

CONVENTION CENTRE, UJJAIN

Thesis submitted in partial fulfilment of the requirements for

The award of the degree of

BACHELOR OF ARCHITECTURE

By

ROHIT PARMAR

2015BARC007

10TH SEMESTER

YEAR: 2020



**DEPARTMENT OF ARCHITECTURE
SCHOOL OF PLANNING AND ARCHITECTURE,
BHOPAL**

Declaration

I **Rohit Parmar**, Scholar No. **2015BARC007** hereby declare that, the thesis titled **Convention Centre, Ujjain** submitted by me in partial fulfilment for the award of degree of Bachelor of Architecture at School of Planning and Architecture, Bhopal, India, is a record of bonafide work carried out by me. The design work presented and submitted herewith is my original work and I take sole responsibility for its authenticity. The matter/result embodied in this thesis has not been submitted to any other University or Institute for the award of any degree or diploma.



Signature

Rohit Parmar

Date: 20.07.2020

Certificate

This is to certify that the student Mr. Rohit Parmar Scholar No. **2015BARC007** has worked under my guidance in preparing this thesis titled **Convention Centre, Ujjain**.

RECOMMENDED

Ar. Poonam Khan

ACCEPTED

Ar. Piyush Hajela
Head, Department of Architecture

July, 2020, Bhopal

Acknowledgement

I am grateful to my mentor Ar. Poonam Khan for her guidance throughout the process. Her support and suggestions helped me a lot in during this as well as in previous semesters, especially during the most difficult situations.

I would like to thank Ar. Sushil Kumar Solanki for providing such a nice support and guidance throughout the process. Also, for the help and assistance given to me during the full course of the architecture. I am thankful to and fortunate enough to get constant encouragement, support and guidance from the faculty of S.P.A. Bhopal, especially Dr. Ajay Kumar Vinodia who helped me in every stage.

I would like to express my sincere thanks to all my friends Shubham Kumar, Deepak Soni, Ramji Vishwakarma, Mohammad Saif, Ritik Verma and Prateek Verma for their continuous review of my work and provide me necessary suggestions. They were always with me in most happy as well as most difficult times throughout the entire course.

This acknowledgement will not be complete without expressing my regards to my family for their blessing and constant encouragement and support.

Rohit Parmar

Abstract

Development of Convention Centers are increasingly being acknowledged by their role in stimulating local economics and improving quality of life of Nations' citizen. Conference and business tourism are very important sector of the global tourism industry. Twenty First Century Convention centers are constructed and promoted by sponsorship of Global Tourism Industry, MICE (Meetings Incentives Conventions and Exhibitions).

The proposed convention center is located in Ujjain which is one of the oldest cities of Madhya Pradesh. This convention center is proposed by Ujjain Smart City Limited under the Smart City Mission for Ujjain City. The site is currently been used for open conventions and exhibitions with tents and other temporary structures with lack of necessary amenities which is one of the major reasons for development of Convention Centre.

The design thesis aims to design a Conventional Centre accommodating required number of users with adequate space. The proposed Convention Centre is designed as the iconic building for the city. The main concept for this design is divided into six parts i.e.; context, landscape, sustainability, structure, building materials and building function with appropriate services and circulation. All these factors are applied in proposed design to enhance the user experience and contributing to the environment. The overall scheme of the proposed design is to give Ujjain an iconic building fulfilling all requirements and amenities. The aesthetics of design merge with classical Ujjain architecture and modern architecture.

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1. INTRODUCTION

1.1. BACKGROUND

Development of Convention Centres are increasingly being acknowledged by their role in stimulating local economics and improving quality of life of Nations' citizen. Conference and business tourism are very important sector of the global tourism industry.

Growth of India's Financial Sectors (or IT Sector) employees over 3 million people constituting about 5% of GDP and has market capitalization of over US\$ 200 Billion. India is still currently growing economically. At this rate it could generate 10-11 million jobs till 2025. In order to accommodate the functions of business hub, technology and infrastructure should also be a major contributing factor.

1.2. THE "MICE" INDUSTRY

Twenty First Century Convention centres are constructed and promoted by sponsorship of Global Tourism Industry, MICE (Meetings Incentives Conventions and Exhibitions). MICE is an industry for businesses and conventions which sponsor the various large-scale conventions. Full form of MICE is Meetings Incentives Conventions and Exhibitions. It is a business-oriented segment, involving obligatory (non-discretionary) travel.



Fig. 1.2.1 MICE Industry [Image Source: Author]

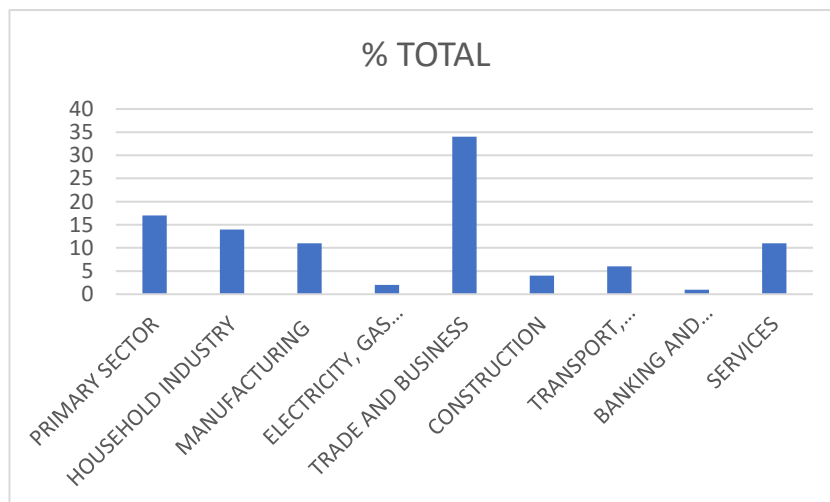
1.3. NEED OF CONVENTION CENTRE

Ujjain is an important unit of urban conurbation formed by Indore, Dewas and Ujjain in Madhya Pradesh. Ujjain is major religious, educational and cultural hub and a destination for millions of Hindu pilgrims, especially at the time of any religious

event. Below Table-1.3-1 shows the work profile of Ujjain city as marked in year 2001. It can be clearly seen that the city has highest no. of worker as well as percentage of total occupation in trade and business category. Hence it is one of the reasons for need of a convention centre.

OCCUPATION CATEGORY	NO. OF WORKERS (IN LAKH)	% TOTAL
PRIMARY SECTOR	0.24	17
HOUSEHOLD INDUSTRY	0.2	14
MANUFACTURING	0.15	11
ELECTRICITY, GAS AND WATER SUPPLY	0.03	2
TRADE AND BUSINESS	0.49	34
CONSTRUCTION	0.05	4
TRANSPORT, STORAGE AND COMMUNICATION	0.08	6
BANKING AND INSURANCE	0.01	1
SERVICES	0.15	11
TOTAL	1.4	100

Table 1.3-1 Work Profile [Data Source: Municipal Corporation of Ujjain, 2001]



[Fig. 1.3.1 Graph Source: Author]

The core of the city comprises of antagonistic land use. The current network of land use doesn't accommodate in the surroundings of areas. Since, Ujjain is divided into two zones in which religious zone is very dense, the land uses are not

appropriate for the future development of the city. For example, these zones include public and semi-public land uses which is inappropriate for the future buildings. Several commercial uses are also housed in residential buildings.

Currently, 30.82% is the percentage of developed land in Ujjain city while it was 27.65% in the year 2001. It is nearly same. The main reason behind the low developed area is the restriction of any development in sensitive zones which majorly includes public and semi-public spaces due to which, economy of the city is affected. To hold the economy and constant graph of commerce in the city, there is a need to create environment in the city to host large public gatherings, corporate meetings, conferences, trade shows, cultural events etc. To cast a role to host these events, a convention center is needed. There is a substantial need for the exploitation of religious and heritage inherit of the city. City is blessed with rich tourism which can boost its economy if properly planned strategies are adopted.

2. PROJECT DESCRIPTION

2.1. PROJECT PROPOSAL

The convention centre which is proposed by Ujjain Smart City Limited, is located in Ujjain city which is one of the oldest cities of Madhya Pradesh. This convention centre is proposed by Ujjain Smart City Limited under the Smart City Mission for Ujjain City.

2.2. PROJECT LOCATION

The site for the convention Centre is located at Samajik Nyay Parisar, along the Agar-Ujjain Road in front of Charak Hospital in Ujjain. The major front road is 24m. wide and another road is 8m. wide. The proposed site is proximity to the Ujjain Railway Station at a distance of 1km. There is a bus terminal at a distance of 750m.

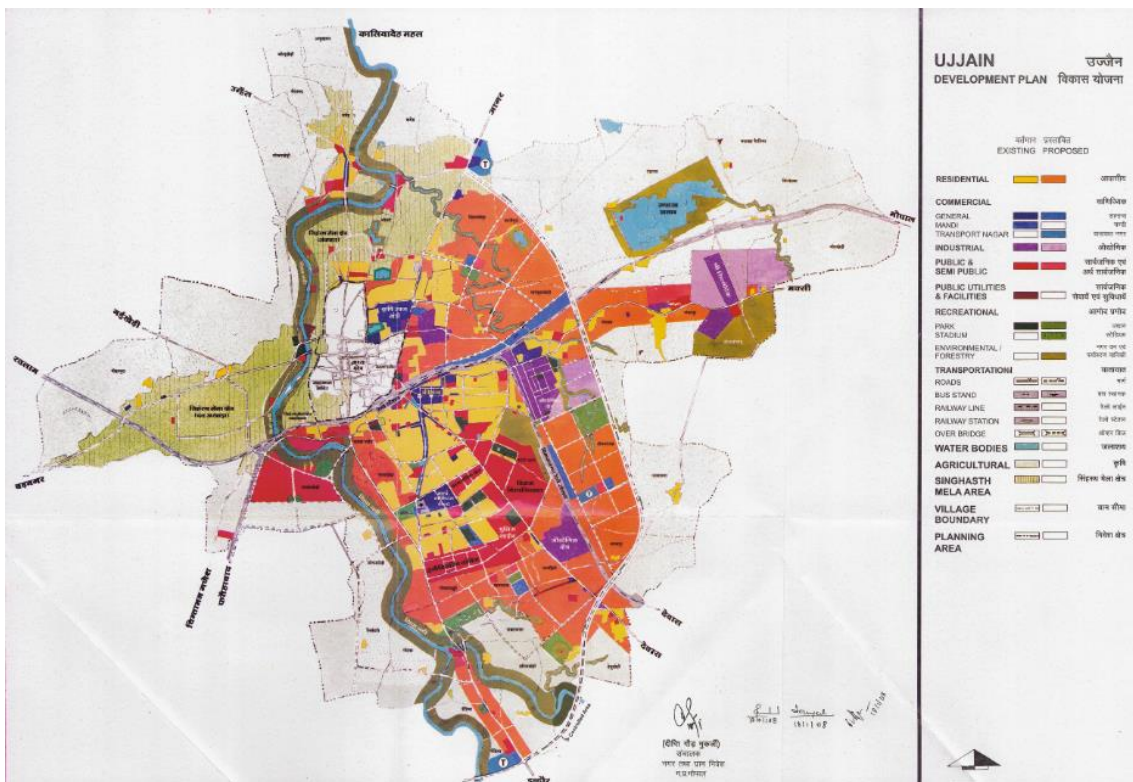


Fig. 2.2.1 Land Use Map [Image Source: TNCP, MP]

2.3. AIM

To design a Convention Centre accommodating required number of users with adequate space.

