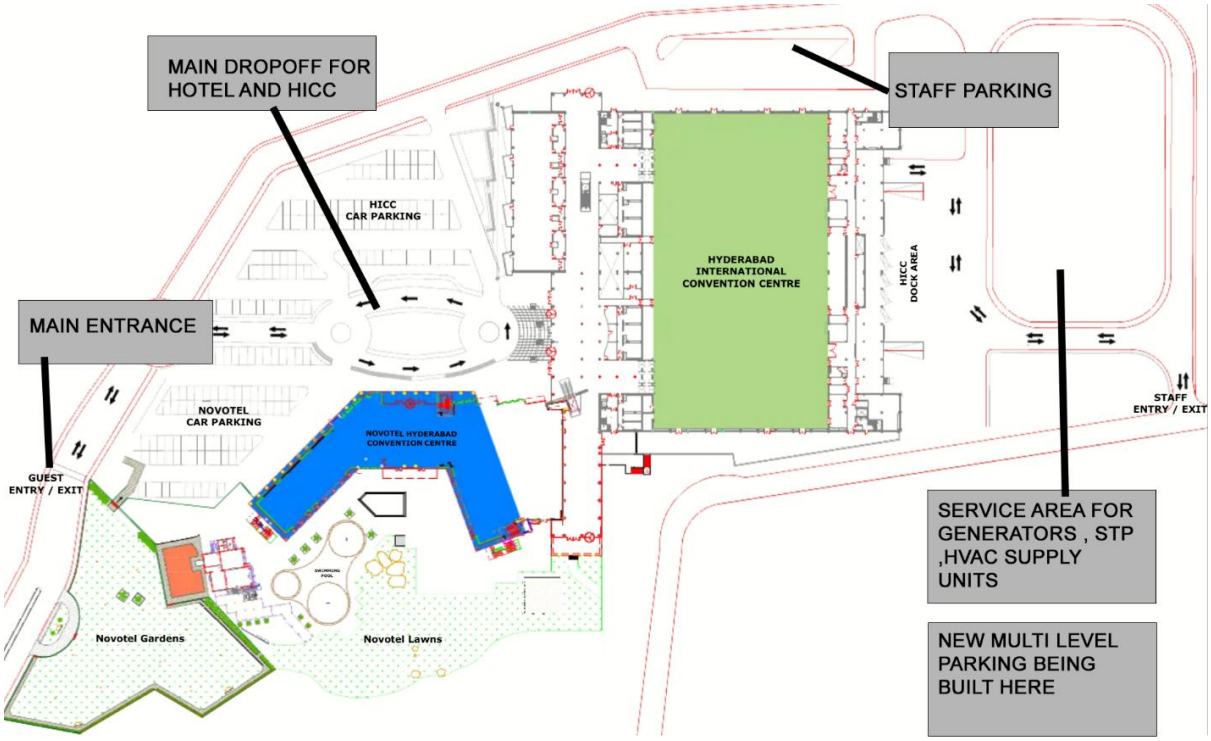
Figure 118

Visitors Parking
The visitor can park the vehicles either in the front or rear depending on the mode of transportation
In case of meetings and conventions the visitors are dropped near the main entrance approached by a roundabout.
Main entrance approached by 8m wide road.
Parking for 300 cars at the surface level at the centre itself for delegates.

Parking for staff
Secondary parking lot is available at the service Zone for the service trucks and staff vehicles
For VVIP drop point is from eastern side of the centre, to provide direct access for the guest at the centre Circulation.

Attribute	Description
Location	Sy. No. 1791/1 of Madikonda (V), Warangal (U) District
Site Area	~10 acres (40,468 sq. m.)
Primary Access	National Highway 163 (NH 163)
Visibility & Frontage	Excellent visibility and contiguous frontage along roads
Shape & Terrain	Regular-shaped and mostly flat terrain
Site Boundaries	
➤ North	Vacant Land
➤ South	Vacant Land
➤ East	NH 163 Access Road
➤ West	Dharmasagar Canal

Figure 119



Site Plan

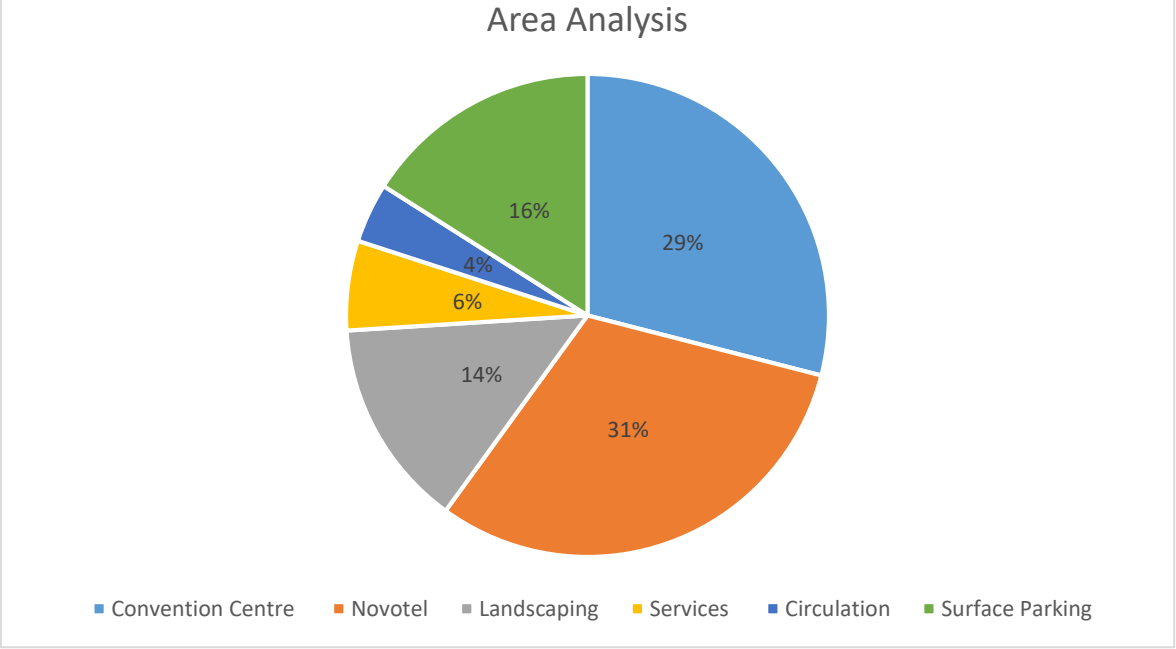


Figure 120

2.29.6 Site Circulation

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



Figure 121 Entrance and site layout at Novotel

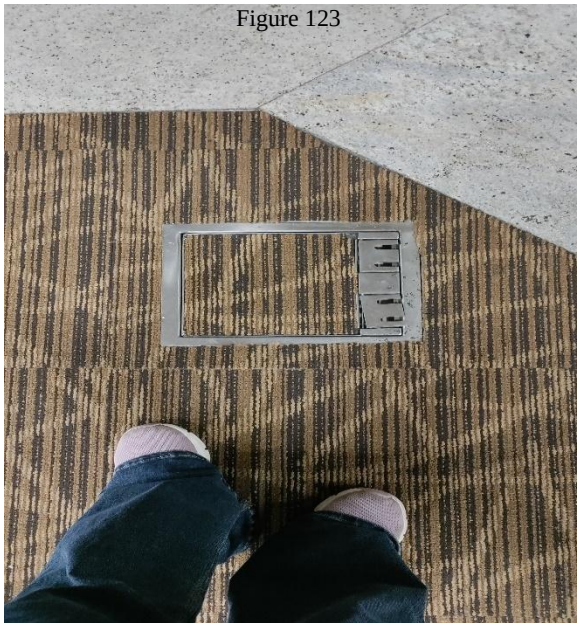
Circulation Pattern

The main driveway has 3 loops of turning radius 11.5 m
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 lake, hotel and conventional Centre.
Loops after consultant intervals lead to the better road connectivity.
Security guard offices at the gate with security devices.
Entry/Exit of the site are not easily locatable.



Figure 122

Figure 123



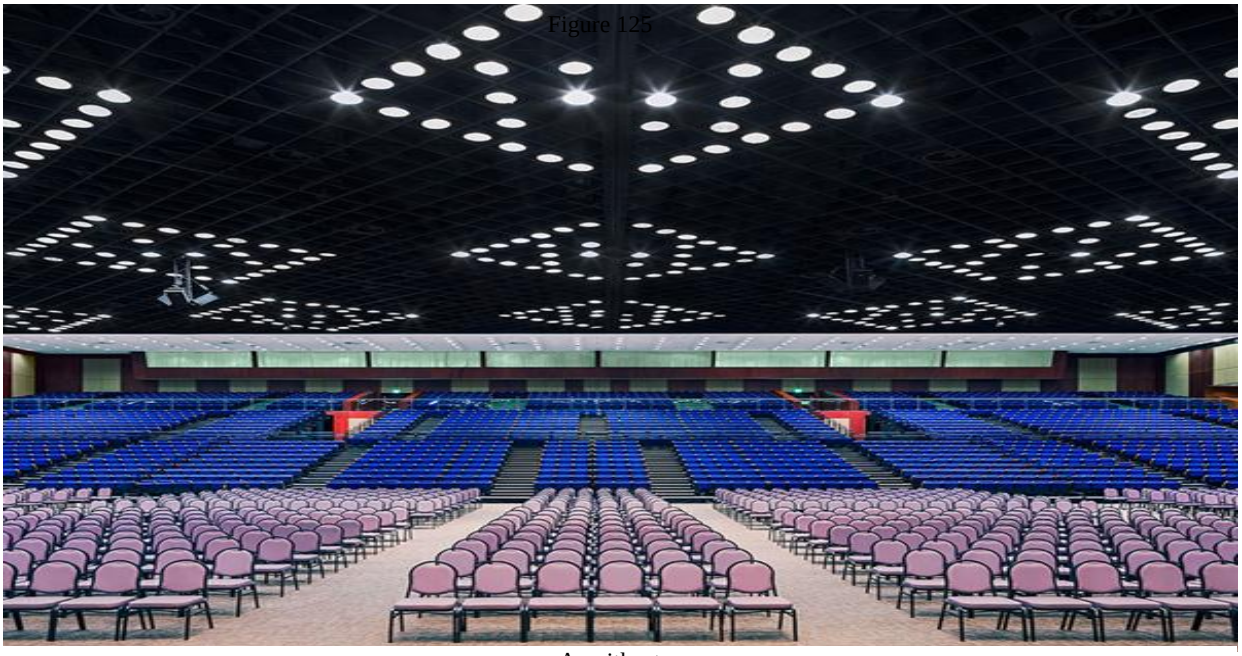
Electrical system chamber

Figure 124



Fire Exit

Figure 125



Ampitheatre





2.29.7 Zoning of space

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.
It lacks in proper external signages.

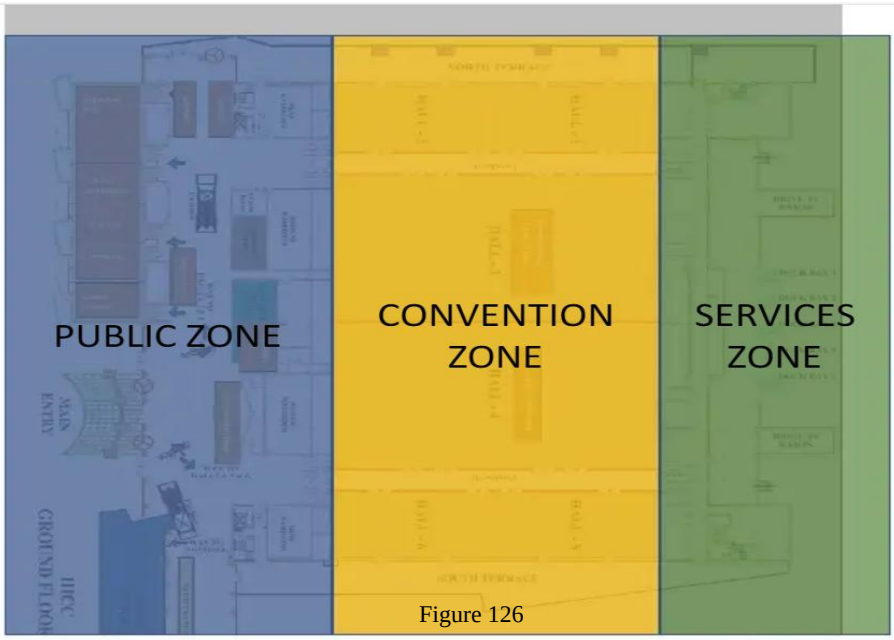


Figure 126

2.29.8 Material and Acoustics



Figure 127

Acoustic Panels: Made of teak wood and silk fabric panels.

Carpet Tiles: Size: 1’6” × 1’6” Purpose: Helps in seizing (resisting) fire.

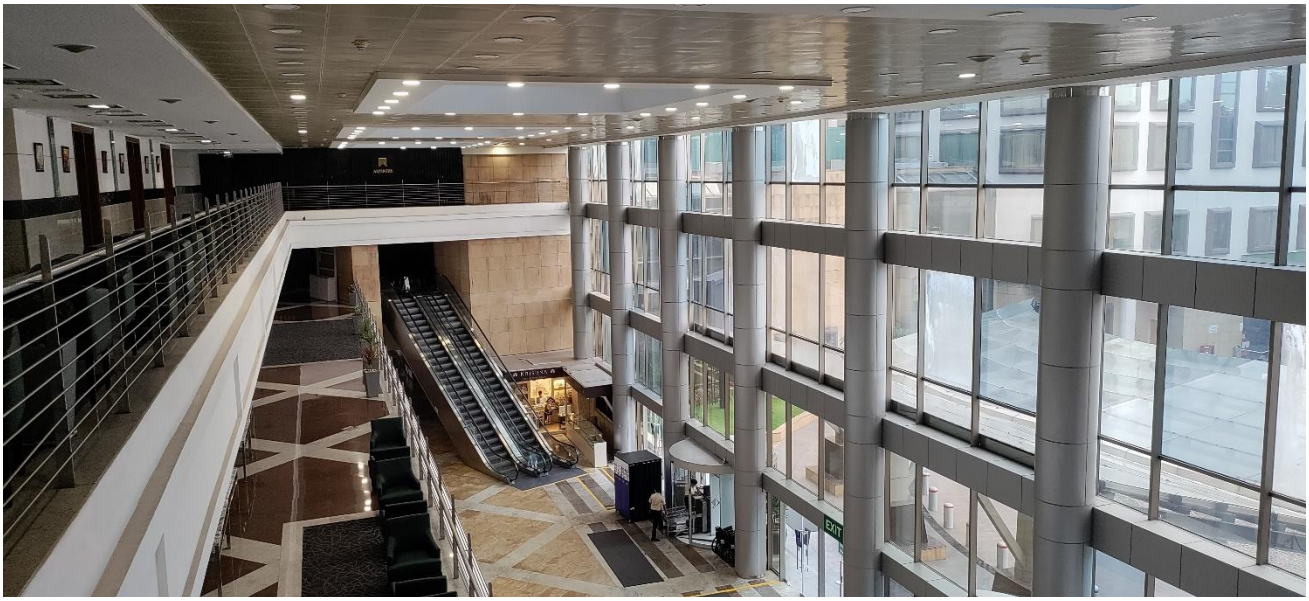


Fig 128 view overseeing lobby

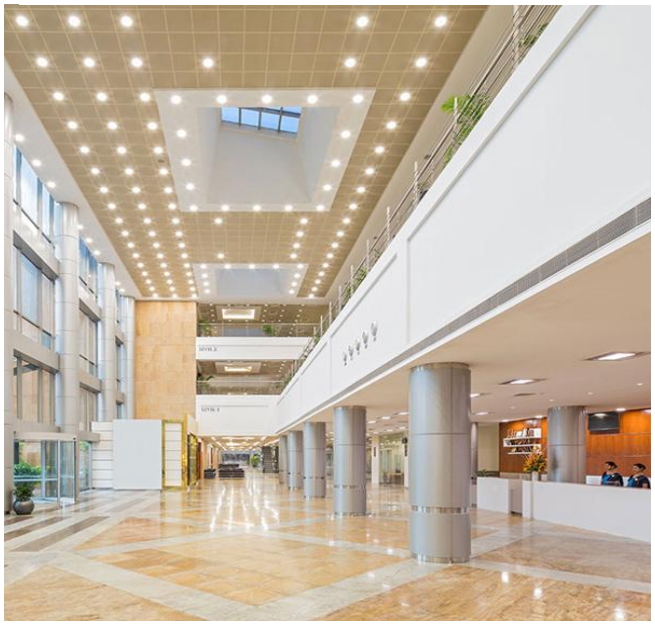


Fig 129 view of lobby



Fig 130 Skylight at different intervals



Fig 131 Corridor connecting hotel and convention centre

Services

2.29.9 Ground Floor:

- Bulk pantry
- Stewarding room
- Electricity room
- Communication room
- Dishwashing room
- Dry storage room
- Cold storage room
- Beverage room
- Gas storage room
- Dock ramps

2.29.10 First Floor:

- Laundry room
- Training department
- Male locker room
- Female locker room
- Kitchenette
- Housekeeping office
- F&B (Food and Beverage) operations storage
- AV stores
- Performers' changing room
- Engineering workshop
- Engineer's staff office
- Chief engineer’s office

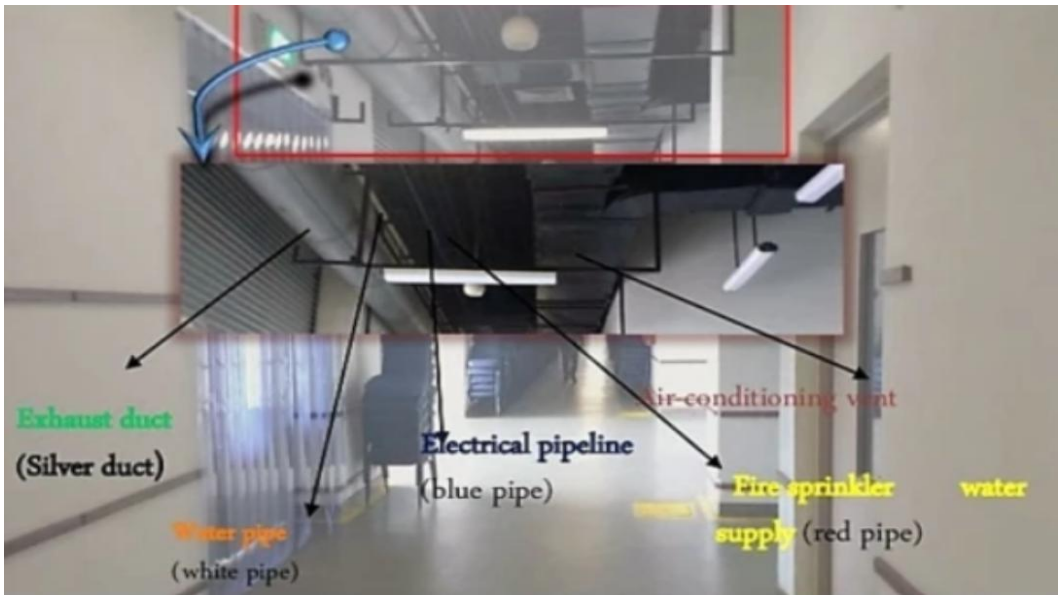


Fig 132 Building Services

The orientation of the building

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

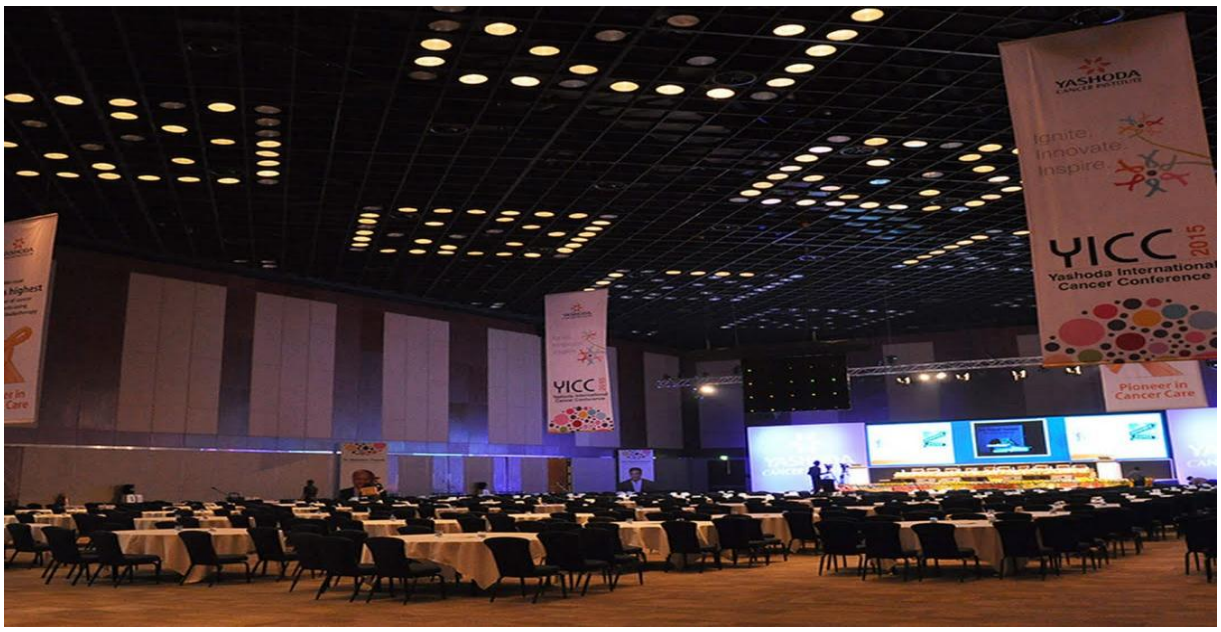


Figure133. Multipurpose Hall of HICC



Figure 134. Meeting room of HICC



Figure 135. Meeting room of HICC

2.29.11 Planning of the Complex

Table 2. Areas and their placements

Area	Description
Porch	Allows users to pause before entering or after exiting the building. Used for sitting. Accessible only by pedestrians.
Entrance Gate & Security Check	Separate gates for entry and exit with revolving doors to prevent bypassing security. Accessible for differently-abled users. Luggage scanning space provided. Separate emergency exits planned.
Reception & Pre-function Lobby	Large atrium with reception in front after the entrance gate. Escalators close to the gate for ease in vertical circulation. Grid of columns and beams with glass panels allowing ample light. 12 desks at the registration area.
VIP Lounge	Furnished with wooden finishes for a rich look. Glass used is bullet-proof for security reasons.
Convention Area	Main hall is pillar-free and can be subdivided into 6 smaller halls using partition walls suspended from the top. Can accommodate up to 6150 guests. Equipped with audiovisual facilities and retractable seating. Various seating styles (classroom, banquet, theatre, etc.) to accommodate different event types.
Gallery Seating	Capacity of 690 people on the first-floor gallery. Gangway width is 1.2m.

Kitchen and Food Preparation	Directly attached to plenary hall on one side and service corridor on the other side. Separate vegetable and non-vegetable pantries. Dry food storage in a separate room. 5 stores with storage facilities (cold storage, utensil storage, etc.). Separate pastry and dessert preparation area. Meat/fish preparation area with cold storage close to it. 3 tandoors/ovens with a meat preparation table. Separate wash area with a work table.

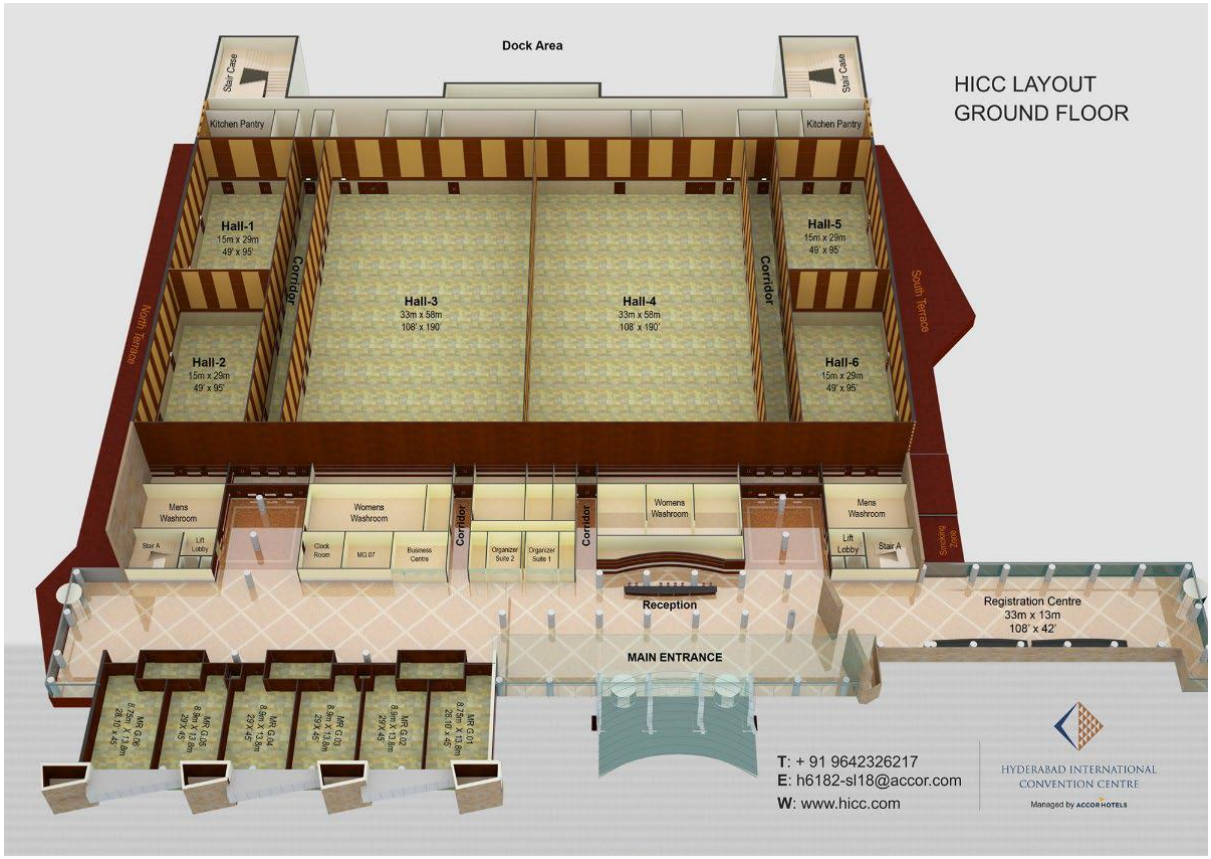


Figure 136. HICC Ground Floor Layout

Ground Floor

Lobby

Reception

Business Lounge

Registration area

Retail Meeting Rooms 2 types (Pantry Service attached)

6 partionable Meeting Room

Each measuring **- 8.9m x 13.8m**

Cloakrooms

Restrooms

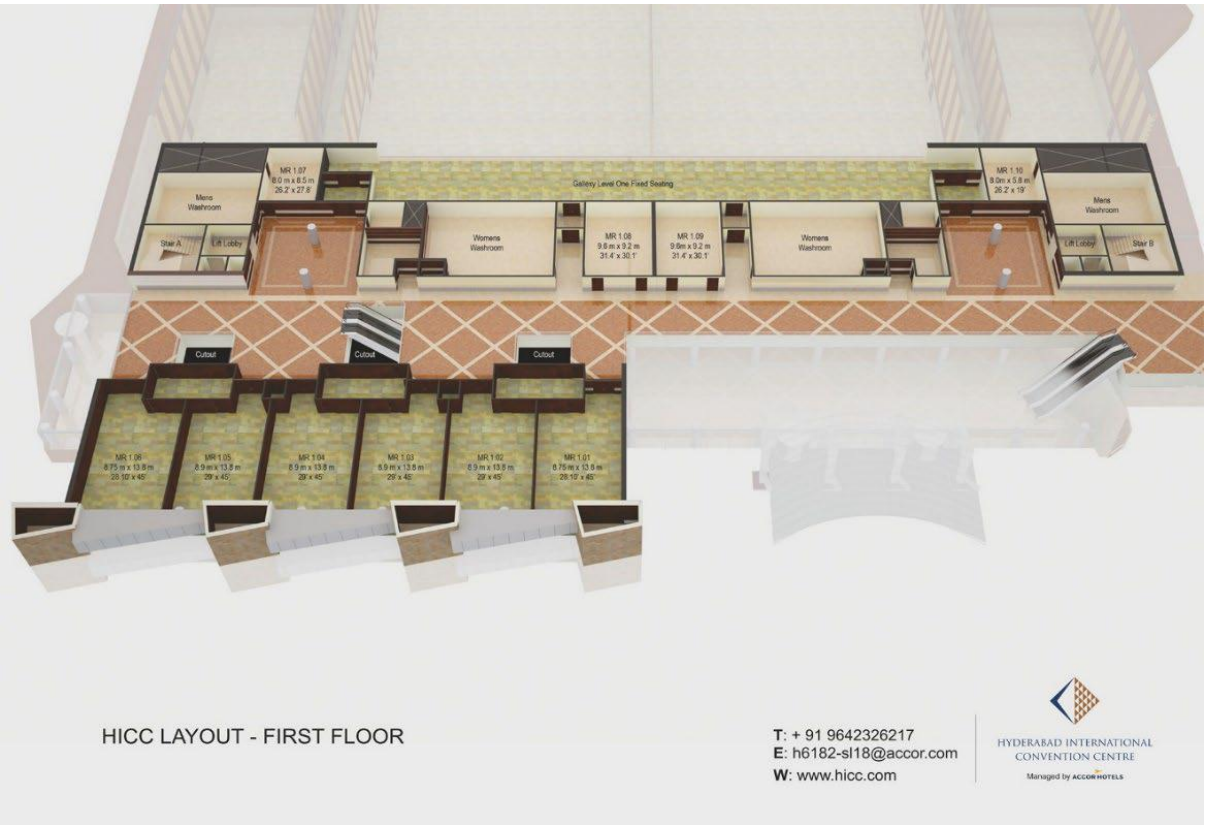


Figure 137. HICC First Floor Layout

First Floor

Meeting Rooms -3 types (Pantry Service attached)

6 partionable meeting Room

Each measuring 8.9m x 13.8m Gallery First level

IT Office

Video Production Centre

Lounge Restrooms

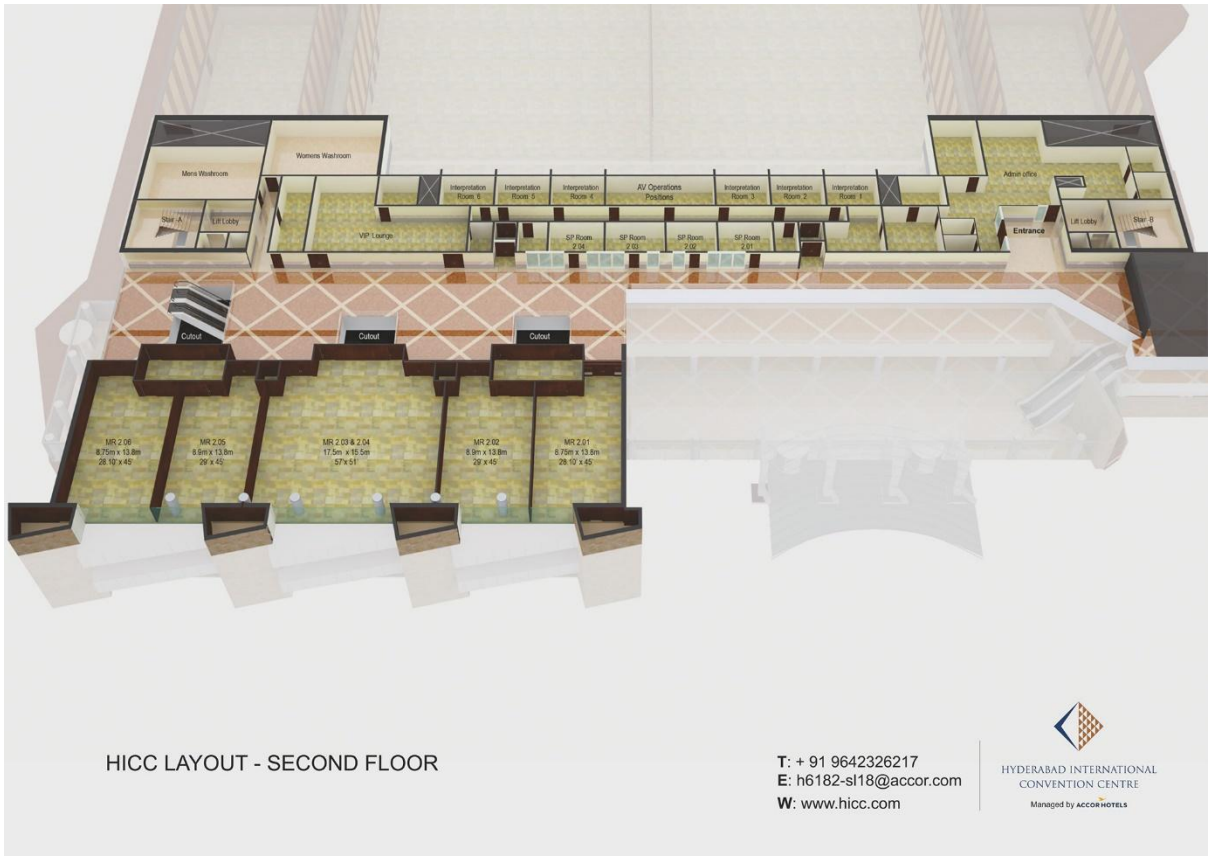


Figure 138. HICC Second Floor Layout

Second Floor

VIP Lounge

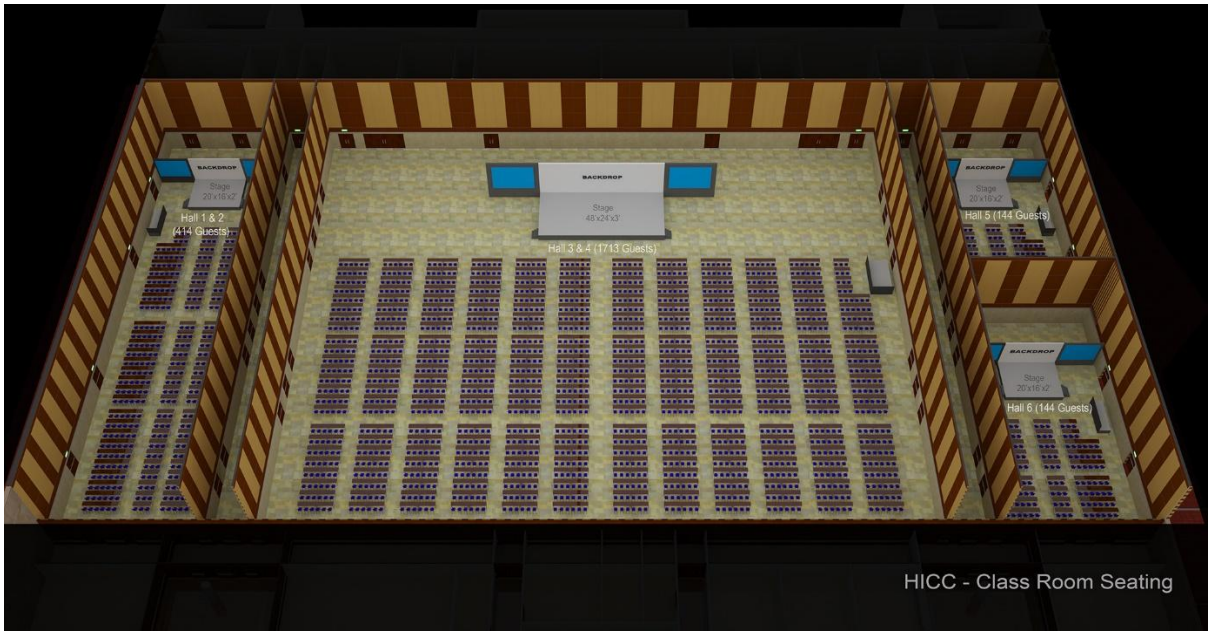
Admin Office

Interpretation Booth Speaker Preparation Room

Translator Booth Mecting Rooms (Pantry Service attached)

5 partionable Meeting Room Measuring-**8.9m x 13.8m & 17.5 x 15.5m**

Restroom



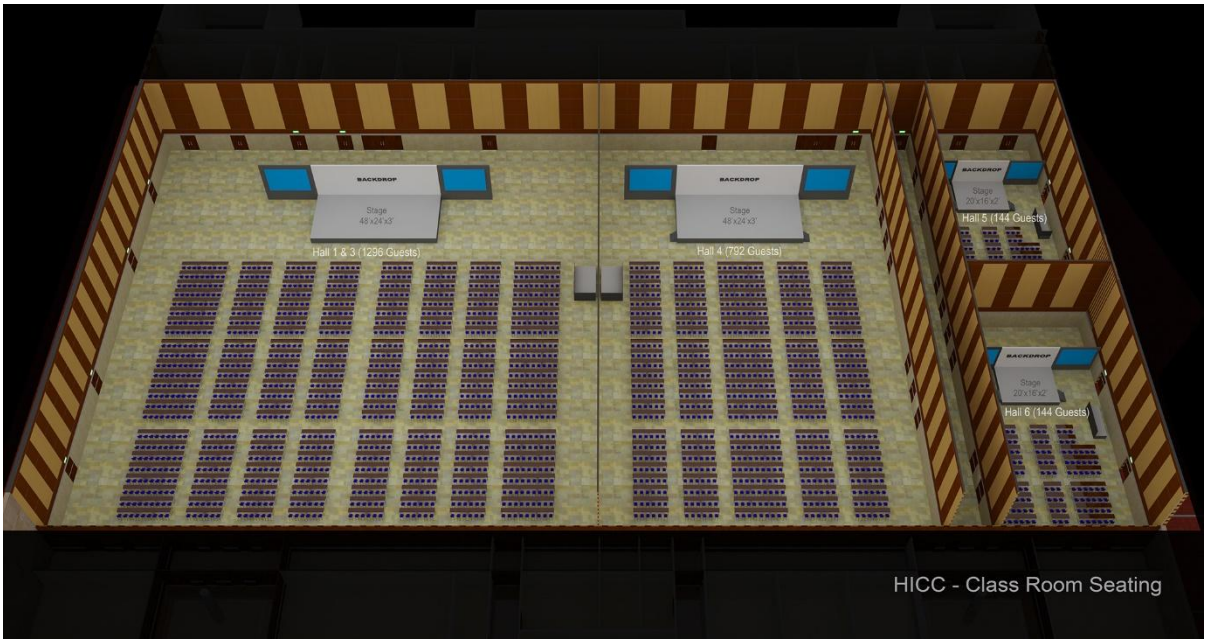
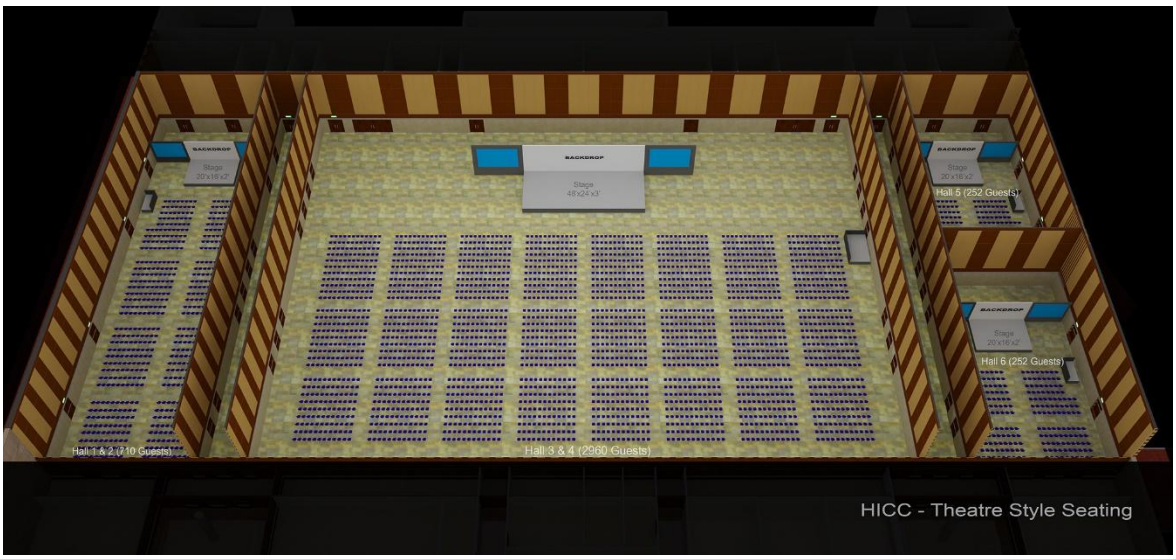
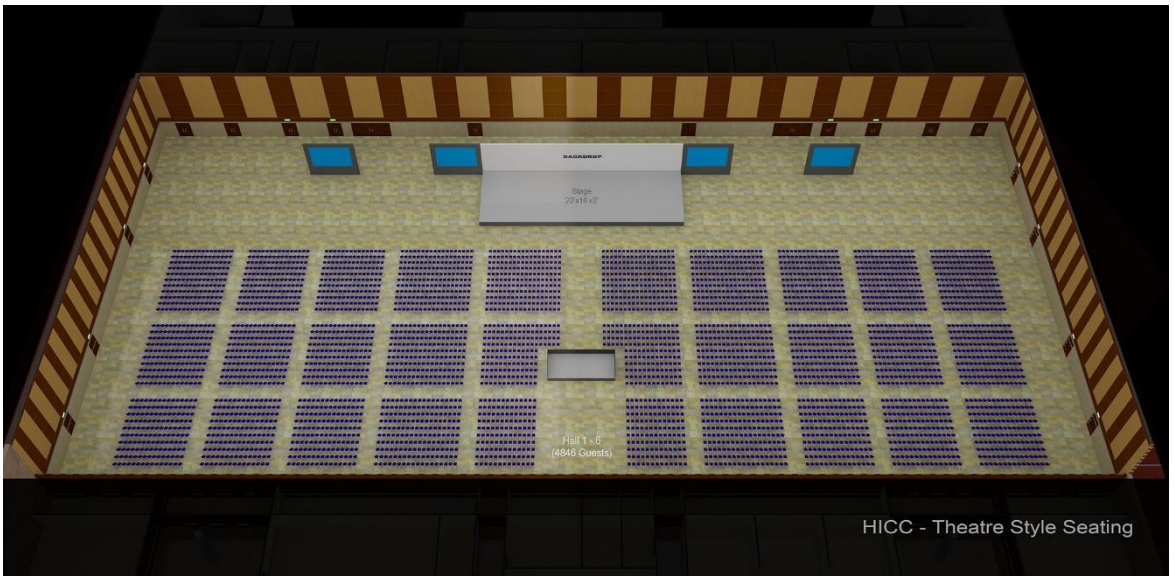
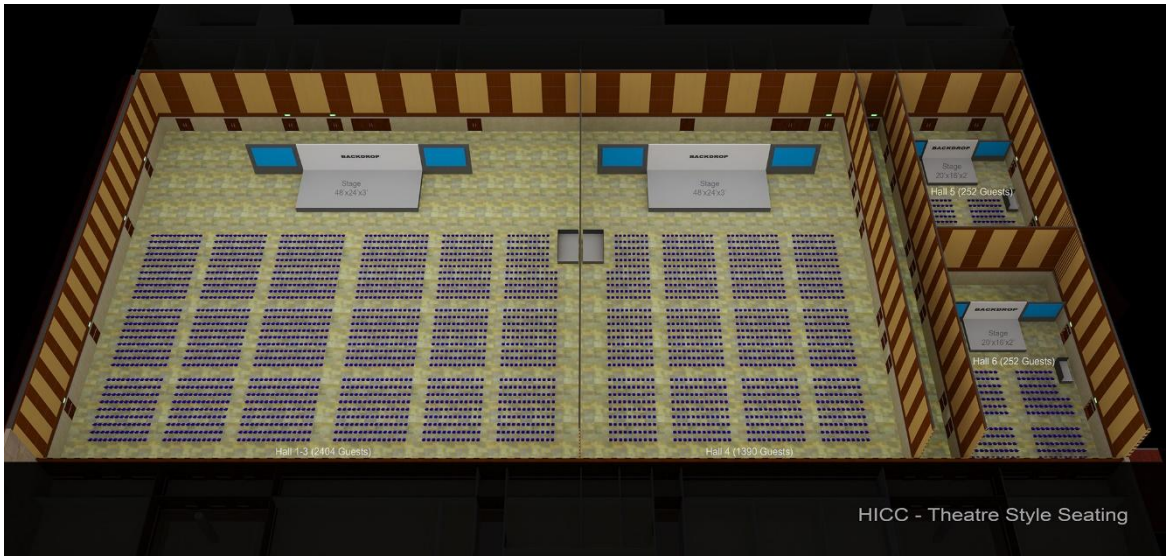