2.4. OBJECTIVES

The objectives of the thesis are as follows:

- To study and design a space for the interaction of people from various professional background.
- To study the design of large column free spaces.
- To learn and apply the techniques of sustainable architecture design in the project.

2.5. SCOPE

- The project will cover all the facilities and spaces which are required to accommodate required number of users.
- The design will provide privacy in terms of public and semipublic areas.
- The project will act as a landmark for the city.

2.6. METHODOLOGY ADOPTED:

[Reference fig: 2.6.1]

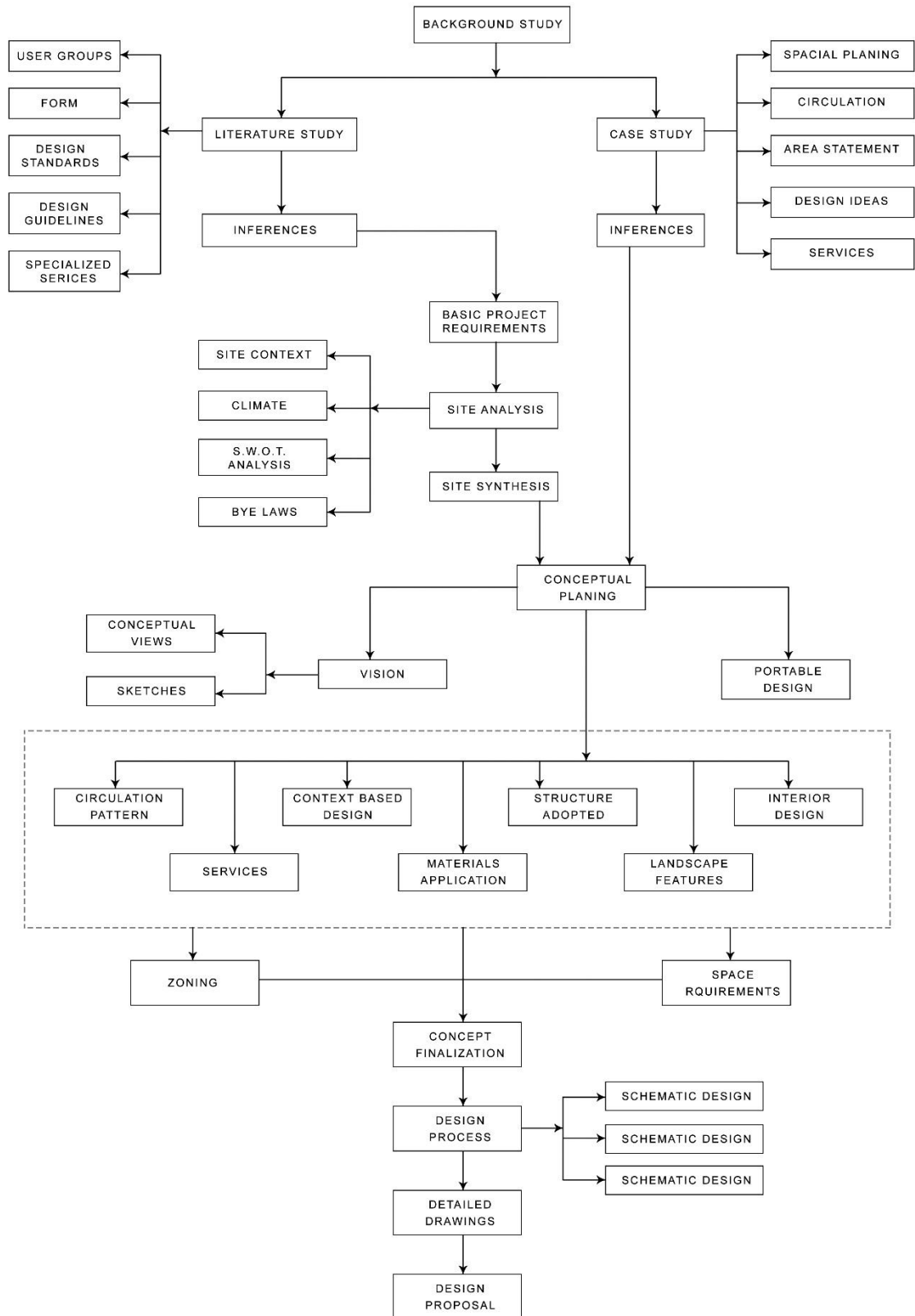


Fig. 2.6.1 Methodology Map [Image Source: Author]

3. LITERATURE STUDY

3.1. DEFINATION

A convention is a assembling of somebodies who meet at an arranged space and time in order to discuss or engage in a common interest. A hosting company generally plan and coordinate the professional meetings or convention by professional convention planners which is generally hired as their staff within the company. A convention centre may include Convention Halls, Showcase Exhibitions, Restaurants, Outdoor and Recreational Spaces etc. It can also serve adapted events such as, appearance by well-known speakers or musicians. In some cases, meetings and events takes place in centre or building not specially designed for conventions but also to accommodate large number of attendees. Convention centre welcomes guest from Local, National and International markets.

3.2. TYPES OF CONVENTIONS

The major conventions are based upon industry and profession. Apart from them other types of conventions are:

- Trade Conventions
- Professional Conventions
- Fan conventions
- Seminars
- Social Events
- Trade Shows/Exhibitions

3.3. USER GROUPS

Users are classified into 3 types:

- **The Delegates:**

- These user group form the major part of the convention centre.
- People from various backgrounds.
- Audience or participants of any specific event.

- **The Exhibitors:**

- Delegates are generally attend events which is hosted by this user group.

- People from various backgrounds are here to promote their events.
- They can be local craftsmen or managers to setup temporary exhibitions.

- **The Staff:**

- These are the people which serve the entire centre.
- They fulfil every need of delegates and exhibitors and provide satisfactory services during events.

3.4. SPACE-USER ANALYSIS

3.4.1. Public Use

I. Entrance hall

It serves as major connectivity space for various components of the convention center. It acts as a junction for the users to reach their corresponding space. It also acts as an ideal space for delegates. Reception, information desk and means of vertical circulation are major provisions for an entrance hall. It is used by delegated, performers and staff.

II. Registration Center

It is the space which contributes to one of the major milestones of process of any event i.e. registration. It is used by people which are taking part in corresponding event. They can be delegates as well as exhibitors.

III. Exhibition Halls

It is the space which is used by delegates but occupied more by exhibitors/traders. Here the promotion of various products is done by the exhibitors. The scale of this space depends on the type of exhibition of products.

IV. Toilets

It is the most necessary service space which need to be provided. The number and size of WCs, Urinals and washbasin should be decided according to standards of National Building Code.

3.4.2. Semi-Public Use

I. Auditorium

It is one of the essential spaces for certain type of conventions. An auditorium serves a large number of delegates to accommodate various events like cultural performance, lectures, seminars, musical concerts, Drama etc. an auditorium should be designed as per design standards and guidelines for specific number of users. It is used by all user groups.

II. Seminar Rooms

These rooms are provided for successful completion of small events like workshops, training session and press conference. The capacity of this space can be extended up to 200. It is used by delegates and staff only.

III. Conference Room

It serves meetings, seminars and training sessions of maximum 30 people. It is used by delegates and staff.

IV. Public Amenities

Amenities such as smoking room, changing room, green rooms etc. comes under public amenities. It is used by delegates which are participating in any event and VIPs.

3.4.3. Private Use

I. Administration

It includes various offices of different sectors such that accounts, event managing, records etc. administration is essential for general functioning of the Convention Centre. It is used by staff only.

II. Control Room

This room is the monitoring Centre of all the CCTV cameras and also includes the security managing of the entire center.

3.4.4. Service Areas

I. Loading Docks

All the necessary goods is transferred into building through loading docks. It can also be used in a loop to dispose of unnecessary things. It is used by staff only.

II. Parking

Used by all user groups, it is provided as per the NBC norms for parking. It can be on or under the ground.

III. Back of the house

The core service area includes the kitchen service of the building which lies in back of the house. It is itself a major network of interconnected spaces which is necessary for the process include in this area. it serves all the events hosted in the convention center. It is used by staff only.

IV. Service Area

All the necessary service rooms such that AC Plant Room, Electrical Room, DG Room, Water Supply and Treatment Room are counted in service areas which is the backbone of the building. It is used by staff.

4. SPACE STANDARDS

4.1. MOVEMENT PATTERN

The functionality of a Convention Centre can be improved by providing adequate circulation and movement pattern of user groups. Hence, flow of movement is categorized in 4 types:

- Public Flow
- Delegate Flow

- VIP Flow
- Staff Flow

4.2. AUDITORIUM

The auditorium is the three-dimensional space which serves as the spot for conductance of various events. The primary function of the auditorium is to accommodate required number of attendees in such a way that they can clearly see and listen to the speaker or narrator. Seating layout, floor type, ceiling design etc. are designed or choose on the basis of it to make an auditorium functionable. Apart from this, various fire, service, and basic amenities need to be provided as per standards.

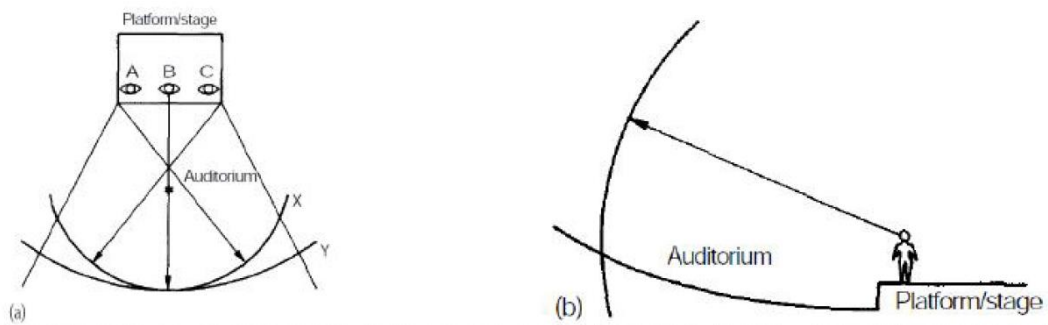


Fig. 4.2.1 Visual and aural limitations: (a) Plan; (b) Section [Source: (Neufert, 1970)]

4.2.1 Seating

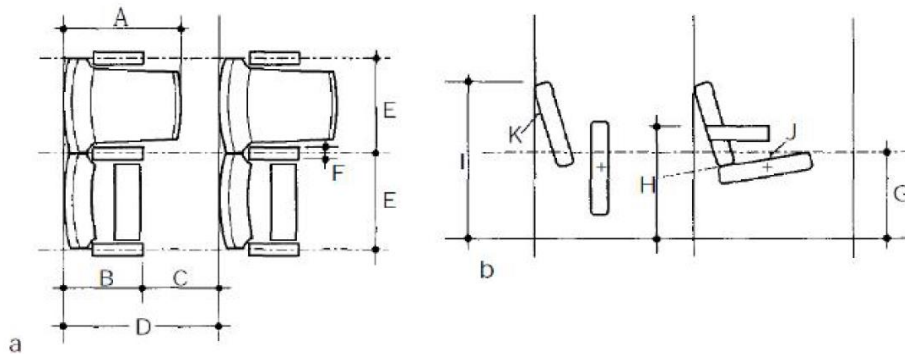


Fig. 4.2.2 Auditorium Seating: (a) Plan; (b) Section [Source: (Neufert, 1970)]

Dimension	Description	Minimum(mm)	Maximum(mm)	Drawn as
A	Overall seat depth	600	720	650
B	Tipped seat depth	425	500	450
C	Seatway	305	-	400
D	Back to back seat spacing	760	-	850
E	Seat width for seat with arms	500	750	525
F	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 4.2-1 Dimension of Auditorium Seat [Image Source: (Neufert, 1970)]

- **Writing surface**

One of the seating categories of the conference or meeting room, a writing surfaced chairs may be required. It may be:

- A table fixed to each seat.
- A fixed table with fixed pivoting or sliding seat.