Figure 139. Meeting Room Setups


Hall 5 (252 Guests)
Hall 6 (252 Guests)
Hall 1 & 2 (710 Guests)
Hall 3 & 4 (2960 Guests)
HICC - Theatre Style Seating


Hall 1 - 6
(4846 Guests)
HICC - Theatre Style Seating


Hall 5 (252 Guests)
Hall 6 (252 Guests)
Hall 1-3 (2404 Guests)
Hall 4 (1390 Guests)
HICC - Theatre Style Seating

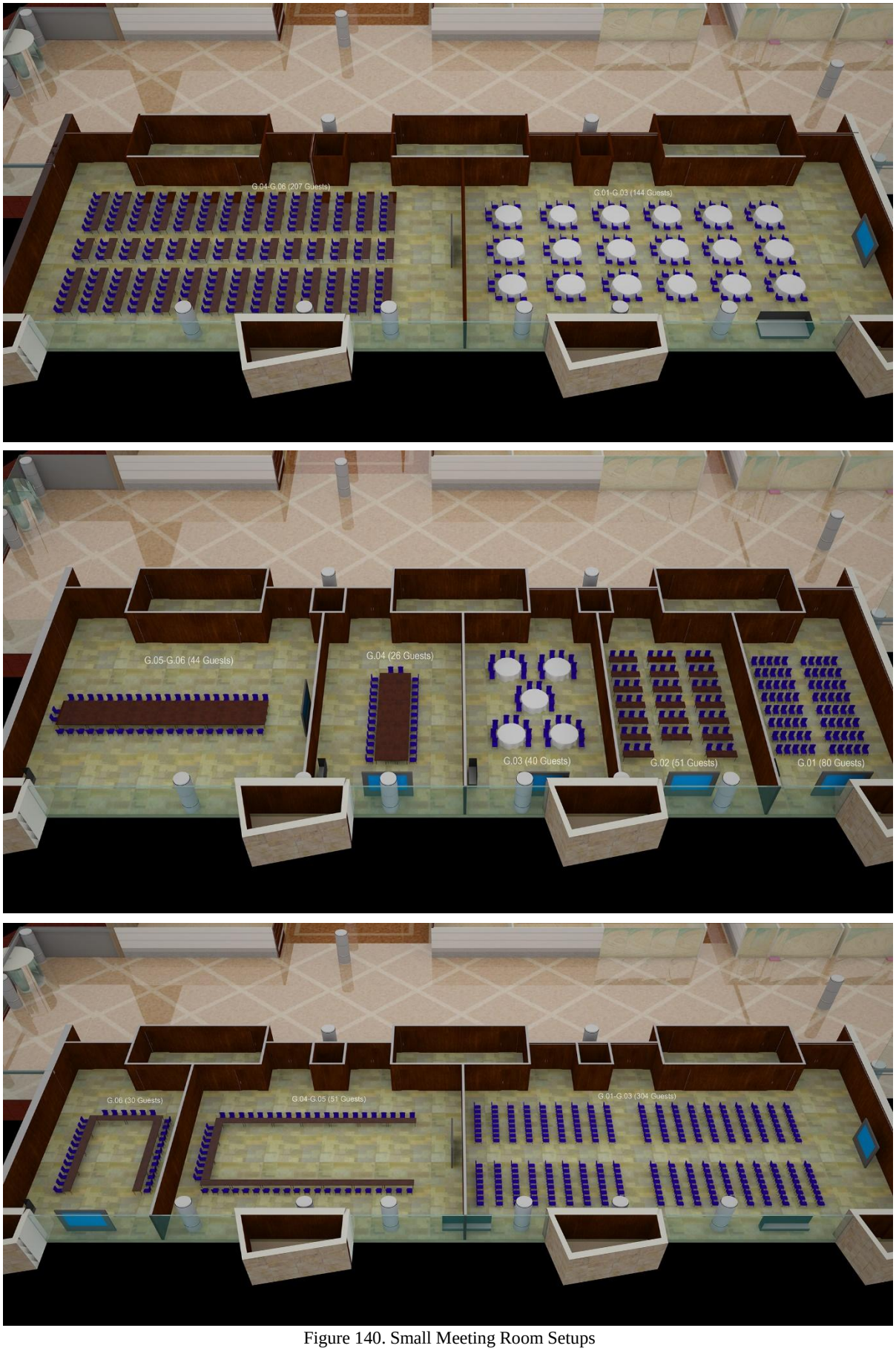
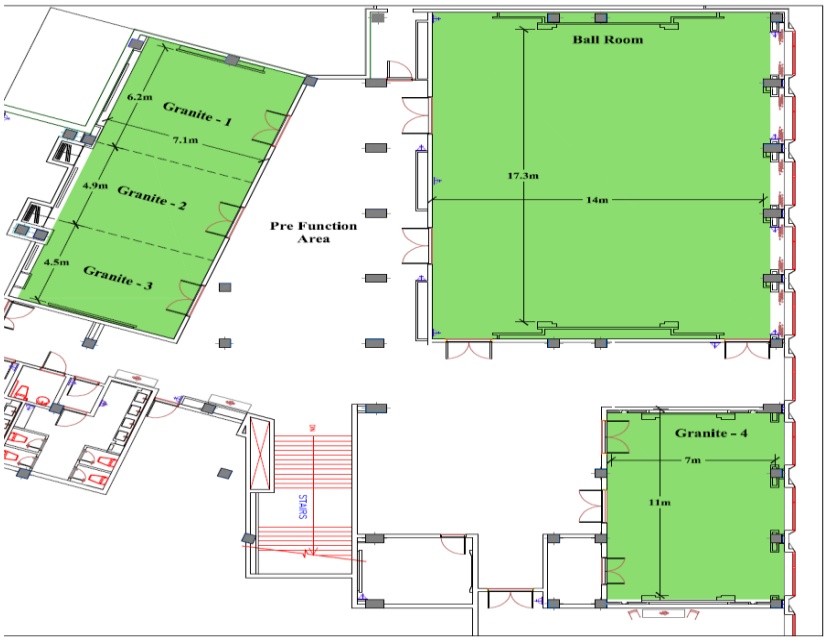


Figure 140. Small Meeting Room Setups

Table 3. Capacities of Major Rooms

Area	Details
Main Convention Hall	**Area**: 5,000 square feet (6,038 square meters) **Capacity**: Theatre Style: Up to 6,500 people Banquet Style: Up to 5,000 people Cocktail Style: Up to 7,000 people The hall is pillarless and can be partitioned into smaller sections.
Exhibition Area	**Area**: 30,000 square feet (2,787 square meters) **Capacity**: Exhibition Booths: Up to 200 standard booths Used for exhibitions, trade shows, and large displays. Can be divided into smaller halls.
Pre-Function Area	**Area**: 23,000 square feet (2,137 square meters) **Capacity**: Standing Reception: Up to 2,000 people Used for registration, networking, and refreshments during events.
Meeting Rooms	**Area**: 15,000 square feet (1,394 square meters) combined across multiple rooms **Capacity**: Each room can accommodate 50 to 500 people, depending on configuration Ideal for smaller meetings, breakout sessions, workshops, or seminars.
Ballroom	**Area**: 20,000 square feet (1,858 square meters) **Capacity**: Banquet Style: Up to 2,000 people Theatre Style: Up to 3,000 people Used for banquets, weddings, and formal gatherings.

Figure 141



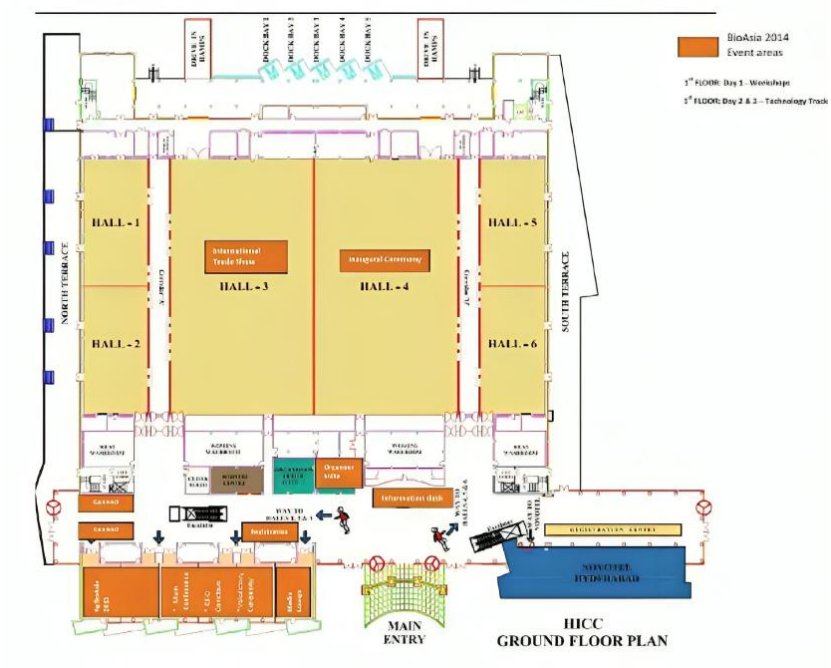


Figure 142

2.29.12 Inferences

Site is well connected to public transport making it easily accessible for visitors and staff.
Hotel within premises and HITEX exhibition centre near to convention has made HICC one of the best MICE destinations in south Asia, well equipped to handle a different kind of events. Waterbody near to the site helps in maintaining the microclimate of the area, especially during extreme climatic conditions. As the built morphology of the space has water body and green foliage in between built spaces creates a pleasant atmosphere The most striking feature of this convention centre is its column-free air- conditioner hall with a clear height of 12m provides a very wide option. The hall is flexible in size, as it can be divided into six parts which can function.

Yashobhoomi India International Expo Convention Centre (IICC Dwarka)

2.29.13 Introduction

Location	Dwarka, New Delhi
Architect	B. V. Doshi.
Area	12 acres

Yashobhoomi Convention Centre, also known as India International Convention & Expo Centre (IICC), is a landmark project situated in Dwarka, New Delhi. It stands as one of India's most ambitious infrastructure endeavours, aimed at positioning the country as a global hub for conferences, exhibitions, and business events.
This state-of-the-art facility not only serves as a venue for large-scale events but also symbolizes India's growing prowess in the global MICE (Meetings, Incentives, Conferences, and Exhibitions) industry.



Figure 143

2.29.14 Concept and Approach

The design and development of Yashobhoomi Convention Centre were driven by a holistic vision to blend modern architectural practices with India's cultural heritage. The concept focuses on creating a world-class convention and exhibition space that is both functional and symbolic of India's economic growth and cultural diversity.
The architectural approach is characterized by its emphasis on sustainability, flexibility, and technological integration. The design incorporates green building principles, aiming for a LEED Platinum certification. This is achieved through energy-efficient systems, water conservation strategies, and the use of locally sourced materials.
A critical aspect of the conceptual design is the centre's ability to host a wide variety of events, ranging from international conferences to large-scale exhibitions, concerts, and cultural events. The
architecture is flexible, with spaces that can be easily adapted to different configurations and event types.

2.29.15 Proximities

11 Kms from Indra Gandhi International Airport
23 Kms from Connaught Place
26 Kms from New Delhi Railways Station
16 Kms from Gurugram
Serviced by Public Transports (Buses, Cabs, Metros)

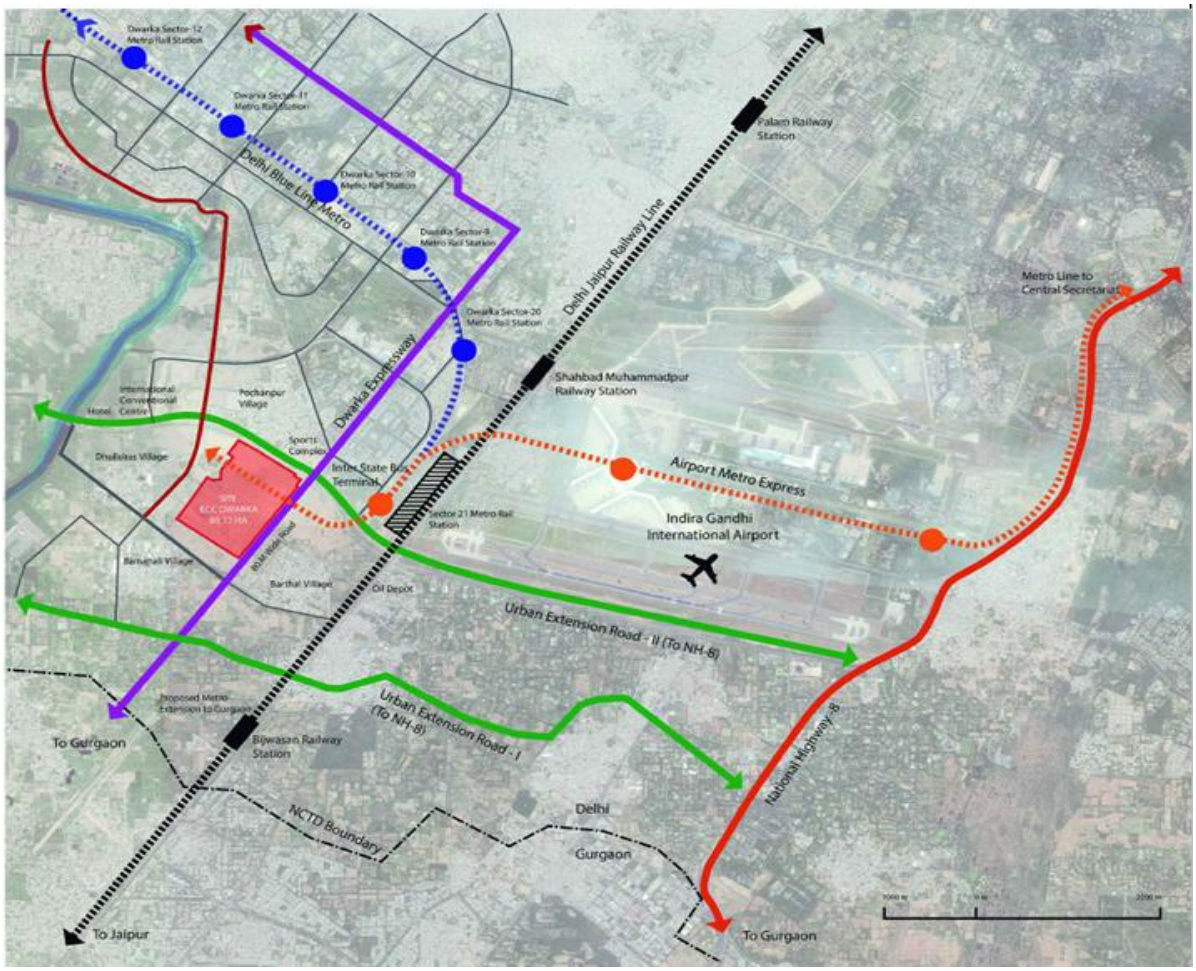


Figure 144



Figure 145

2.29.16 Accessibility

· Adjacent to Dwarka Express for easy road access
· Connected via NH-8 and Urban Extension Road-II (UER-II)

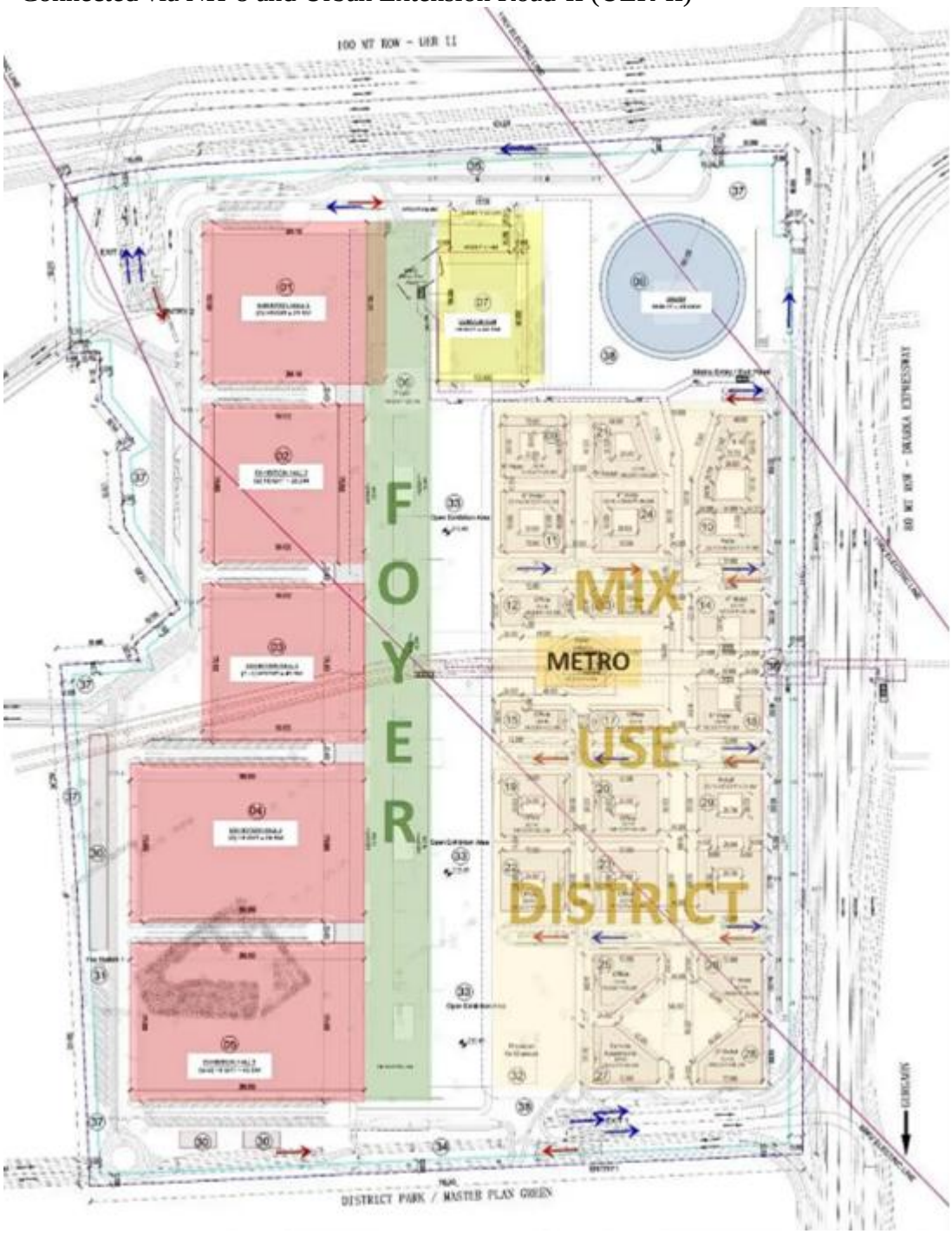


Figure 146

2.29.17 Spatial planning:

The Master Plan structures the project in two differential sectors. It leaves the fairgrounds and Convention area to the West and

The development of mixed use (Hotels, Offices, Retail Areas) to the East.

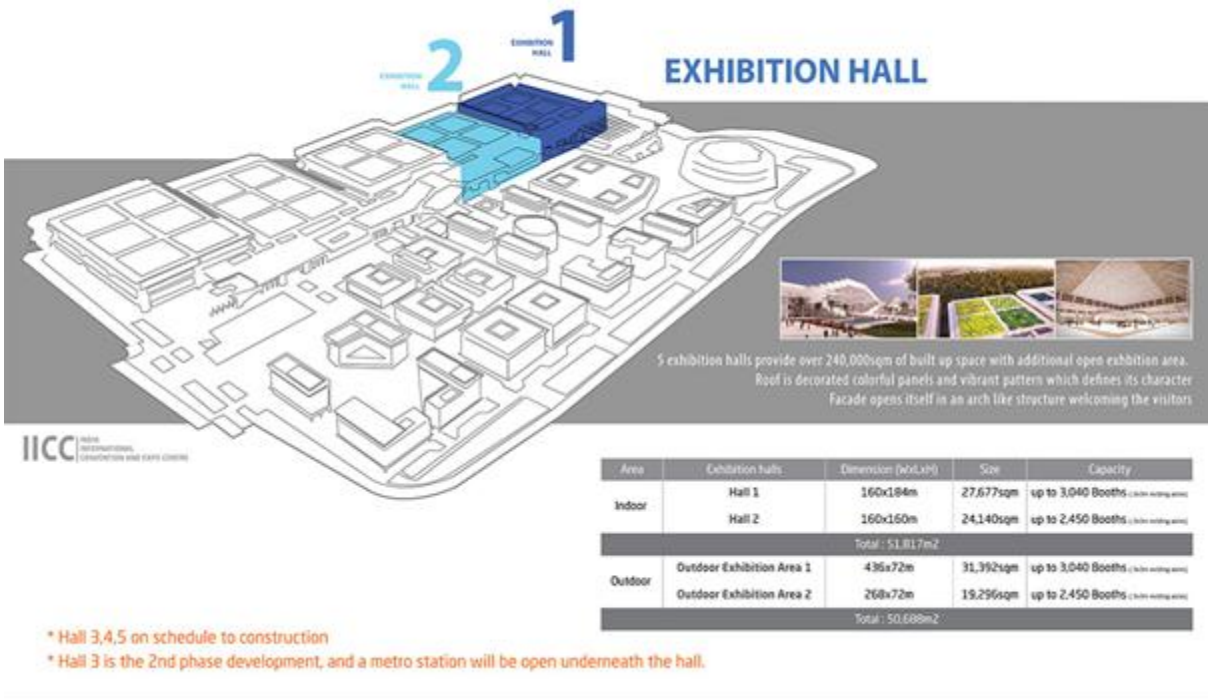


Figure 147

Area	73000 sqm
No. of Floors	8
No. of Convention rooms	15
Capacity of Main Auditorium	6000 pax
Capacity of Grand Ballroom	25000 pax
No. of Meeting rooms	13
Total Capacity	11000

2.29.18 4 Site And Planning

The Master Plan structures the project in two differential sectors. It leaves the fairgrounds and Convention area to the West and

The development of mixed use (Hotels, Offices, Retail Areas) to the East.



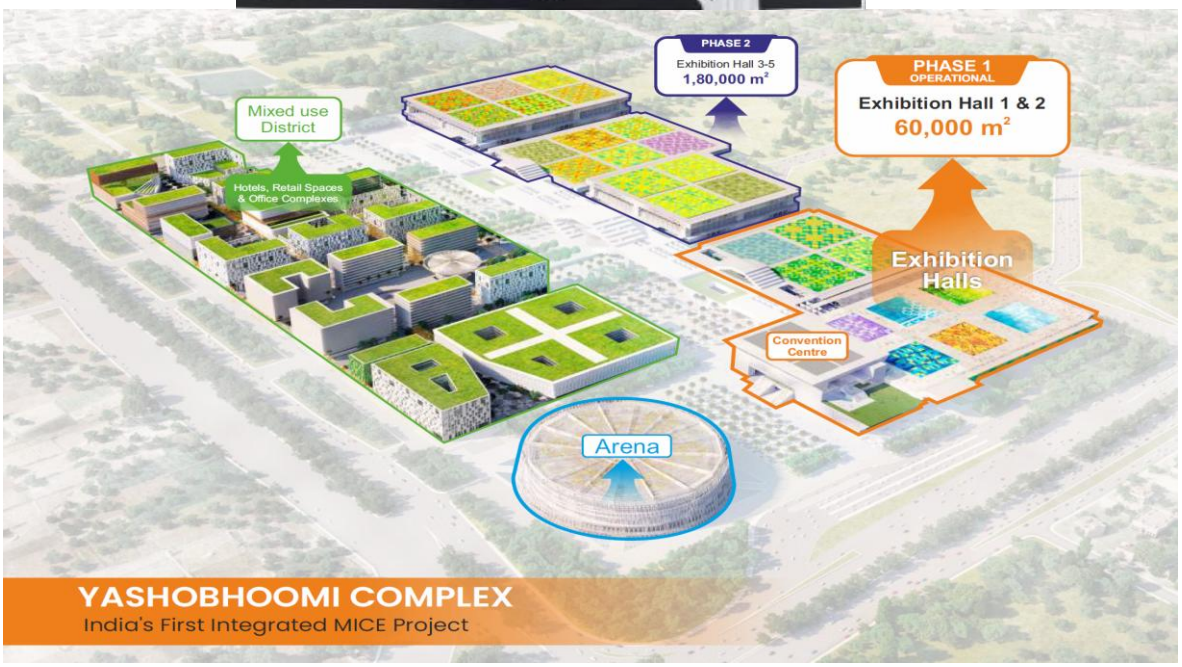


Fig 148 Yashobhoomi Complex site plan

Site plan

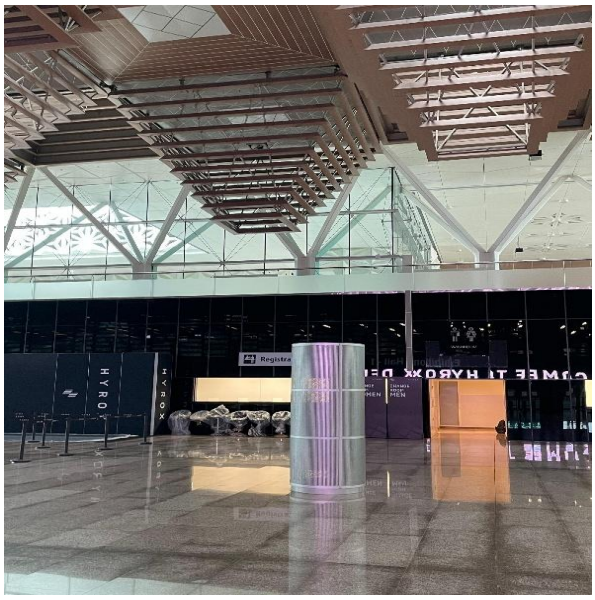
Typology	Capacity/Scale	Key Features
Auditorium	6,000 seats (divisible)	GALA system, multi-use, divisible
Grand Ballroom	3,000 (max)	Can be split, prefunction space
Meeting Rooms	13-15, seats 200–600 each	Dividable, AV equipped
Exhibition Halls	5 (Phase II), 51,000sqm+	Subdividable, large-scale events
Multipurpose Arena	20,000 (future phase)	Retractable roof, sports/events
VIP/Organiser Suites	Various	Private, secure access

Typology of spaces

- **Exhibition halls**
- **Auditorium**
- **Meeting rooms**
- **Vip lounges**
- **Clock rooms**
- **Organizers rooms**
- **Banquet halls**
- **Grand ballrooms**

Grand entrance / foyer

The covered & air-conditioned foyers in Hall 1 and 2 enhances the participants and attendees experience, it houses all the major support facilites like Registration Blocks, Organiser Rooms, VIP Lounges, Exclusive Lounges, Media Rooms and Cloak Rooms which makes Yashobhoomi a Plug & Play venue for the organisers.



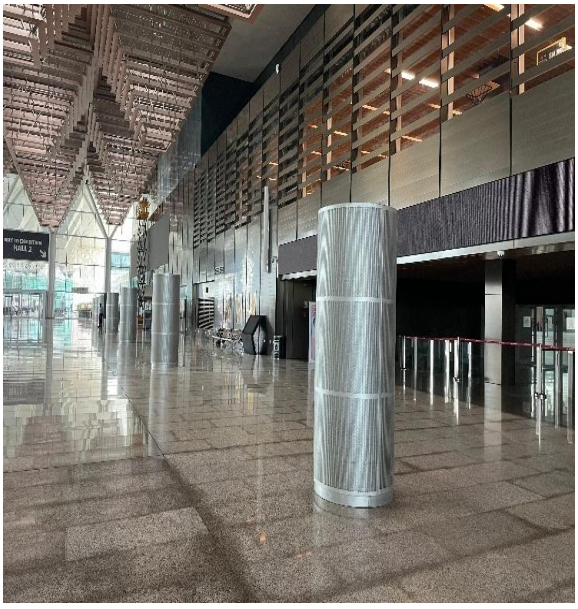


Fig 149 HVAC air supply tower like structure in the central area for cooling

I. Exhibition halls

There are 3 Exhibition Halls constructed among a total of 5 Exhibition Halls

5 exhibition halls with attached washroom provide over 240000 sqm of built-up space with additional open exhibition area. Roof is decorated colorful panels and vibrant pattern which defines its character façade opens itself in an arch-like structure welcoming visitor. Each hall is equipped with flexibility to be converted into 4 small halls.
Exhibition hall 1 divided into Four quadrants ABCD
15 m clear height
Hall B and C are of equal area

A 5200 sqm
D 5800 sqm



Figure 150

2.29.19 Convention hall

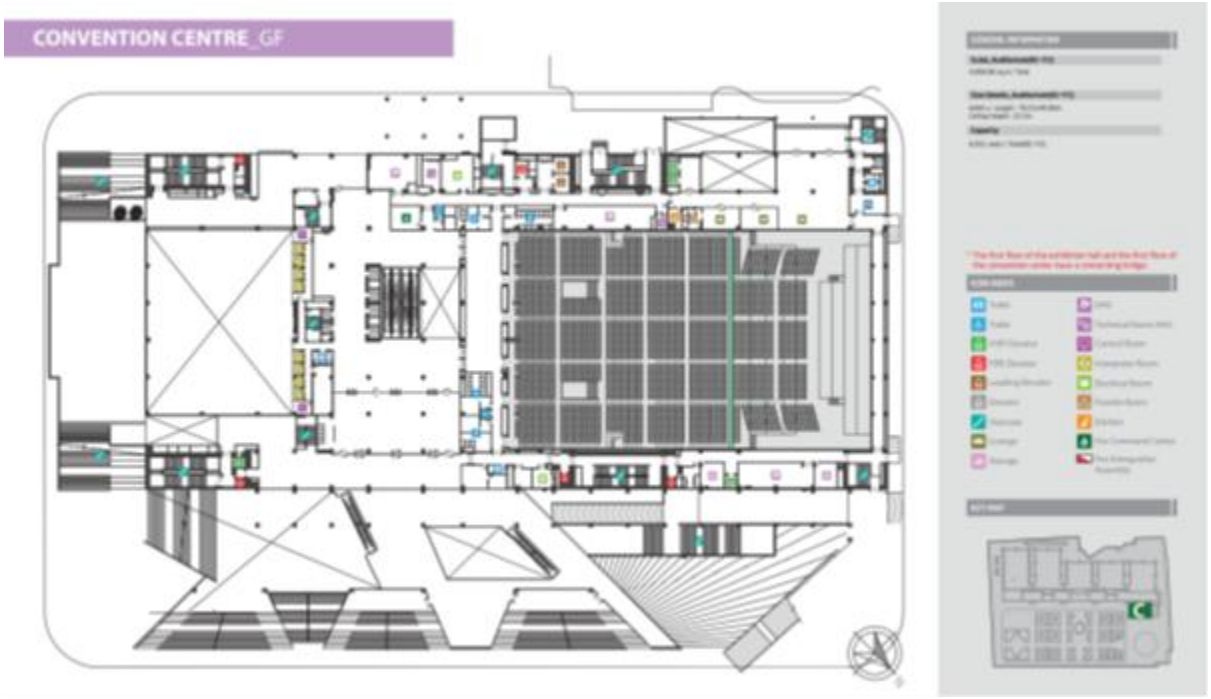


Figure 151

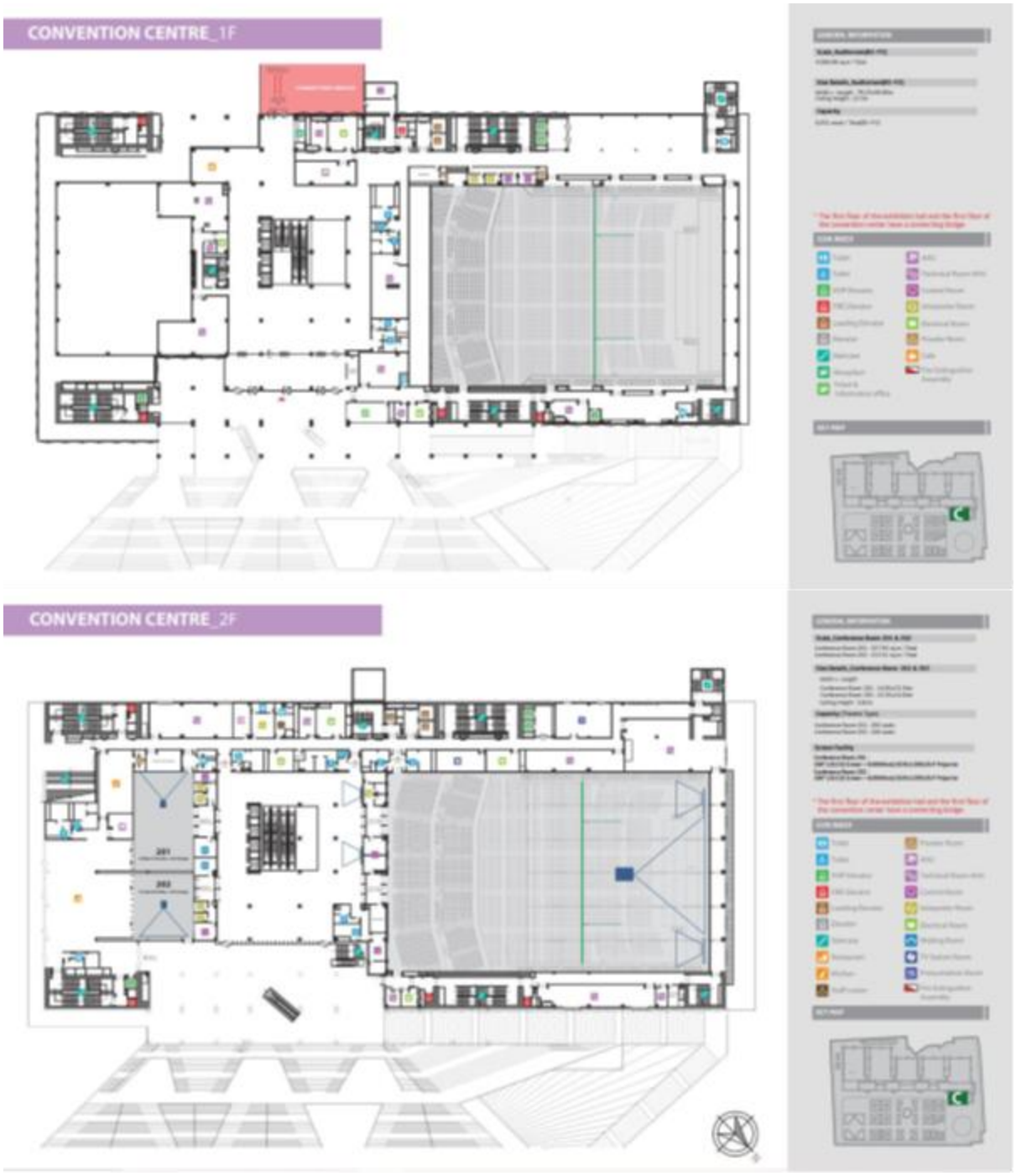


Figure 152





Figure 153

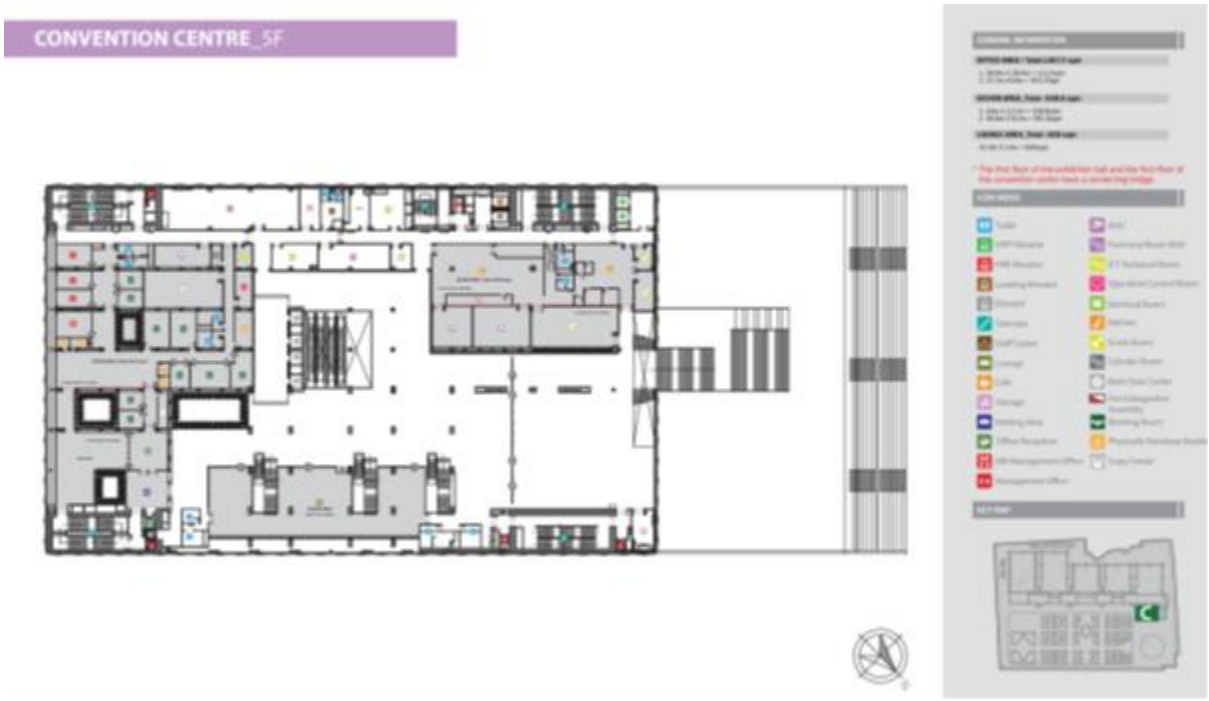


Figure 154

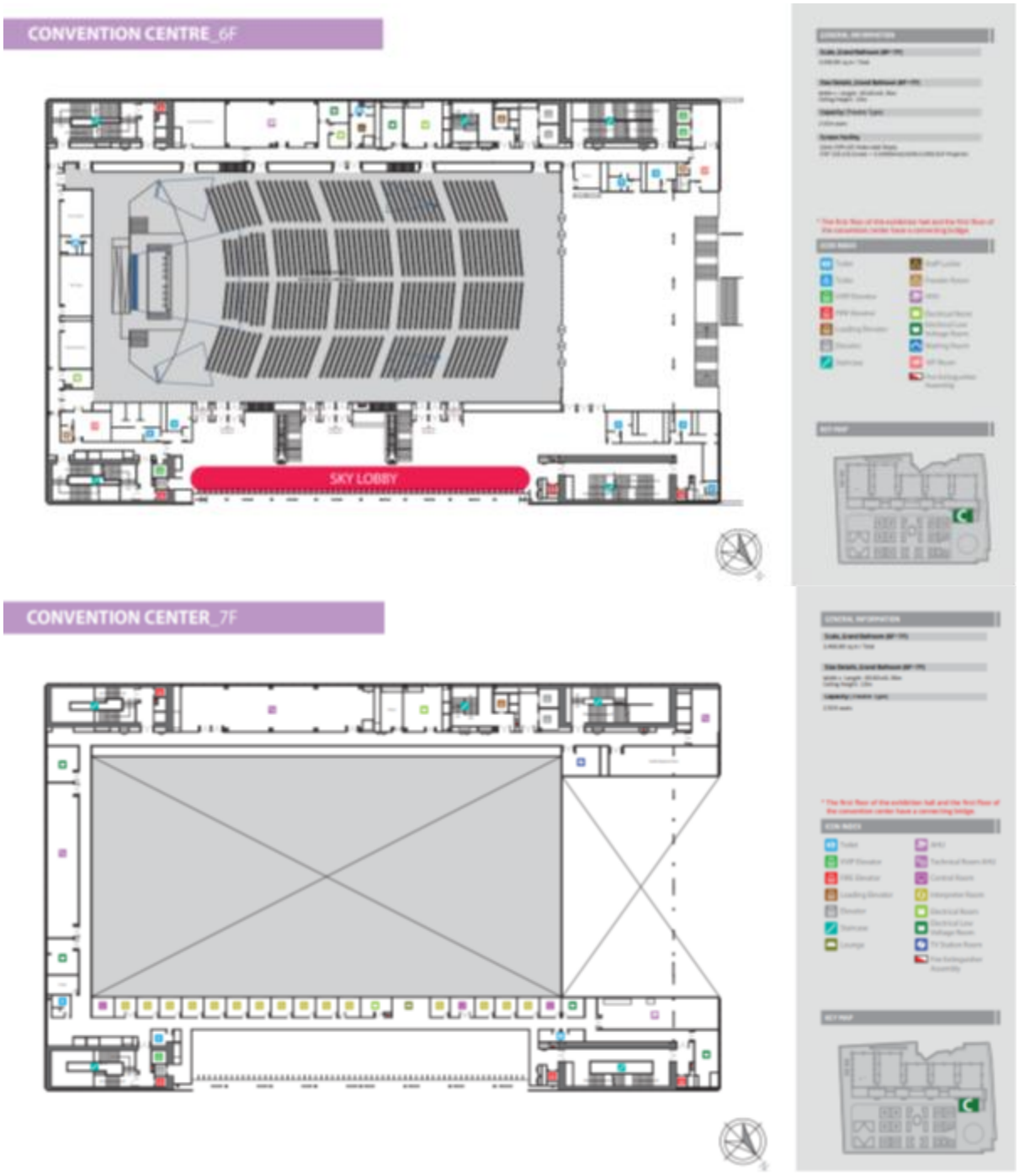


Figure 155

2.29.20 Auditorium

It is the core of the complex and it's equipped with a seating capacity of around 6000 people.