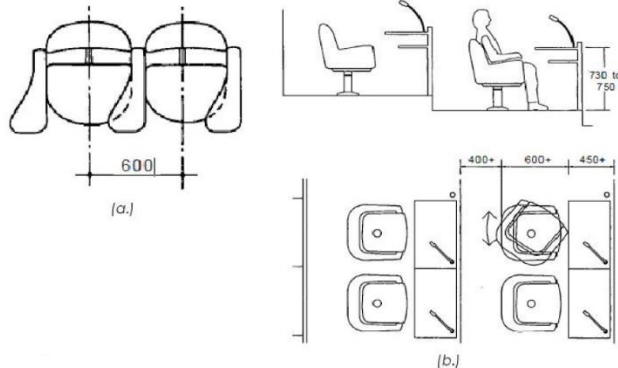


Fig. 4.2.3 Writing Surface [Source: (Neufert, 1970)]

4.2.2 Auditorium Design

- **Audience requirements:**

Each and every attendee must have satisfied by aural and visual experience from the auditoriums. The aural and visual encirclement up to 180° can accommodate more people if the encirclement of the audience of platform or stage is more. With a full encirclement, the distance from platform or stage is restricted to six rows.

- **Number of seats in a row:**

The maximum permissible number of seats in a row is 22 if, gangways are provided at both the ends. It is applicable in the traditional seating as well. If there are gangways at one end, then the maximum permissible number of seats in a row is 11. If the audience is not thereby imperiled, the more that 22 seats are permitted in a row.

- **Row to row spacing:**

The clearway between the rear edge of former seat and front edge of the seat behind controls the spacing of the rows of seating. The minimum and maximum clearway for provision of continental seating is 400mm and 500mm respectively, while 300mm in traditional seating. It can be increased with increase in number of rows.

- **Gangways:**

Gangways are the entrance and exit routes which connects the seating to the exit/entrance lobby. the minimum width of the gangways which can be provided in 1.1m. It can be ramped up to 10%. In case of steeper seating rake, a consistent tread and risers should be introduced for the circulation.

- **Seating geometry:**

The seating of auditorium is such that is face the stage in forms of rows. These rows can be circular, straight or a combination of both. Further these rows become steeper gradually by increase in distance from the front edge of the stage/platform.

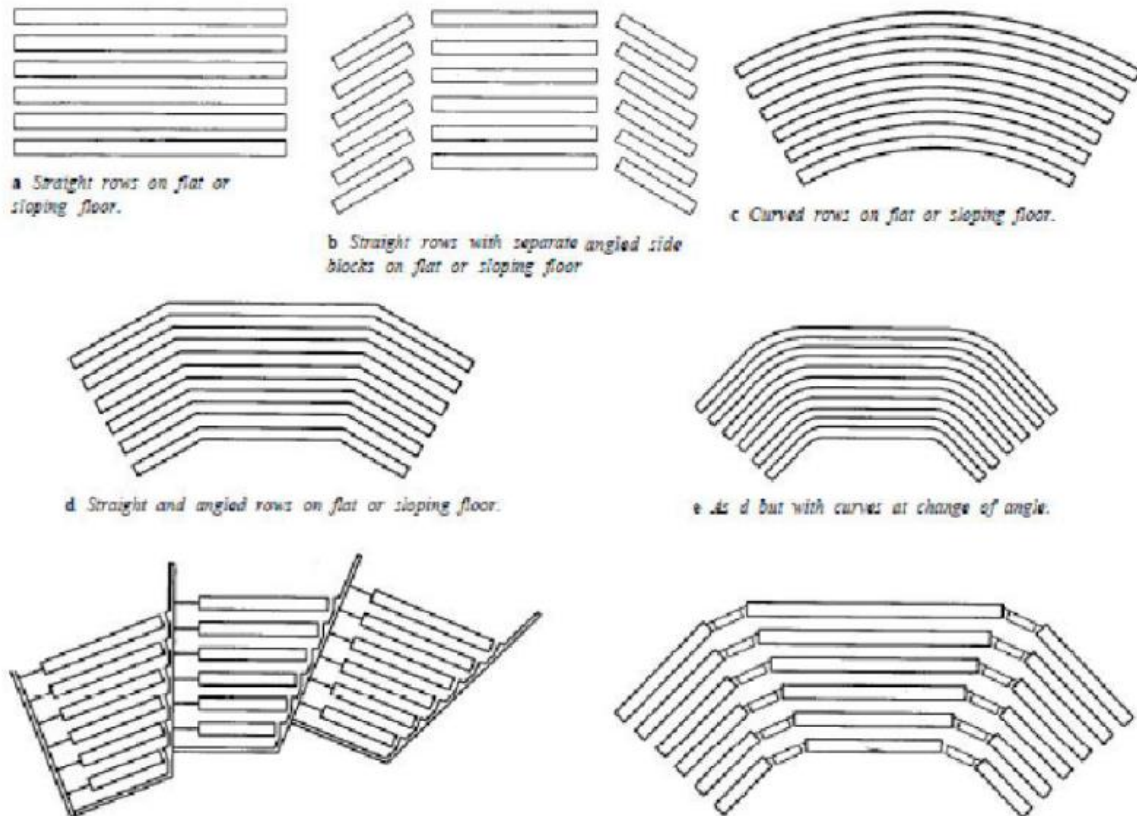


Fig. 4.2.4 Seating Geometry [Source: (Neufert, 1970)]

- **Seating density:**

The occupation of space up to small width of 500mm with row-to-row dimension and large width up to 760mm can be followed by the seats with arms and tippable. The large width can be further enlarged up to 1400mm. The area per seat therefore varies between 0.38m² and 3.05m².

Seats with arms and tippable seat can occupy a space as small as 500mm wide with a row-to-row dimension of 760mm. but can be as large as 750mm wide by 1400mm.

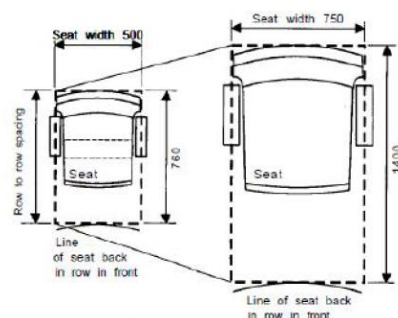


Fig. 4.2.5 Seating Geometry [Source: (Neufert, 1970)]

- **Sightlines for a seated audience:**

It is a necessity of stepped seating can be functionally achieved by provision of minimum 120mm vertical steps but not more than 180mm. in case of 180mm steps, the number of rows of seating will be limited as a result audience of the auditorium will be limited. These steps provide a vertical drop of front seats resulting in clear sight of the stage.

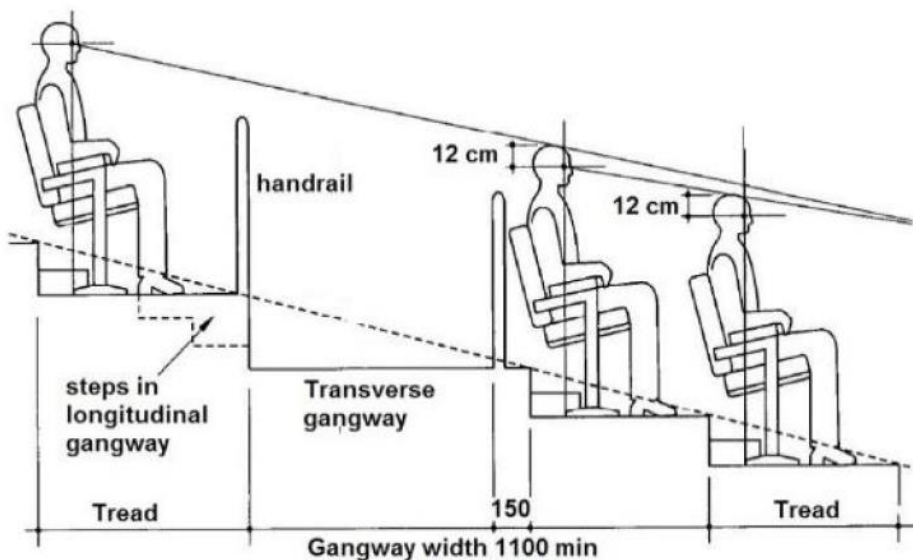


Fig. 4.2.6 Vertical Sightlines [Source: (Neufert, 1970)]

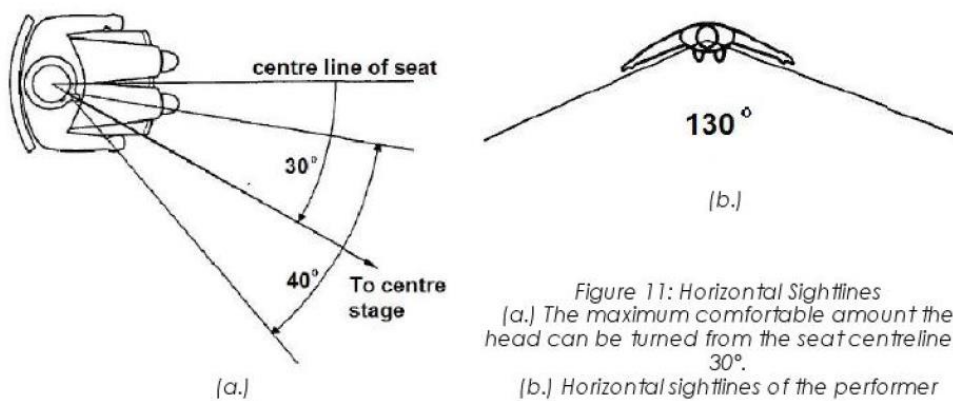


Fig. 4.2.7 Horizontal Sightlines: (a) Maximum comfortable turn of eyes is 30° from centerline, (b) Sightlines [Source: (Neufert, 1970)]

Width of an auditorium:

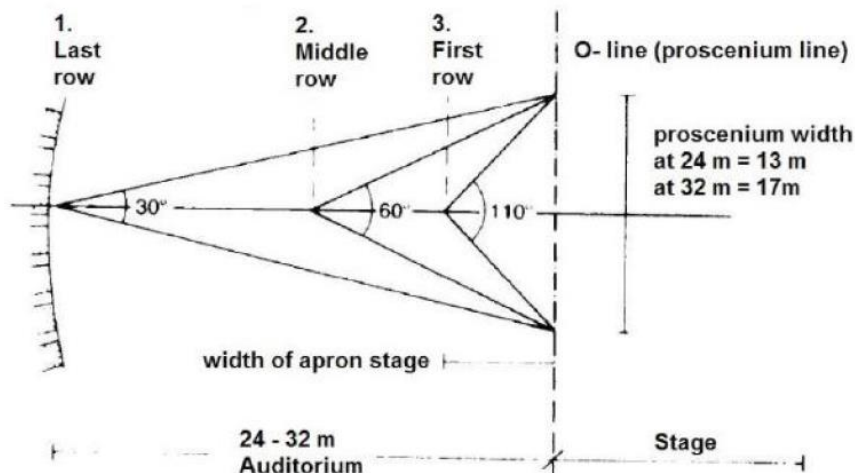


Fig. 4.2.8 Determining the width of auditorium [Source: (Neufert, 1970)]

4.2.3 Means of escape

- **Travel distance:**

The travel distance is determined by the evacuation of an individual from its seat to exit within the time limit of 2½ minutes. By the standard it is 18m for traditional seating from gangway and 15m. for continental seating.

- **Exits:**

For 500 seats, two exits must be provided in the auditorium. And one additional for 250 seat each. All these exits must be separate from themselves.

- **Stairs:**

Tread and risers must be 27.5 cm and 18 cm respectively. the number of risers in each staircase need not be exceed 16.

- **Ramps:**

For accessible design, ramps of 4.500mm width must be provided in form of flat or sloped route. It should be separate from other exit routes. The maximum slope should not exceed 8.5% steeper.

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

Table 4.2.3 Exit width of ramp as per number of people [Source: (Neufert, 1970)]

4.3 CONFERENCE ROOMS

This particular space is utilized in form of a single room for business meeting, conference and short or long training sessions. It can be designed such that is can be divided in two separate rooms by acoustic panels and used as two small conference rooms. It can be windowless for security/ privacy purposes.

4.3.1 Types of seating

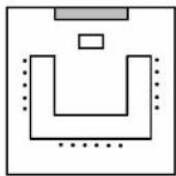
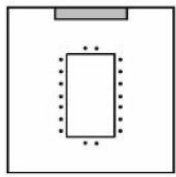
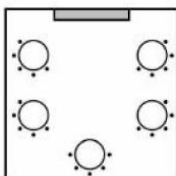
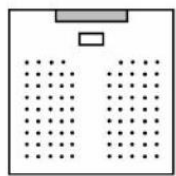
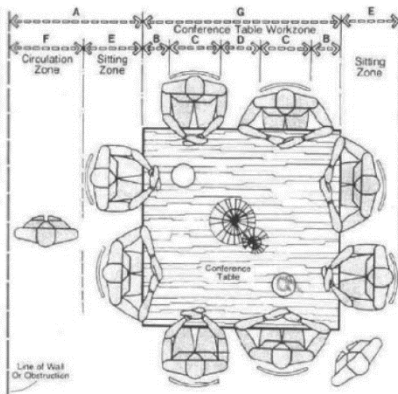
	Type	Description	Layout
1.	U shaped	<ul style="list-style-type: none"> Seating around three sides of the room. It is good for presentations from front. Presentation space in the middle of the room. Can be used for up to 50 persons. Per seat area is 3.25m². 	
2.	Boardroom style	<ul style="list-style-type: none"> Centrally located table. Classic layout ideal for debate and discussion. Seating capacity 5-30 persons. Per seat area is 3.71m². 	
3.	Cabaret style	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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. 	

Fig. 4.3.1 Types of Seating [Source: (Neufert, 1970)]

4.3.2 Space standards

Circulation and clearances must be kept in mind while furnishing the restaurant dining area with large dining tables.



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

Fig. 4.3.2 Seating standards for conference table [Source: (Neufert, 1970)]

4.4 EXHIBITION GALLERIES

Exhibitions may be used as per many functional requirements such that; history museums, interpretive exhibitions, smaller galleries and natural history museums.

4.4.1 General planning

The connectivity of exhibition space with bits supportive spaces can be seen in Fig. 4.1.1. it shows the movement as well as circulation and necessary spaces which are required for any exhibition space. but some of these spaces can be utilized as one common space depending on its privacy concern. Further, spaces which include collection as their primary function should be kept far from public spaces and other traffic dominate spaces.

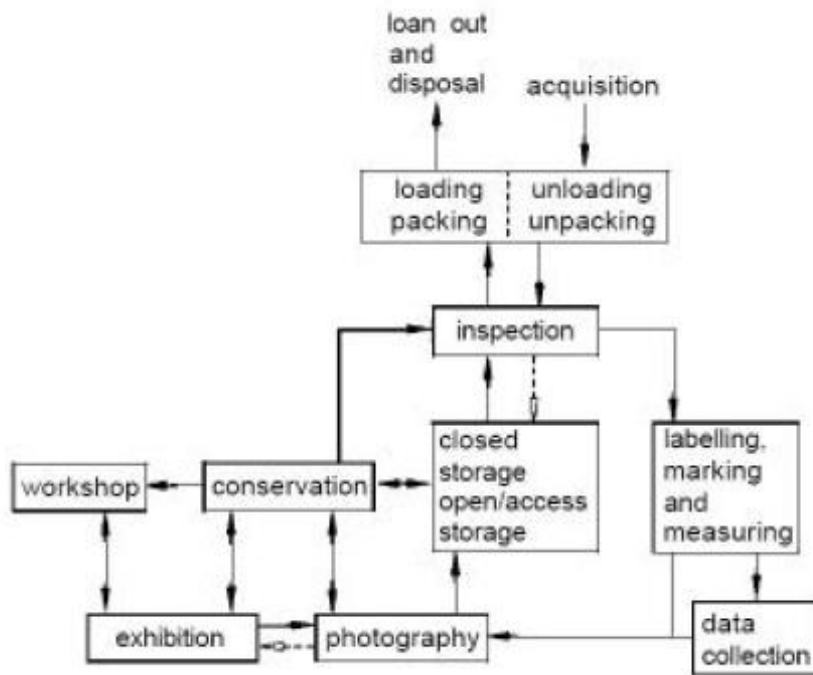


Fig. 4.4.1 General Planning [Source: (Neufert, 1970)]

4.5 RESTAURANTS

A space which serves as the eating place of all the user groups. Here, meals are cooked and served on the premises. Type of restaurant is based on the number of meal takers as well as requirement of the corresponding building. preparation methods and pricing are main reasons for the type of restaurant which is to be provided.

4.5.1 Types of restaurants

S. No.	Type	Description
1	Fine dining restaurant with bar	<ul style="list-style-type: none"> • These are full service restaurants with specific dedicated meal courses. • Décor of such restaurants features higher-quality materials, with an eye towards the atmosphere.
2	Casual dining restaurants	<ul style="list-style-type: none"> • A casual restaurant is that serves moderately-priced food in a casual atmosphere. • Except for buffet-style restaurants, casual restaurants typically provide table services.

Fig. 4.5.1 Types of restaurant [Source: (Neufert, 1970)]

4.5.2 Relationship of main elements

- Type of facility determines the layout relationship of many required areas.
- the dining area should be 50% more of the kitchen area and ancillary and storage will be about 1.5-2 times the kitchen area.

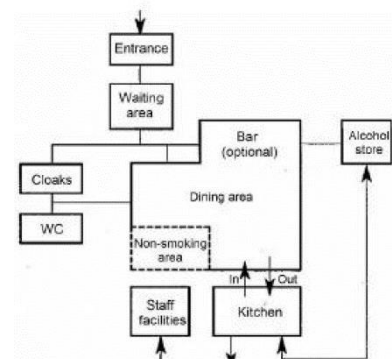


Fig. 4.5.2 Relationship between major spaces [Source: (Neufert, 1970)]

4.5.3 Space standards

- Restaurant should be planned so that a variety of seating arrangements is possible.
- To eat comfortably, one person requires a 600mm wide and 400mm deep table.
- Service aisle should be minimum 900mm to 1350mm wide is used both by trolleys and guests.
- Area required per person ranges from 1.3-1.9m².
- There must be clarity in organization between self-service, fast food, etc. and a separate smoking area.

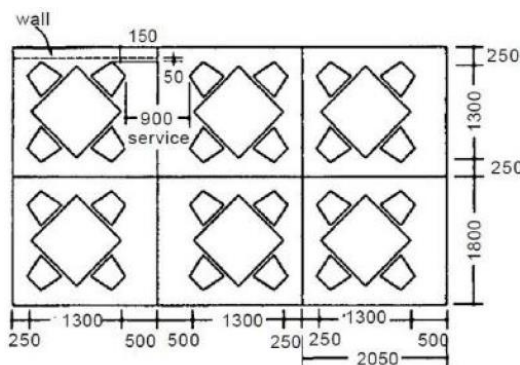


Fig. 4.5.3 Square Tables [Source: (Neufert, 1970)]

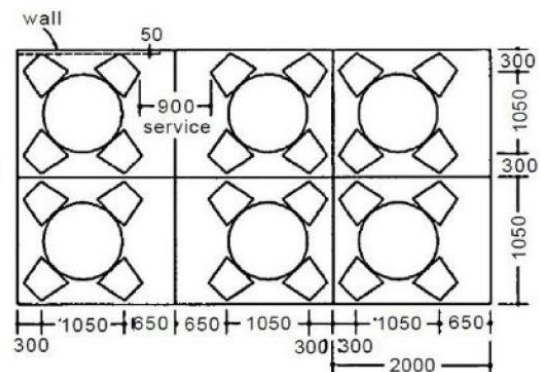


Fig. 4.5.4 Circular Tables [Source: (Neufert, 1970)]

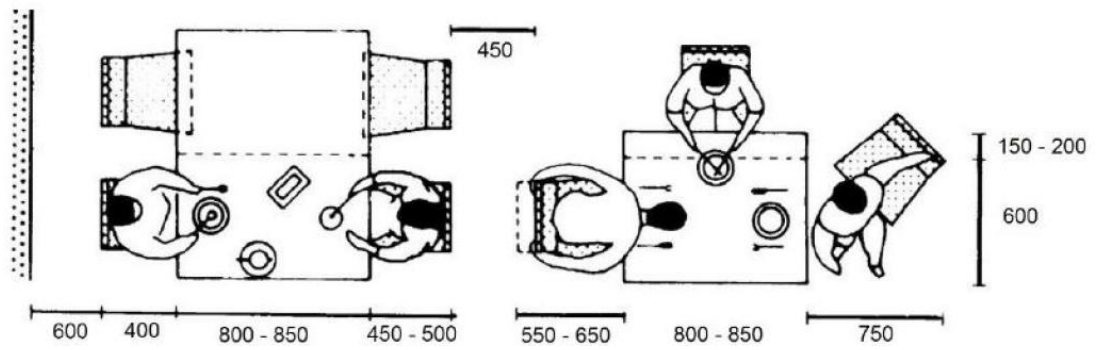


Fig. 4.5.5 Circulation Space requirement [Source: (Neufert, 1970)]