Other Features:

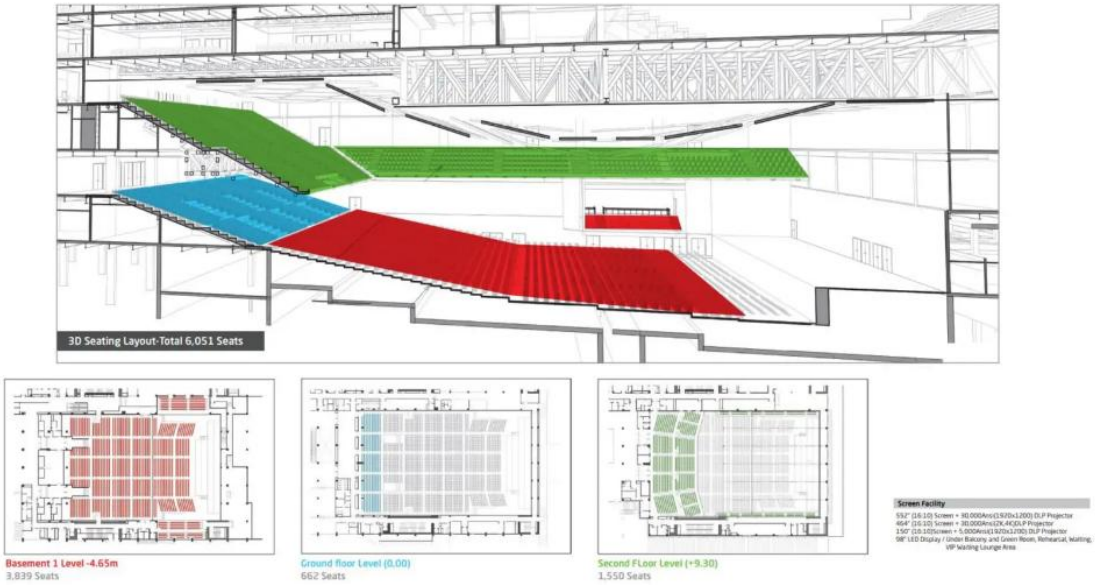
i. LED Media Façade on both interior and exterior sides

ii. Decoration inspired by Indian Culture

iii. Terrazzo floors, metal sound absorbers, lit-up patterned walls

iv. Innovative automated seating system (flat floor or tiered seating)

Figure 156



2.29.21 Exhibition halls

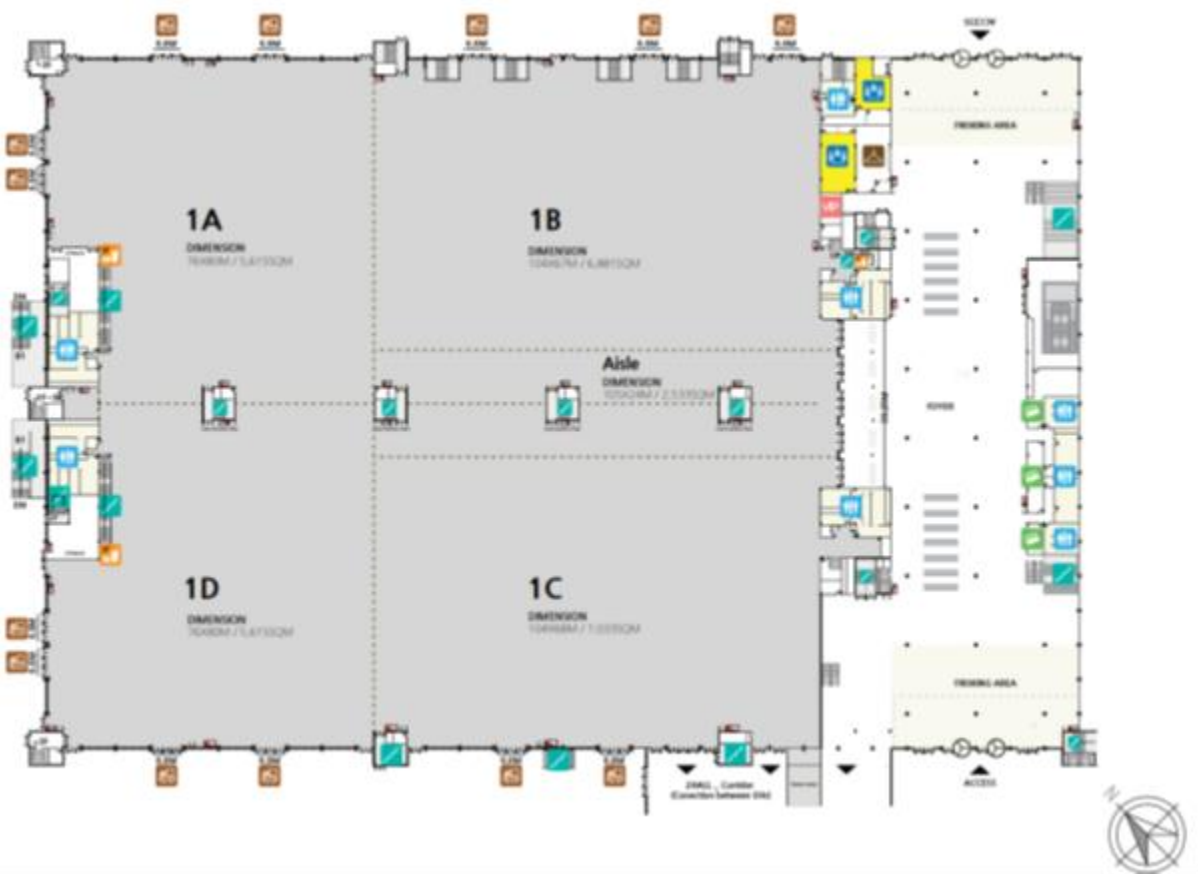


Figure 157

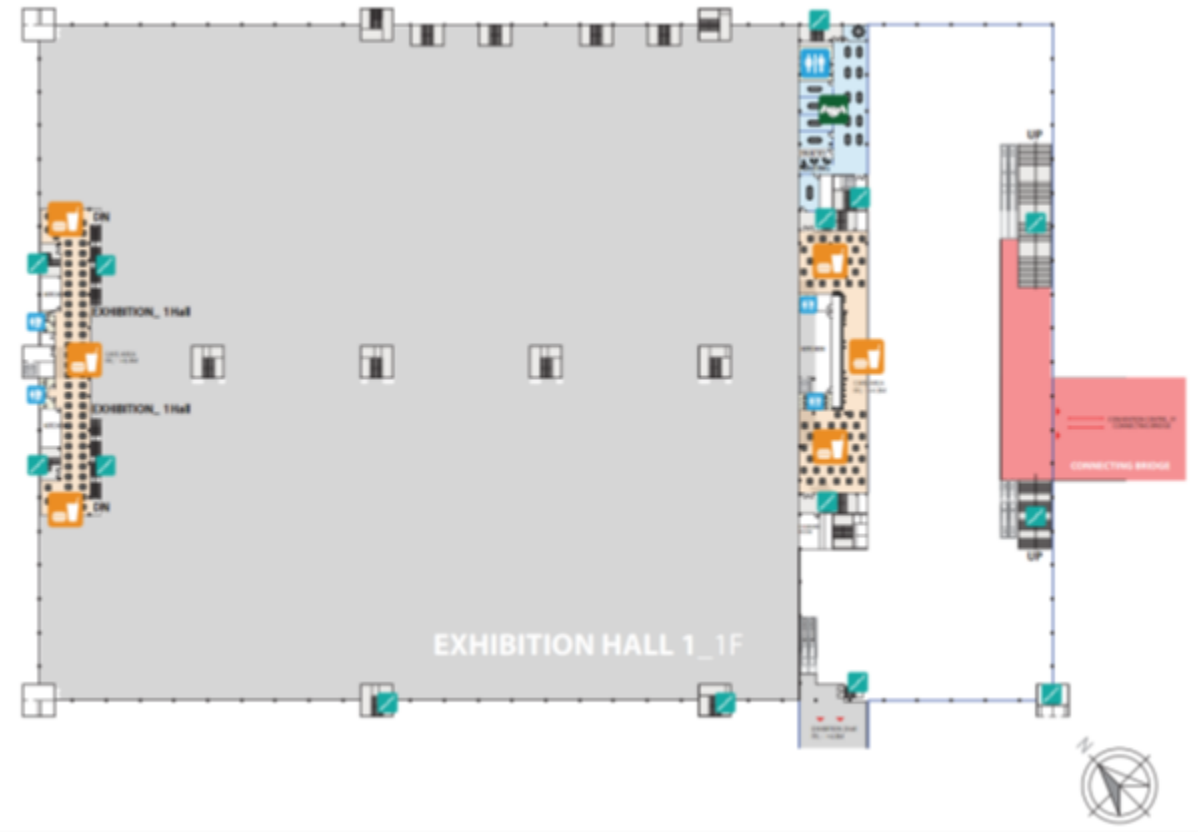


Figure 158

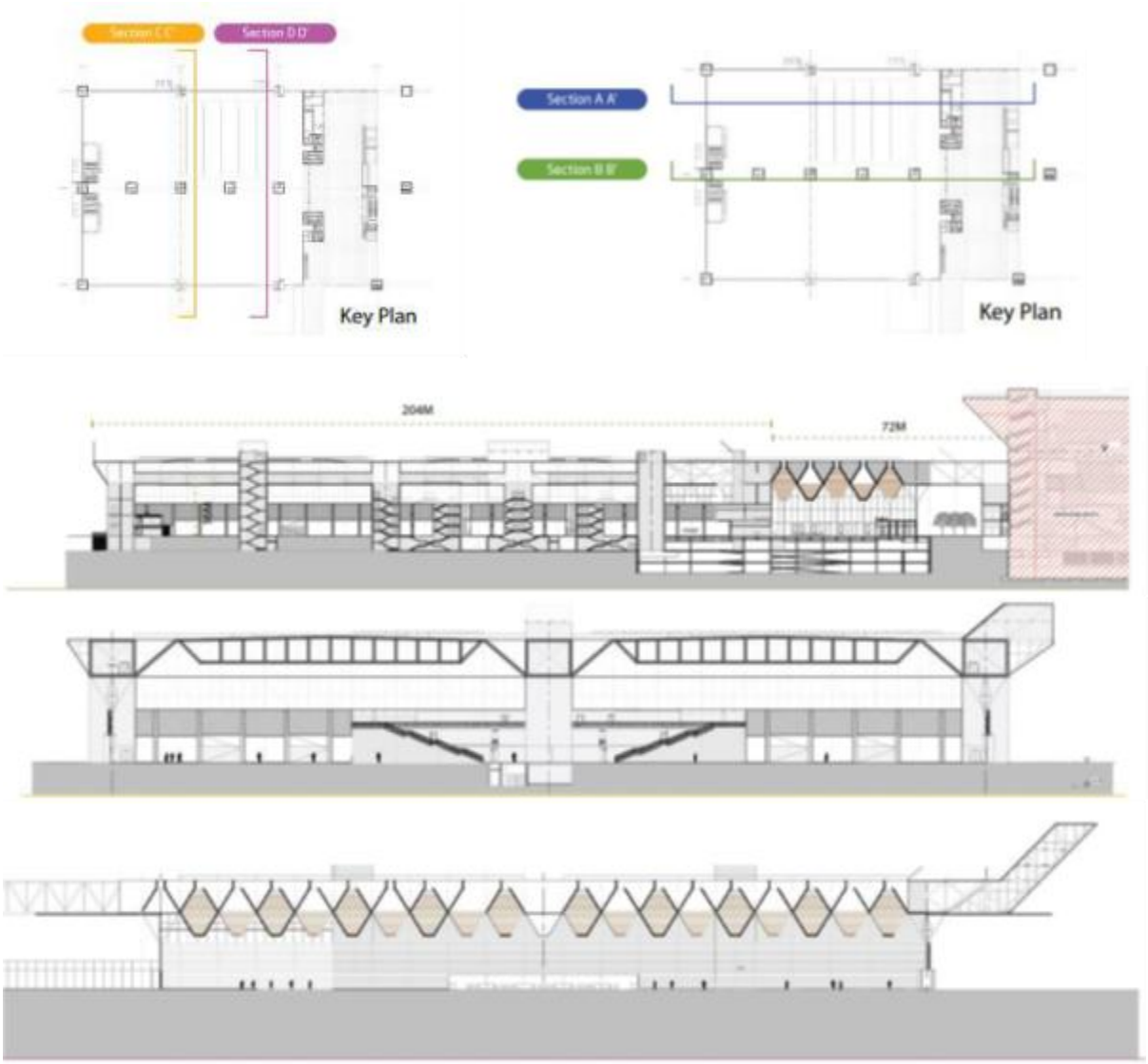


Figure 159

There are 3 Exhibition Halls constructed among a total of 5 Exhibition Halls

5 exhibition halls provide over 240000 sqm of built-up space with additional open exhibition area. Roof is decorated colourful panels and vibrant pattern which defines its character façade opens itself in an arch-like structure welcoming visitor. Each hall is equipped with flexibility to be converted into 4 small halls.

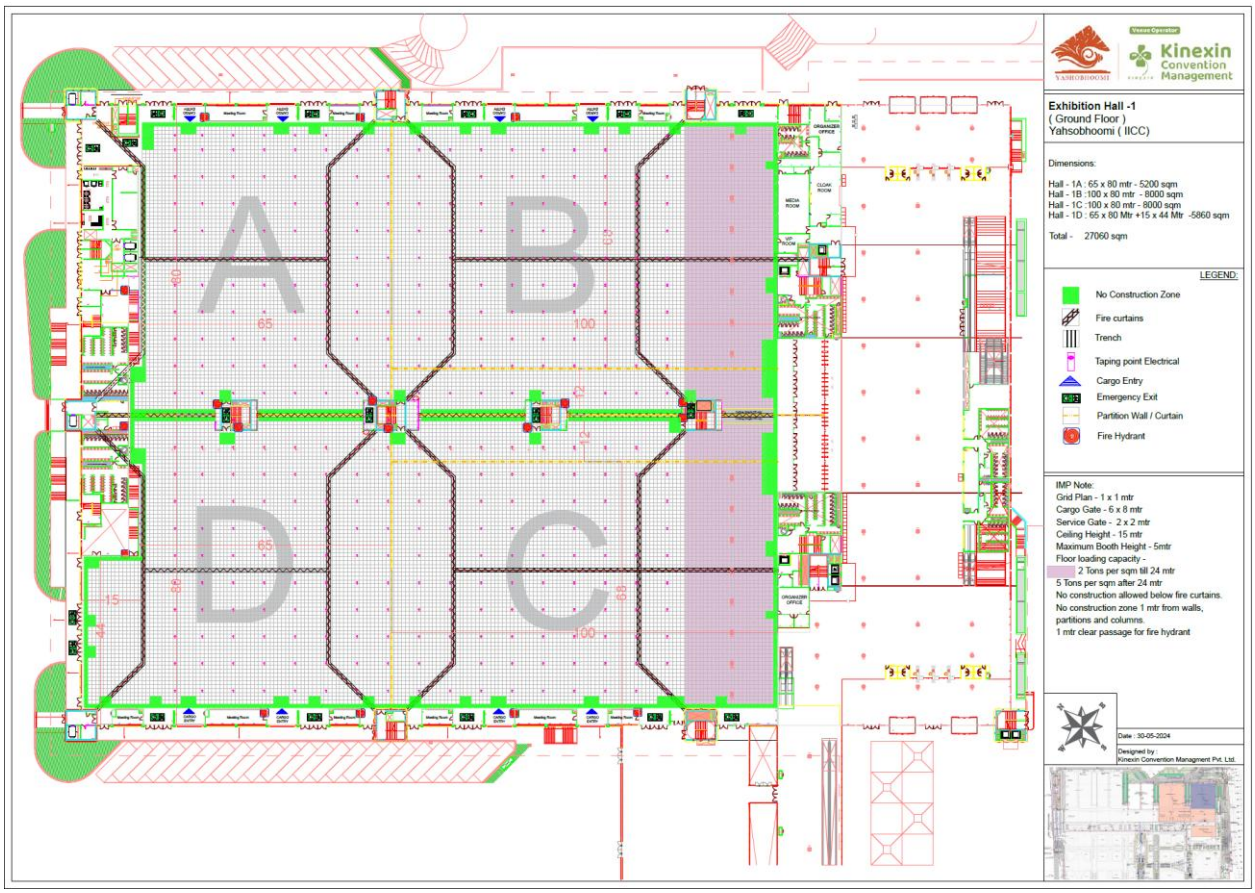


Fig 160 Detailed plans for exhibition hall 1

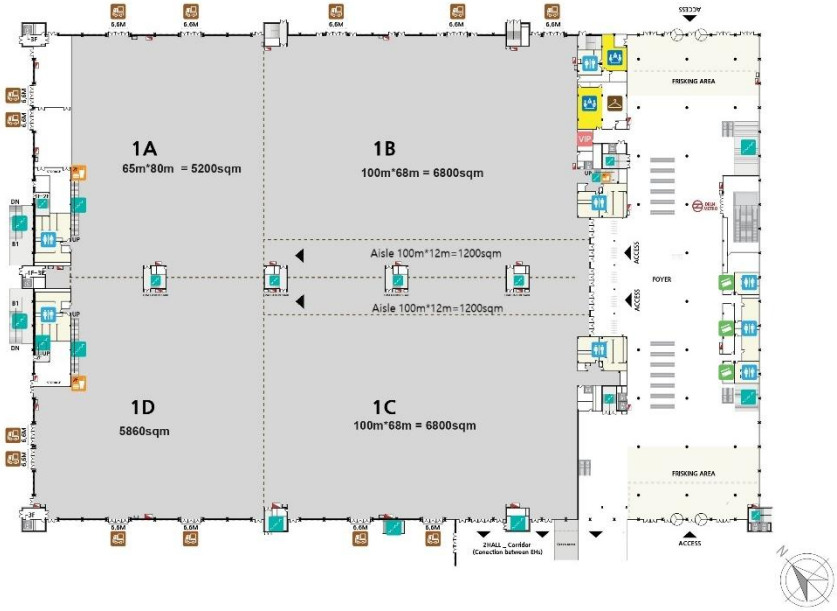


Fig 161 Ground floor plan : Exhibition hall 1

- Cargo gates for truck
- 18 gates in total for the premise
- Gate 10 for truck

- 9th gate for labors

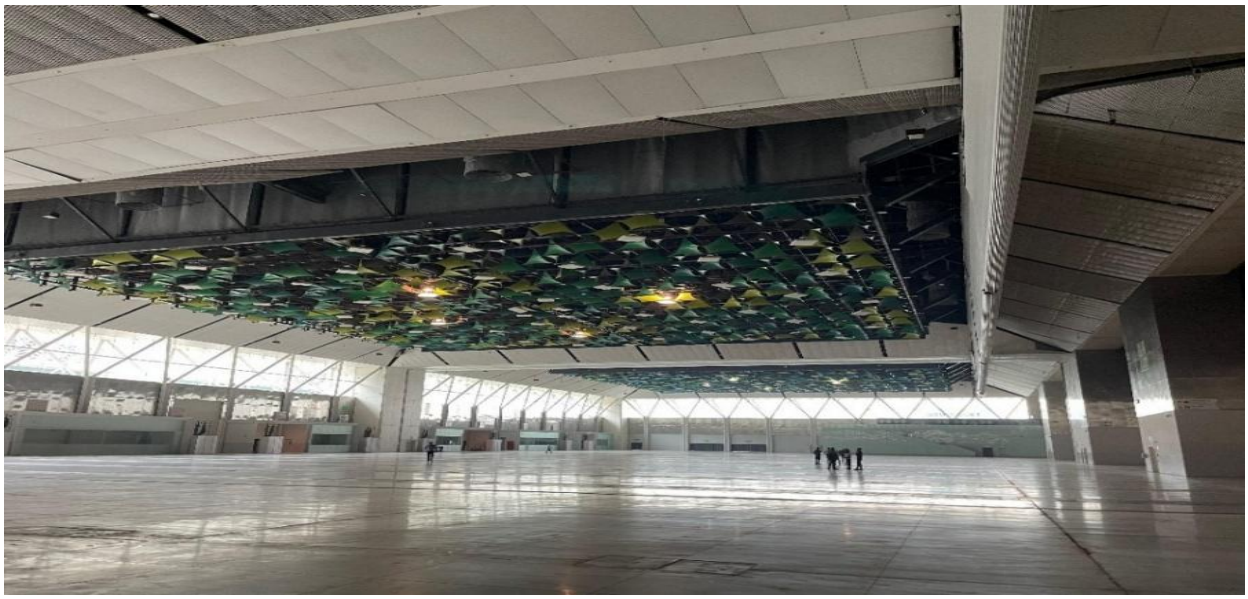


Fig 162 Exhibition hall with provisions for maximum light

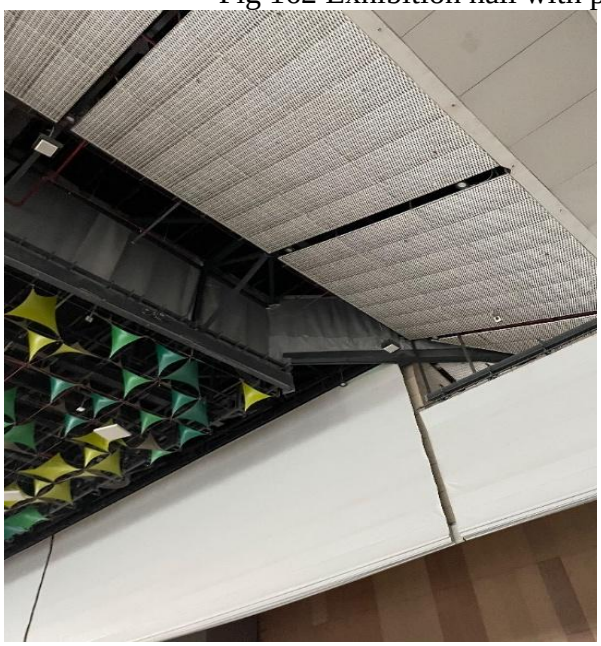


Fig 163 Ceiling panels in exhibition hall

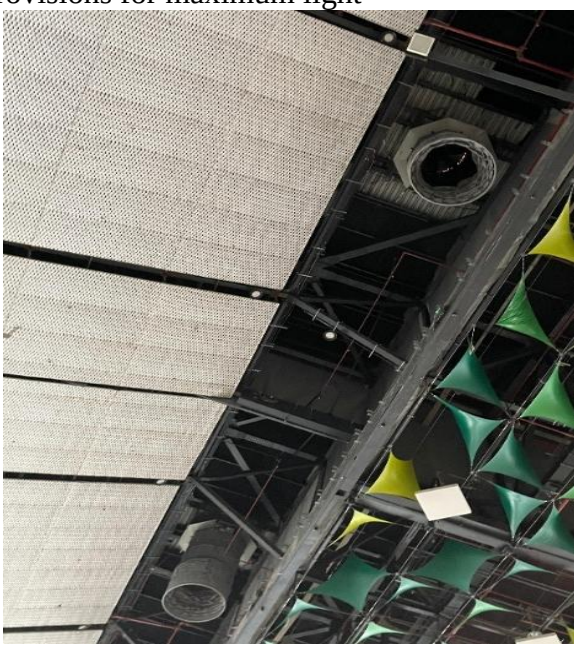


fig 164 Retractable ducts for fire fighting



Fig 165 Partition to divide the exhibition halls into smaller parts



Fig 166 Different types of room on different floors

It is the core of the complex and it's equipped with a seating capacity of around 6000 people.

Other Features:

i LED Media Façade on both interior and exterior sides

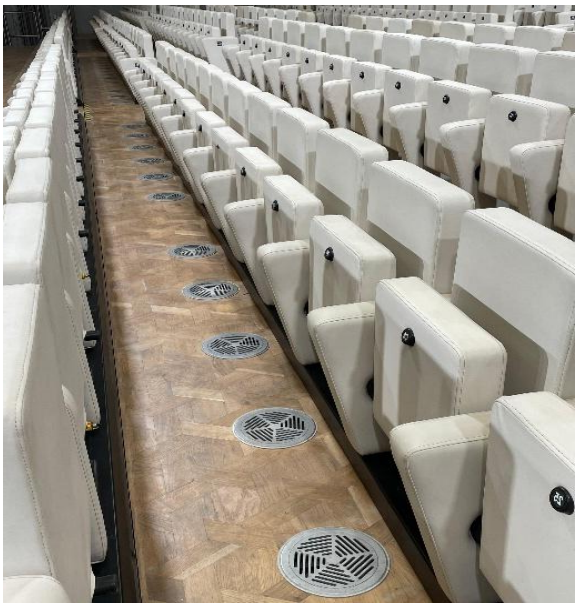
ii Decoration inspired by Indian Culture

iii Terrazzo floors, metal sound absorbers, lit-up patterned walls

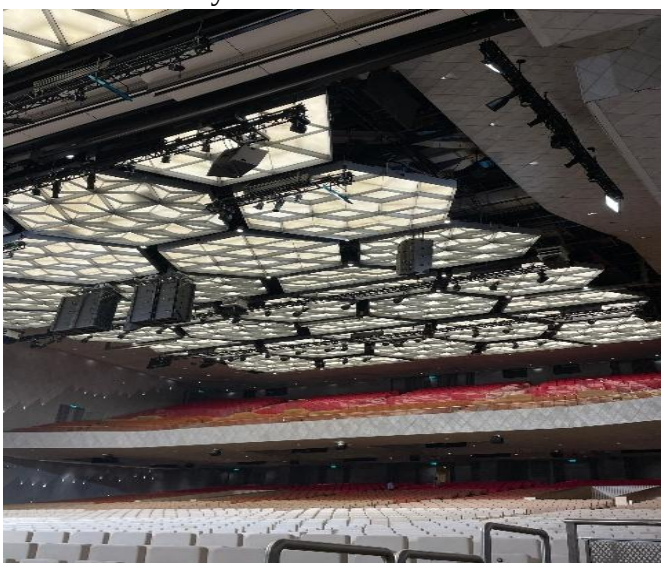
iv Innovative automated seating system (flat floor or tiered seating)

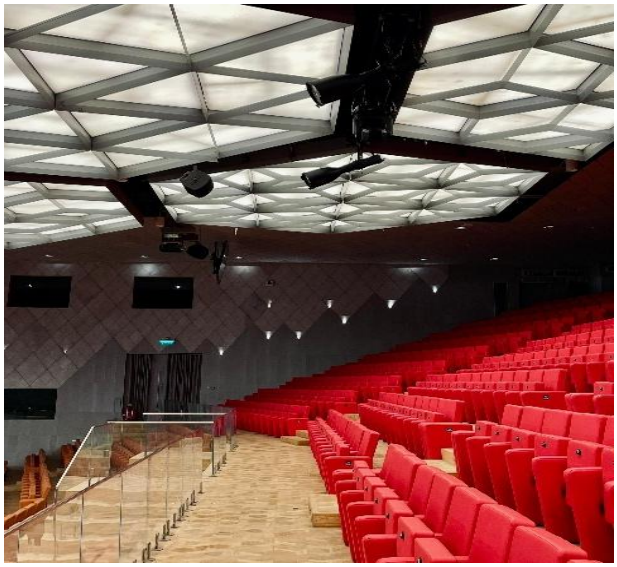


Ac Vents behind Seats for
The Balcony Floor in the Auditorium

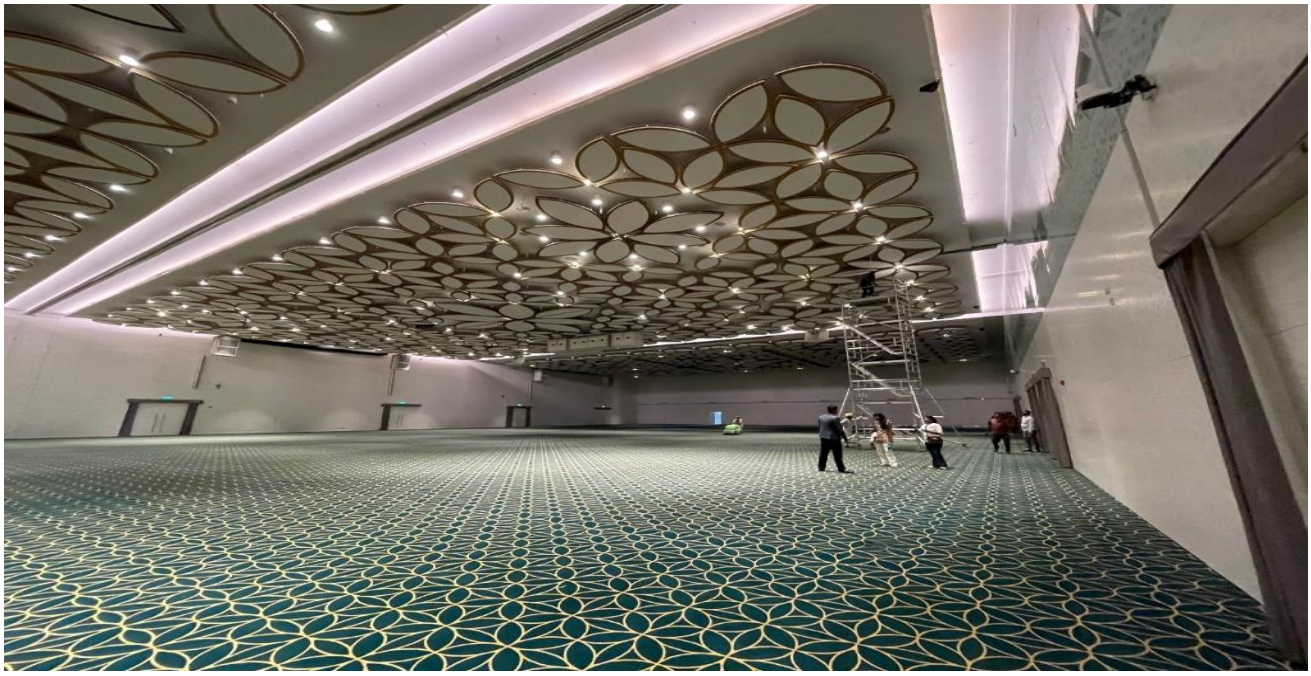


Ac Vents on the Floor
for the Front Seats

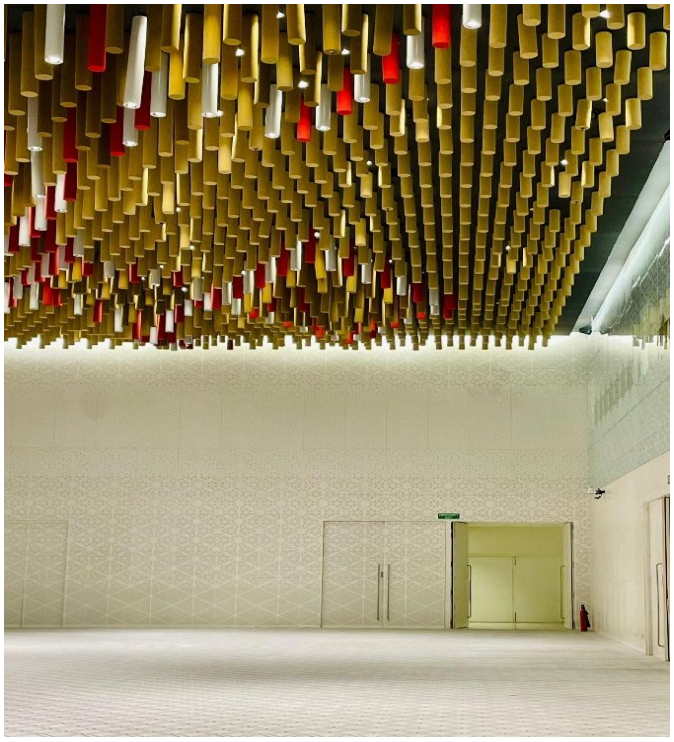


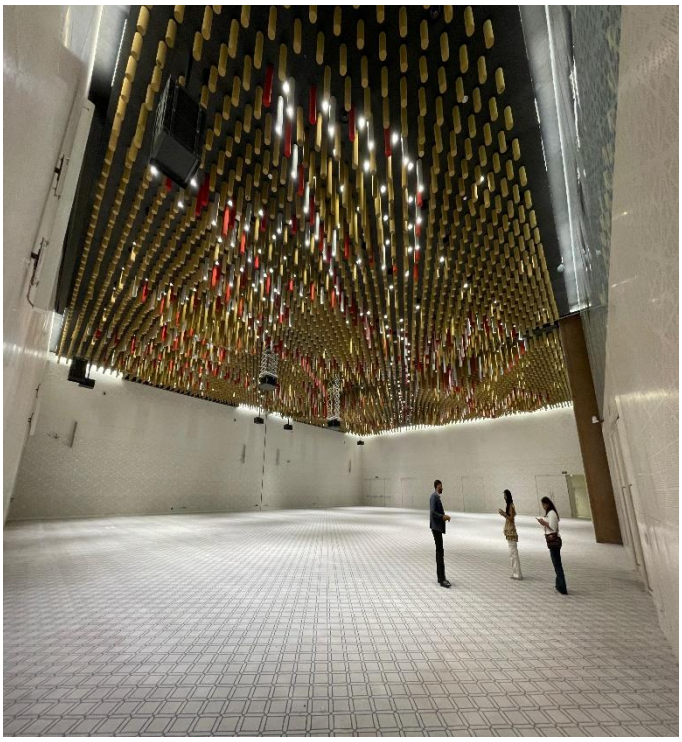


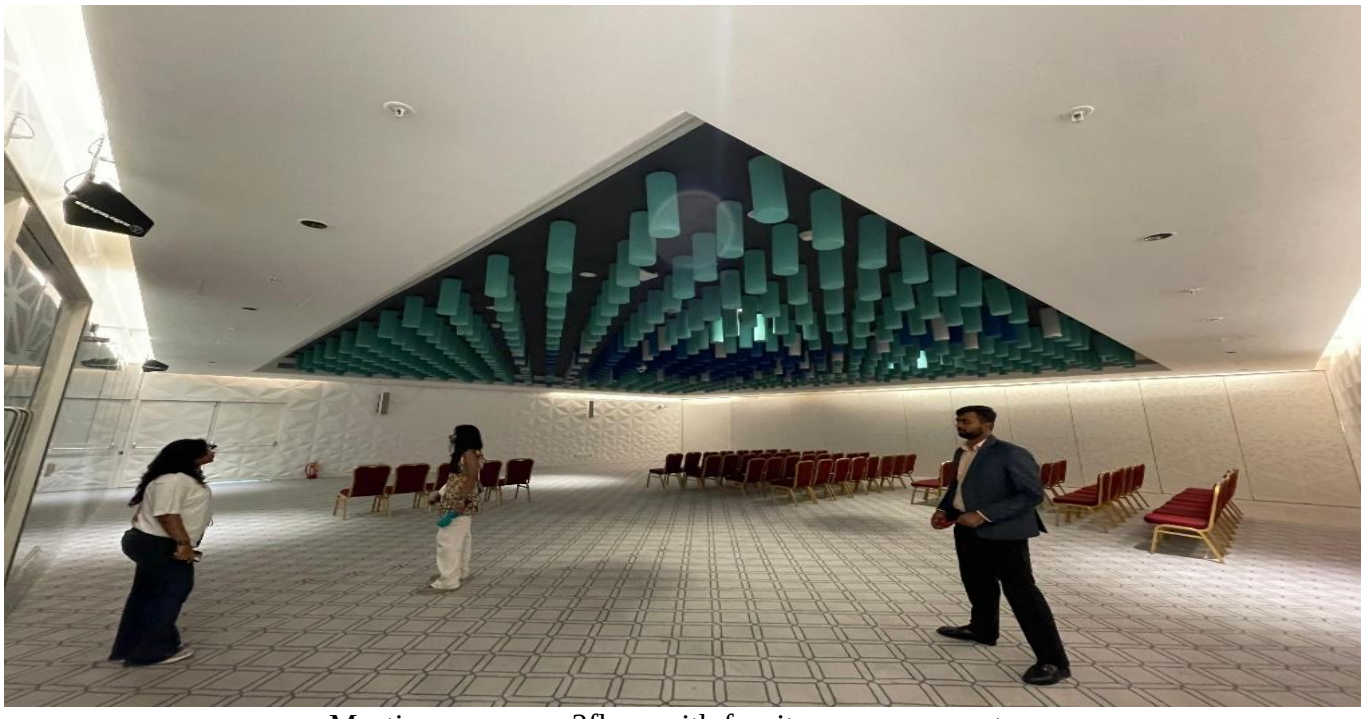
Ceiling Panels



Largest Pillarless Hall on The Top Floor Palash



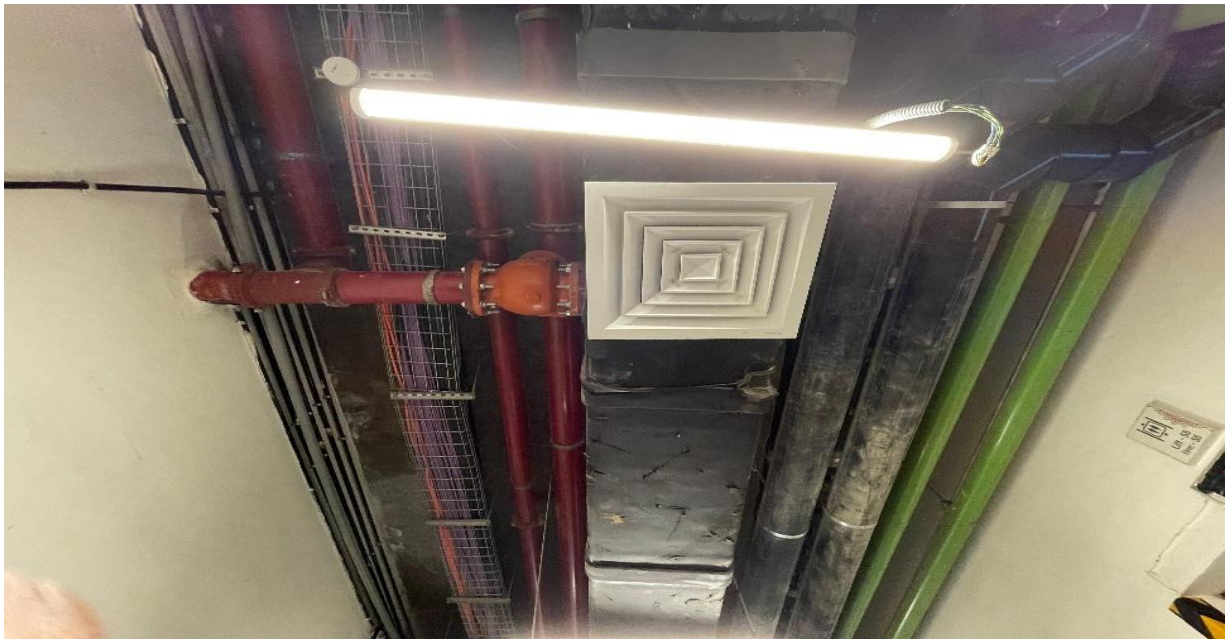




Meeting rooms on 3floor with furniture arrangement



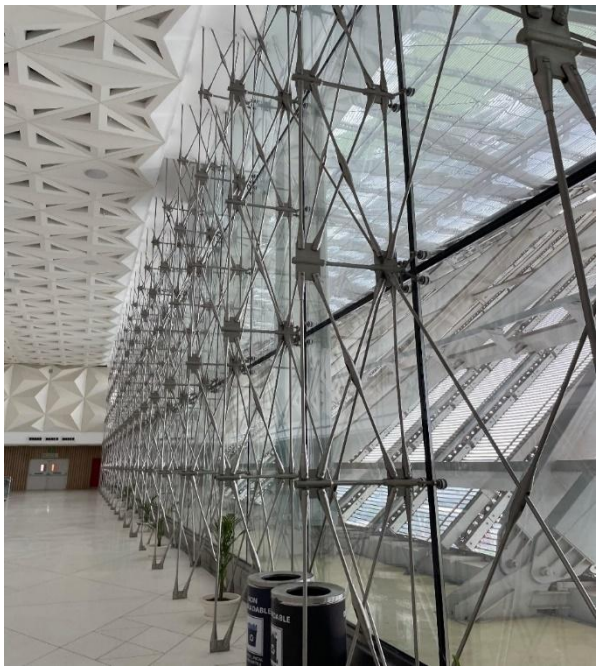
Av and control booth behind the walls concealed via single on way see through mirror

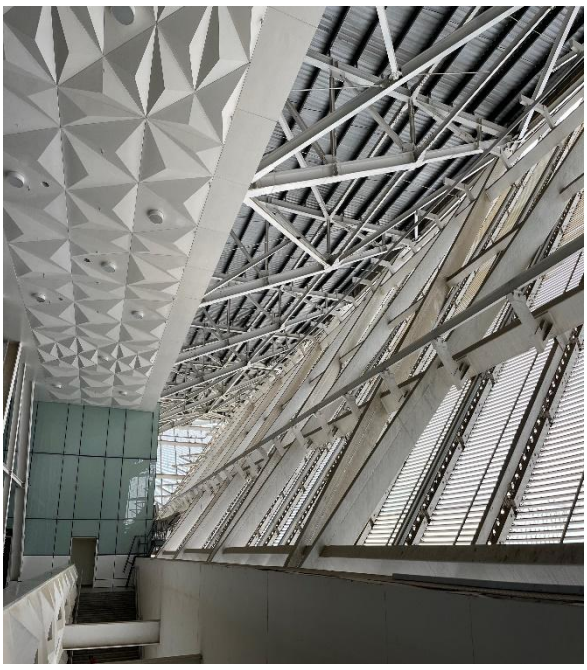


Service Corridor with Overhead Pipelines For
Hvac , Sewage , Fire Fighting , Electrical Conducting









Point Supported Glass Curtain

II. PARKING

Car Spaces Distribution

Parking is distributed across 4 basement levels, with a total of 6,294 ECS (Equivalent Car Spaces). These are spread across different facilities including hotels, offices, and retail areas. A total of 168 preferred car spaces are designated across the four basements, providing convenient parking for specific categories, such as VIP or priority guests.
Various facilities such as retail, hotels, offices, and convention centres have dedicated parking spaces, with retail receiving the largest share, having 1,555 ECS in total

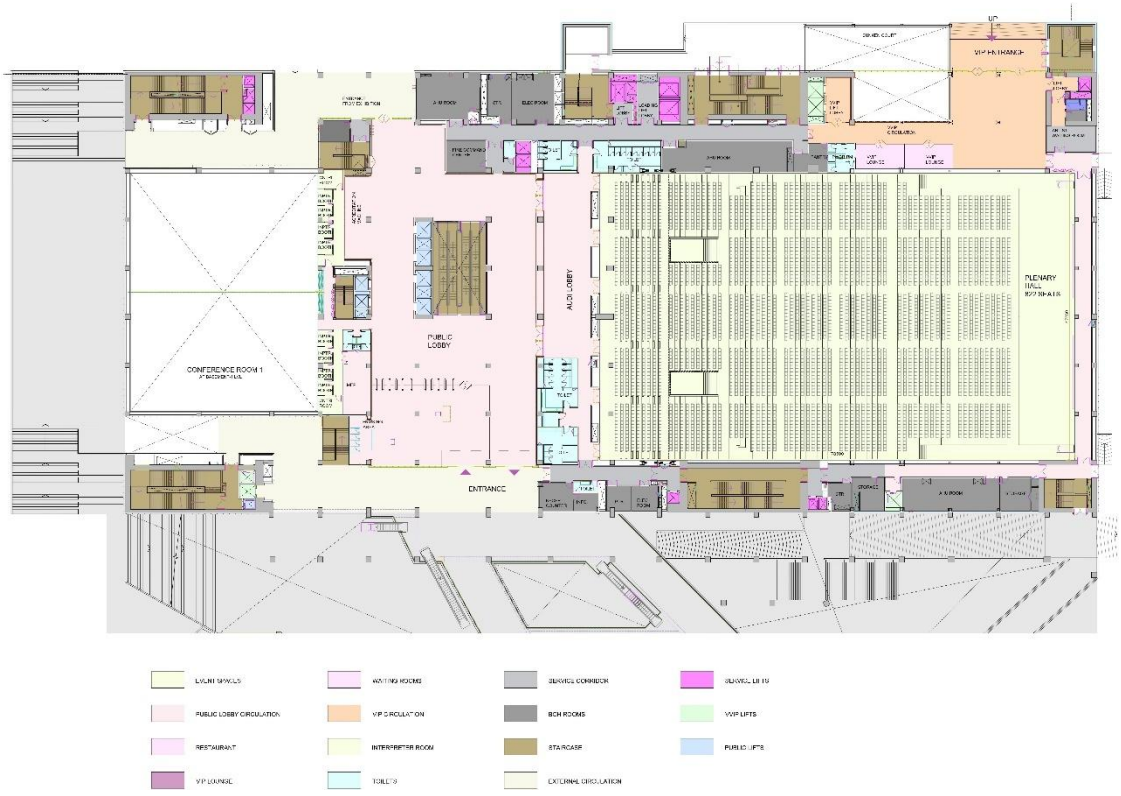
2.29.22 Parking

Car Spaces Distribution

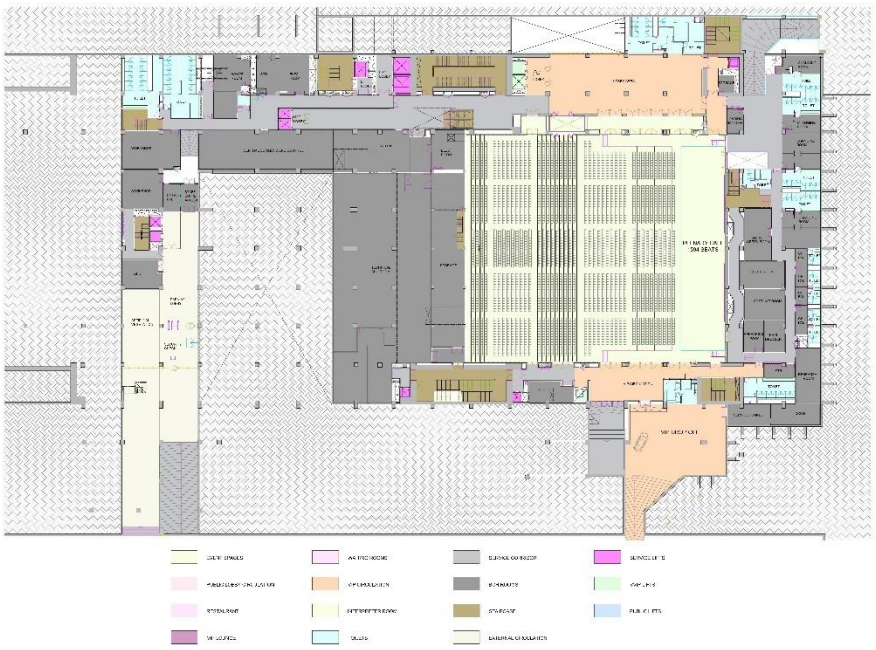
Parking is distributed across four basement levels, with a total of 6,294 ECS (Equivalent Car Spaces). These are spread across different facilities including hotels, offices, and retail areas.
A total of 168 preferred car spaces are designated across the four basements, providing convenient parking for specific categories, such as VIP or priority guests.
Various facilities such as retail, hotels, offices, and convention centres have dedicated parking spaces, with retail receiving the largest share, having 1,555 ECS in total.