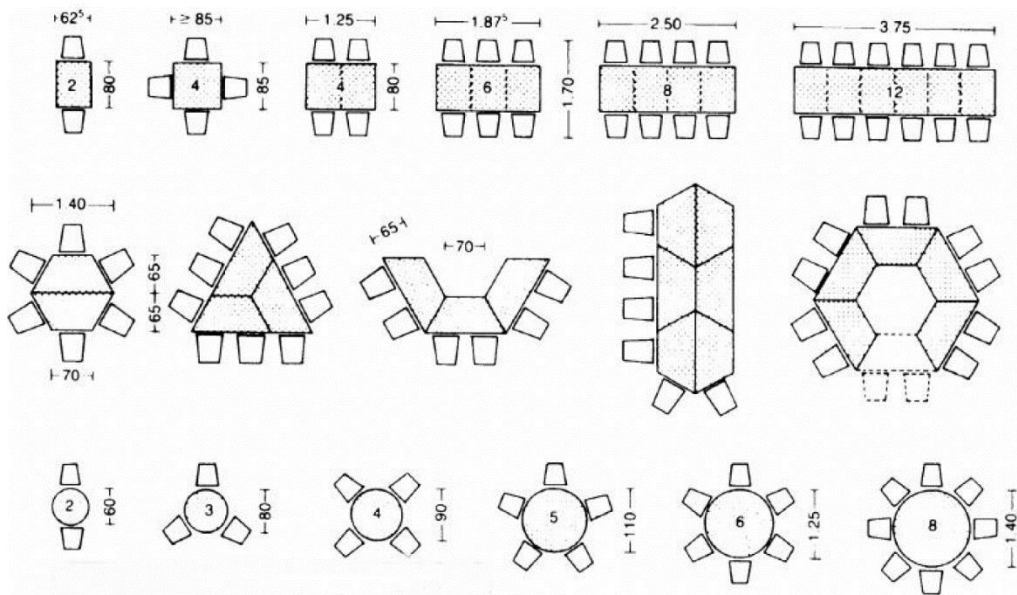
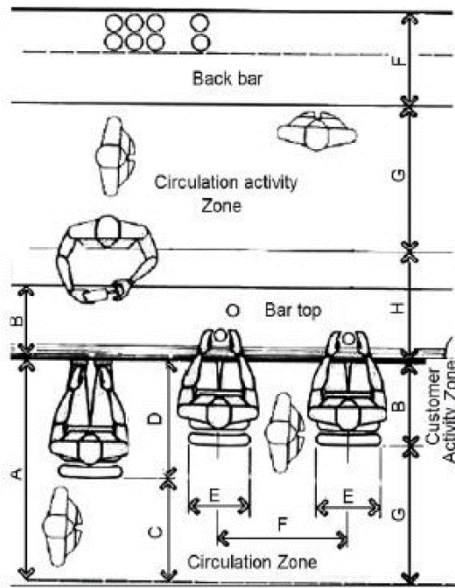


Fig. 4.5.6 Different seating dimensions [Source: (Neufert, 1970)]

4.5.4 Bar service

- To encourage business from non-diners the main bar may have an external entrance.
- A fairly long bar counter supported by bar store and place for seating should be provided.
- Cocktail lounge (comfortable) 1.8-2.0m² per person.
- General bar (some standing on stools) 1.3-1.7m² per person.



Type	Dimension
A	1370
B	450-610
C	610
D	760
E	400-450
F	610-760
G	760-910
H	710-960

Fig. 4.5.7 Bar Service [Source: (Neufert, 1970)]

4.5.5 Toilet facility

S. No.	Sanitary Appliance	Male	Female
1.	WC	1 per 100 up to 400 males. For over 400 males, add at the rate of 1 per 250.	2 per 50 up to 200 females. For over 200, add at the rate of 1 per 100 females.
2.	Urinals	1 per 50 males.	-
3.	Wash basins	1 per WC and in addition 1 per 5 urinals.	1 per WC.
4.	Toilets for disabled	1 Unisex compartment should be reasonably close by.	

Fig. 4.5.8 Toilet Facility [Source: (Neufert, 1970)]

4.6 CENTRAL KITCHEN

Kitchen requirements vary depending on preparation methods used. The capacity of the kitchen is primarily dependent on the number of customer seats,

customer expectations and the proportion of raw materials which have to be freshly prepared.

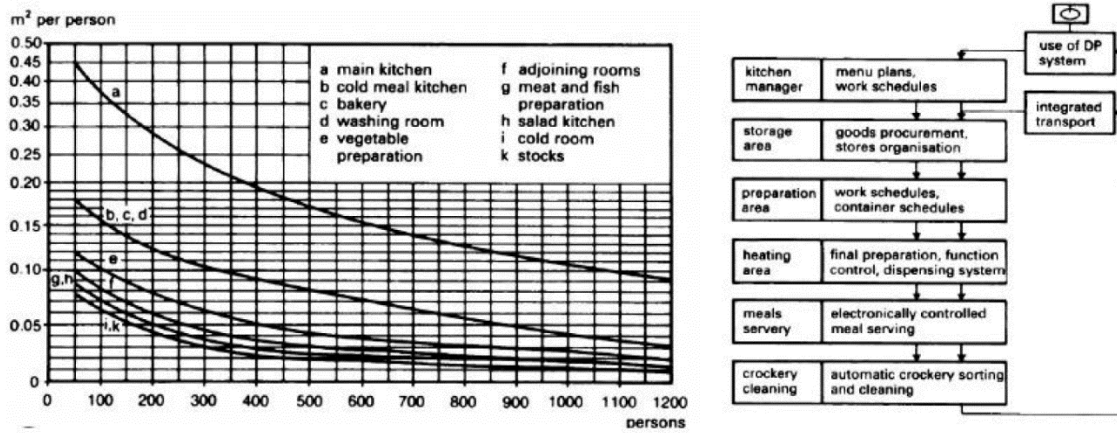


Fig. 4.6.1 Programmed kitchen function [Source: (Neufert, 1970)]

Group catering for large number of people requires labor saving mechanization and automatic units i.e. a programmed kitchen from meals plan, through goods procurement to meal distribution and crockery cleaning for more than 800-1000 table places.

- Allow approximately 50% extra for staff toilets ($0.4\text{m}^2/\text{person}$), locker and changing room ($0.6\text{m}^2/\text{person}$).
- The kitchen should be planned on one level to serve all catering outlets.
- If this is not possible, the main kitchen should be on the same level as the main restaurant, with preparation and stores on the different level.
- Banqueting service area not next to kitchen should be linked by service lifts and stairs and have their own forward service equipment.

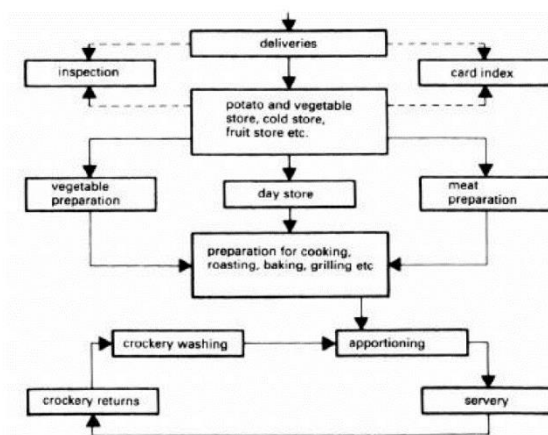


Fig. 4.6.2 Convention Kitchen Schematic Layout [Source: (Neufert, 1970)]

Certain of the preparation process may be located in separate floors. A bakery, for example, may be tucked out of the way, but thought must be given to the flow of materials to and away from its area. Generally, the plan is a continuous process, always moving forward from one step to the next, with backtracking or cross-ovens limited as far as possible.

4.7 FIRE SAFETY NORMS (AS PER 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.

4.7.1 General Exit Requirements

- An exit may be doorway; to an internal staircase, or external staircase, or terrace(s), which have access to the street, or to the roof of a building or a refuge area.
- All exits shall provide continuous means of egress to the exterior of a building or to an exterior open space leading to a street.
- Exits shall be so arranged that they may be reached without passing through another occupied unit.

4.7.2 Capacity of exits

- The unit exit width, used to measure the capacity of any exit, shall be 500mm. A clear width of 250mm shall be counted as an additional half unit. Clear widths less than 250mm shall not be counted for exit width.
- In an assembly building (Convention Centre), the capacity per storey per unit width of exit of stairways, ramps, and doors is 40, 50 and 60 respectively.
- The travel distance to an exit from the dead end of a corridor shall not exceed 30m in case of assembly building.

4.7.3 Doorways

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

4.7.4 Stairways and ramps

- The minimum width of tread shall be 300mm and the maximum height of riser shall be 150mm for assembly buildings.
- The minimum width of a staircase shall be 2m.

- The minimum headroom in a passage under the landing of a staircase and under the staircase shall be 2.2m.
- The slope of a ramp shall not exceed 1 in 10. In certain cases, steeper slopes may be permitted but in no case greater than 1 in 8.

4.7.5 Horizontal exits

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

4.8 VERTICAL CIRCULATION

4.8.1 Elevators

- Location:

Passenger lifts should be within a reasonable walking distance from the furthest part of the floor areas served (say, 70m maximum) and, where they are the only or main lifts near the 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 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.

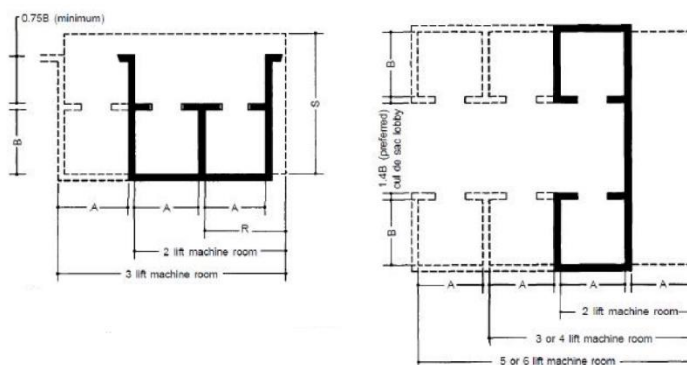


Fig. 4.8.1 Planning a passenger lift
[Source: (Neufert, 1970)]

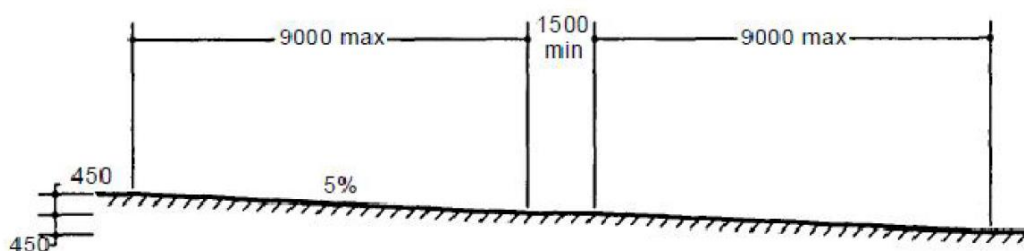
- Selecting size of an elevator:

Type	Capacity/load (person/kg)	Shaft size	Car size	Door	Pit
General purpose passenger traffic (speed: 1m/s)	13/1000	2400x2300	1600x1400	1100	1800
	16/1250	2600x2300	1950x1400	1100	1900
	21/1600	2600x2600	1950x1750	1100	1900
Intensive passenger electric traction (speed: 2.5m/s)	13/1000	2400x2300	1600x1400	1100	2800
	16/1250	2600x2300	1950x1400	1100	2800
	21/1600	2600x2600	1950x1750	1100	2800
General-purpose goods lifts, electric traction (speed: 0.5/0.63/1m/s)	13/1000	2100x2100	1400x1800	1400	1500
Heavy-duty goods, electric traction	26/2000	2600x2900	1700x2000	1700	1500-1800
	26/2000	2900x2500	2000x2100	1800	1500-1800

4.8.2 Ramps

- These are used to allow wheeled vehicles such as trolleys, wheelchairs and buggies to change levels.
- A ramp when provided should not have a slope greater than 1 in 20 or maximum of 1 in 12 for short distance up to 9000mm.