2.29.23 Inferences

The Yashobhoomi Convention Centre is a landmark in modern Indian architecture, embodying a blend of cutting-edge technology, sustainability, and cultural representation. Its design and concept underscore the importance of flexible, multi-functional spaces in meeting the demands of a global MICE industry. The centre not only enhances India's infrastructure capabilities but also serves as a testament to the country's commitment to becoming a major player in the global conference and exhibition landscape.



GROUND FLOOR LEVEL PLAN



BASEMENT B1 PLAN



BASEMENT B1 PLAN



7F LEVEL PLAN



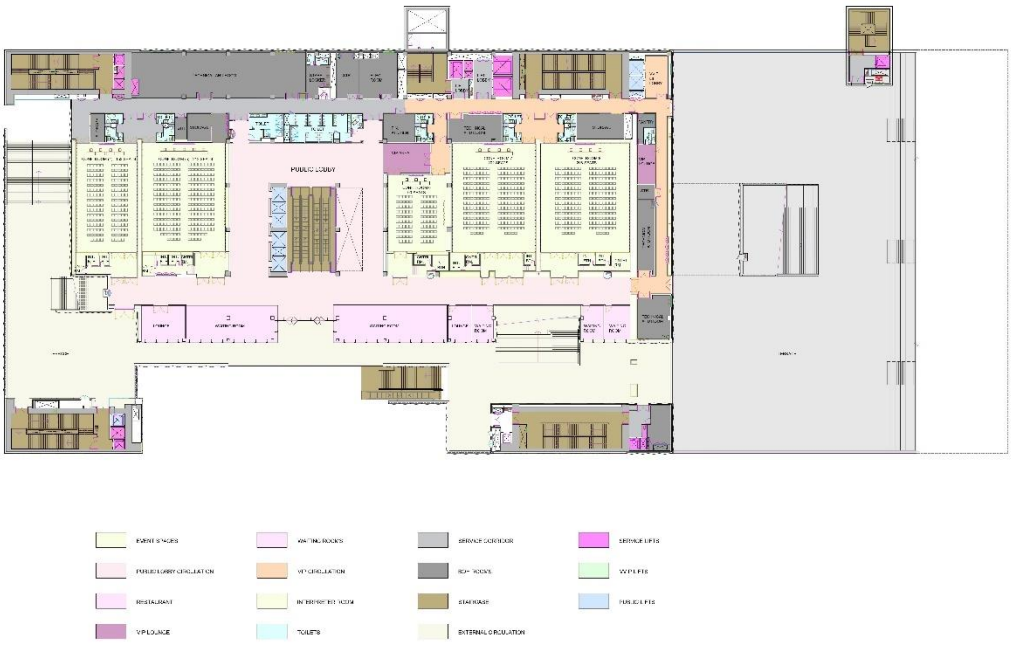
6F LEVEL PLAN



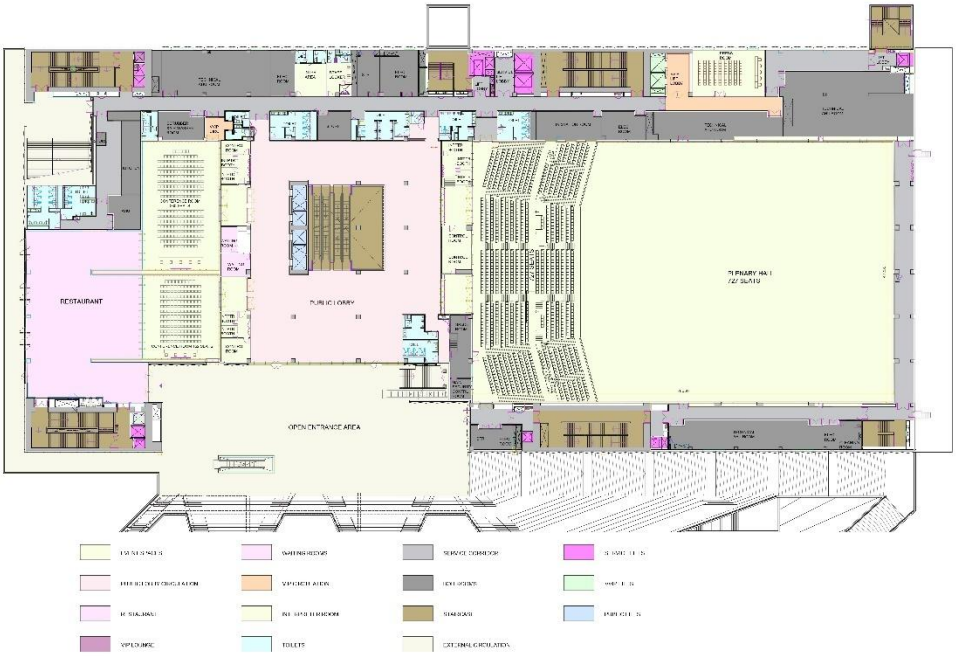
5F LEVEL PLAN



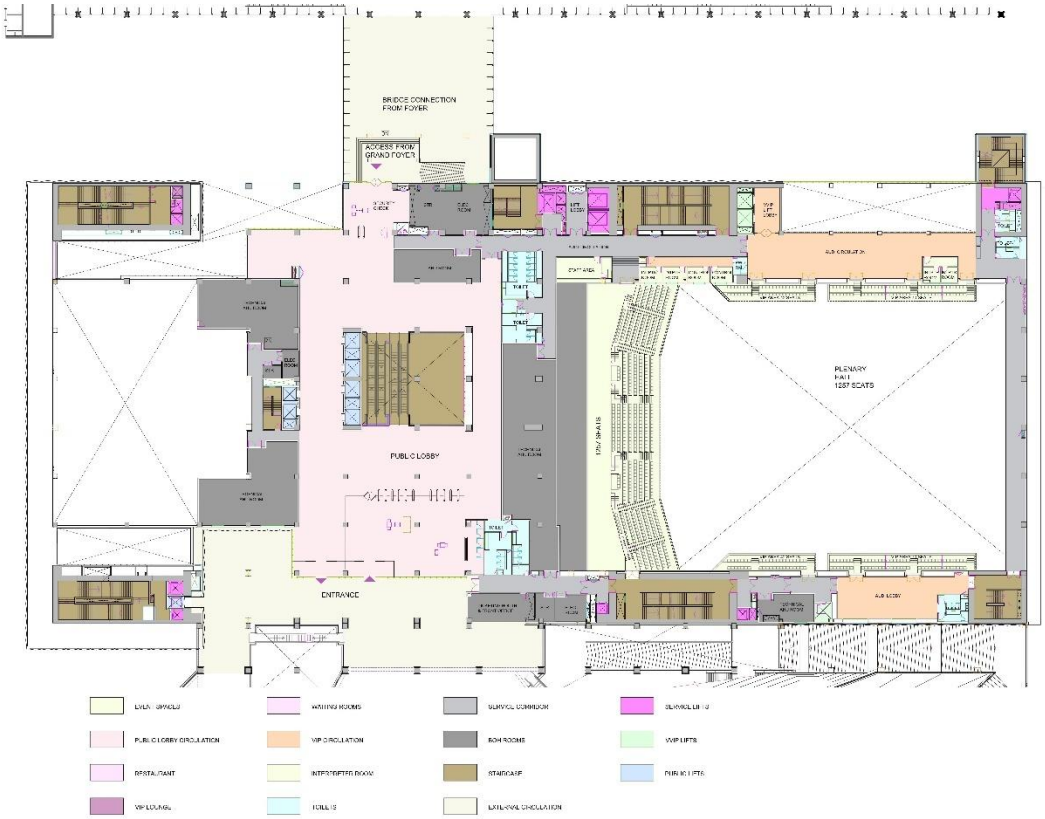
4F LEVEL PLAN



3F LEVEL PLAN



2F LEVEL PLAN



1F LEVEL PLAN

2.30 Kushabhau Thakre Hall (Minto Hall)



Kushabhau Thakre Hall (Minto Hall)

Location : Bhopal, India
Owners : Madhya Pradesh Tourism
Built by- The Last of the Four Nawab Begums, Sultan Jehan
Built In: 1909
Renovation Completed in 2018
Principal Architects (Rennovation): Ar. Puneet Sohal
Site Area: 10.6 Acres
Built Up area: 4.6 Acres
Ground Coverage: 1.78 Acres
Cost of Project: 3 lakhs at the time of construction
Renovation Cost: 65 Crore
Established: 1909
Key Events: Government Meetings
Accessibility: Well-connected by road and public transport.
Amenities: Restaurant, Bar, Wi-Fi, security, and Building maintenance system.
Design: Indo-Saracenic with colonial influence

2.30.1 Introduction



Figure 20- Nawab Begum Sultan Shah Jehan

Minto Hall is a historic heritage building located in Bhopal, the capital city of Madhya Pradesh, India. It was built in honor of **Lord Minto**, the then Viceroy of India, by **Nawab Shah Jahan Begum**, the last Begum of Bhopal. The foundation stone was laid on **November 12, 1909**, and the construction was completed by her son, Nawab Hamidullah Khan, in 1933.

The hall is a blend of **Indian and English architectural styles** and was initially intended to serve as a guest house for visiting Europeans. Over the years, it has served various purposes, including being the headquarters of the Bhopal Army and housing Hamidia College until 1946. After India's independence, it became the venue for the State Assembly until 1996.

In recent years, Minto Hall has been restored and now serves as an **international convention center** with a stylish rooftop bar and restaurant. The building stands as a testament to the rich history and cultural heritage of Bhopal



Figure 21- Minto Hall Previous and after renovation

2.30.2 Purpose of the case study

- Understanding the design approach at that time
- To compare structure of heritage and modern building

- To understand the laws and design as it is in same state

2.30.3 Entrance

The entrance of Minto Hall in Bhopal is quite impressive, reflecting its historical significance and architectural beauty. The entrance, showcase a blend of Indian and English architectural styles. The grandeur of the entrance sets the tone for the elegance and heritage that the building represents. As we enter, there is a statue of **Kusabhau Thakre**, adding to the grandeur of the entrance, which sets the tone for the elegance and heritage that the building represents.
There is a commemorative wall mounted on a structure with four columns and has a red and beige color scheme, displaying the name of the Minto Hall.



Figure 24- Main entrance



Figure 23- Commemorative wall

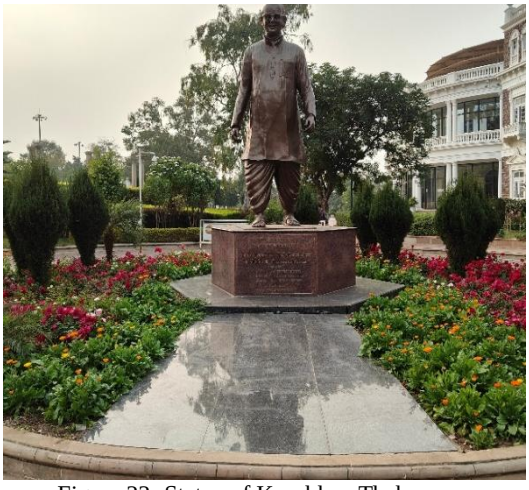


Figure 22- Statue of Kusabhau Thakre

2.30.4 Accessibility towards the site :

- Location: Strategically located on the shore of lower lake, facing the skyline of old Bhopal, Bhopal.
- Airport: About 13.6 km from Raja Bhoj Airport.
- Railway Station: 3.3 km from Bhopal Railway Station and 5.4 km from Rani Kamlapati Railway Station
- Bus Connectivity: Well-connected through buses.
- Major Roads: Accessible via Roshanpura Road and Lower lake Road.
- Hotels: MPT Palash Residency at 1.6 Km.

2.30.5 Major components of site:

According to needs, the venue offers a flexible seating capacity that can accommodate anywhere from 1180 people. The hall offers seating for up to 600 people in a theatre style, with an additional of Seminar and meeting rooms.
It also has underground wiring for power, and HVAC System;

- Entrance Plaza
- 2 halls: 2 Seminar Room, 2 Meeting Rooms, 1 Media Room
- Gardens
- Parking
- Service blocks
- Restaurants
- VIP lounge

2.30.6 Architectural Element

- **Pillars**

The building features a series of majestic pillars, supporting the arches and providing structural stability.

- **Arches**

Arched doorways and windows are prominent features of Minto Hall, adding an element of grace and elegance.

- **Domes**

The dome-shaped roof, a common feature in Islamic architecture, adds a touch of grandeur and magnificence.

- **Ornamentation**

The building is adorned with intricate carvings and decorative motifs, reflecting the rich artistic traditions of India.

2.30.7 Building Material and Construction

- Minto Hall was built using red sandstone, a durable and aesthetically pleasing material commonly used in Indian architecture.
- The construction process involved skilled craftsmen and artisans who meticulously carved the stone and erected the building with traditional techniques.
- The use of sandstone, combined with the intricate details and skillful craftsmanship, has contributed to the hall's enduring beauty and historical significance.

2.30.8 Project program

SPACE	CAPACITY
Main hall – Raja Bhoj Hall	600
Nawab Shah Jaha Begum Hall	
Nawab Sultan Jehan Begum Room	50
Nawab Qudsia Begum Room	25
Nawab Hamidullah Hall	133
Nawab Sikander Jehan Room	
Makhanlal Chaturvedi Media Room	
Parking	300 cars





Back View











Figure 26- Raja Bhoj Hall (Main Hall)

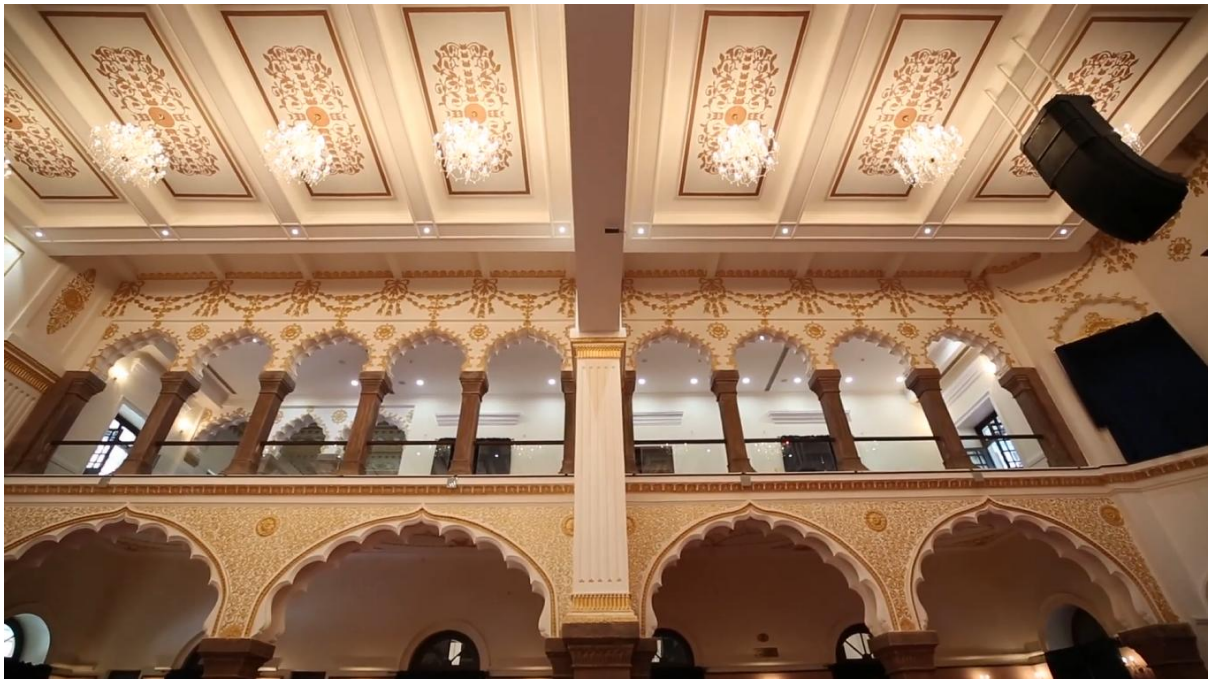


Figure 25- Engraving and carving at ceilings and arches (Raja Bhoj Hall)



Figure 28- Grand Lobby



Figure 27- Nawab Shah Jaha Begum Hall (Secondary Hall)



Figure 30- Nawab Sultan Jehan Begum Room



Figure 29- Nawab Qudsia Begum Room



Figure 32- Nawab Sikandaer Jehan Room



Figure 31- Makhanlal Chaturvedi Media Room

2.30.9 Entrance plaza:

The Entrance Plaza at Minto Hall serves as the main entry point, where cabs and vehicles drop off visitors. Guest enter through Main gates.

2.30.10 Amenities

- Adequate Power supply with backup generators
- Spaces for small meeting and conferences
- Ground Diffused Chilled Water System
- Acoustic treatment
    - 3 feet thick walls
    - Acoustic Panels
    - Carpets
    -



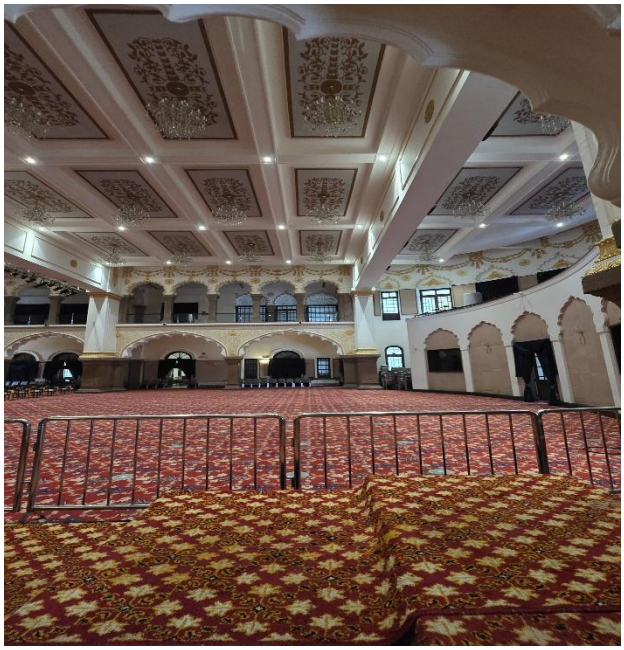
Figure 34- Drop on and off point



Figure 33- Grand Area in front for gatherings

Ground vents for HVAC







Desk Appraisal

2.31 Bharat Mandapam

2.31.1 Introduction

Bharat Mandapam, located in Pragati Maidan, New Delhi, is a centerpiece of a sprawling 150-acre complex known for hosting prestigious events. The redevelopment of Pragati Maidan was initiated to replace the iconic Hall of Nations with a modern, world-class convention facility. The government justified this transformation as essential for creating a state-of-the-art venue capable of hosting high-profile global events, including the G20 summit.

Now spread across 123 acres, Bharat Mandapam is a cutting-edge Integrated Exhibition-cum-Convention Centre (IECC). Its design reflects India's aspirations for global prominence, combining advanced infrastructure with eco-friendly features. The venue serves as a hub for international exhibitions, conferences, and cultural events.



Figure 35. Bharat Mandapam Front View

Location	New Delhi
Owners	Govt. of India
Architects	ARCOP Associates Pvt. Ltd & Aedas
Client	India Trade Promotion Organisation (ITPO)
Contractor	NBCC & Shapoorji Pallonji Pvt. Ltd
Area	123 acres (497763 sqm)
Cost of Project	2700 crores

Redevelopment	2017-2023
Landuse Type	Recreational

2.31.2 History

The Hall of Nations and Hall of Industries at Pragati Maidan were designed by architect Raj Rewal and engineer Mahendra Raj in 1972. The ITPO, however, which comes under the Union Ministry of Commerce, had decided to tear down these building as a part of a larger overhaul of the Pragati Maidan area to make way for more 'modern', 'state of the art' buildings.



Figure 36. Hall of Nations

2.31.3 Conceptual and Design Approach

The concept of Bharat Mandapam draws heavily from India's rich cultural heritage, combined with contemporary architectural practices. The name "Bharat Mandapam" itself is indicative of its purpose – a 'mandapam' in Indian tradition refers to a pillared outdoor hall used for public rituals and gatherings. The design seeks to capture the essence of this traditional structure, reinterpreting it for a modern context.

The façade of Bharat Mandapam is a modern interpretation of the traditional Indian temple architecture, with intricate patterns and motifs that are derived from various Indian art forms. The use of locally sourced materials and sustainable construction practices are key elements of the design, contributing to the building's LEED certification.

2.31.4 Proximity

Airport: 18kms from Delhi Airport
Railway station: 3.9kms from New Delhi Railway Station
Bus: 13km from ISBT Kashmere Gate
Metro: 26km from Airport to Supreme court metro station



Figure 37. Proximity Map

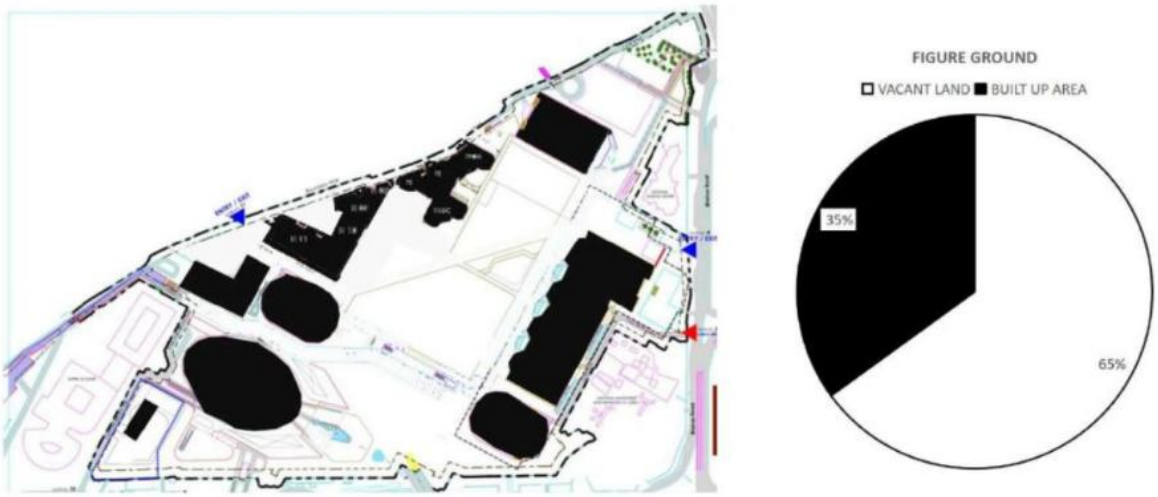


Figure 38. Figure Ground Map

2.31.5 Site Components

The site expands over 150 acres consists of several elements of IECC

1. 14 Exhibition blocks
2. Convention center
3. 3 Amphitheatres
4. Office Building
5. 1 Helipad
6. Admin Block
7. 1 Hotel (500 rooms)
8. Open spaces

Total number of Gates to the whole campus is 11 which connect the site to its surroundings.

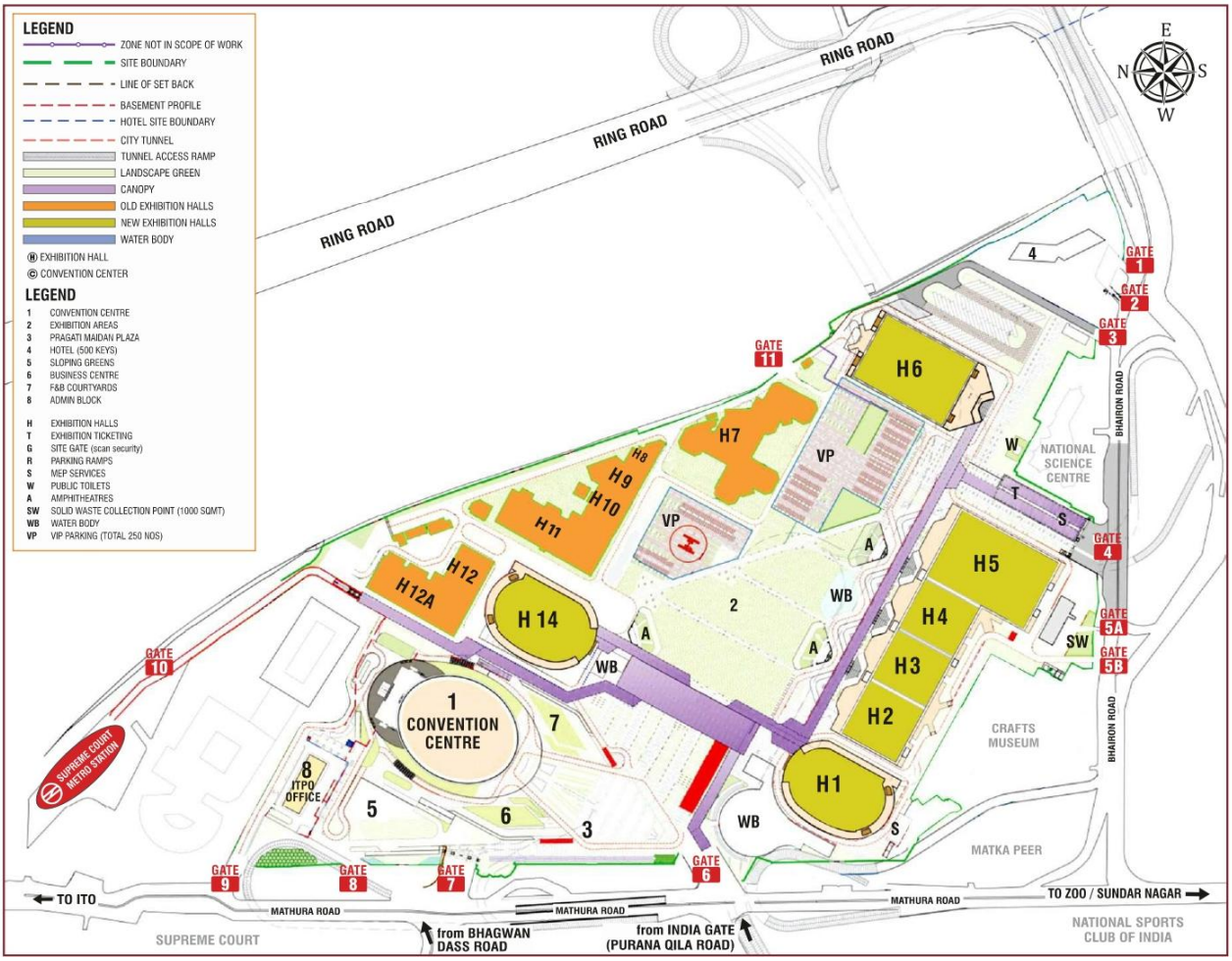


Figure 39. Site Plan

2.31.6 Components of Convention Center

2.31.6.1 Level 1 - Ground Floor

Floor to floor Height: 5.4m
Spaces:

1. Premium meeting room
2. Pre-function area
3. Waiting Lounge
4. Dining Hall
5. 20 Meeting Rooms
6. Courtyards
7. Drivers' Lounge

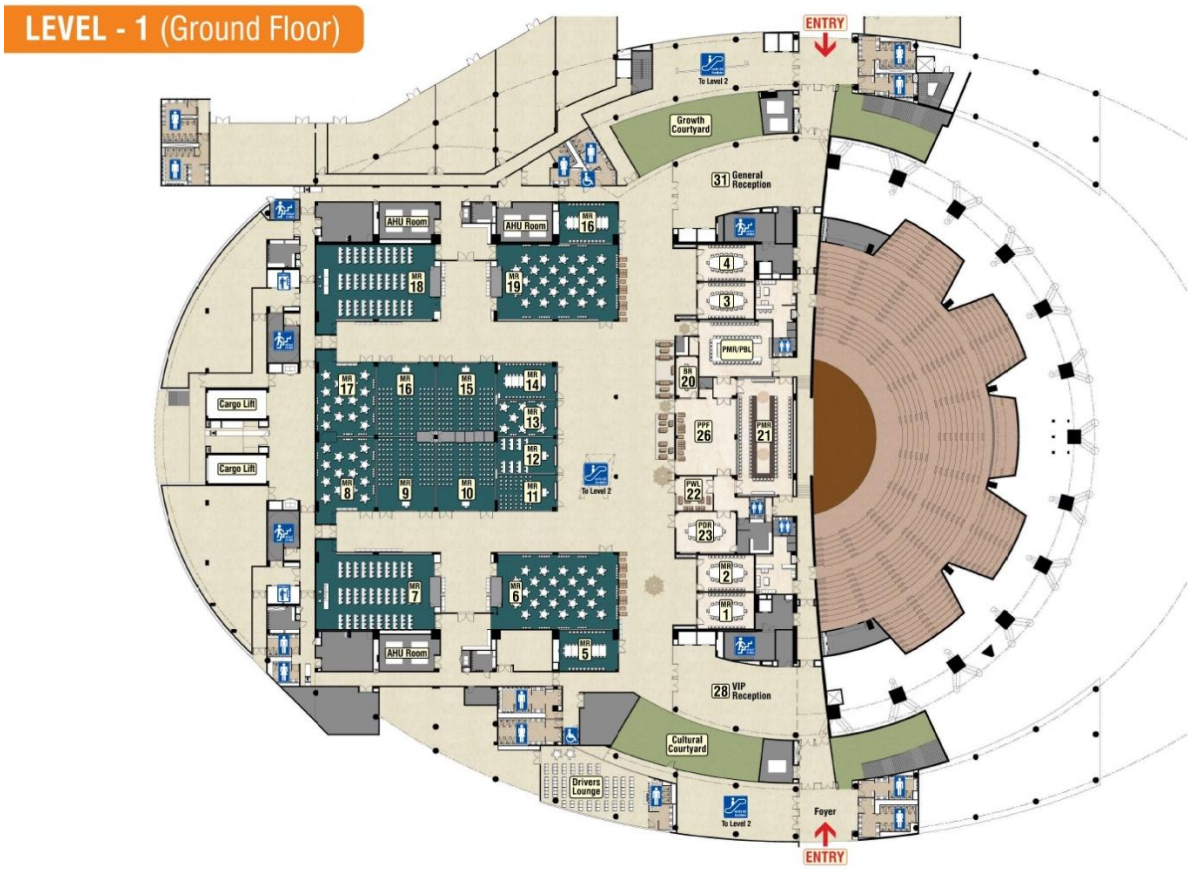


Figure 40. Ground Floor Plan

Table 4. Ground floor area program

Sr No.	Description	Capacity (in pax)	Floor Area (in sqm)	L	B
	Premium Complex				
1	Premium Meeting room -1	100	197	9.7	20.3
2	Premium Meeting room -2	50	121	12.7	9.5
3	Breakout Room		28	3.9	7.1
4	Premium Pre-function		132	10.1	13.1
5	Premium Waiting Lounge		39	6.3	6.1
6	Premium Dining Hall		36	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	121	20.2	12.7
8	Meeting Room - 8	100	121	10.4	11.6
9	Meeting Room - 9	100	111	7.4	9.8
10	Meeting Room - 10	100	111	11.4	9.8
11	Meeting Room - 11	50	111	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	13
19	Meeting Room - 19	200	276	21.2	13
20	Meeting Room - 20	50	276	21.2	13
	Support Facilities				
1	VIP & General Receptions		381		
2	Help Desk		482		
3	Cultural Courtyard				
4	Growth Courtyard				
5	Pre-Function		2229		
6	F&B Courtyard				

(indtradefair)

2.31.6.1.1 Meeting rooms

Capacity: 50, 100, 200
No. of Rooms: 20
Supporting Spaces: VIP Reception, General Reception, 2 Courtyards, Storage, 1 Drivers' waiting room, 5 staircases (4 normal, 1 fire), 6 Washrooms, 2 escalators, 1 escalator (G-1), 2 lifts.
Services: LV shafts, AHU Rooms

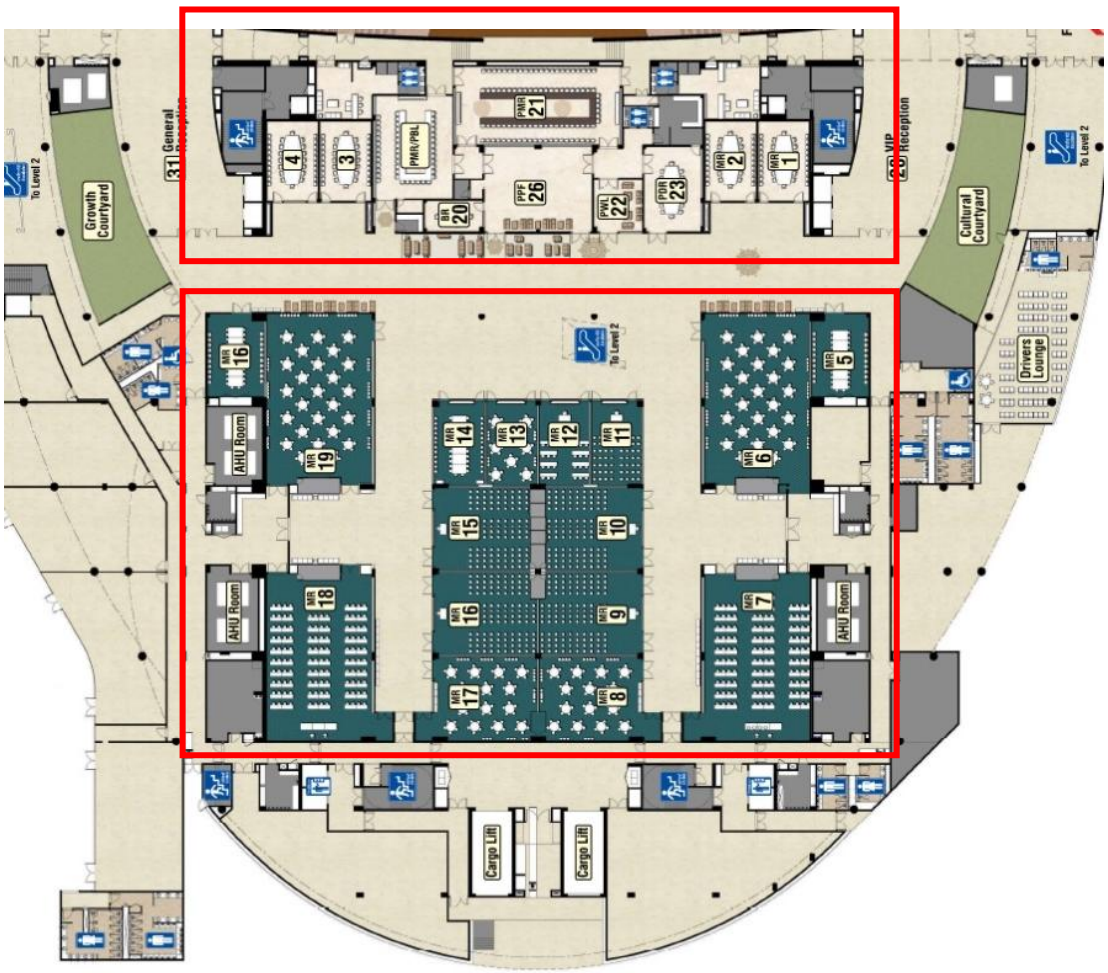


Figure 41. Meeting Rooms - Ground Floor



Figure 42. Meeting room with capacity 50



Figure 43. Premium Meeting Room



Figure 45. Meeting room with capacity 100



Figure 44. Meeting room with capacity 200

2.31.6.2 Level 2 – Podium Level

Floor to floor Height: 9m
Spaces:

1. Summit rooms
2. Auditorium
3. Retreat Lounge
4. Tea House
5. Medical Room
6. Cloak room
7. Amphitheatre

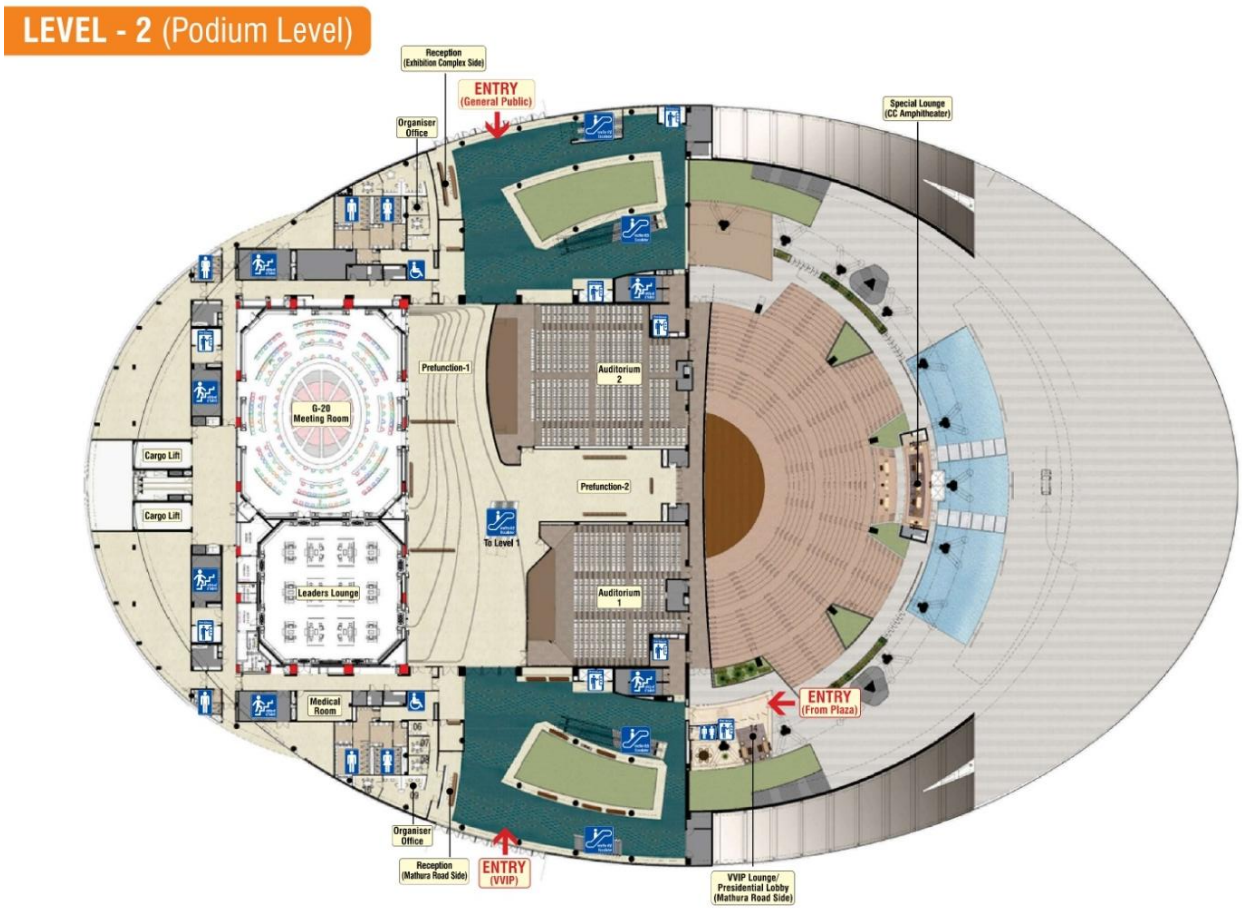


Figure 46. First floor plan

Table 5. First floor Area Program

Sr No.	Description	Capacity (in pax)	Floor Area (in sqm)	L	B
	Premium Complex				
1	G20 Summit room		1153	38.6	29.9
2	Leader's Lounge		702	26.5	26.5
3	L2 WIP Room		101	14.4	7
	Meeting Complex				
1	Auditorium -1	574	992	37.3	26.6
2	Auditorium -2	821	793	29.8	26.6
	Amphitheatre (Open-Air)				

1	Amphitheatre	3000	2250	66.5	118
2	Jewel Box		76	16.6	4.5
	Support Facilities				
1	Retreat Lounge		350	37.6	9.3
2	Tea House		350	37.6	9.3
3	Medical Room		56	5.4	10.3
4	VIP & General Receptions				
5	Pre-function Areas				
6	Cloak Room				

2.31.6.2.1 Auditorium-1

Area: 992 sqm.
Capacity: The auditorium can accommodate 574 people.
Seating: 3 tiers, 18 aisles, 10 rows each, staggered fixed seating.
Supporting Spaces: 2 Organiser Offices, 2 Pre-function areas, 1 Reception, Storage, Staircase lobby, 4 Washrooms, 2 escalators, 1 escalator (G-1), 5 lifts.
Services: LV shafts, Electrical Shaft.

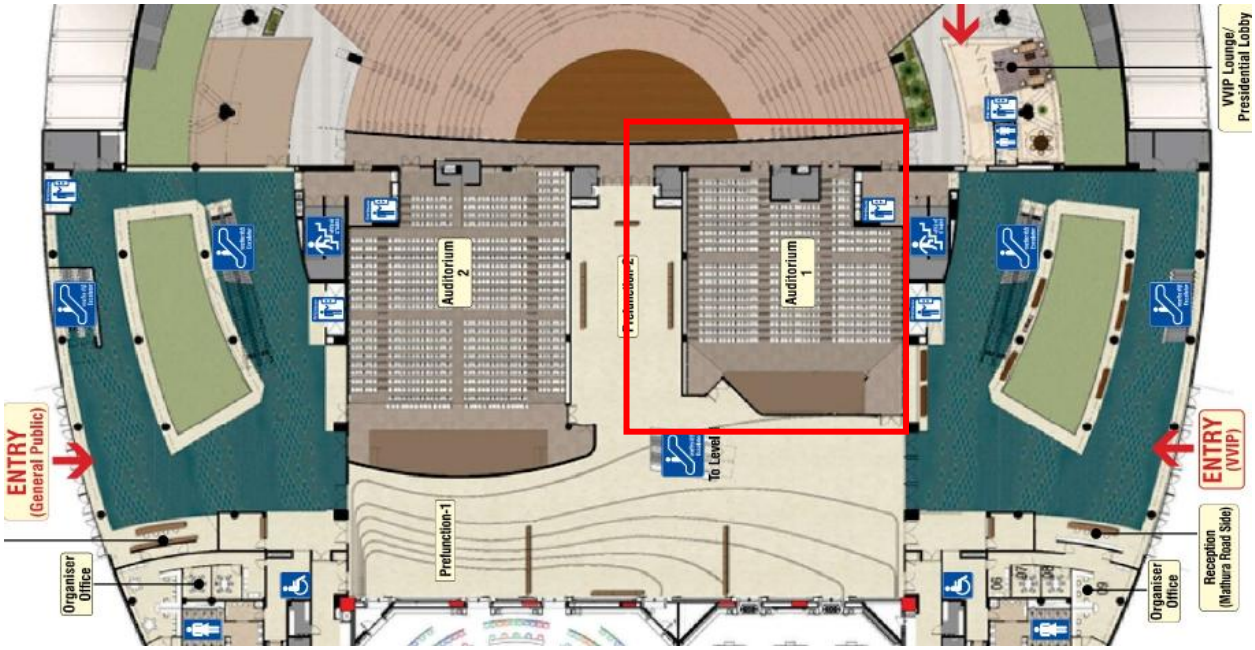


Figure 47. Auditorium Plan


Figure 49. Auditorium front view


Figure 48. Auditorium view from behind

2.31.6.2.2 Amphitheatre

Area: 2250 sqm.
Capacity: The auditorium can accommodate 3000 people.
Features: Its an open air Amphitheatre with drop off zone nearby.
Supporting Spaces: Special Lounge, VIP Lounge, 4 Washrooms, 3 lifts (2 normal, 1 VIP). 4 staircases (2 standard, 2 fire)

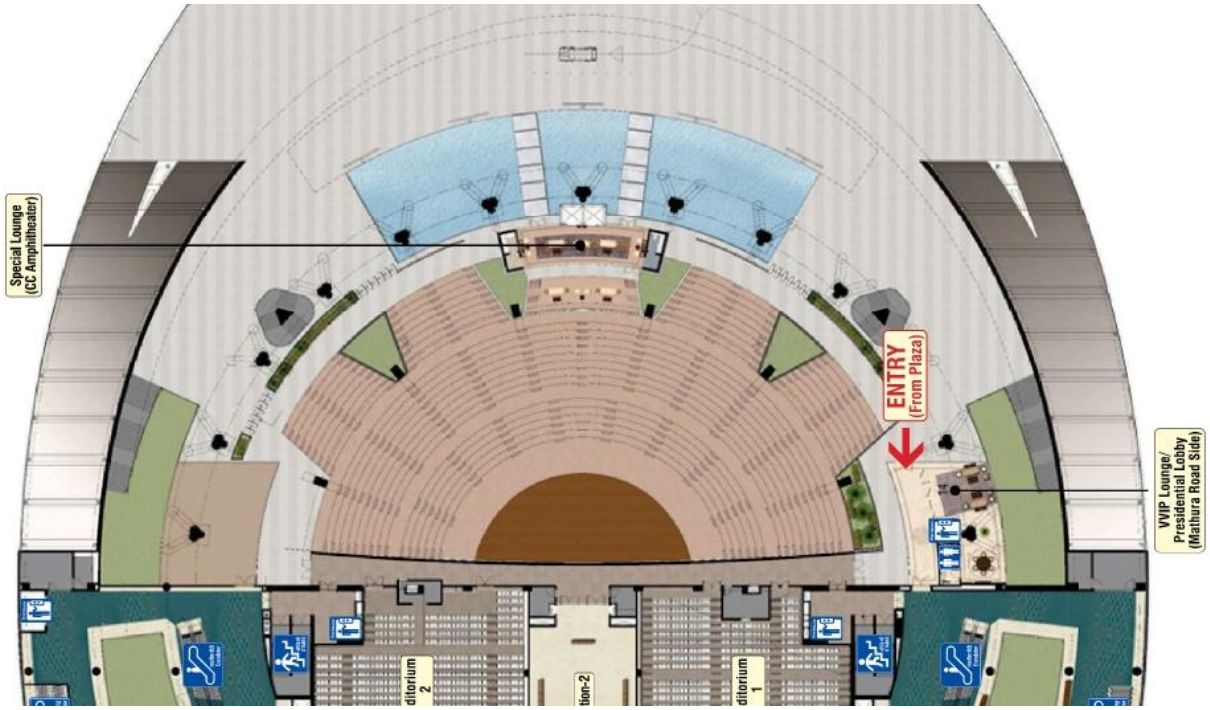


Figure 50. Amphitheatre Plan

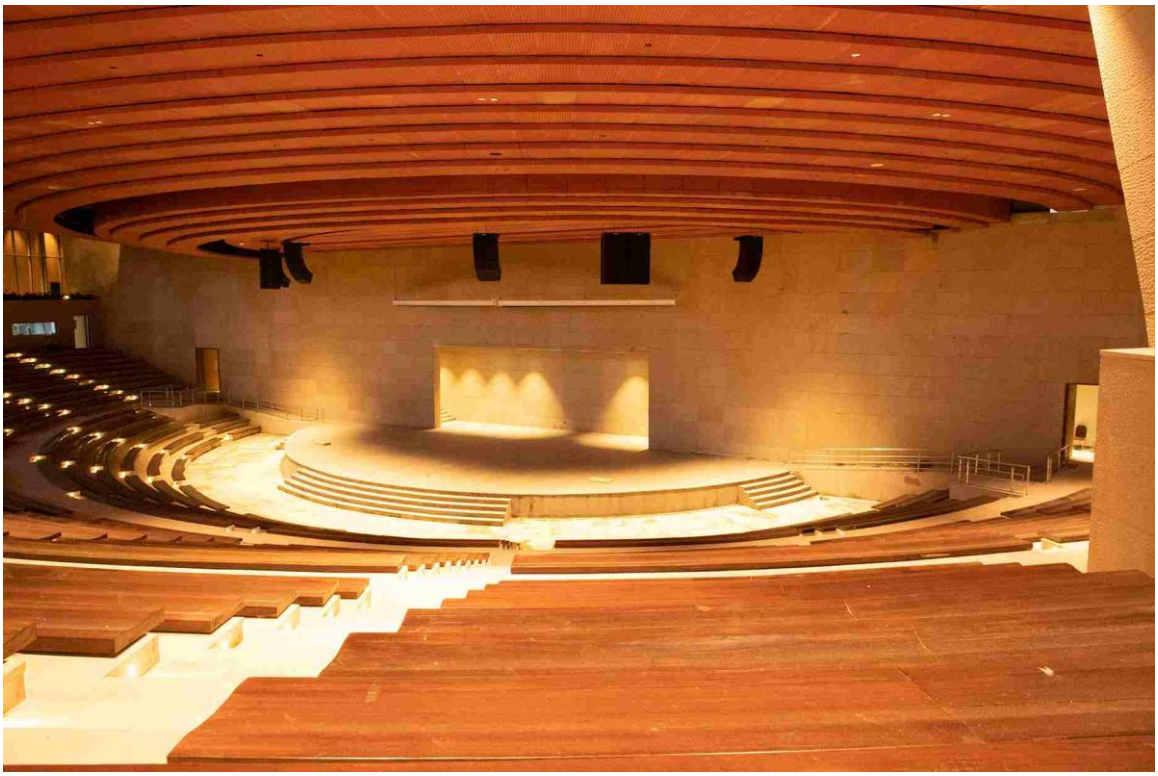


Figure 51. Amphitheatre Interior view

2.31.6.3 Level 3 – Plenary Level

Floor to floor Height: Plenary Hall 9.5 to 14m

Spaces:

1. Plenary Hall
2. Multipurpose Hall
3. VVIP Lounge
4. Special Lobby

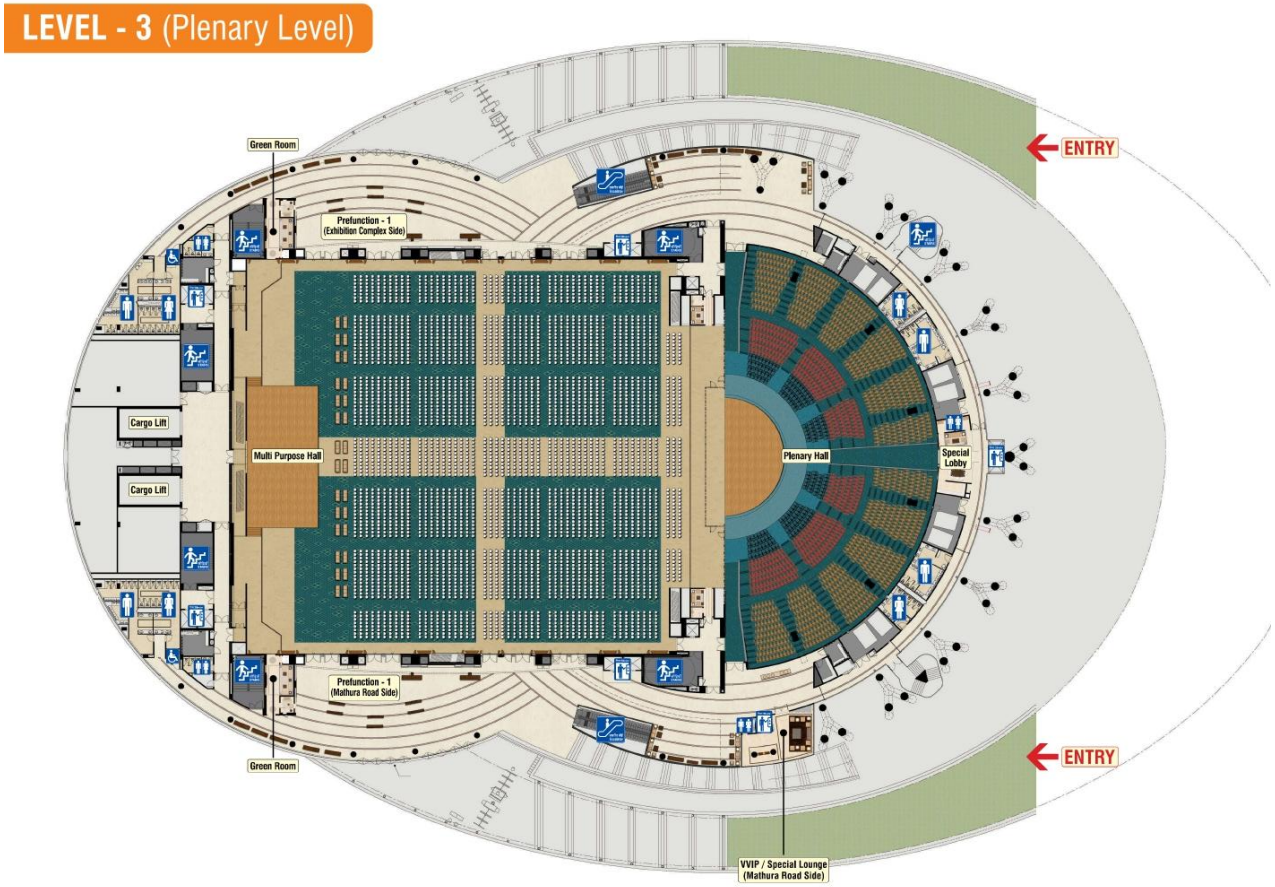


Figure 52. Third Floor Plan

Table 6. Third Floor Area Program

Sr No.	Description	Capacity (in pax)	Floor Area (in sqm)	L	B
	Multi-Functional and Plenary Hall				
1	Plenary Hall	3000	1985	71.5	36 (rd)
2	Multi-purpose Hall	4000	4884	74	66.7
	Support Facilities				
1	VVIP Lounge		80	12	6.7
2	Special Lobby (Plenary)		80	8.2	9.8
3	Pre-function Area				
4	Reception				

2.31.6.3.1 Plenary Hall

Area: 1985 sqm.
Capacity: The plenary hall can accommodate 3,000 people
Seating: 3 tiers, 18 aisles, 10 rows each, staggered fixed seating.
Features: Air conditioning, Modern AV and IT systems, Hydraulic stage, Live audience polling facility, and Interpreter rooms for multilingual events.
Supporting Spaces: 1 VVIP Lounge, 1 Special Lobby, 1 Waiting lounge, Storage, Interpreter room, 4 Washrooms, 2 Green rooms, 4 staircases (2 standard, 2 fire) and 2 lifts.
Services: LV shafts, Electrical Shaft, Control room, Movable panel storage.

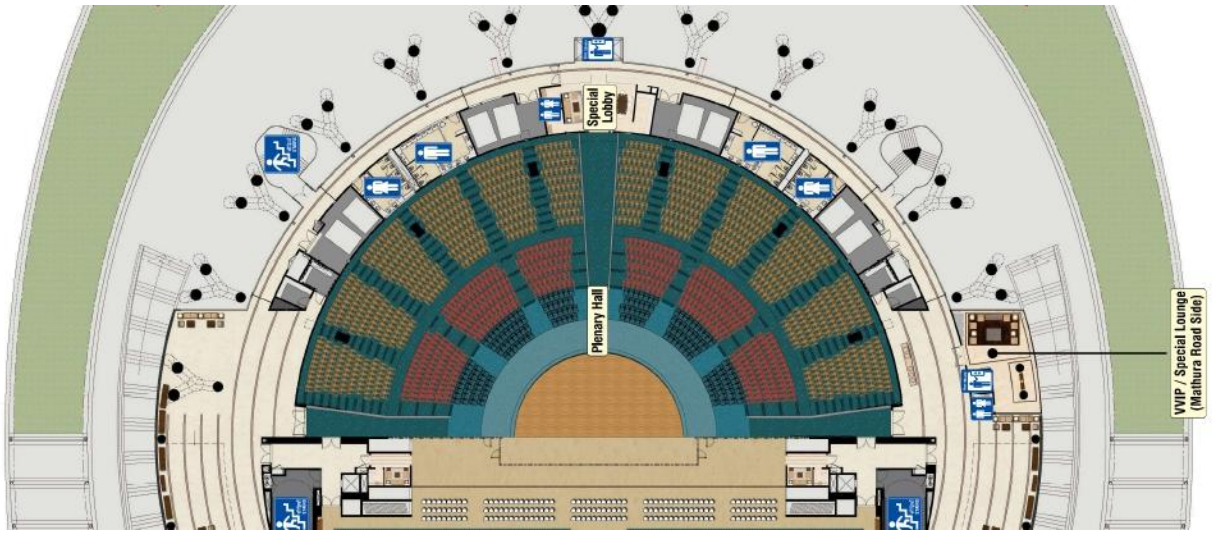


Figure 53. Plenary Hall Plan

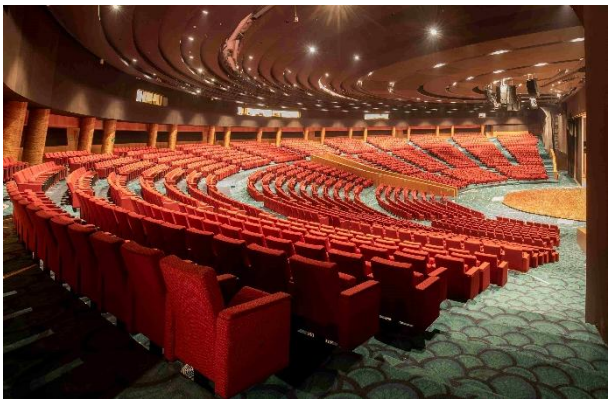


Figure 55. Plenary Hall view



Figure 54. Plenary Hall View from Highest tier

2.31.6.3.2 Multipurpose Hall

Area: 4884 sqm.
Capacity: The plenary hall can accommodate 4,000 people
Features: Air conditioning, Modern AV and IT systems, Hydraulic stage, Live audience polling facility, and Interpreter rooms for multilingual events.
Supporting Areas: 2 Pre-function areas, 2 Green rooms, 6 staircases, 2 Escalators, 2 Cargo Lifts, 4 lifts, 6 Washrooms.

Services: LV shafts, Electrical Shaft, Movable panel storage, 36m of door openings (2.4m each)

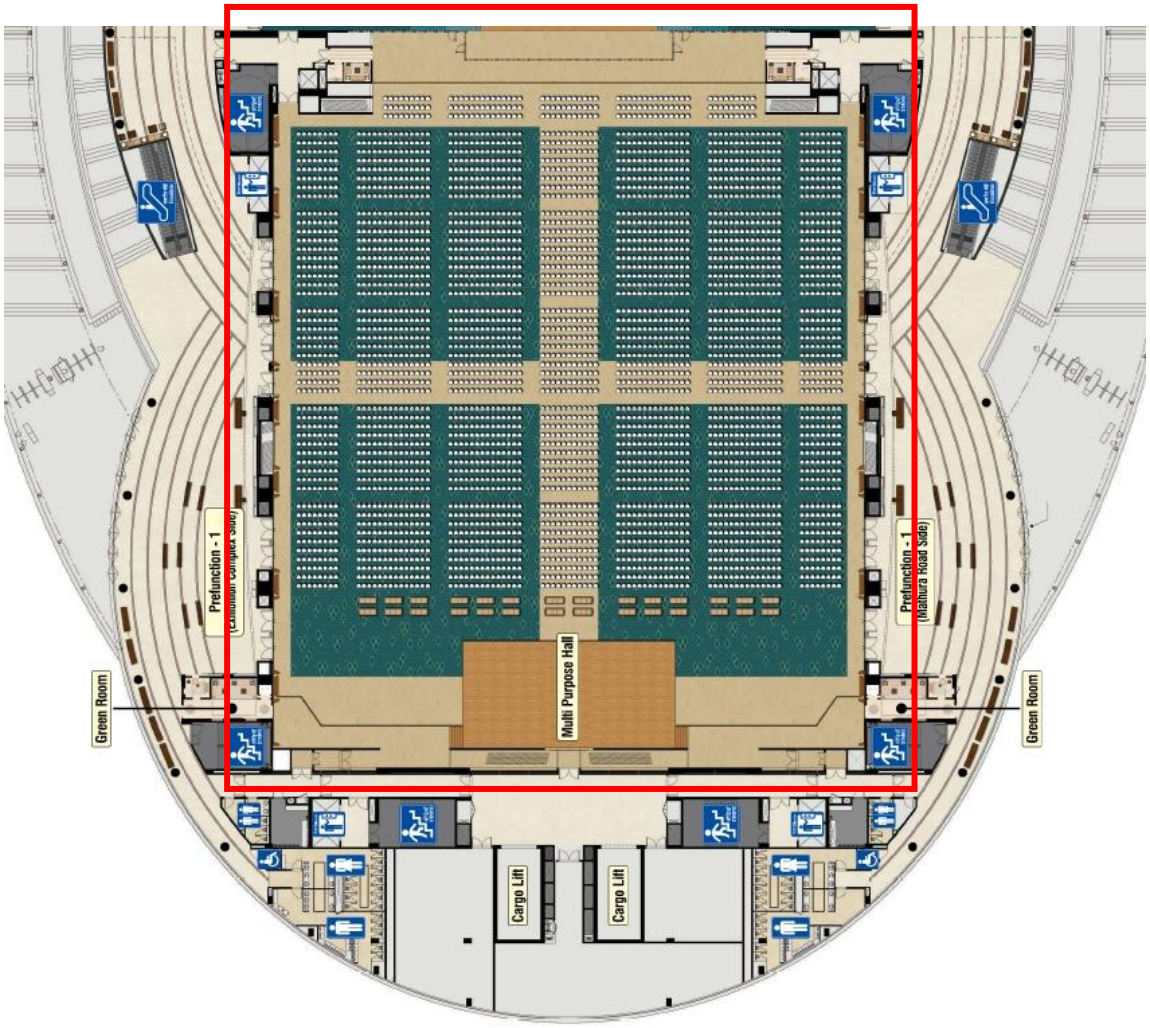


Figure 56. Multipurpose Hall Plan

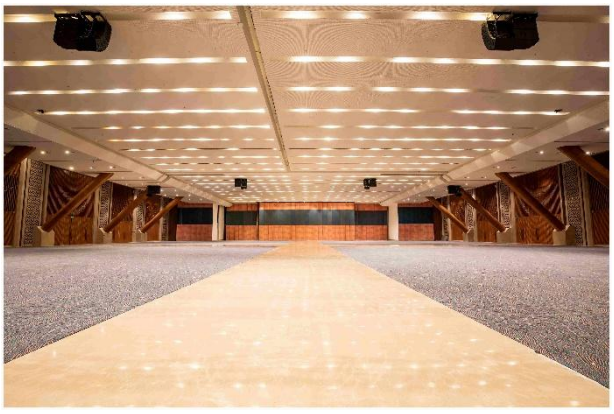


Figure 57. Multipurpose Hall View 1

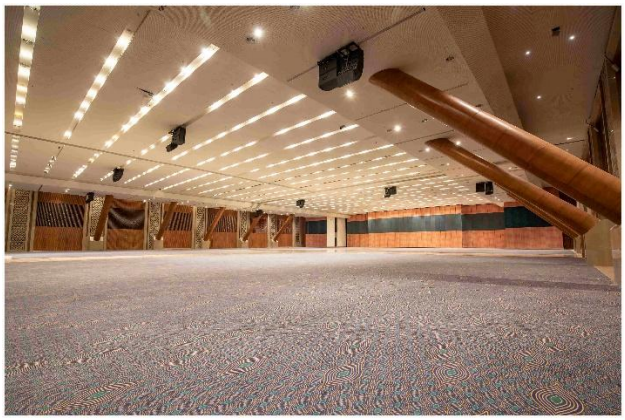


Figure 58. Multipurpose Hall view 2

2.31.6.4 Level 4

Spaces:

1. Double heighted Multipurpose Hall
2. Interpreter room

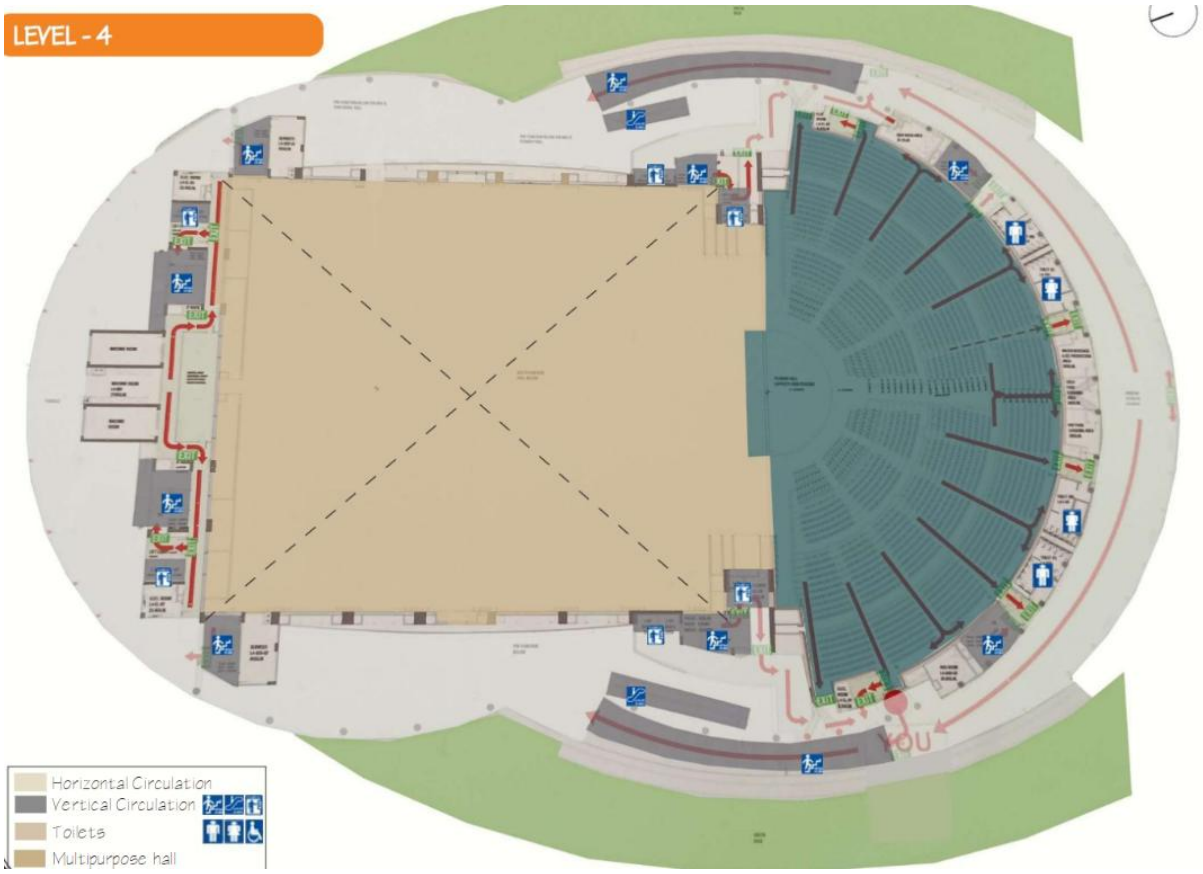


Figure 59. Fourth Floor Plan

Features: Double Heighted Plenary Hall maximizing the capacity and view, Double Heighted Multi-purpose hall, Washrooms and special Lobby. Green roof contributing to sustainability efforts.

2.31.7 Inferences

2.31.7.1 Percentage share of Spaces in a convention centre

Sr. No.	Spaces	Total Area (in sqm)
1	Meeting Rooms	2835
2	Auditoriums	6176
3	Conference rooms	1855
4	Halls	4884
5	Lounges	490
6	Pre-function Area	2361
7	Misc. and circulation	1305

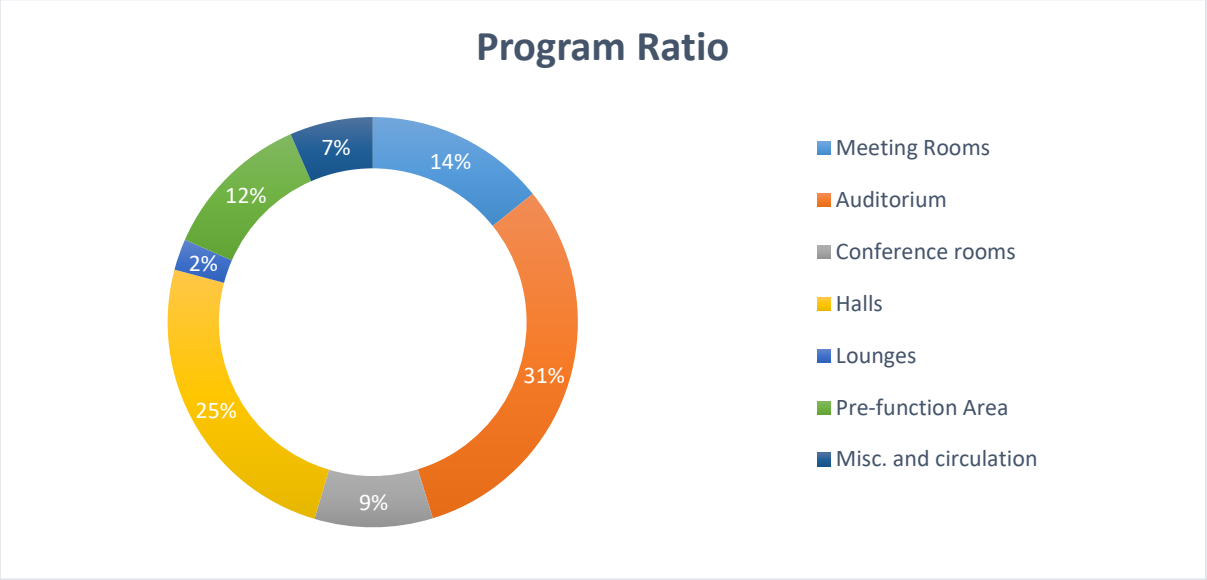


Figure 60. Program Ratio

2.31.7.2 Area per person in different types of spaces

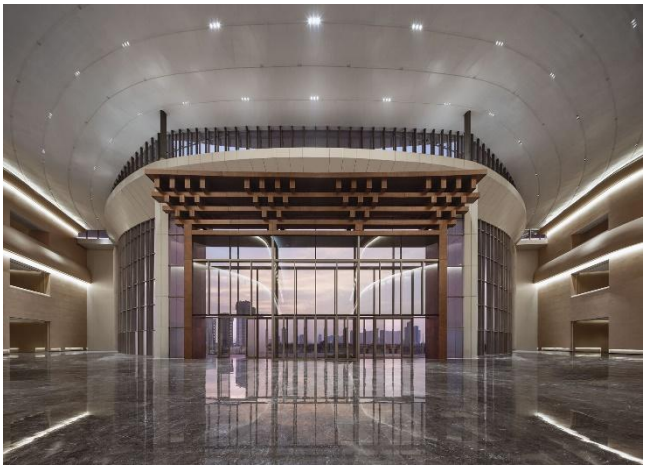
Spaces	Area per person (in sqm.)	Optimal Range
Meeting Rooms	1.402	1.5
Auditorium	0.835	0.9-1.1
Halls	1.221	0.55-0.74

(Audidim)

(toolbox)

THE IFF CONVENTION CENTRE, China





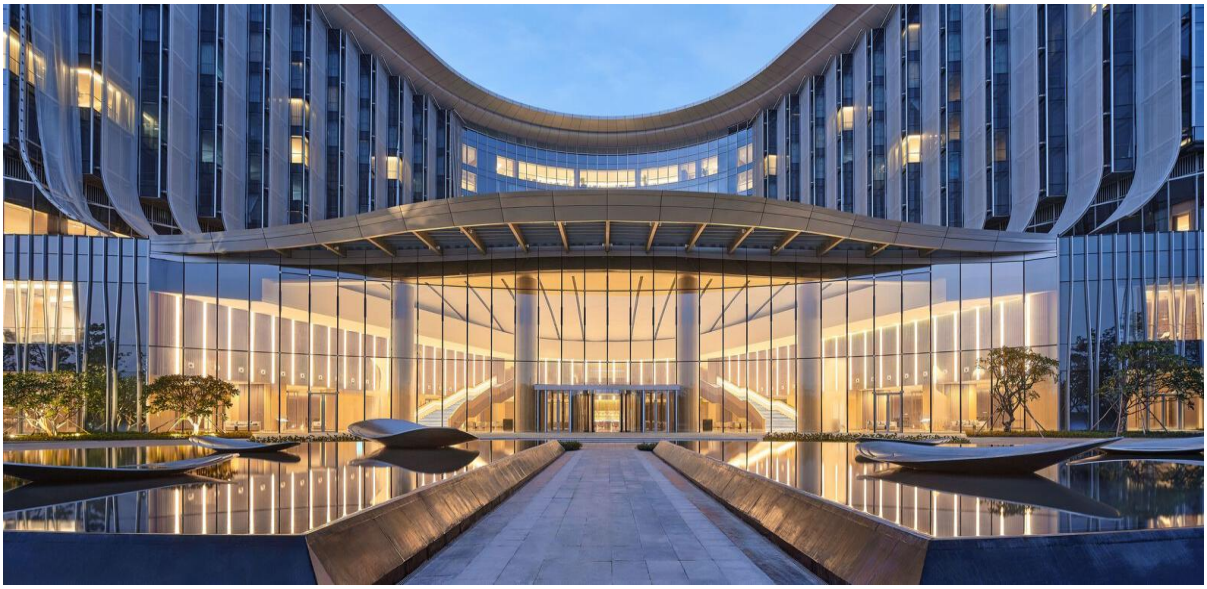
The International Financial Forum (IFF) has recently completed its venue at the tip of Hengli Island in Pearl Bay, Nansha, Guangzhou. The venue's construction area is approximately 260,000 square meters. From October 27th to 29th, 2023, the IFF Convention Center hosted the IFF's 20th Anniversary & Annual Meeting. It radiated like a brilliant "kapok" against the night sky.

IFF Convention Centre's Design Concept

The International Financial Forum (IFF) will have a permanent facility that includes the IFF Convention Center, the IFF Convention Center Hotel, and additional service structures. These structures cater to various functions like conferences, banquets, performances, receptions, accommodation, and other related services. The initiative has also planned exhibition areas and media facilities equipped with state-of-the-art technology to cater to the demands of international and governmental conferences. The initiative is anticipating future growth and aims to meet the needs of all its guests and attendees.



The IFF Convention Center building has a second floor comprising two large halls – Meeting and Banquet Hall. These halls cover an area of 3000 square meters and accommodate up to 3000 people. On the fourth floor, two more halls – the Council Hall and the Multi-functional Hall – each covering 1800 square meters. These halls are designed to host events of national significance. Over 40 small and medium-sized conference rooms are also on the second to



fourth floors. These rooms can be configured in different ways to meet the needs of various parallel forums

The project utilized various state-of-the-art technologies and materials in the design and construction stages. A comprehensive digital visualization design and continuous structural monitoring were employed to create a three-dimensional model that precisely positioned steel structures and building envelope systems. The compact digital representation of the IFF Convention Centre includes:

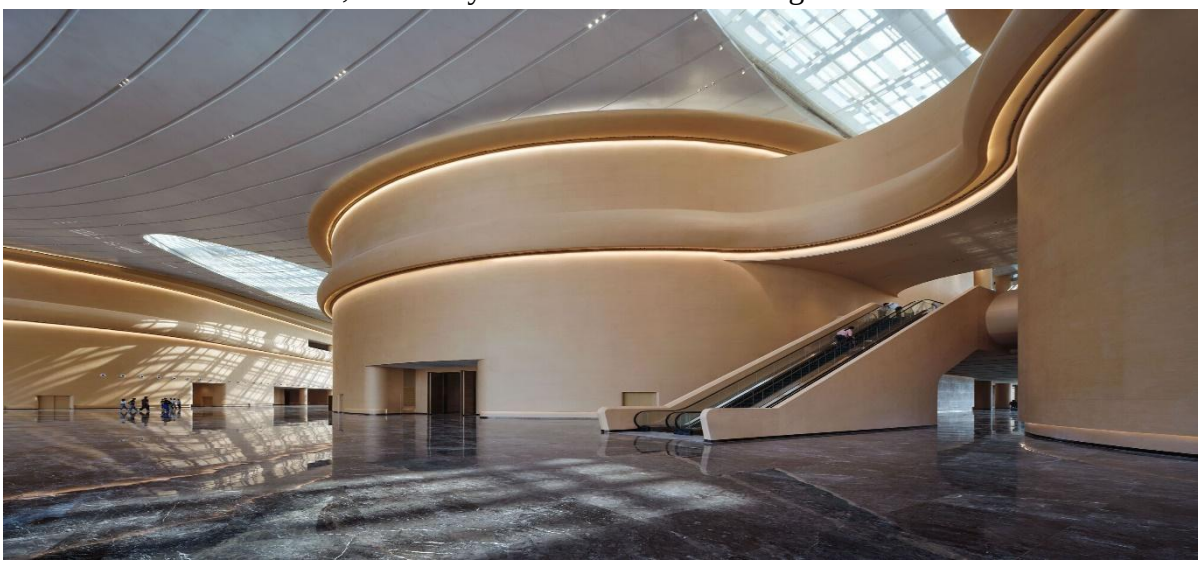
- Over 14,000 tons of steel.
- More than 40,000 square meters of metal facade materials.
- Approximately 7,000 square meters of ultra-high-performance concrete (UHPC).
- Nearly 20,000 square meters of PTFE.

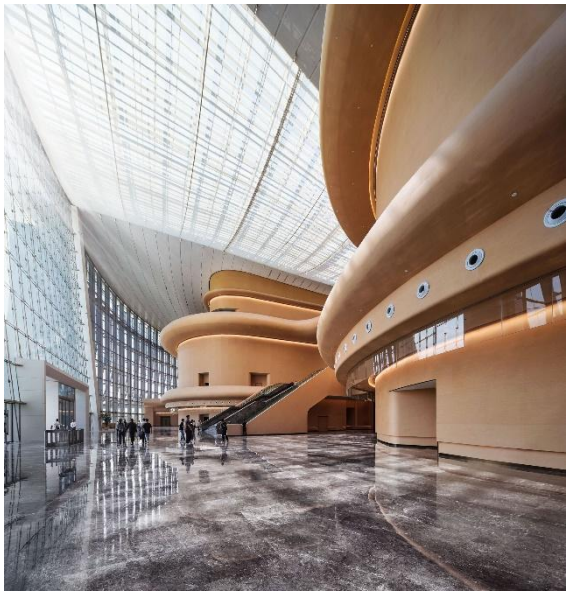


The design of the building incorporates the grand architectural essence of traditional Chinese structures. It blends it with the organic motif of the kapok to create a contemporary architectural language that rejuvenates traditional forms. The main entrance is located at the center and serves as the focal point, with building wings extending horizontally like blossoming flowers on the sea or the outspread feathers of a roc. The undulating roof adds to the overall atmosphere of magnificence and solemnity. The structure also incorporates traditional Chinese architectural elements such as flying cornices and bucket arches in an abstract manner while preserving the proportion and beauty of Chinese architecture in a modern interpretation.



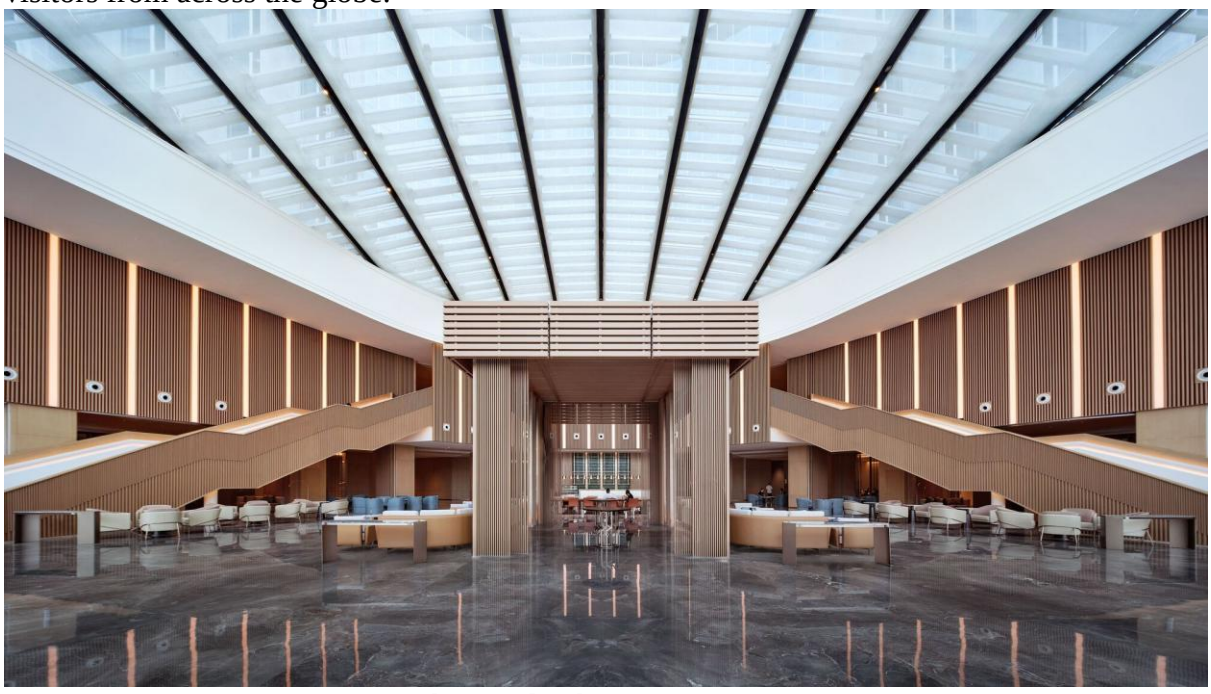
The IFF Convention Center is inspired by traditional Lingnan architecture and incorporates raised, semi-outdoor spaces on both sides that are reminiscent of local Lingnan arcades. This maintains a connection with the regional context while adapting to the local climate. The convention center also employs the traditional Lingnan architectural layout, integrating “Cooling Allies” within the internal space. The ship-shaped halls between the structures allow fresh air and sunlight through skylights, while the curtain beneath the glass roof, constructed from PTFE, delicately filters and softens sunlight.