Fig.



4.8.2 Ramp [Source: (Neufert, 1970)]

- Each ramp shall have at least 1800mm of straight clearance at the bottom.
- At least one entrance usable by individuals in wheelchairs shall be on a level that would make the elevators accessible.

It is determined according to type and intensity of use. One travel requires a minimum width of 900mm clear, whereas two-way travel needs 1500mm. where turns occur at landings adequate space for circulation of wheelchairs must be provided.

4.8.3 Internal staircase

- All assembly buildings having area more than 500m² on each floor shall have a minimum of two staircase.
- The minimum width for a staircase in an assembly building shall be 1500mm.
- The formula for most staircase of twice the rise plus the going lies between 600 and 630mm will give a suitable relationship.
- The rise should not exceed 190mm, and the going should not be less than 250mm.

Maximum pitch	Rise		Going		Maximum risers per flight
	32.7 degrees	Minimum	135	Minimum	
	Maximum	180	Maximum	340	

Fig. 4.8.3 Staircase [Source: (Neufert, 1970)]

- The top of the handrail should be between 900 and 1000mm above the pitch line.
- The minimum headroom in a passage under the landing of a staircase and under the staircase shall be 2.2m.

4.9 PARKING

4.9.1 Surface parking

Parking stalls should be built accommodable the larger cars frequently used, although not necessarily the very largest. Parking spaces may be parallel, perpendicular or angled (30°, 45° or 60°) to the driving lane or aisle. Area per ECS for surface car parking as per Madhya Pradesh Bhumi Vikas Adhiniyam, 2012 is 25m².

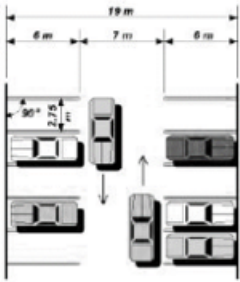
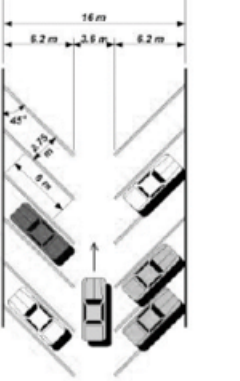
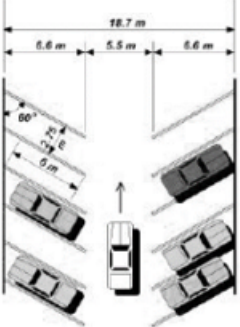
Type	Description	Layout
Perpendicular	<ul style="list-style-type: none"> • Effective in low turnover rate or long-term parking areas. • Most efficient and economical since it accommodates the most vehicles per linear meter. 	
Angled - 60°	<ul style="list-style-type: none"> • This parking area configuration 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. 	
Angled - 45°	<ul style="list-style-type: none"> • The 45-degree angled parking configuration displays similar benefits and limitations as the 60 degree. 	

Fig. 4.9.1 Parking
[Source: (Neufert, 1970)]

4.9.2 Basement parking

- Every basement shall be in every part at least 2.4m height from the floor to the underside of the roof slab or ceiling.
- Adequate ventilation shall be provided for the basement.
- The access to the basement shall be separate from the main and alternative staircase providing access and exit from higher floors.
- Area per ECS for basement car parking as per Madhya Pradesh Bhumi Vikas Adhiniyam, 2012 is 30m².

• **RAMP SYSTEM:**

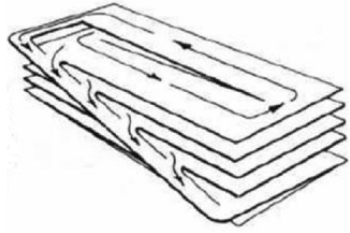
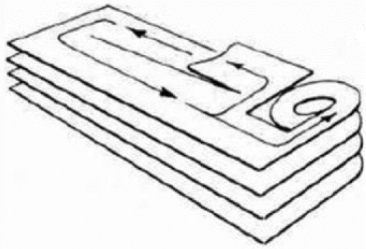
Type	Description	Layout
Clearway ramp systems	<ul style="list-style-type: none"> • Travel path completely separated from potentially conflicting parking movements. • Provide safest movement with least delay. • Preferred for self-park design. 	
Adjacent ramp systems	<ul style="list-style-type: none"> • Part of 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. 	

Fig. 4.9.2 Parking Ramp [Source: (Neufert, 1970)]

• **RAMP DESIGN:**

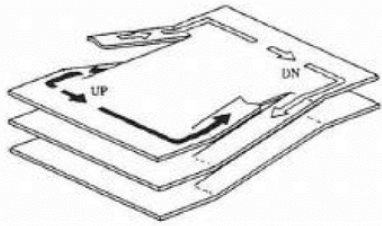
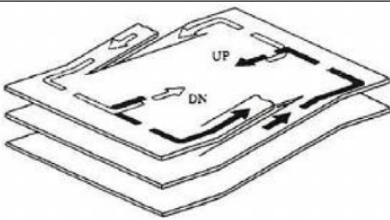
Type	Description	Layout
Opposed ramp design	<ul style="list-style-type: none"> • Vehicles rotate in the same direction. • Up and down ramps in opposite direction. • Required ramp surfaces to be opposed. 	
Parallel ramp design	<ul style="list-style-type: none"> • Up and down ramp slope in the same direction. • Ramp surfaces are parallel. • Vehicles must rotate in opposite direction • Cheaper to construct. 	

Fig. 4.9.3 Parking Ramp Design [Source: (Neufert, 1970)]

- **FLOOR SYSTEM:**

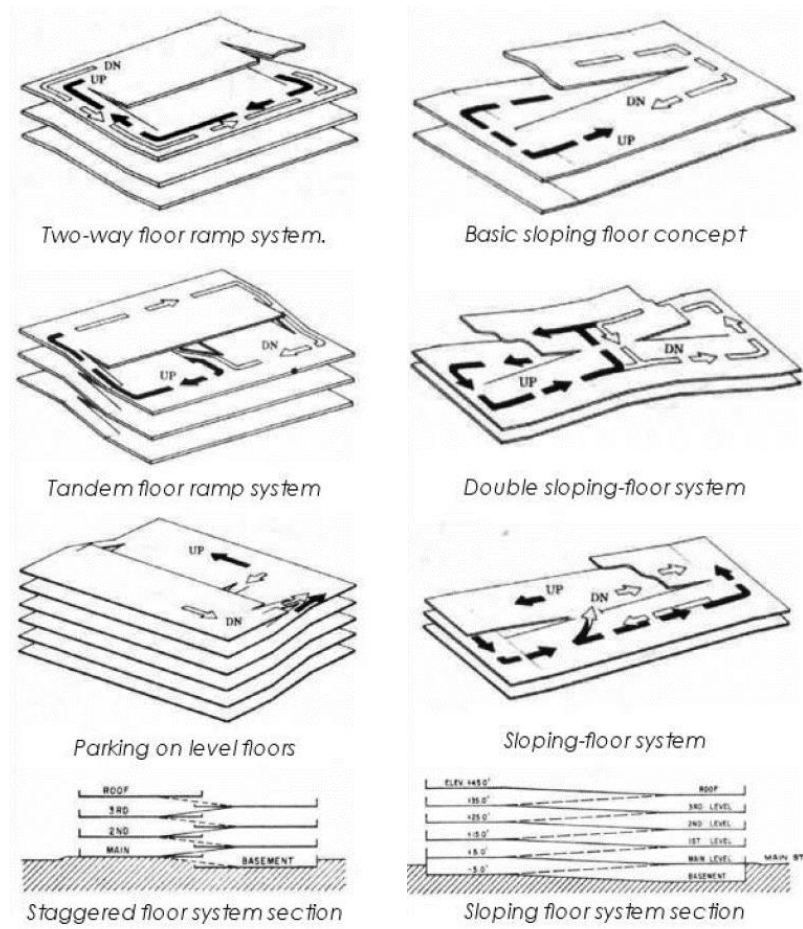


Fig. 4.9.4 Floor System [Source: (Neufert, 1970)]

5. SITE STUDY

5.1. ABOUT THE CITY

The proposed site is located in Ujjain city of Madhya Pradesh. The city being located at tropic of cancer, it is one of the 7 sacred cities of India. Ujjain has a rich cultural and heritage value. The city is also called “city of temples” because of its religious believes. Ujjain is the major trading centre in terms of agriculture production.

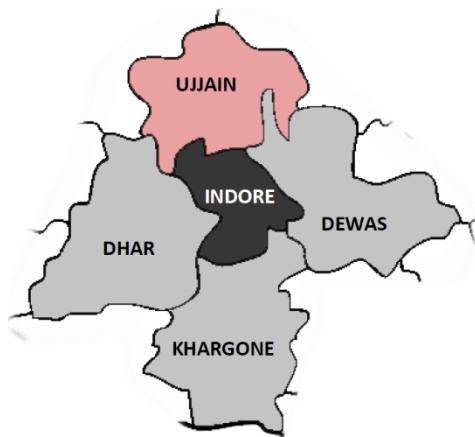


Fig. 5.1.1 City Surrounding [Image
Source: Author]

It is one of the 4 cities (Dewas, Dhar, Khargone and Ujjain) which surrounds the major educational as well as business hub of Madhya Pradesh i.e. Indore. This city is being influence to be the upcoming hub for the same. The city has been consisting of various land uses suitable for the future development of the entire city. The city is naturally surrounded by river Shipra from three direction. This river is one of the main water sources of the entire city as well

as it has a major religious belief for the citizens of Ujjain.

The City has been divided into two major parts; first, the old city which consist of various temples including Mahakaal Temple for which Ujjain is one the major religious spot for the Hindus. Second, the new city which consist of all the necessary land uses such as Commercial, Industrial, educational and institutional.

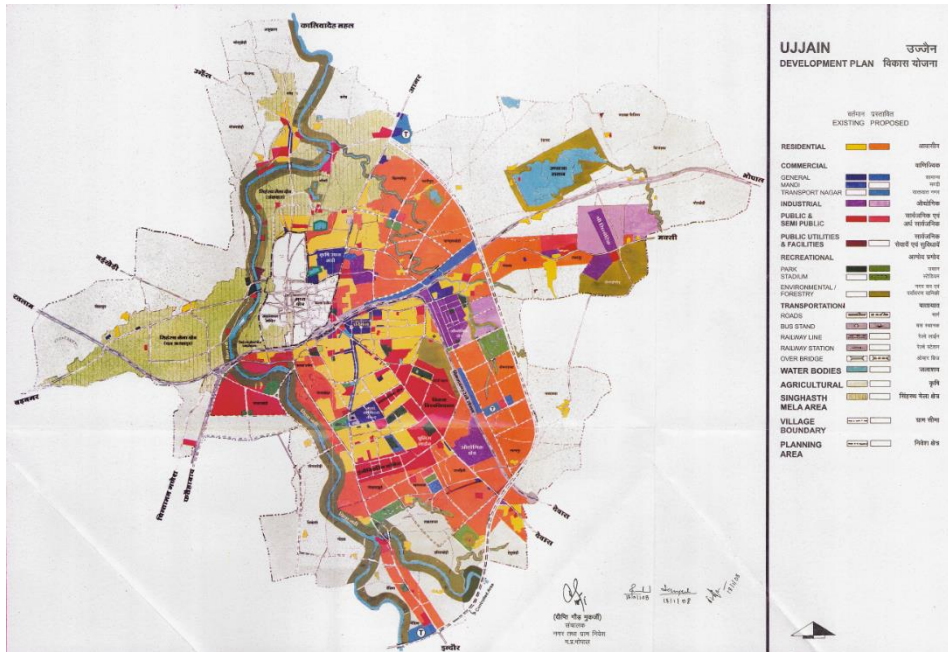


Fig. 5.1.2 Land Use Map [Image Source: TNCP, MP]

5.2. URBAN CONTEXT AND SITE

The site is located at Samajik Nyay Parisar which is placed at Indore-Agar Road in the core of the city.