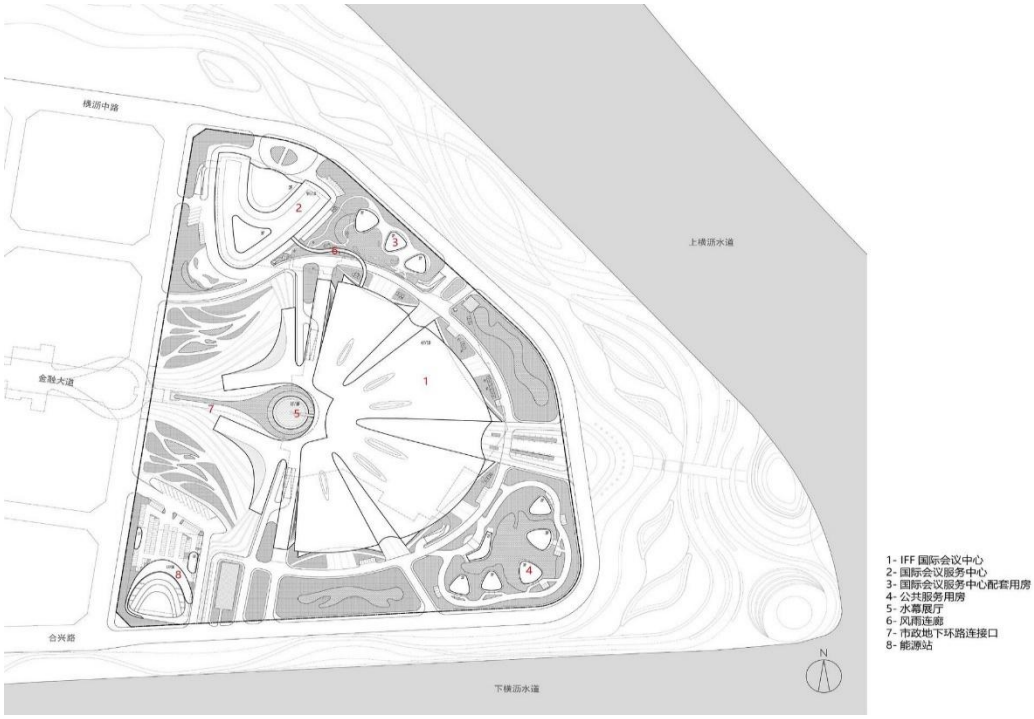



View of Lobby

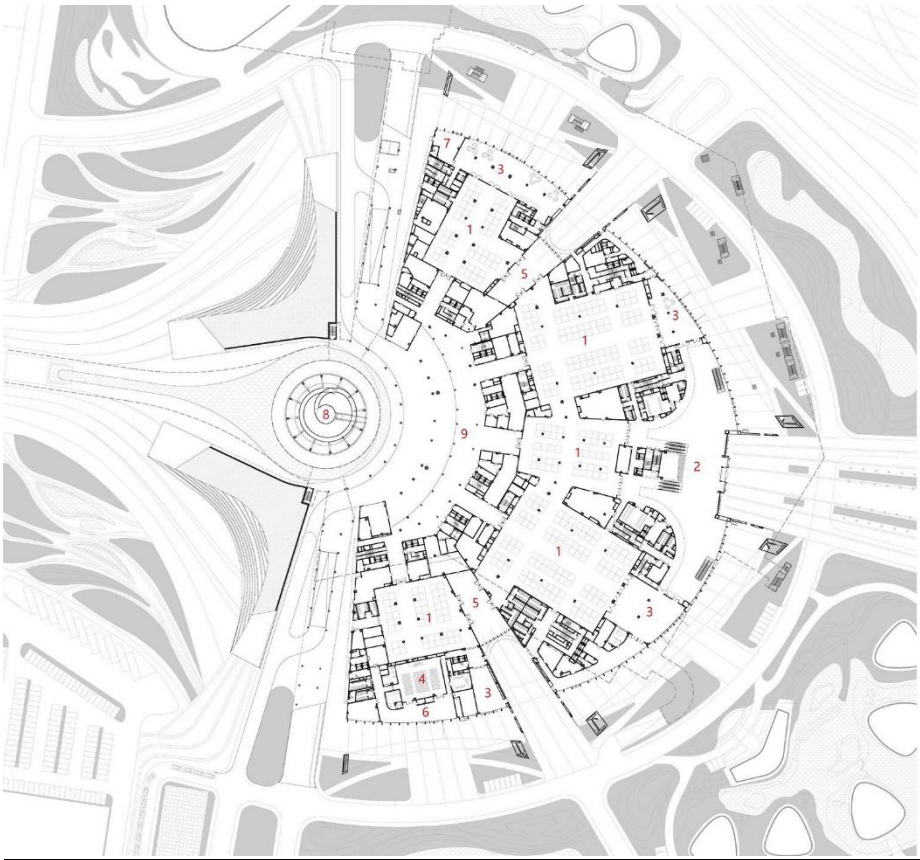
The four-story cable-net glass curtain wall seamlessly connects to the daylighting ceiling, framing scenic views within the building. This transparent experience establishes a connection for occupants with the sky, the earth, the city, and the sea. The intricate decorative details exhibit Lingnan's distinctive features, preserving the allure of traditional Lingnan spaces in a contemporary manner. Positioned at the geometric center of the Guangdong-Hong Kong-Macao Greater Bay Area, the IFF Convention Center welcomes visitors from across the globe.



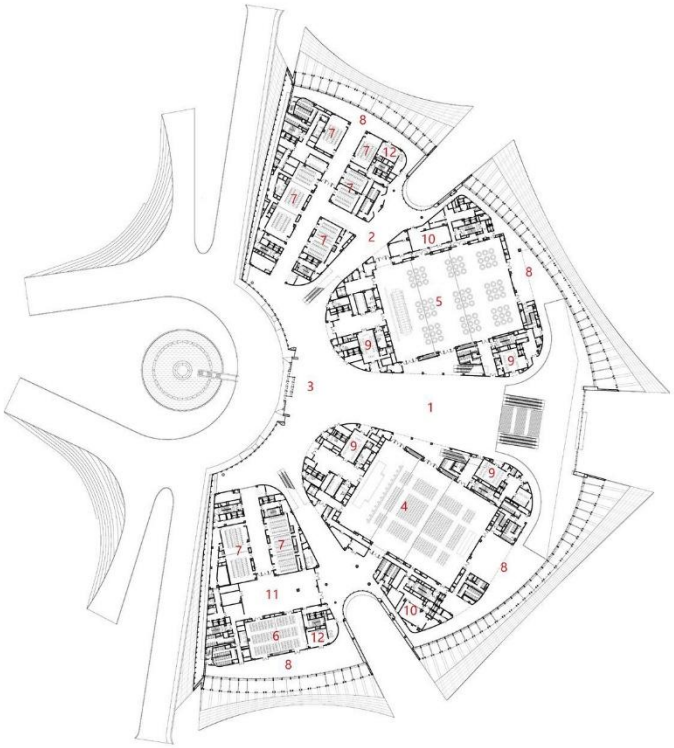
Plans and Other Drawings



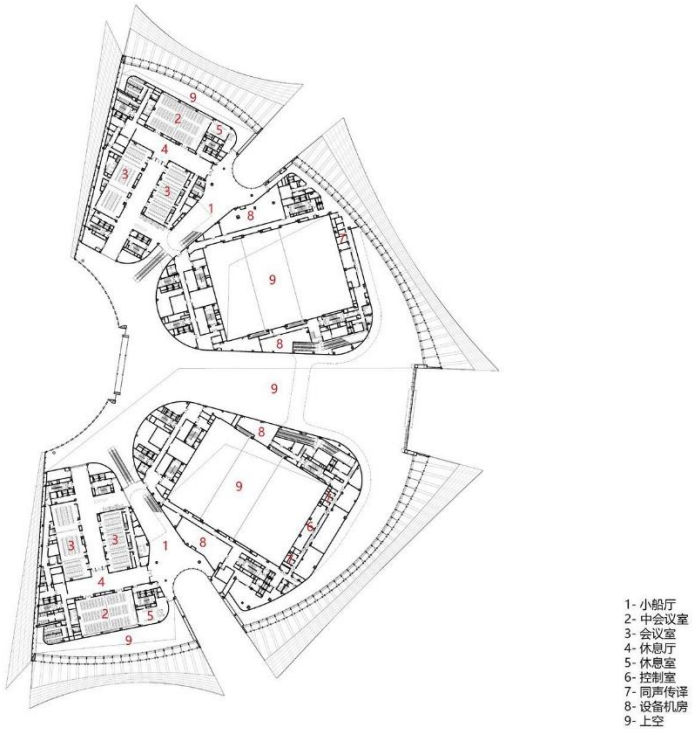
MASTER PLAN



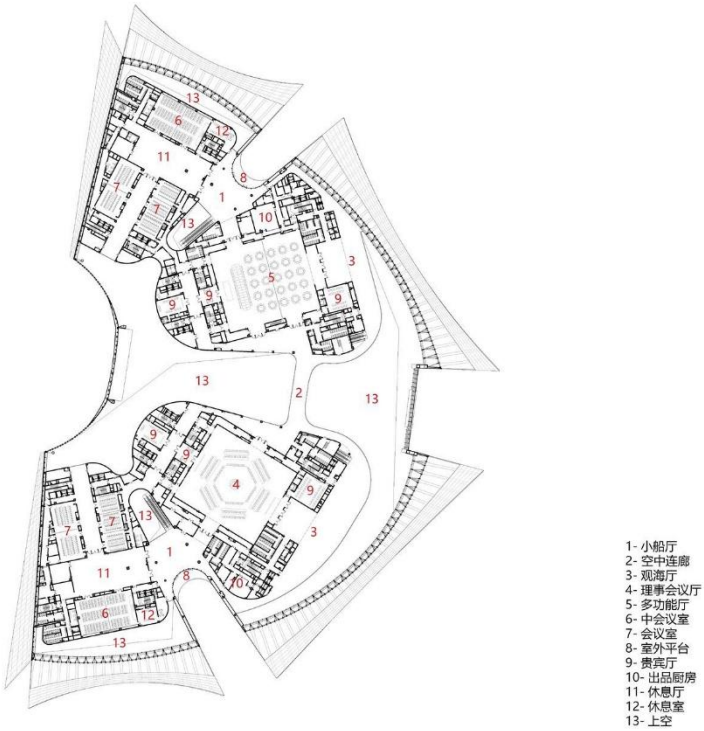
FIRST FLOOR



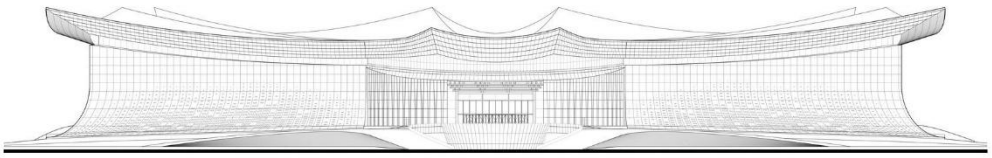
SECOND FLOOR



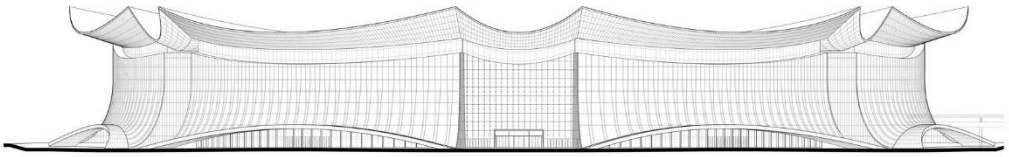
THIRD FLOOR



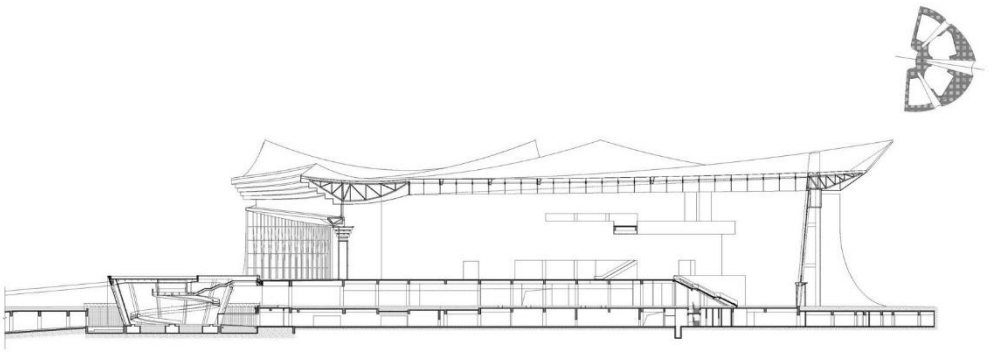
FOURTH FLOOR



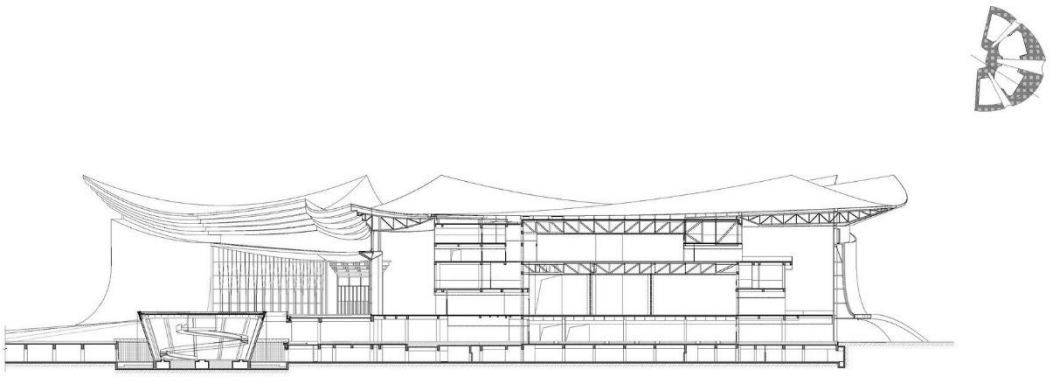
ELEVATION -WEST



ELEVATION- EAST

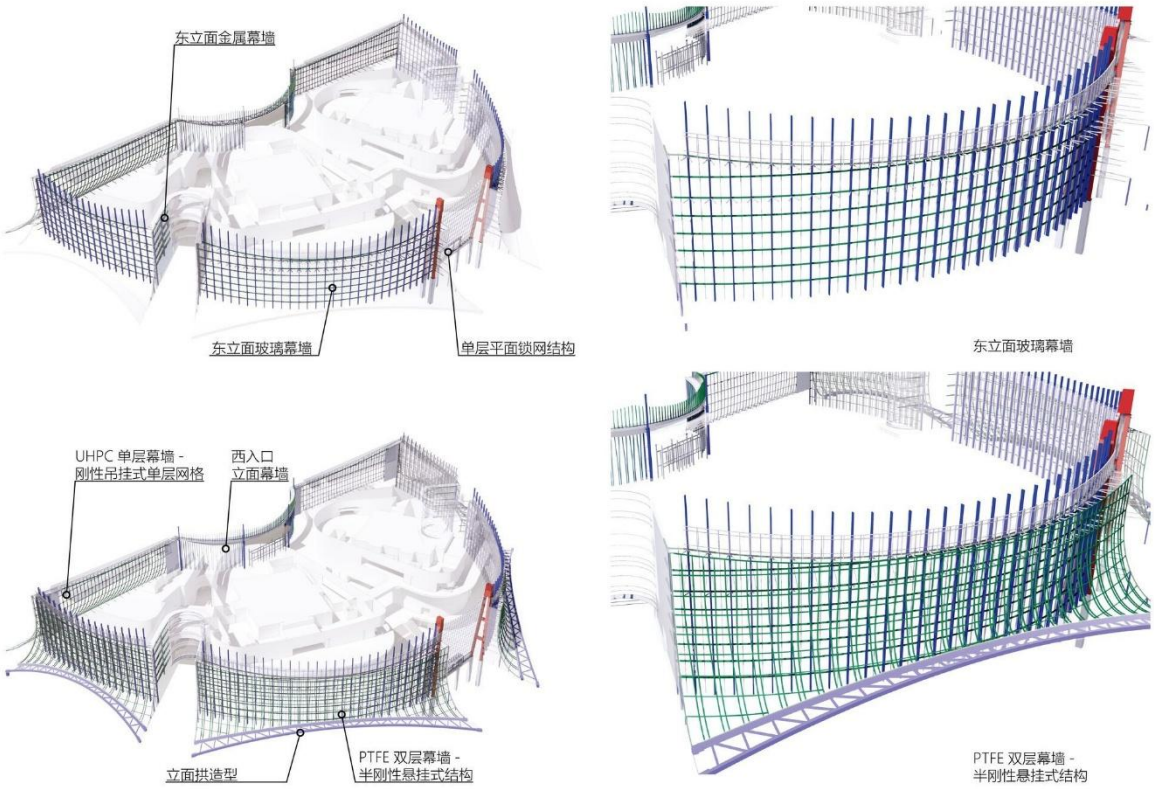


SECTION 1

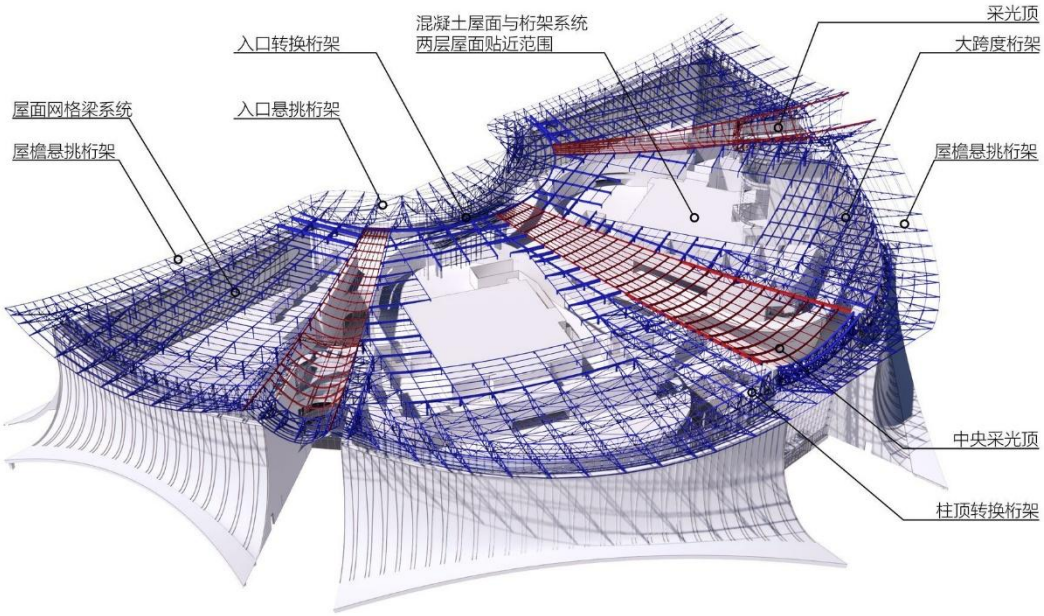


SECTION 2

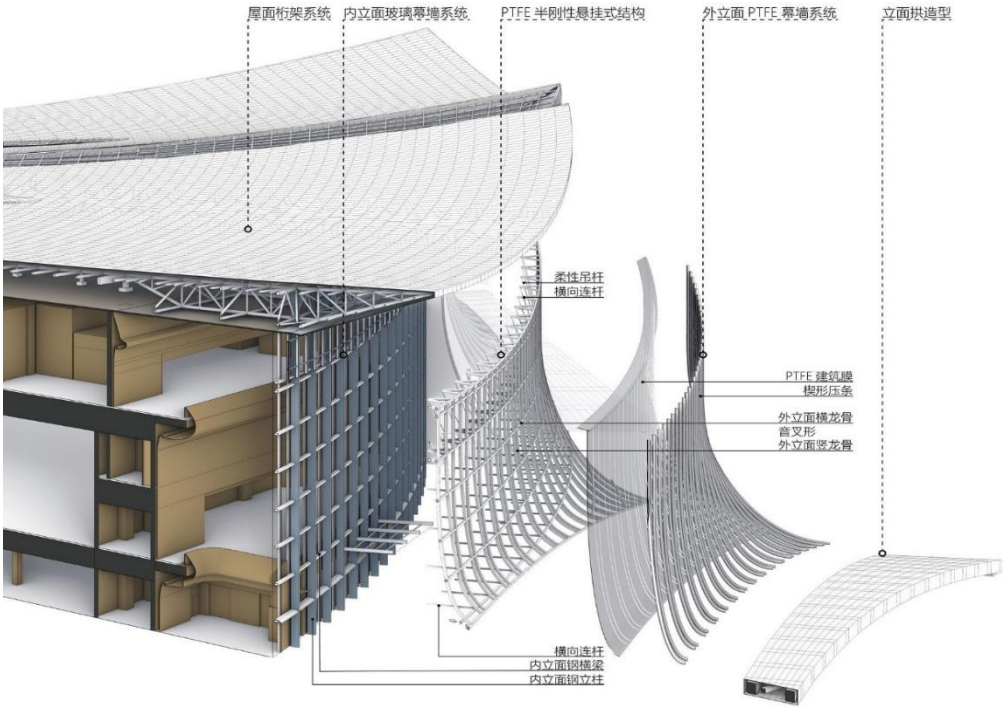
LAYOUT CONFRENCE ROOMS



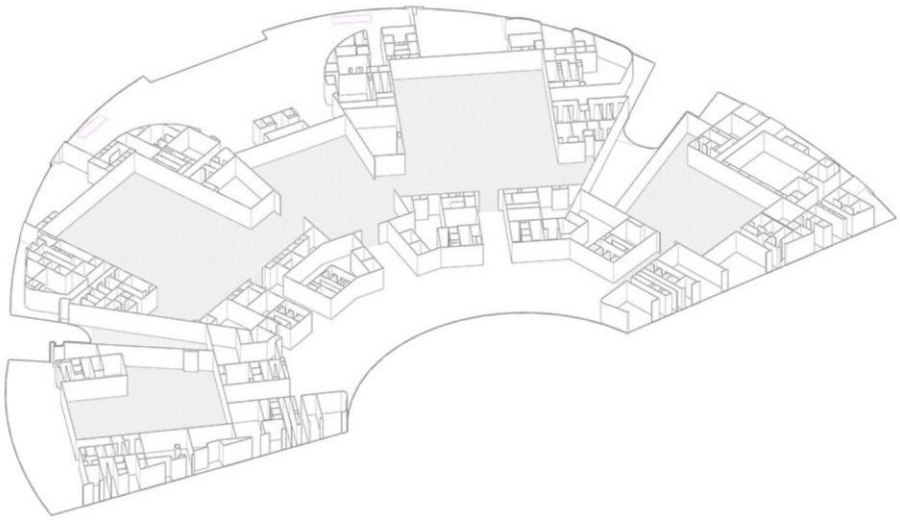
FACADE STRUCTURE SYSTEM



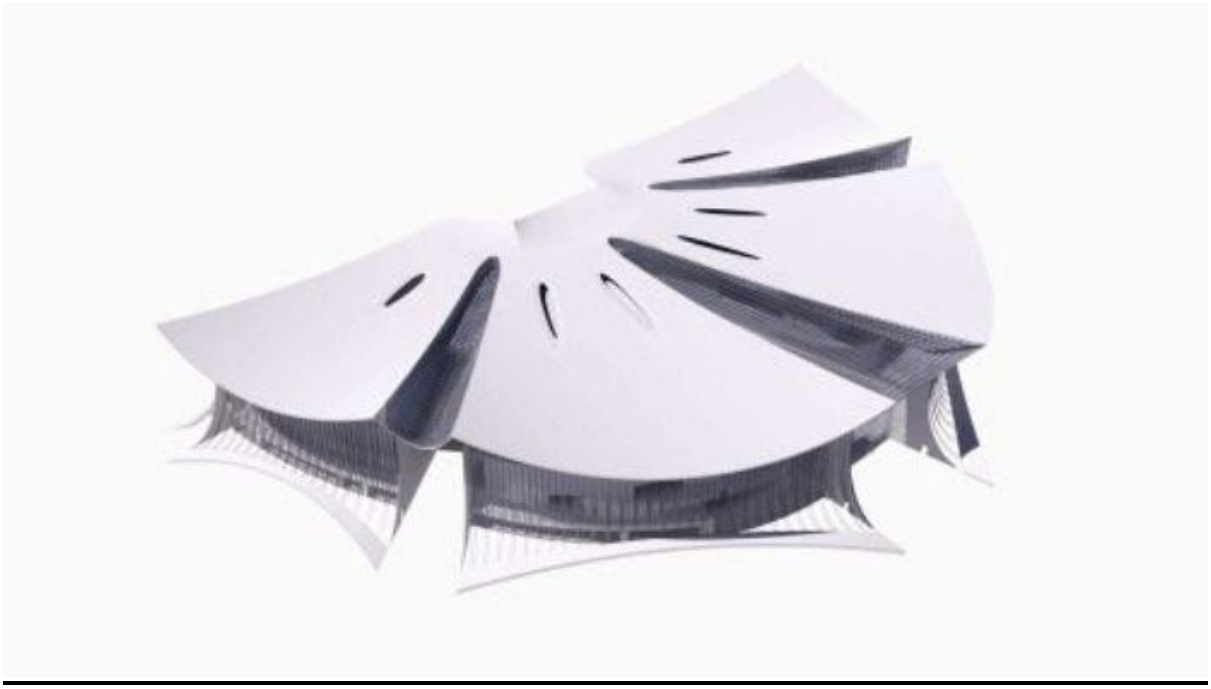
ROOF LARGE SPAN TRUSS



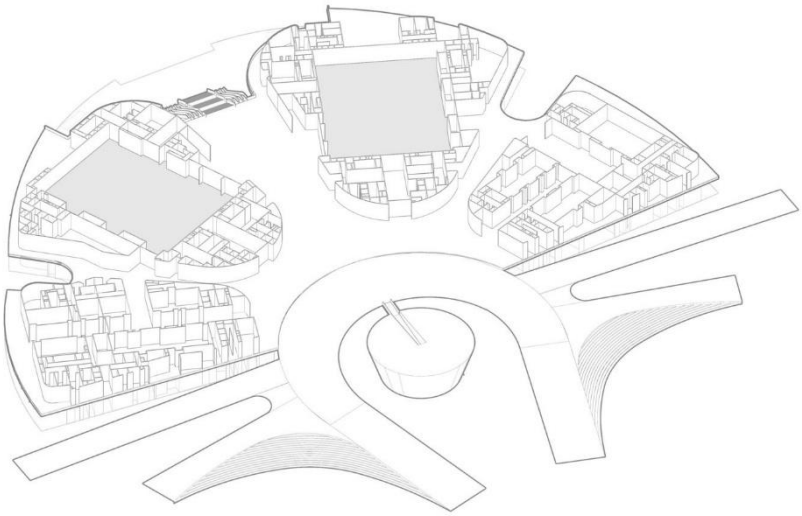
DOUBLE LAYER FAÇADE



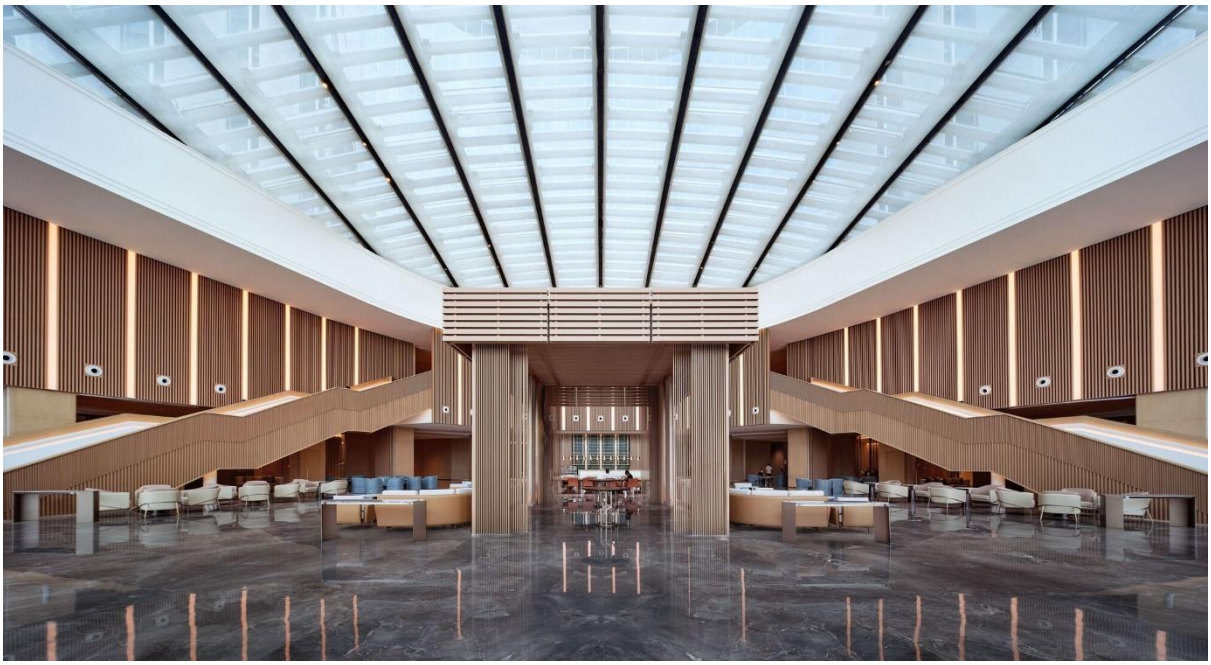
MODEL

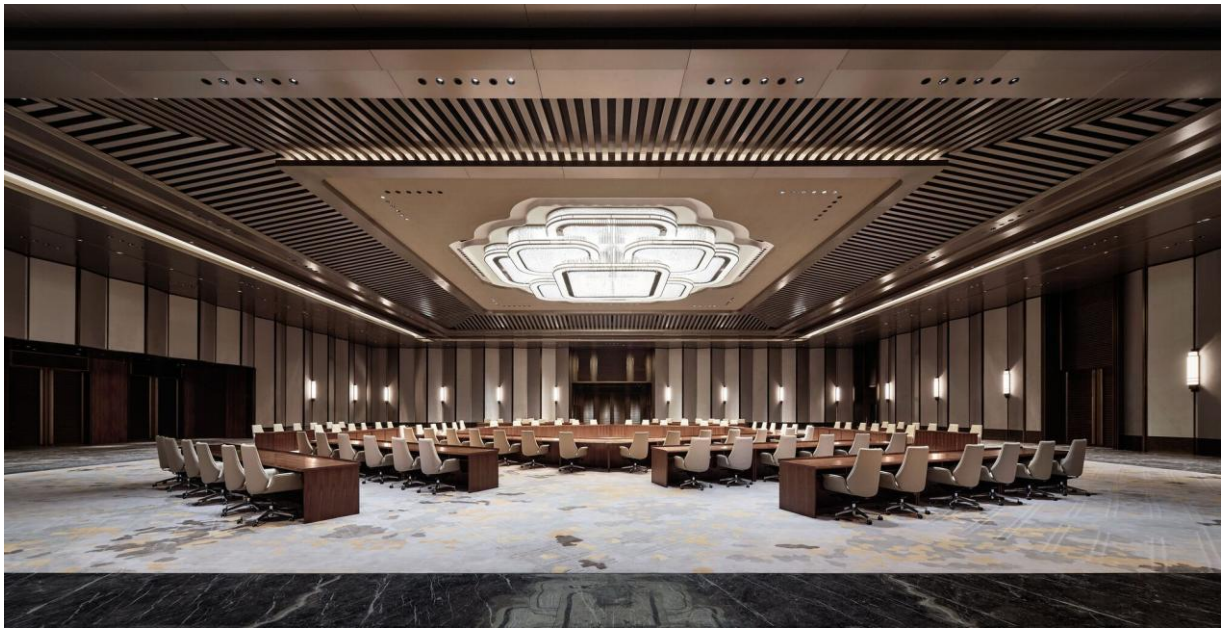


MODEL (A)



MODEL (B)





Building Services

A. HVAC (Heating, Ventilation & Air Conditioning):

- Central air-cooled system
- Smart zoning and thermal comfort sensors
- Passive cooling using **sea breezes** and ventilated facade

B. Electrical:

- Smart lighting systems and daylight sensors
- Diesel generator backup
- Grid-connected high-capacity power units

C. Water Supply & Conservation:

- Low-flow fixtures
- Rainwater harvesting
- Greywater recycling for landscaping

D. Waste Management:

- Waste segregation system
- Organic composting for garden waste
- Recyclable materials separation points

E. Fire & Life Safety:

- Sprinkler systems, smoke detectors
- Fire exits, alarms, pressurized stairwells
- Fire hydrants and hose reels on all floors

Food & Beverage Facilities

- **Central Kitchen**
  - Location: Service Block (2nd Floor)
  - Area: Approx. 3,300 m²
  - Use: Large-scale event catering across all halls and conference rooms.
- **Production Kitchen (Nansha Hall)**
  - Location: Inside Nansha Hall (2nd Floor)
  - Area: Approx. 680 m²
  - Use: In-house banquet and VIP catering for Nansha Hall.

Event & Conference Spaces

- **Guangzhou & Nansha Grand Halls**
  - Location: 2nd Floor

  - Area: 2,800 m² each
  - Ceiling Height: 12 meters
  - Use: Main plenary and exhibition halls with partitioning and AV infrastructure.
- **Hong Kong & Macau Halls**
  - Location: 4th Floor
  - Area: 2,000 m² each
  - Ceiling Height: ~7.5 meters
  - Use: Council meetings, business forums, and adaptable events.
- **Conference Rooms**
  - Location: Floors 2–4
  - Quantity: 41 rooms
  - Area: Ranges from 100–480 m²
  - Use: Breakout sessions, workshops, private meetings.
- **Foyer / Arrival Zone**
  - Location: 2nd Floor
  - Area: Approx. 4,000 m²
  - Height: ~30 meters
  - Use: Grand entrance with circulation to all core spaces.
- **VIP Lounges**
  - Location: Attached to major halls
  - Quantity: 19 rooms
  - Area: Estimated 25–50 m² per room
  - Use: Private and diplomatic reception spaces.

Circulation & Parking

- **Parking Area**
  - Location: Basement & Surface Level
  - Capacity: Over 1,100 vehicles
  - Features: EV charging, coach access, VIP zones

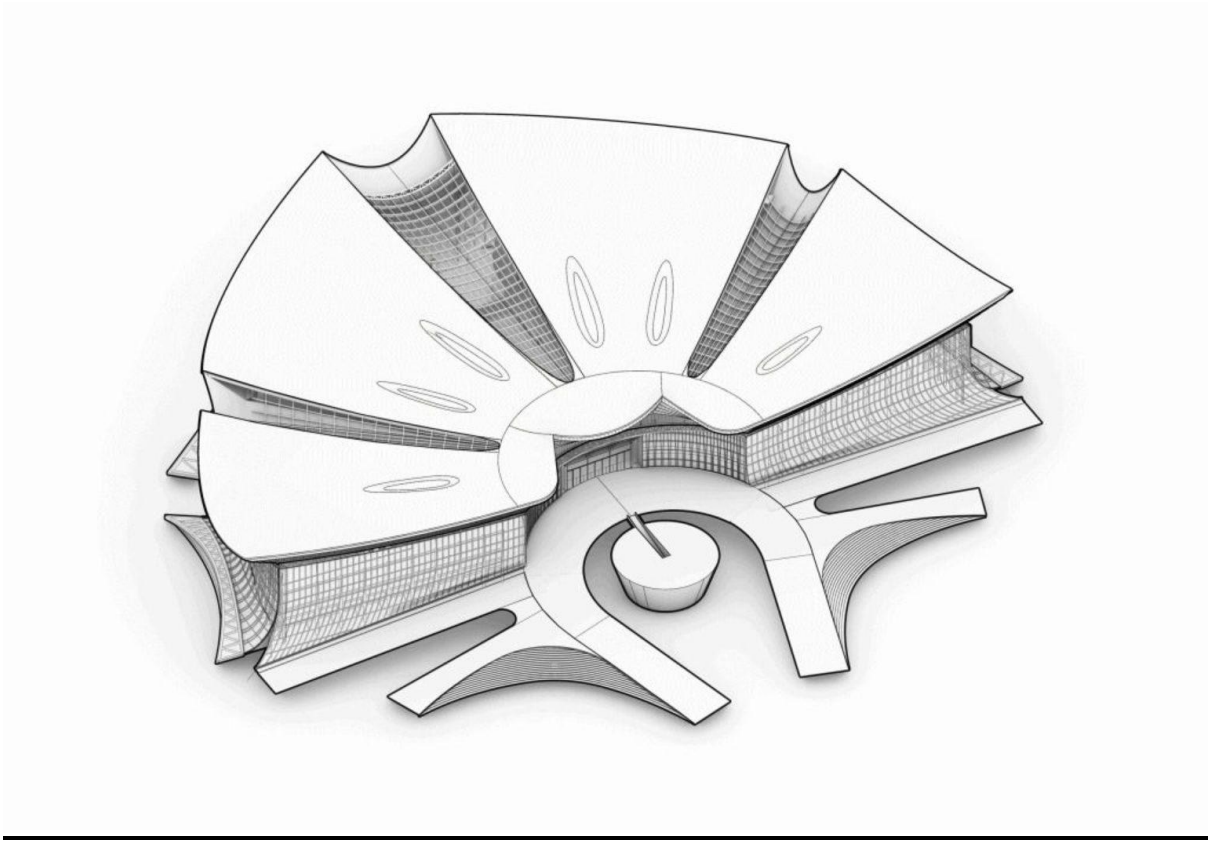
Building Services (MEP)

- **HVAC Plant Rooms**

  - Location: Rooftop & Basement
  - Area: Approx. 1,200–1,500 m²
  - Use: Houses central chillers, air handling units, smart controls.
- **Electrical Substations & UPS Systems**
  - Location: Utility Core / Basement
  - Area: Approx. 200–300 m²
  - Use: Distributes high-voltage power and backup supply.
- **Water Treatment / Greywater Systems**
  - Location: Utility Zones
  - Area: Approx. 150–400 m²
  - Use: Greywater recycling, rainwater storage, irrigation reuse.
- **Waste Management & Disposal**
  - Location: Service Core (Ground/Basement)
  - Area: Approx. 150–300 m²
  - Use: Segregation and composting for organic and recyclable waste.

Life Safety Systems

- **Fire Pump Room & Control Center**
  - Location: Basement
  - Area: Approx. 50–100 m²
  - Use: Central monitoring for sprinklers, alarms, hydrants.
- **Pressurized Escape Stairwells**
  - Location: Throughout the building
  - Area: Code-defined, built into structure
  - Use: Smoke-free egress during emergencies.



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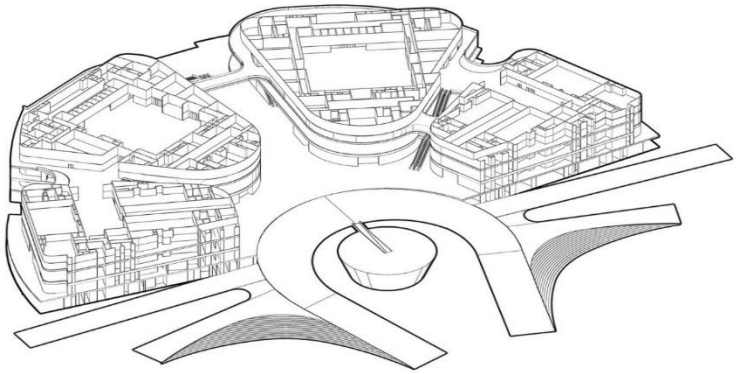

MODEL (D)

3 Case Study Comparison:

Parameter	HICC Hyderabad	IFF Convention Centre (Warangal)	Bharat Mandapam, Delhi	Minto Hall, Bhopal	Yashobhoomi (IICC), Dwarka
Location	HITEC City, Hyderabad	Madikonda, Warangal, Telangana	Pragati Maidan, New Delhi	Shamla Hills, Bhopal	Sector 25, Dwarka, New Delhi
Site Area	15 acres	~10 acres	~123 acres (Pragati Maidan)	~1.5 acres	89 hectares (~220 acres)
Built-up Area	~52,640 sq.m	Proposed	123,000+ sq.m	~13,000 sq.ft	Phase 1: ~8.9 lakh sq.ft (Exhibition + Convention + Arena)
Context	Surrounded by IT & commercial hubs	Growth node on NH-163	National exhibition grounds	Adaptive reuse in heritage precinct	Integrated with urban transit and airport corridor
Land Use	Commercial/Mixed (with hotel)	Public/Institutional	Cultural/Exhibition	Government/Public	Exhibition, Conference, Hospitality
Design Elements	Multipurpose halls, banquet, pre-function, lounges	Zoning based on HICC; open buffer landscape	Pavilion-style mega spaces, iconic central vista	Restored historic hall and banquet	Grand convention hall (6,000 pax), amphitheater (600 pax), LED media facade
Zoning	Convention / Public / Services	Convention / Public / Services	Thematic zones: pavilions, art park, water bodies	Minimal—centralized hall	Convention, Exhibition, Arena, Hospitality & Support facilities
Accessibility	MMTS station, NH access, airport	NH-163, local road network	Central Delhi: metro, bus, rail connectivity	Local road connectivity only	Direct metro (Dwarka Sector 25), airport nearby (IGI), expressway access
Green & Foliage	5 acres landscaped	Neem, Palmyra trees planned in buffer	Gardens, sculpture spaces, water features	Heritage gardens	LEED Platinum rated; rainwater

Parameter	HICC Hyderabad	IFF Convention Centre (Warangal)	Bharat Mandapam, Delhi	Minto Hall, Bhopal	Yashobhoomi (IICC), Dwarka
					harvesting, green zones
Technology	HVAC, AV systems, WiFi, telecommunication	Modern HVAC and AV proposed	Smart display systems, digital scheduling, security systems	Basic conference AV setup	Smart lighting, retractable seating, green energy systems
Cultural Identity	Limited modernist design	Local vegetation & identity to be incorporated	National symbols, Ashoka Pillar, cultural exhibits	Colonial heritage building	Bharat Mandapam-inspired facade, local crafts & tech fusion
Special Features	Attached to Novotel Hotel	Modeled on HICC with regional adaptations	Hosted G20 Summit, largest hall with 7,000 capacity	Heritage reuse for administrative and event functions	India's largest convention space, green building certified
Learning / Influence	Source template for modern Indian convention planning	Used HICC & Bharat Mandapam as reference	Icon for national-scale convention facilities	Ideal model for adaptive reuse	Global benchmarking; fusion of scale, technology & sustainability

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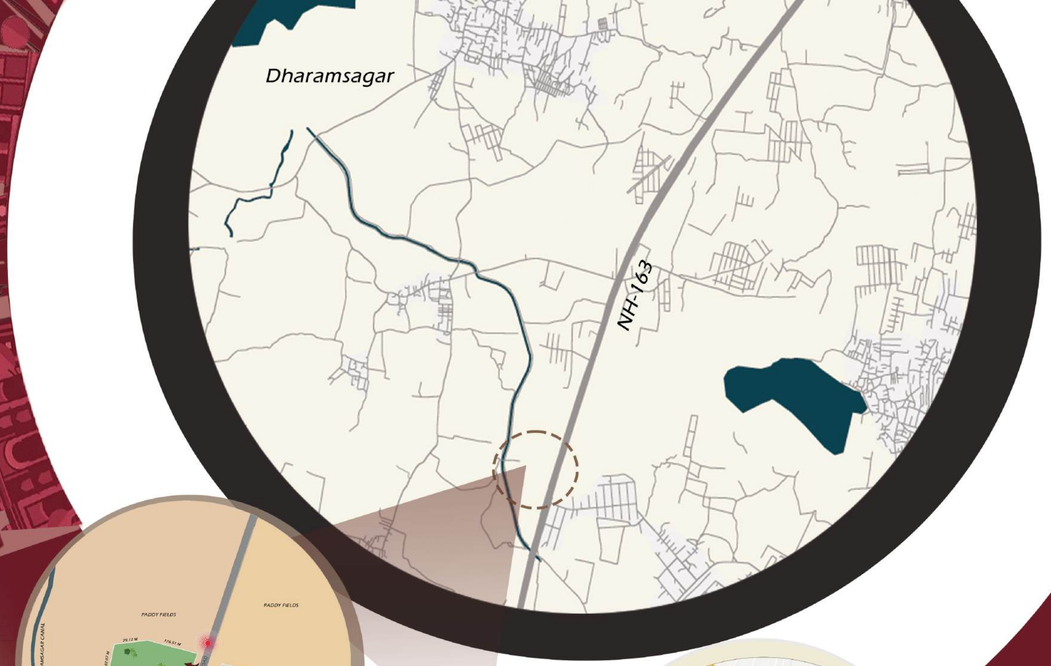
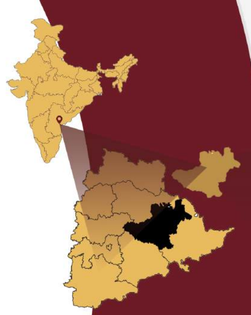
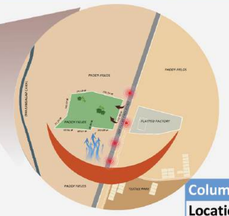
- ASHRAE Guidelines for HVAC Design in Convention Centres
- International Green Building Code (IGBC) – Green Building Rating System
- AutoCAD and Revit Modelling Data (Site plans and zoning layouts used in design)
- Google Maps and GIS Datasets (for regional topography and site connectivity)





Introduction



Warangal, known for its rich cultural heritage and growing economic significance, is fast emerging as a hub for trade, education, tourism, and IT-related activities.