The site is located at 1KM. from Ujjain junction railway station, 750 m. from nearby bus station and 140 m. from Charak Hospital which is situated opposite of the connecting road to the site. Further there is Office building of Ujjain Municipal Corporation at North site of the site following the main road at a distance of 250m.

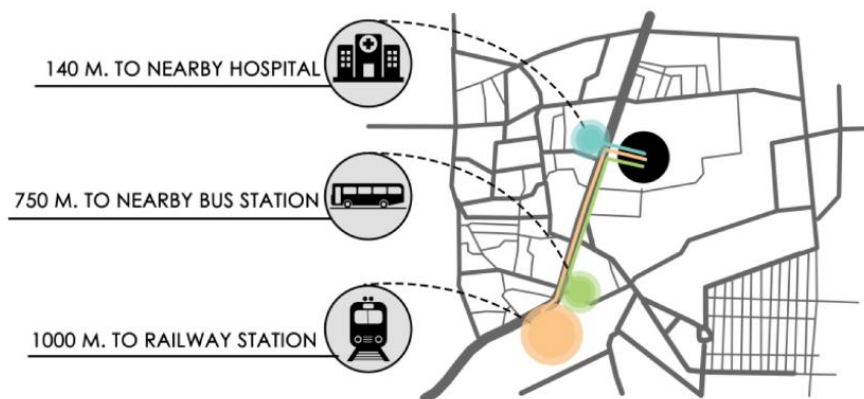


Fig. 5.2.1 Connectivity to amenities [Image Source: Author]

The site is surrounded by various land uses as shown in Fig-x. There is a hospital named Charak Hospital located at west side of the site (hospitality). The east portion consist of a Sudama Nagar which is residential land use and further a nursing college followed by southern side. The site has local factories just adjacent to the southern side and

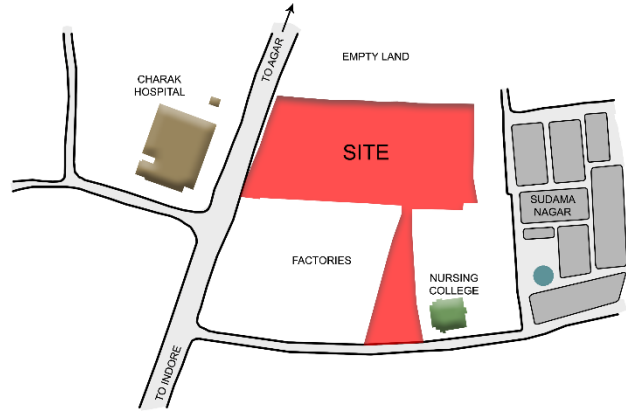


Fig. 5.2.2 Site Surrounding [Image Source: Author]

shares a major common wall with this industrial land use. Further northern side of a side is an empty land which is a private property currently has no function.

5.3. SITE DETAILS

SITE AREA:	36788 SQ.M.
F.A.R.:	1.0
PERMISSIBLE BUILTUP AREA:	36788 SQ.M.
GROUND COVERAGE :	30% - 11036.4 SQ.M.
PERMISSIBLE HEIGHT:	30 M.
FRONT SETBACK:	12 M.
SIDE SETBACK:	7.5 M.
RARE SETBACK:	7.5 M.

Fig. 5.3.1 Bye Laws [Source: Bhumi Vikas Adhinyam, 2012]

The site is unique in shape. It can be visually divided into two zones; a rectangular portion in north and triangle shaped portion in south. The total site area is measured to be 36788 sq.m. according to Bhumi Vikas Adhinyam, Madhya Pradesh, the site lies in Public and semipublic land for which bye laws are shown in Fig-x. The basement is permissible for minimum 2.4 m. depth. The basement should be within the line of MOS and it will be calculated in built-up area if it is habitable otherwise, for non-habitable functions such as parking, there is no addition of corresponding area in built-up area.

5.4. SITE CHARACTER

- *Site Contours:* There is natural slope of 1:67 between highest and lowest point of the site measured at contour interval of 1m. The slope is from South-East to North-West. The contours are favorable for waste disposal of the site through natural flow of the site.

- *Accessibility:* The site is accessible from three faces. First, from the main Indore-Agar Road which is suitable for public and VIPs. Second, From the Sudama

Nagar located at east direction. Last, from the southern face which is attached to an 8m. wide road which further connects the main road. This road can be used as service road for the proposed convention center.

- *Vegetation:* The existing vegetation of the site consist of Gulmohar, Peepal, Neem and Kabit Trees at the frontage. Most of them are deciduous trees which is a major benefit for proposed landscaping as they are dense in summer for heat resisting and take off their leaves in winter season for allowing sunlight.

- *Soil:* Black cotton soil is observed at the site with bearing capacity of 150KN/m². pile or raft foundation is suitable for this type of soil.

A glimpse of site:



Fig. 5.4.1 Site Photographs [Source: Author]

5.5. CLIMATE ANALYSIS

Ujjain city lies in Composite Climatic region which covers the central west zone of India. In this climate, no season continues for more than 6 months of the year. March is categorized in Moderate (temperate) season in which range of dry bulb temperature is 18°C-35°C and relative humidity 30%-60%. Summer season is experienced from April-June in which dry bulb temperature ranges 24°C-40°C and relative humidity 30%-60%. During this period Nature of climate is observed to be Hot and Dry. From July-September, Monsoon season is experienced with dry bulb temperature 20°C-31°C and relative humidity 80%-90%. This period has Warm and Humid climate. October again experience Moderate (Temperate) season in which dry bulb temperature ranges from 18°C-35°C and relative humidity 50%-60% with Moderately humid climate. Winter season ranges from November-February with dry bulb temperature as 11°C-28°C and relative humidity 50%-60%. This period has cool humid climate. Buildings designed in this type of climate should be heat resistant (Kishore N, 2017).

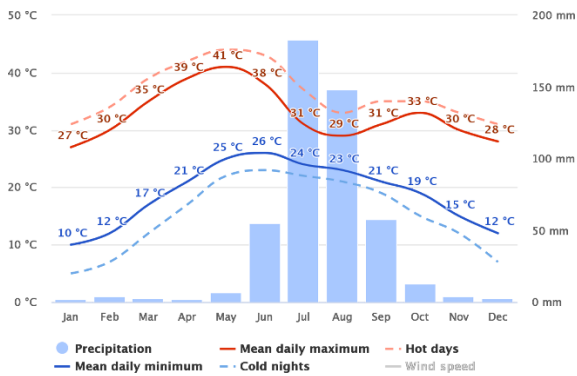


Fig. 5.5.1 Average Temperature and precipitation [Source: www.meteoblue.com]

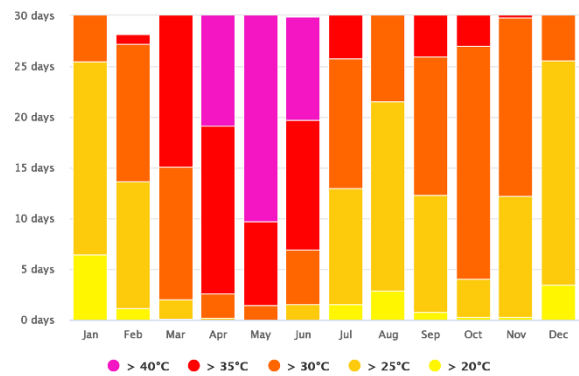


Fig. 5.5.2 Maximum Temperatures [Source: www.meteoblue.com]

Wind analysis shows that the direction of wind throughout the year is from South-West to North-East with maximum velocity of 28km/h and minimum velocity of 1 km/h.

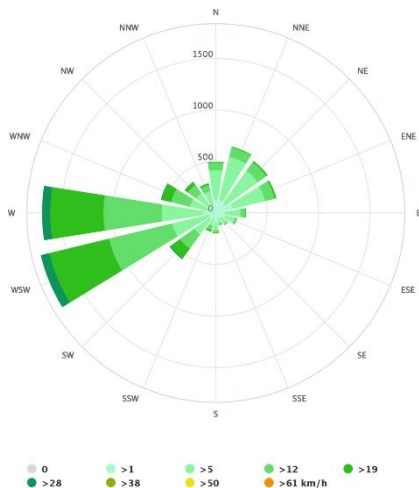


Fig. 5.5.4 Wind Direction [Source: www.meteoblue.com]

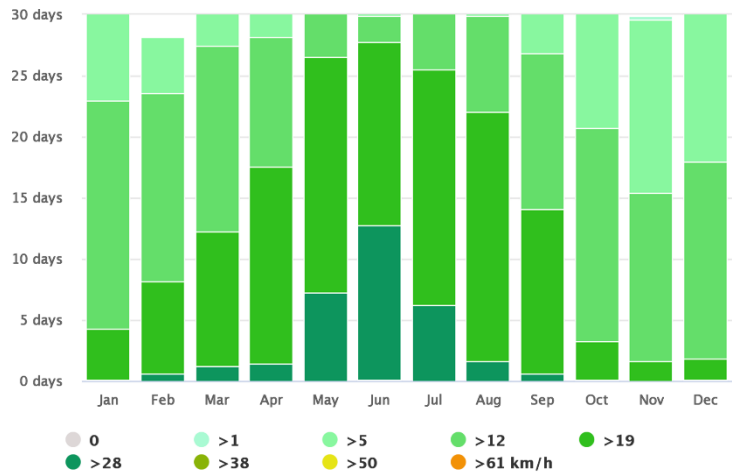


Fig. 5.5.3 Wind Speed [Source: www.meteoblue.com]

Solar analysis shows that in summer, on the peak day, time for sunrise is 05:40 AM and sunset at 07:13 PM. Winds in summer season flows from West-South-West(WSW) to East-North-East (ENE). In winter season, on the dpeak day, time for sunrise is 07:11 AM and sunset is 06:05 PM. winds in winters flow in the direction West to East.