The presence of a convention centre within this ecosystem will not only cater to the business and IT community but also support tourism, cultural activities, exhibitions, and large-scale events.

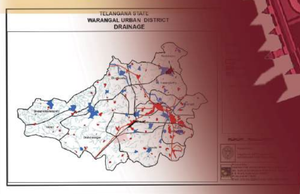
Column1	Column2
Location	Sy. No. 1791/ 1 of Madikonda (V)
	Warangal (U) District
Site Area	~ 10 acres (40,468 sq. m.)
Site Coordinates	17°58'50.18'' N and 79°30'14.89'' E
Primary Access	NH 163
Visibility & Frontage	Excellent Visibility and Frontage along abutting roads ; contiguous site
Shape, Terrain	Regular and mostly flat
Project Site Boundary	
North	Vacant land
South	Vacant land
East	NH 163 Access road
West	Dharmasagar Canal

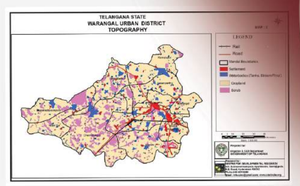


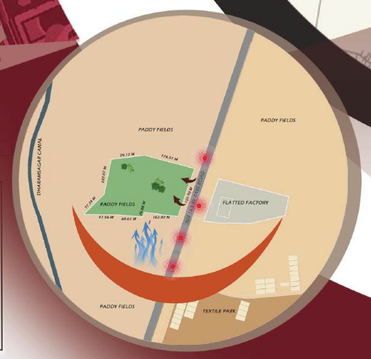
Sustainability Opportunities

The site has the potential to integrate constructed wetlands, bioswales, and recharge pits that connect with natural drainage.Convention centre landscaping can be designed as a water-sensitive urban system, reducing dependency on external water sources.

Drainage and Topography







ACCESSEBILITY

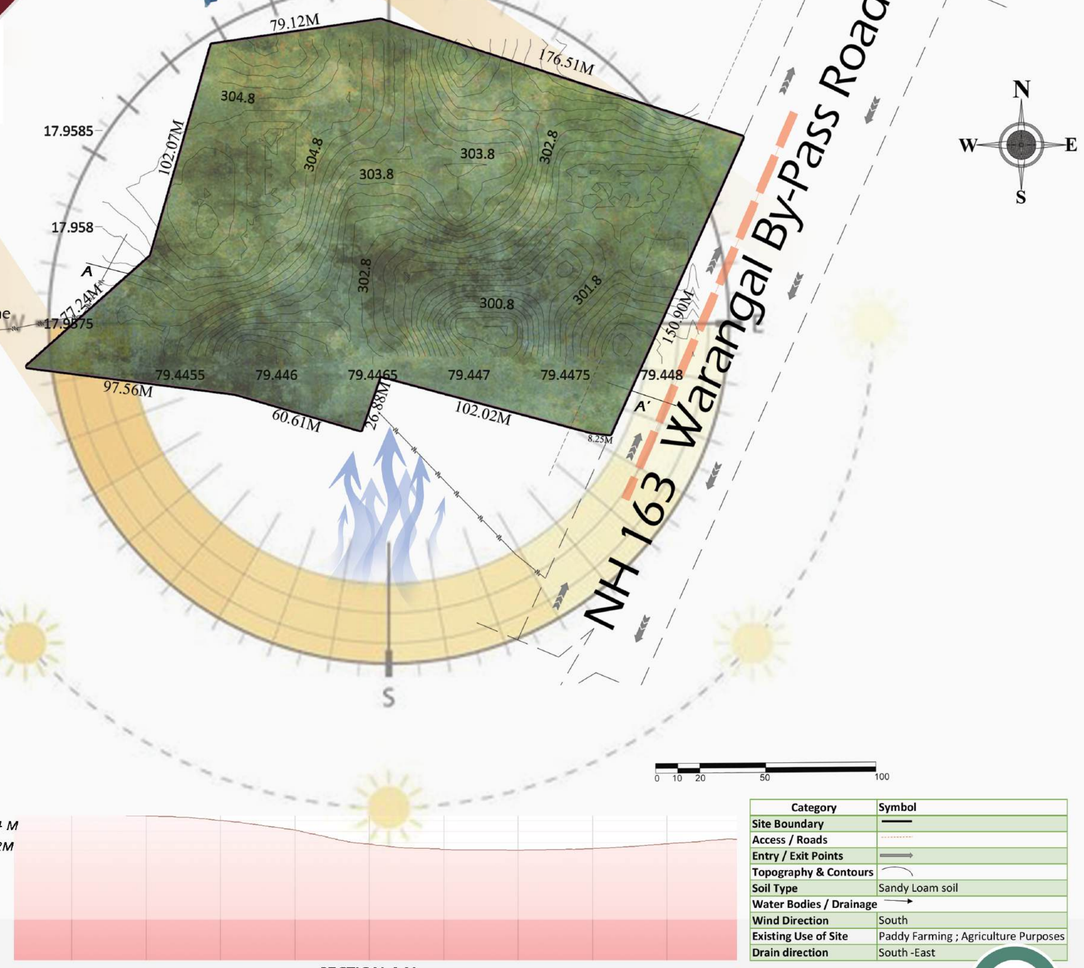
Create multiple access points (VIP, service, public) from the highway. Provide dedicated drop-off zones, parking and service yards to prevent congestion.



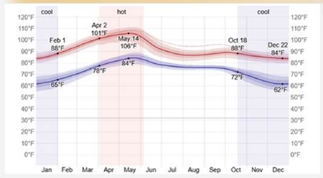
CONNECTIVITY

Dharamsagar Canal

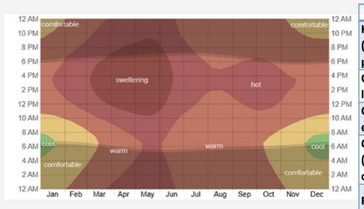
WARANGAL SOCIETY



Climatic Data

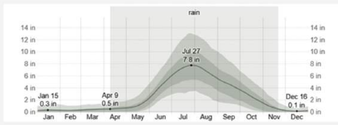


Average Temperature

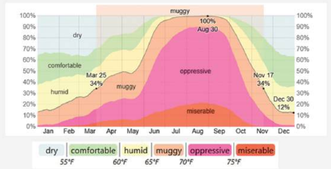




Average Hourly Temperature



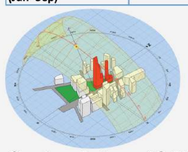
Rainfall



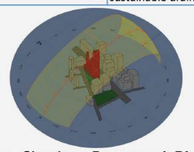
Humidity

Climatic Analysis

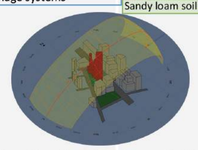
Climate Factor	Site Impact/Analysis	Design Response
High Temperatures (Hot Season Apr–Jun, peak May 105°F)	Extreme heat, discomfort in outdoor spaces	Use shaded walkways, courtyards, reflective roofing, green cover, and passive cooling techniques
Cool Season (Oct–Feb, lows ~62°F)	Comfortable weather for outdoor activities	Plan open-air events, outdoor plazas, landscape-heavy spaces
Clear Skies (Oct–May, esp. Feb 78% clear)	High solar exposure, strong daylight	Incorporate skylights, maximize solar PV panels, daylighting in interiors
Cloudy Period (Jun–Oct, peak Jul 92% cloudy)	Reduced daylight, gloomy interiors	Ensure efficient artificial lighting, façade treatments for soft light
Rainy Season (Apr–Nov, peak Jul 7.4" rain, 16 wet days)	Risk of flooding, waterlogging	Provide stormwater drains, elevated plinth, rainwater harvesting, pervious paving
Dry Season (Nov–Apr)	Limited water availability	Include water storage tanks, greywater recycling, drought-tolerant landscaping
Wind from West (May–Sep)	Strong winds with rain, may cause façade stress	Design protective façades, avoid large openings on west
Wind from South (Dec–May)	Favorable breeze for cooling	Align courtyards and windows to harness ventilation
Humidity (Mar–Nov, peak Aug oppressive)	Discomfort indoors, high cooling load	Use cross-ventilation, dehumidifiers, efficient HVAC
Seasonal Comfort (Oct–Feb optimal)	Best time for outdoor gatherings	Schedule conventions/events in cooler months
Solar Potential (Oct–May, clear skies)	Energy opportunity	Install rooftop solar panels for electricity and water heating
Heavy Rainfall (Jun–Sep)	Large runoff, erosion risks	Rain gardens, retention ponds, sustainable drainage systems



Shadow Pattern :12 PM



Shadow Pattern :6 PM



Shadow Pattern :6 AM

Vegetation and soil type

Attribute	Asian Palmyra Palm Lorem Ipsum	Neem Tree	Prosopis juliflora Power Line
Common Name	Asian Palmyra Palm /	Neem Tree	Mesquite / Vilayati Babul
Scientific Name	*Borassus flabellifer*	*Azadirachta indica*	*Prosopis juliflora*
Region	Tropical Asia	Native to Warangal & Indian subcontinent	Native to Central & South America, invasive in India
Trunk Radius	~30–50 cm (Diameter:	~30–45 cm (Diameter: 60–90 cm)	~20–30 cm (Diameter: 40–60 cm)
Average Height	20–30 m (up to 30 m	Around 15–20 m	5–12 m (occasionally up to 15 m)
Foliage Type	Evergreen	Evergreen (may shed in drought)	Semi-evergreen (deciduous in dry conditions)
Leaf Shape	Fan-shaped	Compound leaves	Bipinnate compound leaves
Leaf Size	1.5–2 meters long	Medium-sized leaflets	Small leaflets (~1–2 cm)
Crown Spread	6–10 meters wide	10–15 meters wide (dense, rounded canopy)	5–10 meters (irregular, thorny canopy)









Sandy loam soil

Drainage Patterns

Natural streams run near the settlement zones, flowing towards major tanks.Site planning must respect these natural drainage lines, ensuring no obstruction of water flow, with culverts and percolation pits designed for stormwater management.

304 M
302M

SECTION AA'

Category	Symbol
Site Boundary	
Access / Roads	
Entry / Exit Points	
Topography & Contours	
Soil Type	Sandy Loam soil
Water Bodies / Drainage	
Wind Direction	South
Existing Use of Site	Paddy Farming ; Agriculture Purposes
Drain direction	South -East

SITE ANALYSIS

CONVENTION CENTRE

KRATIKA SINGH 211110217 SEMESTER IX- THESIS
THESIS GUIDE : DR. NAVNEET MUNOTH

Site Inferences

PHYSICAL AND SPATIAL OBSERVATIONS

Topic	Remarks
Topography & Landform	Relatively flat terrain, gently sloping towards the East.
Site Area	~10 acres within IT Park premises at Madikonda, Warangal.
Accessibility	Well connected by **NH-163** ; ~9 km from Kazipet Railway Junction; accessible by private vehicles and cabs.
Connections to Primary & Secondary Roads	Direct access from NH-163
Surrounding Landmarks & Views	Textile Park, Madikonda abutting NH-163
Existing Footpaths & Pedestrian Circulation	No formal pedestrian circulation or footpaths on-site.
Existing Structures & Boundaries	Vacant parcel of land,The land area has zoned into the category of Industial Zone (I) by TGIIC.
Condition & Usability of Existing Structures	None (site is undeveloped, earmarked for the project).

ENVIRONMENTAL OBSERVATIONS

Topic	Remarks
Vegetation & Biodiversity	Sparse vegetation on site; few scattered trees and shrubs. currently being utilized for agricultural purposes; Rice Cultivation
Water Bodies	No major water bodies within the site; small seasonal drains exist in the vicinity.
Water Supply	Municipal water supply lines available near the site.
Soil Quality	Predominantly red sandy loam
Noise & Air Quality	Ambient noise levels are moderate; close to industrial textile park . Air quality is moderate, noise and traffic related pollution from NH-163.
Visual Quality	Open, clear site offers unobstructed views.

FUNCTIONAL AND BEHAVIORAL ANALYSIS

Topic	Remarks
Traffic and Movement Patterns	Direct access from NH-163; vehicular traffic moderately high; pedestrian activity limited
Activity Mapping	office hours create peak inflow; occasional public gatherings/events
Public Spaces and Amenities	Limited – mostly commercial outlets nearby; scope for integrating public plazas and open greens

SERVICES

Topic	Remarks
Column1	**Column2**
Water Supply	Ranged from municipal supply; borewells and pipelines within IT Park
Availability of potable water on-site	Available through piped connections
Power Supply	Reliable electricity grid; IT park already integrated with substations
Waste Management	planned solid waste collection and disposal system

LEGAL REQUIREMENTS

Parameter	Requirement (as per TBC G.O. Ms. No. 168)
Maximum Height	upto 50 m permitted
FAR (Floor Area Ratio)	FAR- Maximum permissible FAR **2.0**
Ground Coverage	Max **40%** of site area
Setbacks (General for Assembly Buildings)	Based on height: • 9 m setback from sides • 15 m from front
Parking	• 1 ECS (Equivalent Car Space) per 50 sq.m of floor area • 60% in basements, 40% on surface/stilts
Landscaping / Open Space	Minimum **10% of site** earmarked for greenery & landscaping
Fire & Safety	Compulsory **2 staircases per block**, fire tender movement (6 m driveway), fire NOC mandatory
Road Access	45m wide approach road
Utilities	Separate service access, STP, rainwater harvesting, solar provisions required

1. Approach Road to Site

A narrow earthen road leading towards the site with vegetation on both sides.

2.
Paddy Fields (North-East View)
Vast stretches of cultivated paddy fields surrounding the site.

3. Drainage Adjacent to Site

4. Open Agricultural Lands (South View)
Expansive open lands used for cultivation.

Offers unobstructed views and potential for integrating green buffers around the development.

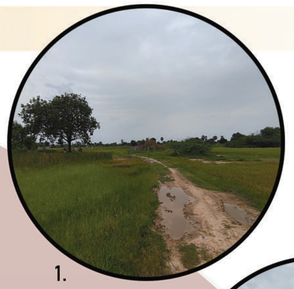
5.Existing Industrial/Institutional Buildings (Textile Park)

Modern factory/industrial blocks located adjacent to the site.

Provides contrast to the natural fields and highlights the transitional nature of the area (rural–industrial–urban).

6. Surrounding Vegetation and Landscape (West View)

Natural greenery and scattered vegetation visible around site periphery.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SWOT ANALYSIS

STRENGTHS

Surrounded by working population (IT employees, students) ready demand for conventions & events.

Direct frontage on NH-163 (Hyderabad –Warangal highway) with excellent regional connectivity.

Close to Warangal city heritage zone (Fort, Thousand Pillar Temple, etc

WEAKNESS

Harsh summer climate with high heat (up to 45°C); requires strong passive design strategies.

Noise and air pollution from adjacent highway corridor.

Sparse existing vegetation cover; site currently lacks natural shadin

OPPORTUNITIES

Scope to integrate sustainable landscape (shade trees, courtyards, water harvesting).

symbolize Warangal's modern growth + historic identity through contextual architecture.

THREATS

Traffic congestion at NH-163 junctions if not planned with buffers & service lanes.

Climate vulnerability: extreme heat, rainfall variability, risk of urban flooding.

SITE VIEWS

SITE ANALYSIS

CONVENTION CENTRE

KRATIKA SINGH 211110217 SEMESTER IX- THESIS
THESIS GUIDE : DR. NAVNEET MUNOTH

HICC (Hyderabad International Convention Centre)



LOCATION AND CONTEXT

HITEC City, Hyderabad; integrated with Novotel Hotel.

Site Area ~15 acres
Built-up Area~30,000 sq.m

Site Planning
Zoning separates main halls, pre-function areas, hotel, service roads; clear pedestrian–vehicular segregation.

Climate
Hot semi-arid (Hyderabad) shading devices, efficient AC, large glass facades.



ZONING AND CIRCULATION

Capacity & Zoning
6,500 seating; halls divisible into multiple configurations; **banquet + breakout spaces.**

Divisible halls, banquet, hotel.

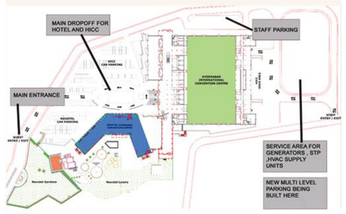
Circulation & Access
Airport, metro, highways; service segregation

Flexibility -Very high – modular.

Strengths Global scale, flexibility.

Weaknesses Costly.

Target Users MICE, corporates.



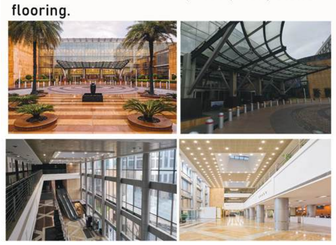
ARCHITECTURE AND STYLE

Architectural Style- Modern, international, glass & steel.

Form & Massing- Large modular blocks, horizontal halls.

Structural System- Steel + RCC frame, long-span trusses.

Material Palette- Glass, steel, ACP, stone flooring.



Kushabhau Thakre (Minto Hall) Bhopal



LOCATION AND CONTEXT

OLD VIDHANSABHA, OPP. RAJ BHAWAN
MINTO HALL, Lower Lake-462008

~5 acres (heritage site, adaptive reuse)
Built -up Area~10,000 sq.m

Adaptive reuse of palace with added annexes; limited zoning flexibility; constrained parking/service areas.

Composite climate heritage thick walls, courtyards help passive cooling.

Form and Masing
Compact heritage block, retrofitted halls.

Structural System
Load-bearing with RCC retrofits.



ZONING AND CIRCULATION

Capacity ~1,200
Facilities
Auditorium, banquet, multipurpose spaces

Circularity and acess
City-centre heritage site; limited parking/service.

Flexibility
Low – heritage constraints

Strengths
Heritage + cultural identity.
Weaknesses Limited capacity, rigid reuse.

Target Users Local/regional cultural groups.



ARCHITECTURE AND STYLE

Architectural Style Indo-Saracenic heritage, adaptive reuse.

Form & Massing Compact heritage block, retrofitted halls.

Structural System Load-bearing with RCC retrofits.

Material Palette Stone masonry, RCC, wood finishes.

Stone masonry, RCC, wood finishes.



Yashobhoomi (Dwarka, Delhi)



LOCATION AND CONTEXT

Site Area ~89 hectares (mega scale)
Built-up Area~89 ha phased (multi-lakh sq.m)



Area	73000 sqm
No. of Floors	8
No. of Convention rooms	15
Capacity of Main Auditorium	6000 pax
Capacity of Grand Ballroom	2500 pax
No. of Meeting rooms	13
Total Capacity	11000

Architectural Style-Modern monumental, global icon.

Form & Massing- Monumental, iconic blocks, global scale
.
Structural System- Steel mega-span + RCC.
Material Palette Glass, steel, stone composites.
Capacity~10,000

Facilities Expo halls, plazas, hotels.
Circulation & Access Metro, expressways, airport.
Convention Centre Capacity6,000 pax (main hall)

Grand Ballroom 2,500 pax

Meeting Rooms13 rooms (total ~1,500 pax)

Exhibition Halls 1.07 lakh sq. m (state-of-the-art modular halls)

Auditorium 3,000 pax capacity

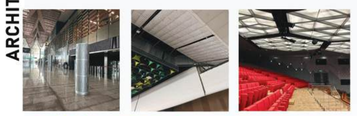
Parking ~3,000 cars (basement + surface)

Special Features - Acoustic & soundproof design
- Retractable seating
- State-of-the-art AV & ICT
- Sustainable building (green rating)

ARCHITECTURE AND STYLE

Architectural Style -Modern monumental, global icon.

Form & Massing- Monumental, iconic blocks,
Structural System Steel mega-span + RCC.
Material Palette Glass, steel, stone composites.
Capacity~10,000 Facilities Expo halls, plazas, hotels.
Circulation & Access- Metro, expressways





Bharat Mandapam (Pragati Maidan, Delhi)



LOCATION AND CONTEXT

Delhi

Site Area ~123 acres (part of Pragati Maidan complex)
Built-up Area~65,000 sq.m

Site Planning Large axial plan; mega halls, expo spaces, plazas; strong hierarchy; integrated parking.



Flexibility High – divisible plenary halls.
Capacity~7,000–10,000
Strengths Monumentality + national stature.

Weaknesses High cost, mega-scale.

Target Users National & international summits.

Location	New Delhi
Owners	Govt. of India
Architects	ARCOP Associates Pvt. Ltd & Aedas
Client	India Trade Promotion Organisation (ITPO)
Contractor	NBCC & Shapoorji Pallonji Pvt. Ltd
Area	123 acres (497763 sqm)
Cost of Project	2700 crores
Redevelopment	2017-2023
Landuse Type	Recreational

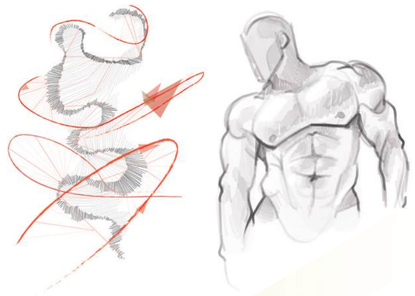

PRAGATI MAIDAN
MATHURA ROAD
BHAIRON MARG
RING ROAD
PRAGATI MAIDAN
PRAGATI MAIDAN
PRAGATI MAIDAN

"Architecture as a living body, choreographed for human interaction"

*"The design concept for the **Warangal International Convention Centre** is inspired by the human form and its behavioral choreography with space. Similar to how the human body integrates the mind, heart, and limbs into a unified system of movement, the convention centre is envisioned as a spatial choreography of interaction, expression, and function.*

DESIGN PHILOSOPHY

"Space is not a passive vacuum, but has an active role in the choreography of social interactions."
Henri Lefebvre (The Production of Space, 1974)



1. Architecture as a Living Organism

2. Behavioral Choreography with Space

Architecture here becomes performative, not just functional — shaping how people interact, connect, and express.

3. Form & Material as Anatomy

Stone = Bones (strength, permanence, cultural rootedness).

Steel = Muscles (flexibility, structural power).

Glass = Skin (transparency, connection with environment).

4. Human-Centric Philosophy

Light as metaphor for vision (guides orientation).
Soundscapes for collective events (auditory choreography).
Touch/materials for tactile experience (stone, shaded courtyards).
Movement as bodily rhythm (fluid circulation & transition).

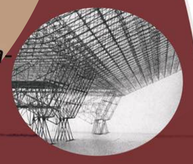
Material Palette

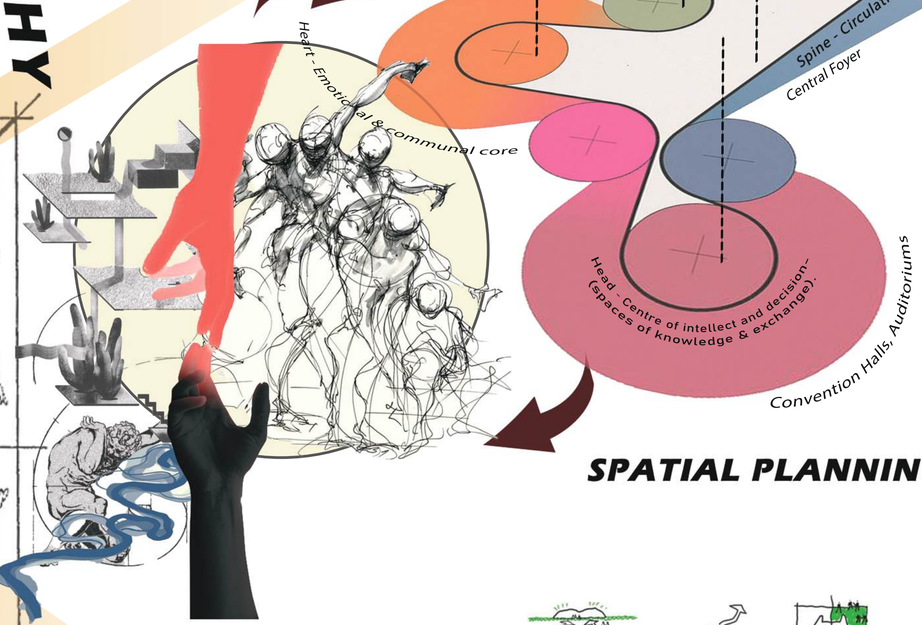
The palette merges local heritage materials (granite, jaali, sandstone) with modern sustainable systems (glass, solar, green roofs).

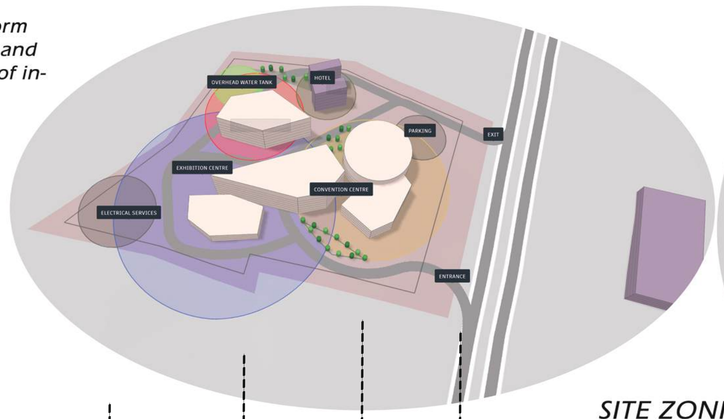
Reinforced Concrete (RCC): Primary structural frame for durability and span.

Steel Trusses / Space Frames: For large-span convention halls and roof structures.

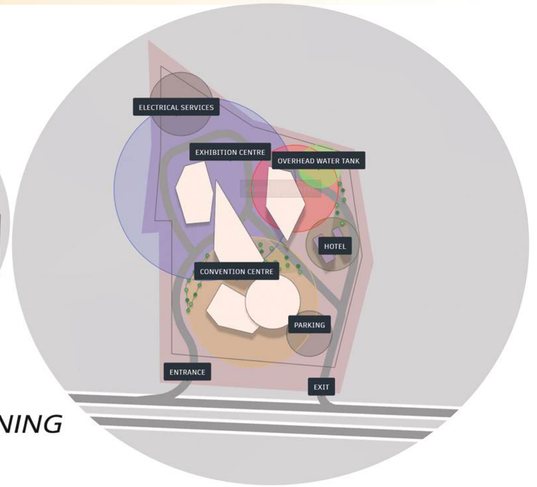
Exposed Concrete Finish (select areas): Evokes strength and perma-



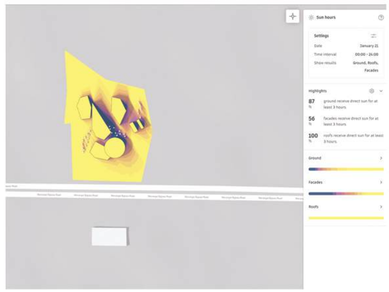




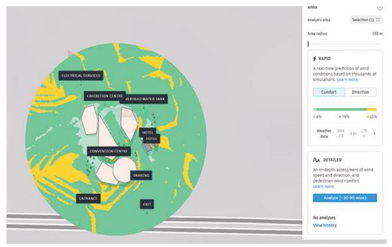
SITE ZONING



SUN ANALYSIS



WIND ANALYSIS



Head - *Centre of intellect and decision-making Convention Halls, Auditoriums (spaces of knowledge exchange).*

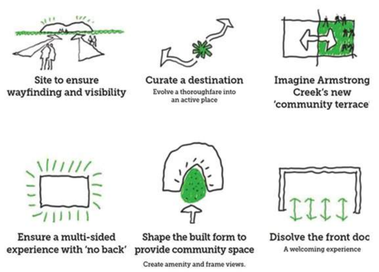
Spine *-Circulation and alignment -Central Foyer / Atrium (connecting all spaces).*

Heart *- Emotional & communal core Cultural Courtyards, Plazas, Banquet Spaces.*

Arms *- Extensions for interaction - Exhibition Wings, Breakout Areas.*

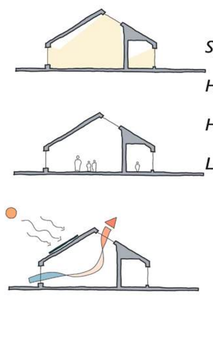
Legs *- Foundation of strength and mobility -Service Blocks, Parking, Support Infrastructure.*

SPATIAL PLANNING



SITE CHALLENGES WITH SOLUTIONS

Passive Design Strategies

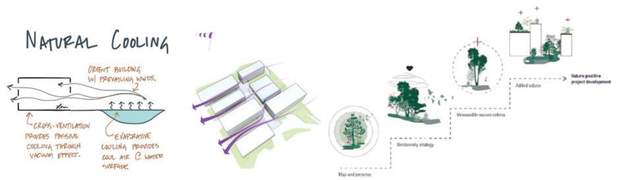


Spine (foyer): Using double-height shaded atrium with clerestory lighting.

Heart (courtyard): Dense landscaping + water features for passive cooling.

Head (convention halls): Insulated walls + shading devices to cut solar gain.

Legs (services, parking): Peripheral placement to shield main halls from west sun.

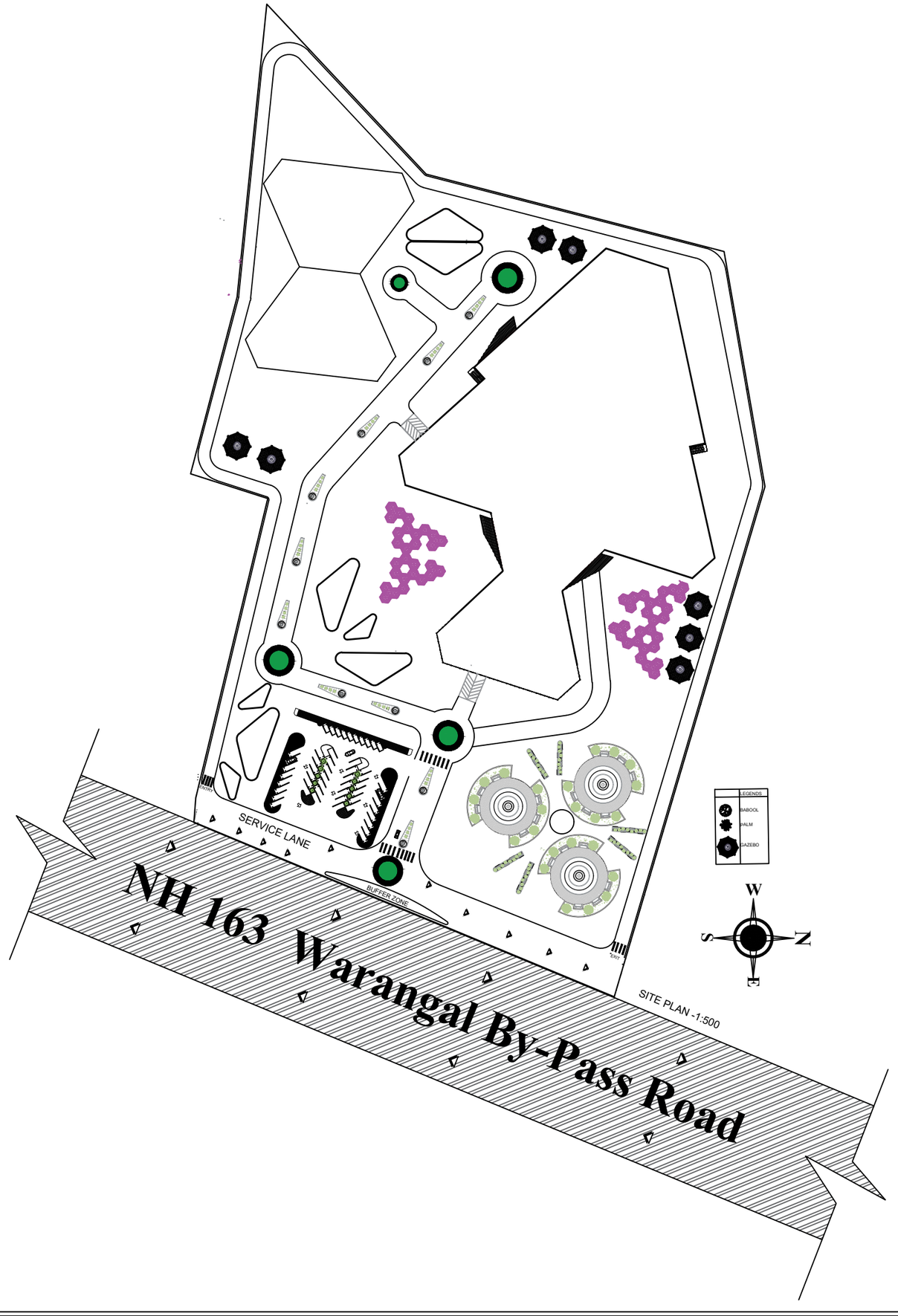


"The proportions of the human body should be used as a model for buildings. For nature has composed the human body in such a way that the proportions of all limbs correspond to the whole."
Alberti – On the Art of Building (1452)

CONCEPT

CONVENTION CENTRE

KRATIKA SINGH 211110217 SEMESTER IX- THESIS
THESIS GUIDE : DR. NAVNEET MUNOTH



KEY PLAN

REVISION

Rev. Date	Description	Appr'd

NOTES

ALL DIMENSIONS ARE IN mm (MILLIMETRES).

DRAWING SHALL NOT BE SCALED AND ONLY WRITTEN DIMENSIONS SHALL BE FOLLOWED.

IN CASE OF ANY DISCREPENCY FOUND IN DRAWINGS AND DETAILS, IT SHALL BE BROUGHT TO THE NOTICE OF THE ARCHITECT, AND RECTIFIED, PRIOR TO ITS EXECUTION.

THIS DRAWING IS ISSUED STRICTLY WITH AN UNDERSTANDING THAT IT WILL BE USED ONLY FOR THE PURPOSE MENTIONED AND SHALL BE RETURNED AFTER COMPLETION.

THIS DRAWING SHALL BE REFERED ONLY FOR THE PURPOSE MENTIONED IN ITS TITLE (FLOORING PATTERN, FALSE CEILING, SHUTTERING PATTERN, ELECTRICAL, PLUMBING, ETC.)

MAULANA AZAD NATIONAL INSTITUTE OF TECHNOLOGY, BHOPAL

PROJECT - CONVENTION CENTRE, WARANGAL

SHEET TITLE - SITE PLAN

GUIDED BY - DR. NAVNEET MUNOTH

DRAWN BY - KRATIKA SINGH

DATE - 10/11/2025

SCALE - 1:500 DWG. NO. - 1

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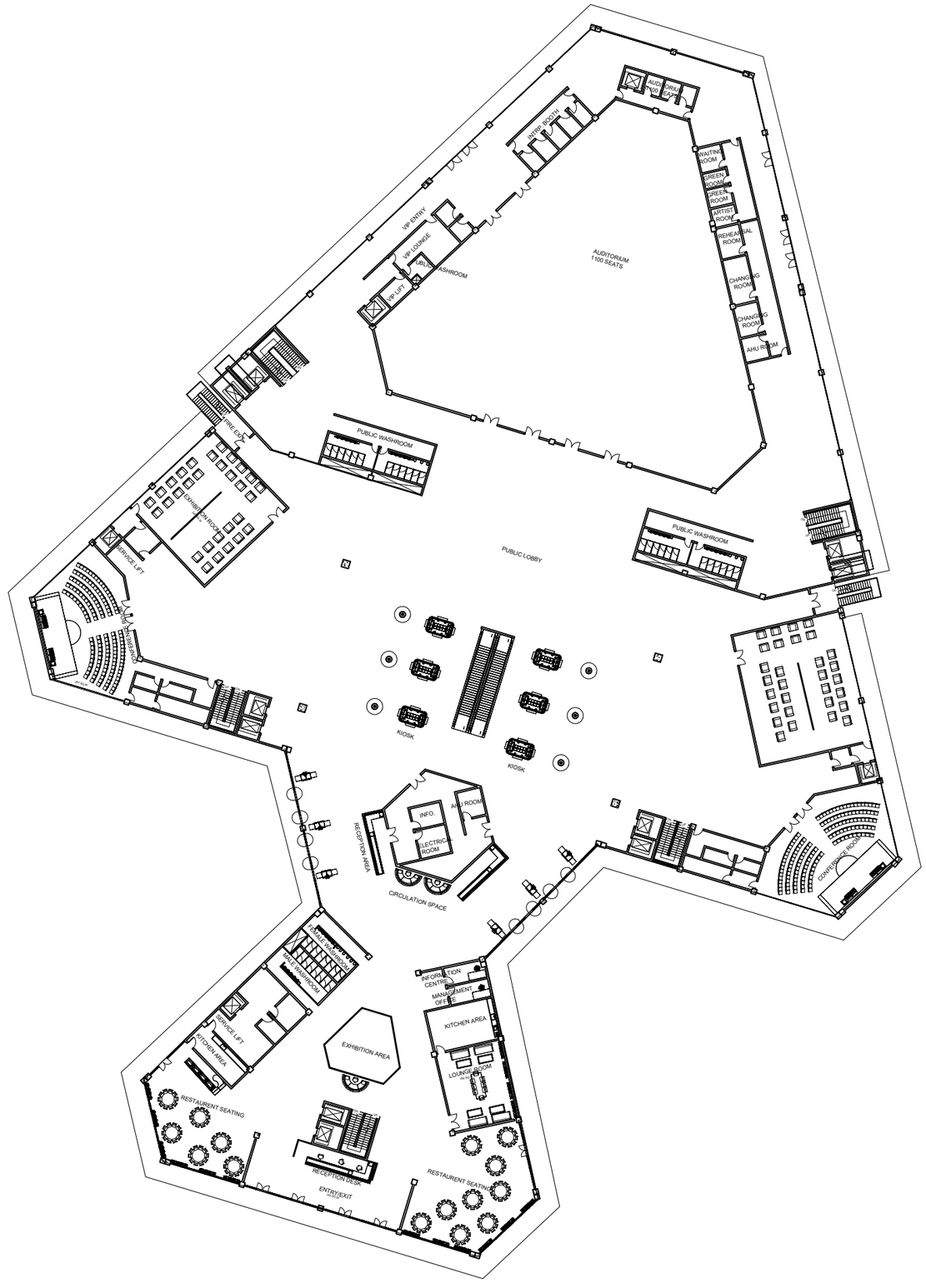

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MAULANA AZAD NATIONAL INSTITUTE OF TECHNOLOGY, BHOPAL

PROJECT - CONVENTION CENTRE, WARANGAL

SHEET TITLE - GROUND FLOOR PLAN

GUIDED BY - DR. NAVNEET MUNOTH

DRAWN BY - KRATIKA SINGH

DATE - 02/12/2025

SCALE - 1:250 DWG. NO. - 2

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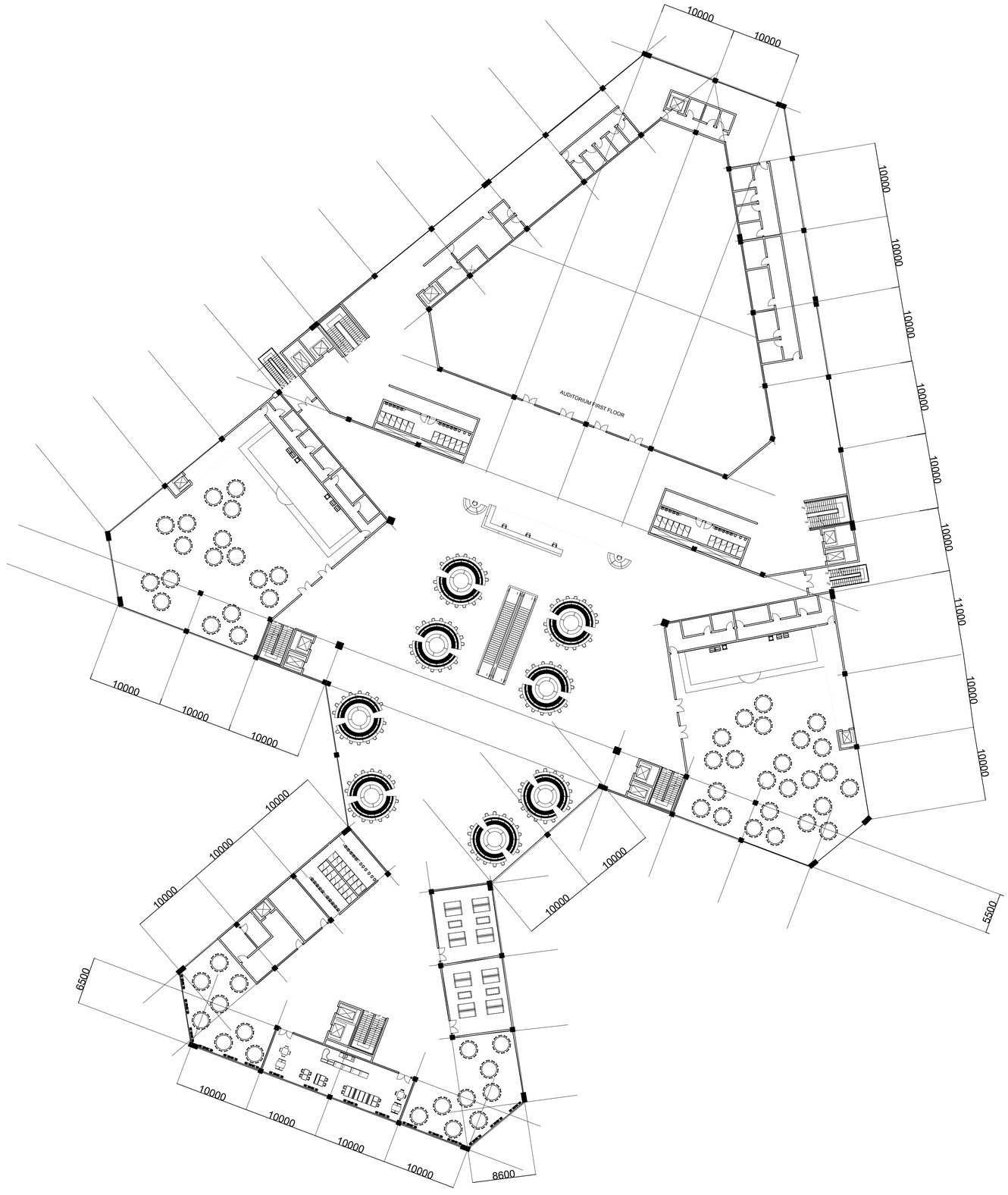

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MAULANA AZAD NATIONAL INSTITUTE OF TECHNOLOGY, BHOPAL

PROJECT - CONVENTION CENTRE, WARANGAL

SHEET TITLE - FIRST FLOOR PLAN

GUIDED BY - DR. NAVNEET MUNOTH

DRAWN BY - KRATIKA SINGH

DATE - 02/12/2025

SCALE - 1:250 DWG. NO. - 3

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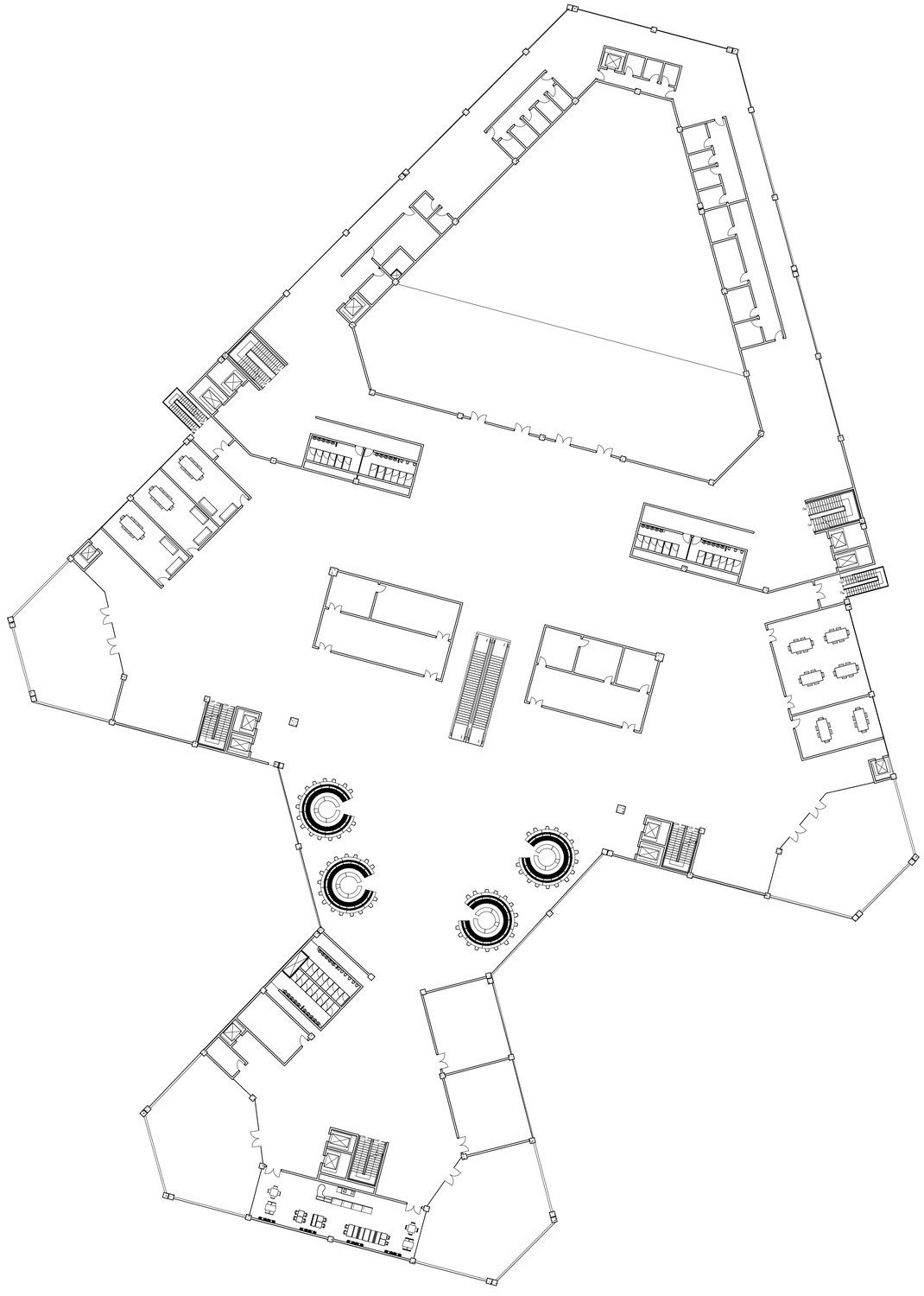

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MAULANA AZAD NATIONAL INSTITUTE OF TECHNOLOGY, BHOPAL

PROJECT - CONVENTION CENTRE, WARANGAL

SHEET TITLE - SECOND FLOOR PLAN

GUIDED BY - DR. NAVNEET MUNOTH

DRAWN BY - KRATIKA SINGH

DATE - 02/12/2025

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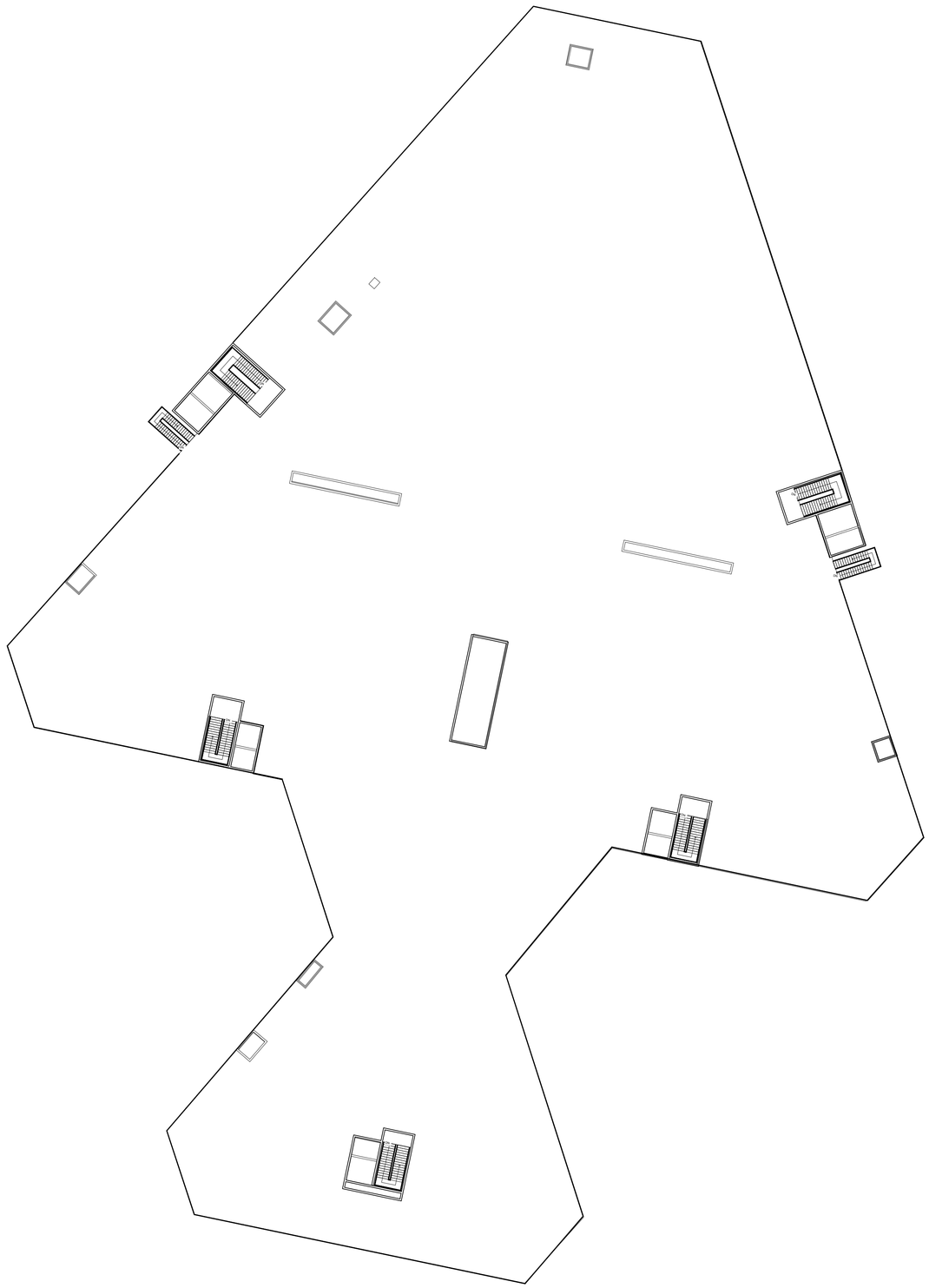

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MAULANA AZAD NATIONAL INSTITUTE OF TECHNOLOGY, BHOPAL

PROJECT - CONVENTION CENTRE, WARANGAL

SHEET TITLE - TERRACE PLAN

GUIDED BY - DR. NAVNEET MUNOTH

DRAWN BY - KRATIKA SINGH

DATE - 02/12/2025

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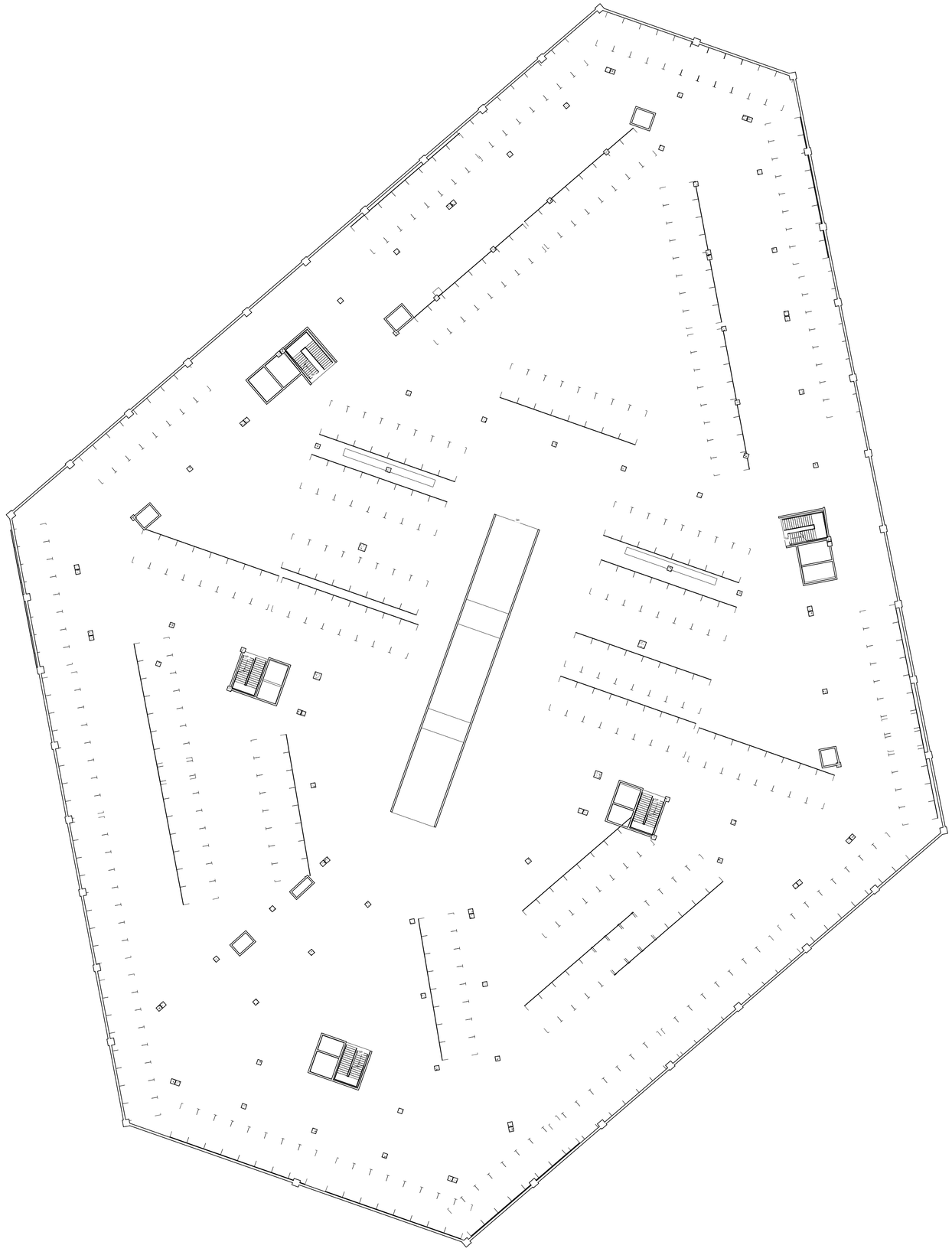

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MAULANA AZAD NATIONAL INSTITUTE OF TECHNOLOGY, BHOPAL

PROJECT - CONVENTION CENTRE, WARANGAL

SHEET TITLE - BASEMENT PLAN

GUIDED BY - DR. NAVNEET MUNOTH

DRAWN BY - KRATIKA SINGH

DATE - 02/12/2025

SCALE - 1:250 DWG. NO. - 6

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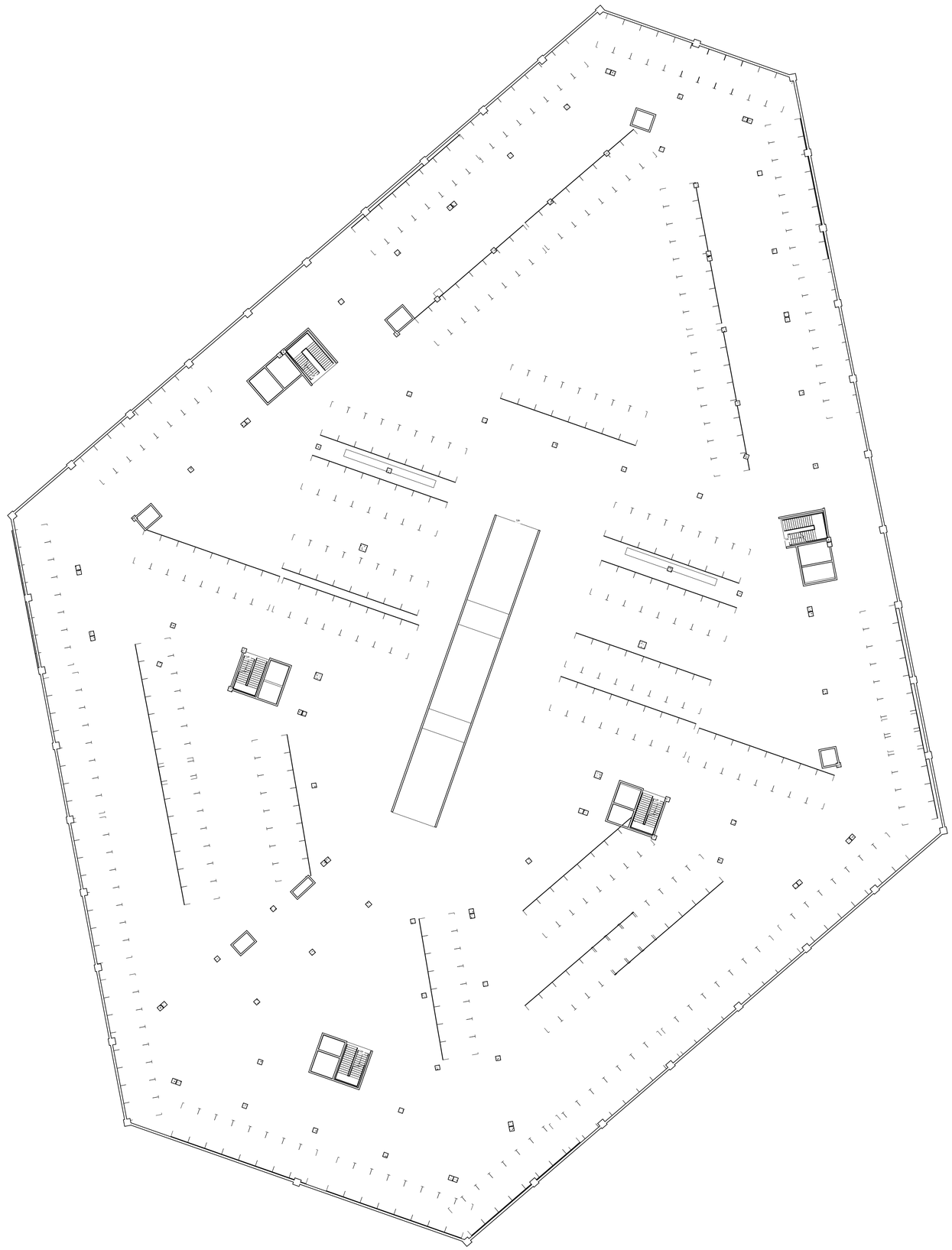

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MAULANA AZAD NATIONAL INSTITUTE OF TECHNOLOGY, BHOPAL

PROJECT - CONVENTION CENTRE, WARANGAL

SHEET TITLE - SECOND FLOOR PLAN

GUIDED BY - DR. NAVNEET MUNOTH

DRAWN BY - KRATIKA SINGH

DATE - 02/12/2025

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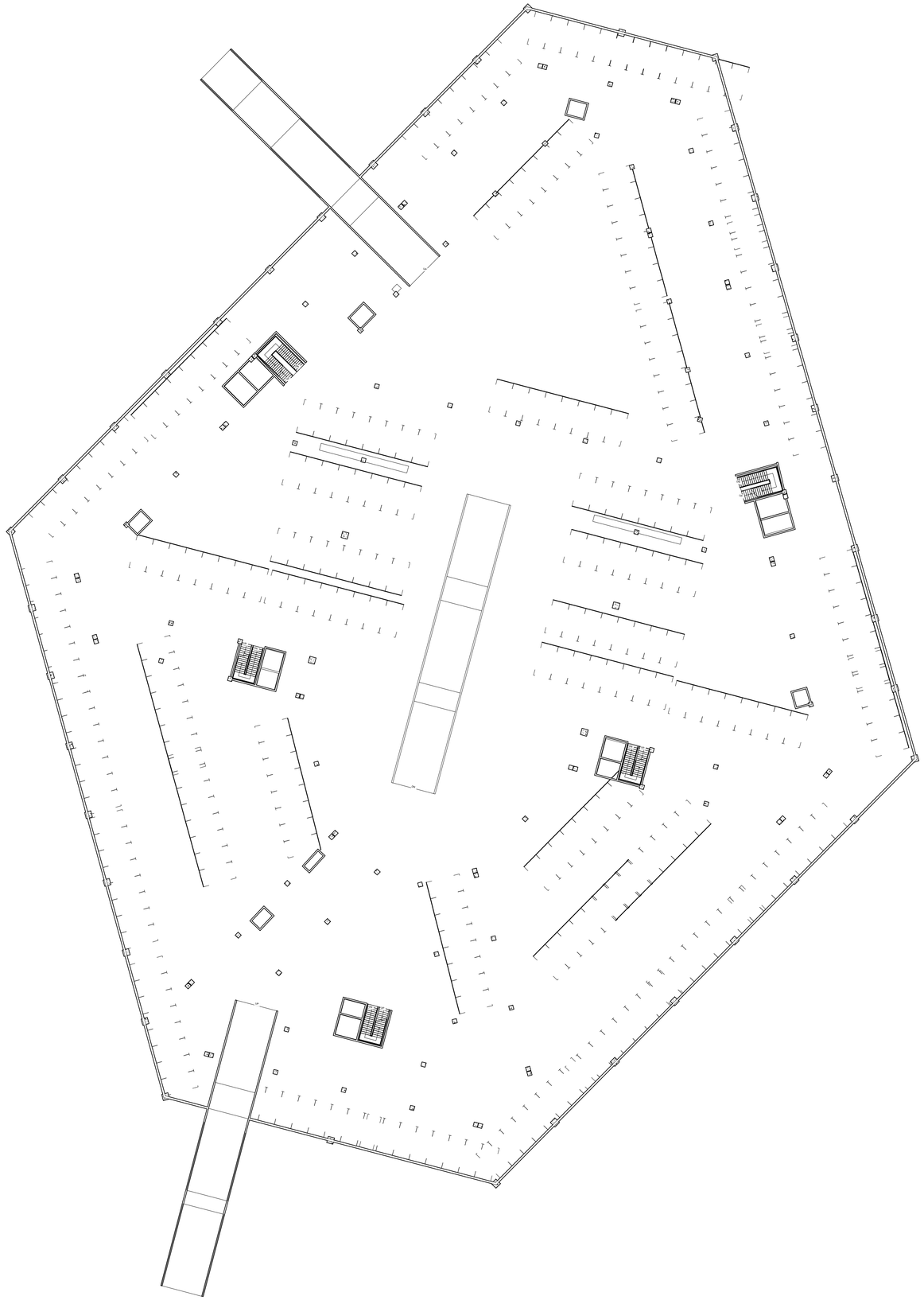

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SHEET TITLE - BASEMENT PLAN

GUIDED BY - DR. NAVNEET MUNOTH

DRAWN BY - KRATIKA SINGH

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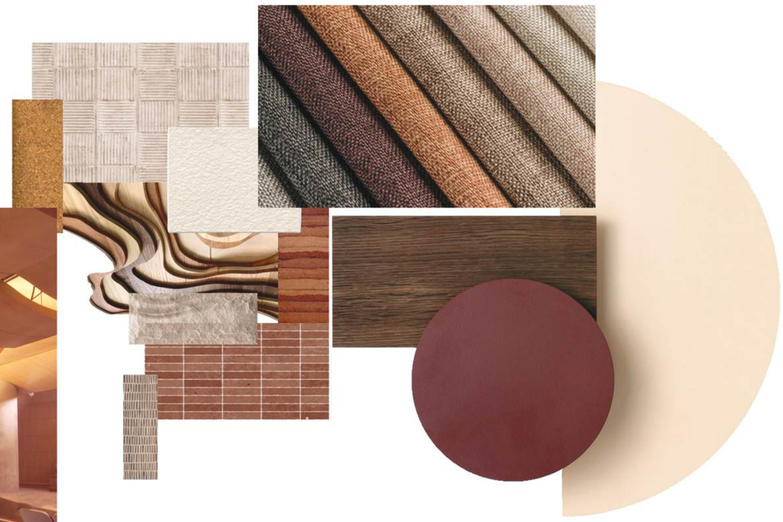
ACOUSTIC DETAILS- AUDITORIUM





MATERIAL PALETTE

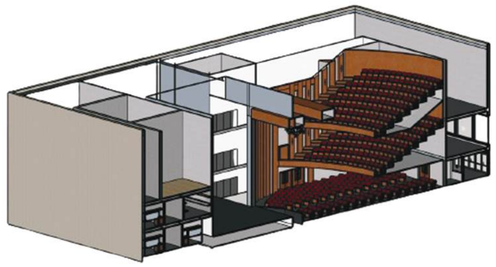
Material Type	Place of Use	Brand / Manufacturer
Fabric-Wrapped Acoustic Panels (Rockwool infill, NRC 0.85–0.9)	Side & Rear Walls	BASWA Acoustic, Envirotech Systems
Wooden Slatted Panels (Reflective + Absorptive)	Front Wall & Side Walls	Hunter Douglas Architectural, ACGI (Architectural Components Group)
Perforated Gypsum / MDF Panels	Ceiling & Upper Wall Zones	Gyproc Saint-Gobain, Pyrok Inc.
Wood Wool Cement Boards (50mm)	Wall Backing & Acoustic Core	Troldtekt, JITEX, Tacet
Carpet Flooring (with Rubber Underlay)	Auditorium Floor & Aisles	Welspun, Shaw Floors, Armstrong
Acoustic Door Panels (Solid Core + Seals)	Entry & Exit Points	MMT Acoustix, Envirotech, StudioAcoustics







Parameter	Symbol / Formula	Value / Description	Remarks
Seating Capacity	–	**900 persons**	Fully seated occupancy
Floor Area (approx.)	–	**1,100 m²**	Includes aisles, stage, and circulation
Room Volume	(V = A_{floor} \times h)	**7,700 m³**	Main hall volume
Sabine Constant	(0.161 × V)	**1,239.70**	For RT_{60} calculation
Target Reverberation Time (RT_{60})	–	0.8 s – 1.0 s (optimum for speech)	Convention / lecture use
Total Absorption Needed	(A = 0.161V/RT)	For RT = 0.8 s → 1,550 sabinsFor RT = 1.0 s → 1,240 sabins	Mid-frequency (500 Hz)
Absorption from Audience	(900 × 0.5)	**450 sabins**	Seated persons, mid-band
Absorption Required from Surfaces	(A_{surf} = A_{total} – A_{people})	For RT = 0.8 s → 1,100 sabinsFor RT = 1.0 s → 790 sabins	Must come from materials
Total Surface Area	–	**≈ 3,166 m²**	Floor + ceiling + walls
Floor Material	Carpet (α ≈ 0.25)	1,100 m² → 275 sabins	Full floor coverage
Ceiling Treatment	Acoustic tiles/clouds (α ≈ 0.75)	440 m² (40% of ceiling) → 330 sabins	Suspended panels
Wall Panels / Curtains	Fabric / perforated wood (α ≈ 0.75)	247 m² → 185 sabins	Side & rear walls
Total Absorption Achieved	–	450 + 275 + 330 + 185 = **1,240 sabins**	Gives RT ≈ **1.0 s**
Background Noise Criterion	–	**NC 25 – NC 30**	For clear speech
Speech Transmission Index	STI	≥ 0.60 – 0.65	Good intelligibility
Clarity Index	C_{50}	≥ +3 dB	Target for speech clarity
Variable Acoustics	–	Retractable curtains / banners	For multipurpose use





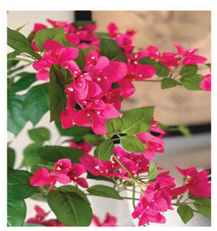




VIEWS OF AUDITORIUM

Element	Description	Typical Materials	Purpose in Site
Pathways / Walkways	Circulation routes	Pavers, tiles, stone	Movement, access
Seating Area	Rest / gathering	Wood, stone, metal benches	Social & relaxation
Pergola / Shade Structure	Semi-covered space	Steel, wood	Shade + aesthetics
Boundary Wall / Fencing	Site enclosure	Brick, RCC, metal grills	Security & definition
Steps / Ramps	Level transition	Stone, pavers, concrete	Accessibility
Patio / Deck	Outdoor usable space	Wood, concrete, tiles	Activity zone
Planters (Built-in)	Fixed planting areas	Concrete, brick	Organised planting
Water Features	Decorative elements	Stone, tiles, fountain units	Cooling & aesthetics
Lighting Poles / Bollards	Outdoor illumination	Metal, solar lights	Safety & ambience
Parking / Driveway	Vehicle zone	Pavers, concrete	Access + parking

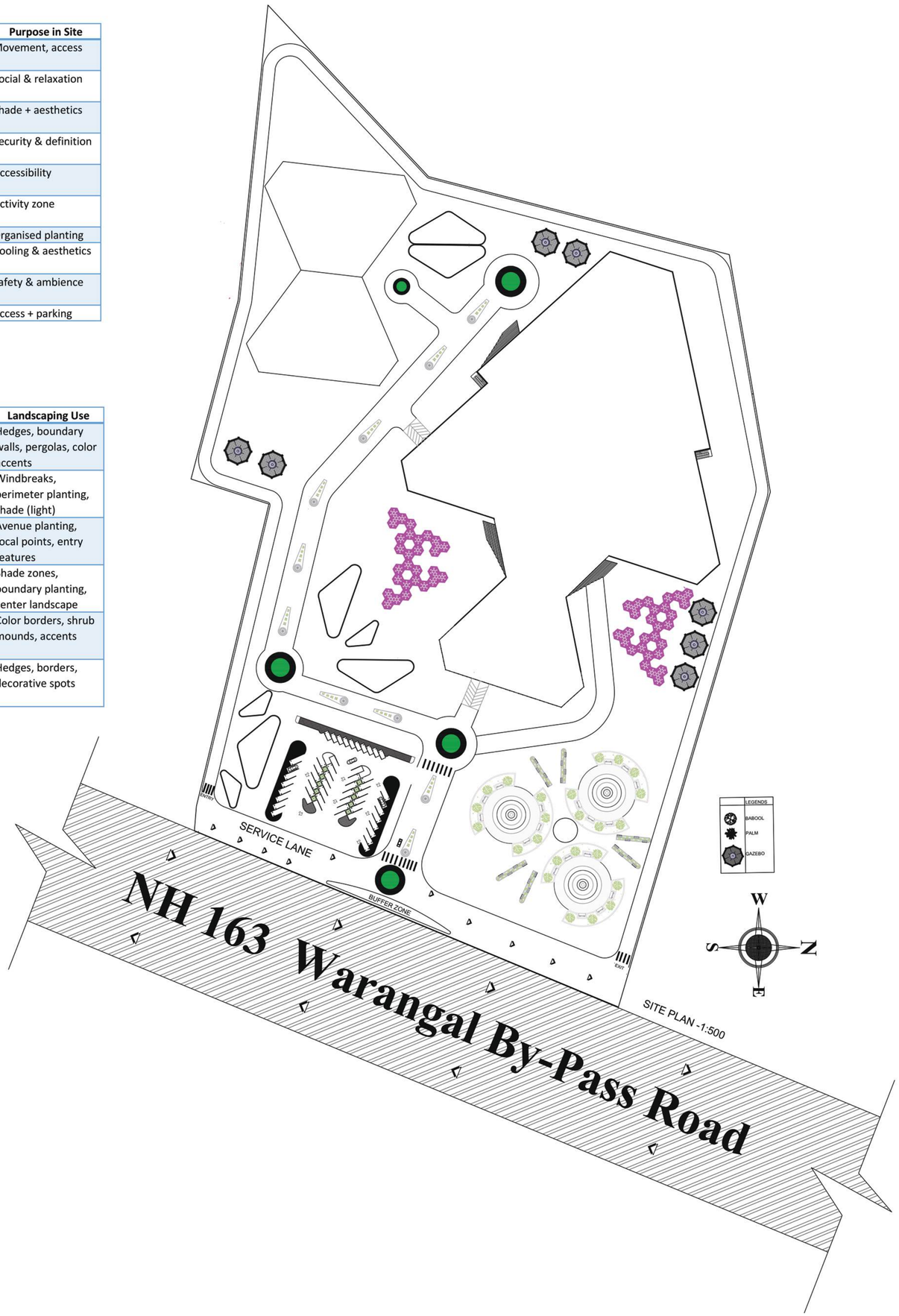
Plant / Shrub	Type	Key Features	Landscaping Use
Bougainvillea	Flowering shrub / climber	Bright colors, drought-tolerant, fast-growing	Hedges, boundary walls, pergolas, color accents
Babool (Acacia nilotica)	Tree	Hardy, drought-resistant, native tree	Windbreaks, perimeter planting, shade (light)
Palm (Areca or Date Palm)	Tree	Tropical look, low maintenance once established	Avenue planting, focal points, entry features
Neem (Azadirachta indica)	Tree	Medicinal, shade tree, pest-resistant	Shade zones, boundary planting, center landscape
Tecoma stans (Yellow Bells)	Flowering shrub	Bright yellow blooms, fast-growing, hardy	Color borders, shrub mounds, accents
Duranta (Golden Dewdrop)	Ornamental shrub	Attractive foliage + flowers, easy to maintain	Hedges, borders, decorative spots











SITE PLAN -1:500

KEY PLAN

REVISION

Rev. Date	Description	Appr'd

NOTES

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MAULANA AZAD NATIONAL INSTITUTE OF TECHNOLOGY, BHOPAL

PROJECT - CONVENTION CENTRE, WARANGAL

SHEET TITLE - SITE PLAN

GUIDED BY - DR. NAVNEET MUNOTH

DRAWN BY - KRATIKA SINGH

DATE - 10/11/2025

SCALE - 1:500 DWG. NO. - 1

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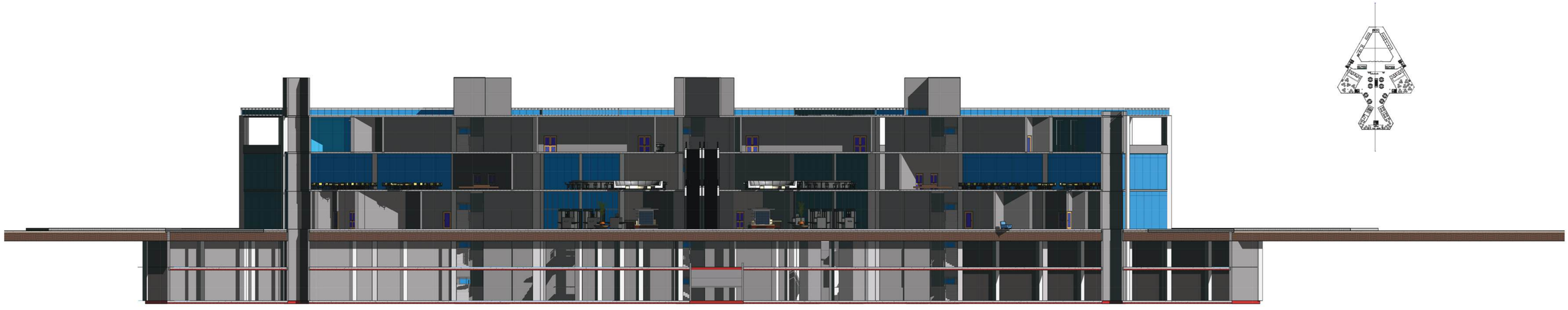
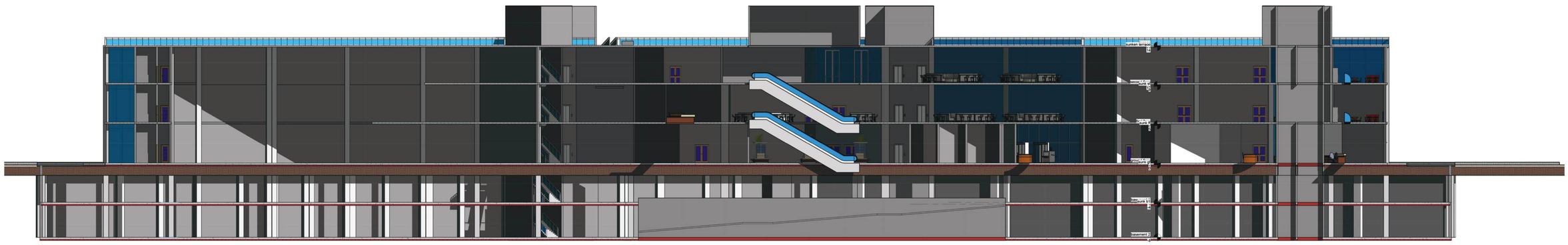
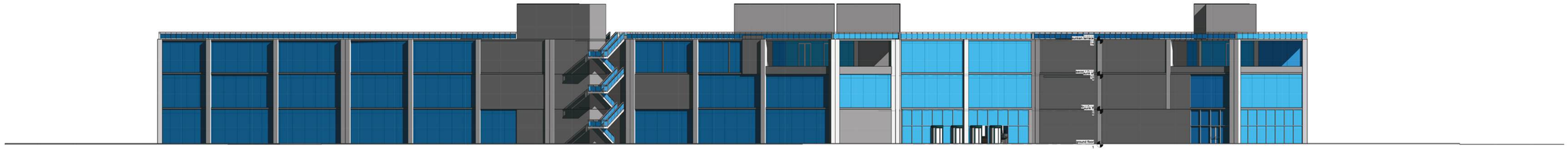
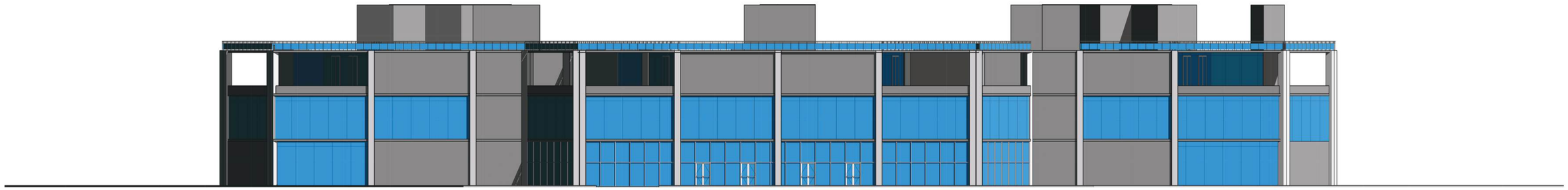
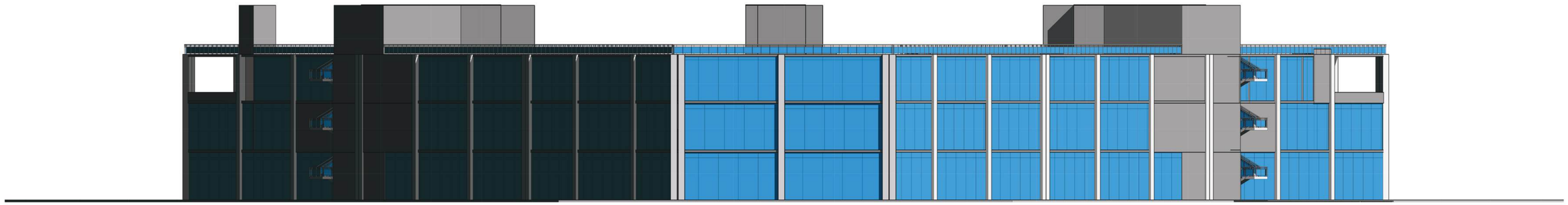
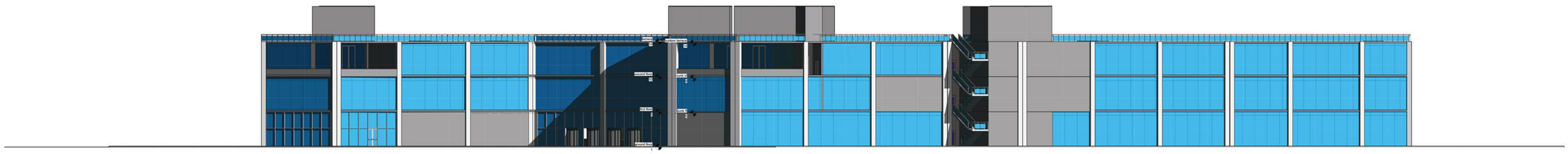


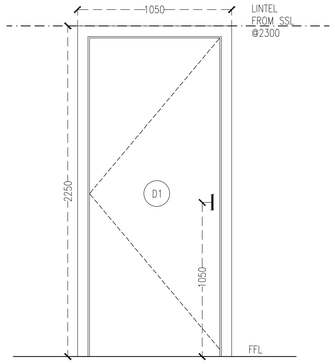




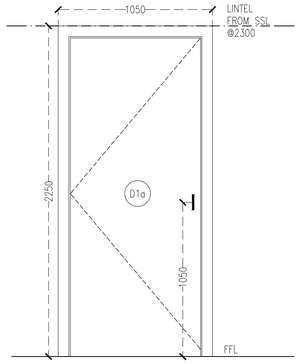




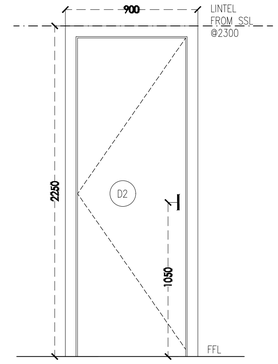




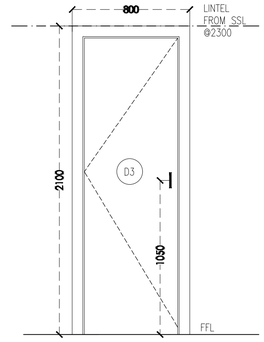
01 A2.00 DOOR D1(1050X2250) SCALE-1:25 ELEVATION



02 A2.00 DOOR D1a(1050X2250) SCALE-1:25 ELEVATION



03 A2.00 DOOR D2(900X2250) SCALE-1:25 ELEVATION



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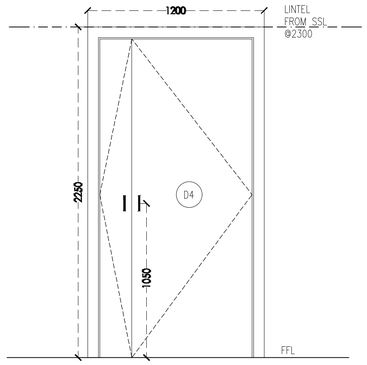

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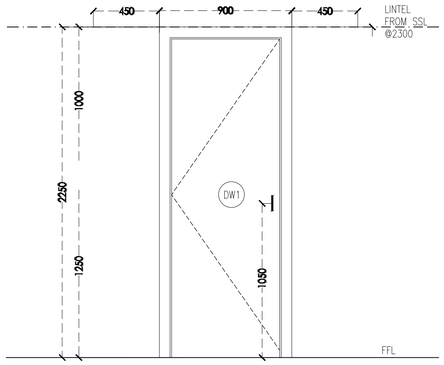
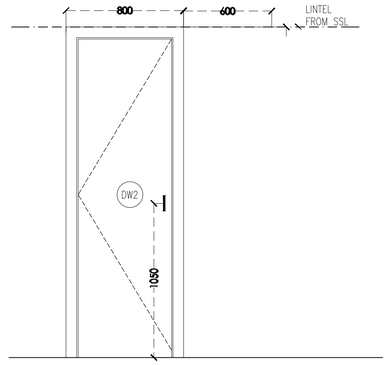
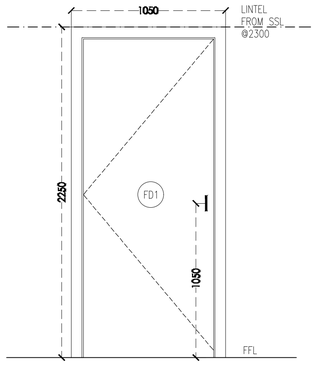


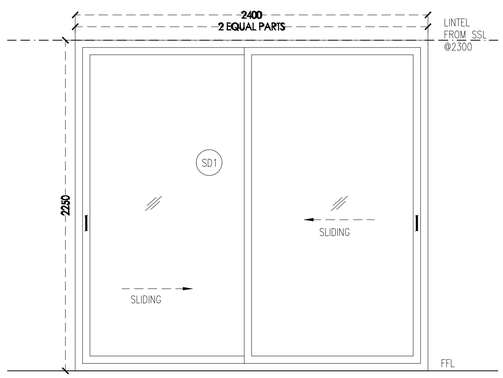
06 A2.00 DOOR DW1(1800X2250) SCALE-1:25 ELEVATION



07 A2.00 DOOR DW2(1400X2250) SCALE-1:25 ELEVATION

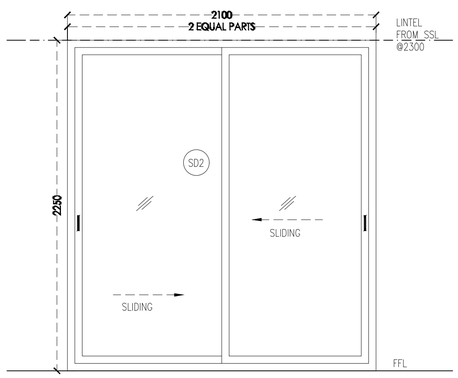


08 A2.00 FIRE DOOR FD2(1050X2250) SCALE-1:25 ELEVATION



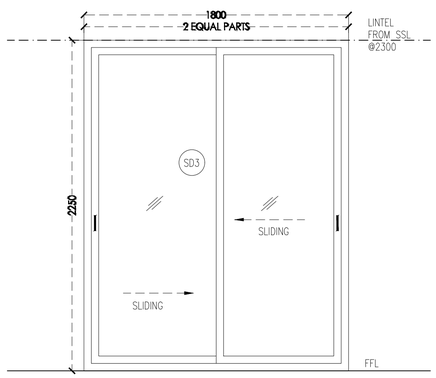
NOTE:
UPVC SLIDING DOOR
2 TRACK 2 SLIDING PANEL
WITH FLY MESH SHUTTER

09 A2.00 SLIDING DOOR SD1(2400X2250) SCALE-1:25 ELEVATION



NOTE:
UPVC SLIDING DOOR
2 TRACK 2 SLIDING PANEL
WITH FLY MESH SHUTTER

10 A2.00 SLIDING DOOR SD2(2100X2250) SCALE-1:25 ELEVATION



NOTE:
UPVC SLIDING DOOR
2 TRACK 2 SLIDING PANEL
WITH FLY MESH SHUTTER

11 A2.00 SLIDING DOOR SD3(1800X2250) SCALE-1:25 ELEVATION

KEY PLAN

REVISION

Rev. Date	Description	Appr'd

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MAULANA AZAD NATIONAL INSTITUTE OF TECHNOLOGY, BHOPAL

PROJECT - CONVENTION CENTRE, WARANGAL

SHEET TITLE - WORKING DRAWING

GUIDED BY - DR. NAVNEET MUNOTH

DRAWN BY - KRATIKA SINGH

DATE - 02/12/2025

SCALE - 1:250 DWG. NO. - 10

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NH - 163
SCALE - 1:500
KRATIKA SINGH
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