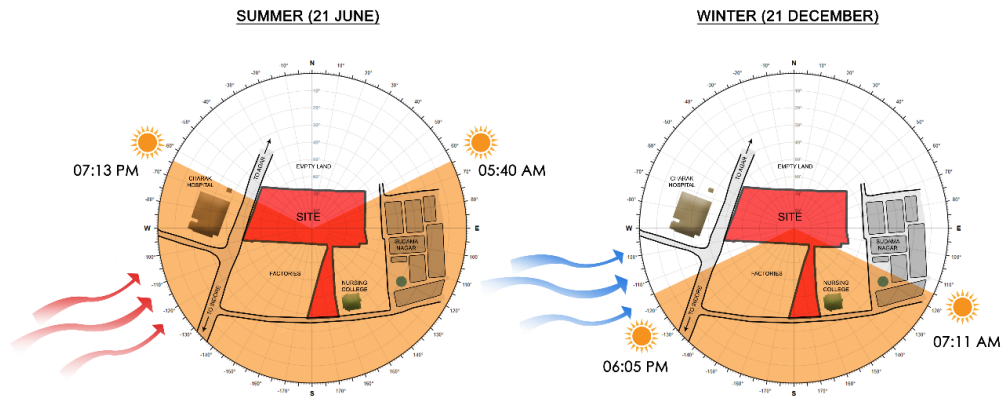


Fig. 5.5.5 Solar Analysis [Image Source: Author]

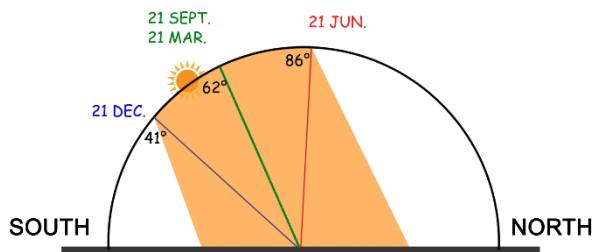


Fig. 5.5.6 Altitude [Image Source: Author]

Sun shading analysis shows that the altitude angle varies from 41°C (winter season) and 86°C in Summer Season inclined in southern direction. It is inferred that provision of shading devices will be suitable for such condition.

5.6. S.W.O.T ANALYSIS

5.6.1. Strength:

- The site is located such that it receives adequate exposure in terms of views.
- Contours are such that no need to additionally create slope for drainage disposal.
- Presence of deciduous trees in frontage is major beneficiary in landscaping.

5.6.2. Weakness:

- The irregularity in site boundaries resulting in complication in site planning.
- The traffic from the front road leads to disturbance while entering site.

5.6.3. Opportunity:

- The connectivity of smaller road in southern side ensures easy access for services.

5.6.4. Threats:

- The adjacent factories produce noise 8 hrs. a day. Also, the typology of the factory includes use of flammable chemicals which is a matter of threat.

6. LITERATURE CASE STUDY

6.1. DAVID L. LAWRENCE CONVENTION CENTRE



Location: Pittsburgh, PA

Site Area: 1,39,000 m²

Capacity: 37,368

Owner: Sports and Exhibition authority of Pittsburgh and Allegheny Country

Architect: Rafael Vinoly Architects, P.C.

Fig. 6.1.1 Site Plan [Image Source: DLCC Green Report, 2016]

6.1.1. Introduction

The David L. Lawrence Convention Centre located in Pittsburgh, PA is one of a unique building of its kind. It is the first Convention Centre in the world with LEED Certification of GOLD. The intend of the study this building is the sustainability features.

- **Project Highlights**

- Cable-stayed suspension roof creates column-free, long-span exhibition hall and saves on structural costs.
- Abundant natural lighting conserves energy usage and makes a more welcoming convention environment.
- First convention centre and largest in world to achieve LEED Gold rating (now rated LEED Platinum).
- A 700-car parking garage with an 8' clearance is available at the Convention Center. The entrance is located on 10th Street.



Fig. 6.1.2 View
[Image Source:]

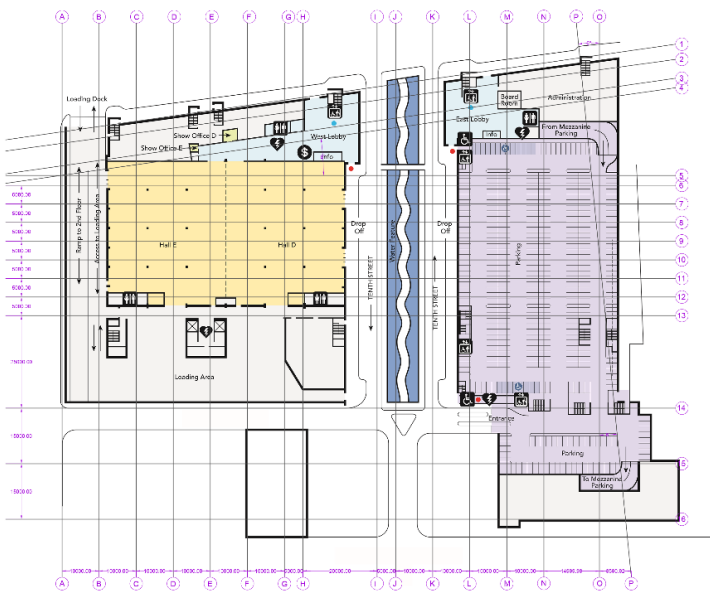


Fig. 6.1.3 Ground Floor Plan
[Image Source:]

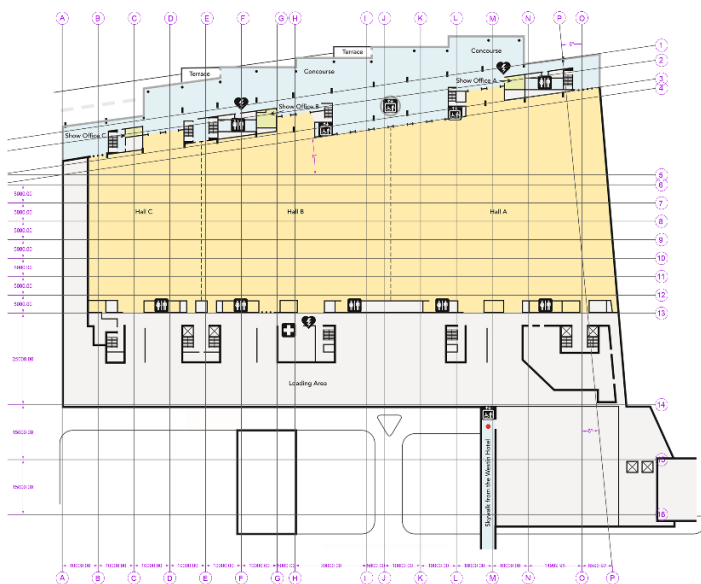


Fig. 6.1.4 First Floor Plan
[Image Source:]

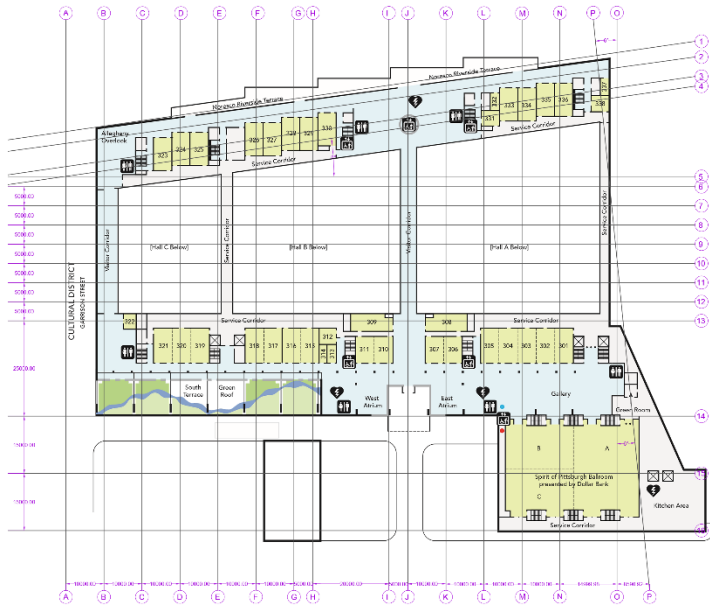


Fig. 6.1.5 Second Floor Plan [Image Source:]

- Public Areas
- Halls
- Meeting Rooms
- Parking

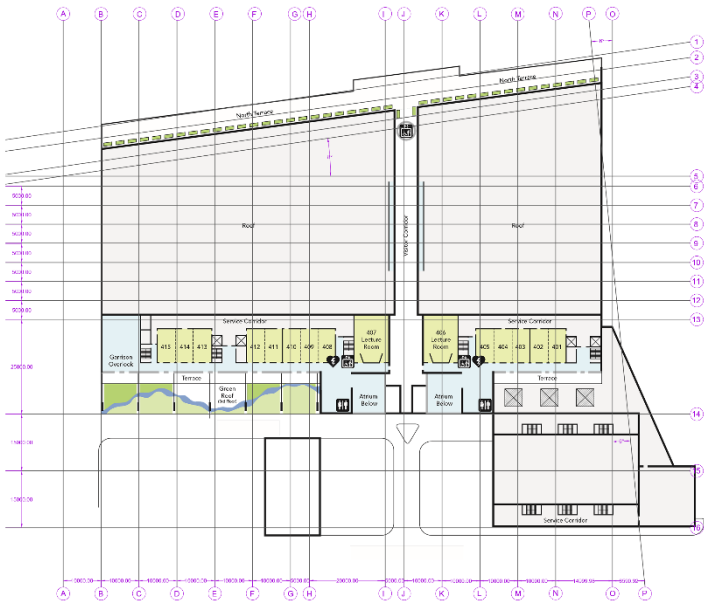


Fig. 6.1.6 Third Floor Plan [Image Source:]

- Public Areas
- Halls
- Meeting Rooms
- Parking

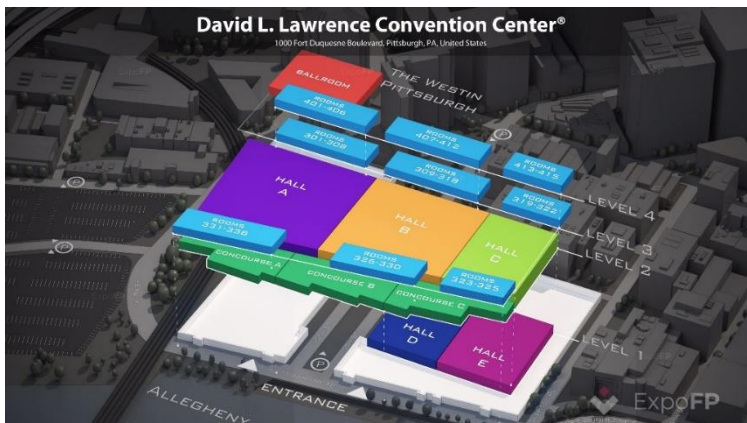


Fig. 6.1.7 Zoning [Image Source:]

6.1.2. Green Roof

- *Heat Island Mitigation:*

Heat islands occur during the summer when sunlight is absorbed by conventional roofing and paving materials and re-radiated as heat energy, causing urban areas to be 1.8°F to 5.4°F warmer than surrounding rural areas. Even on a hot day in full direct sunlight, the DLCC’s roof remains only 18°F warmer than the surrounding air while conventional roofs are typically 50°F-90°F warmer.

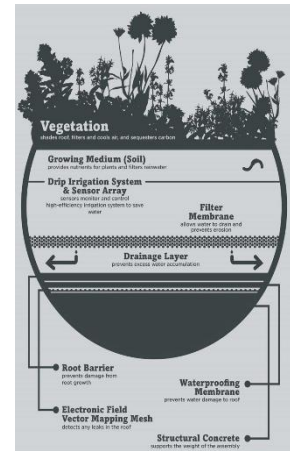
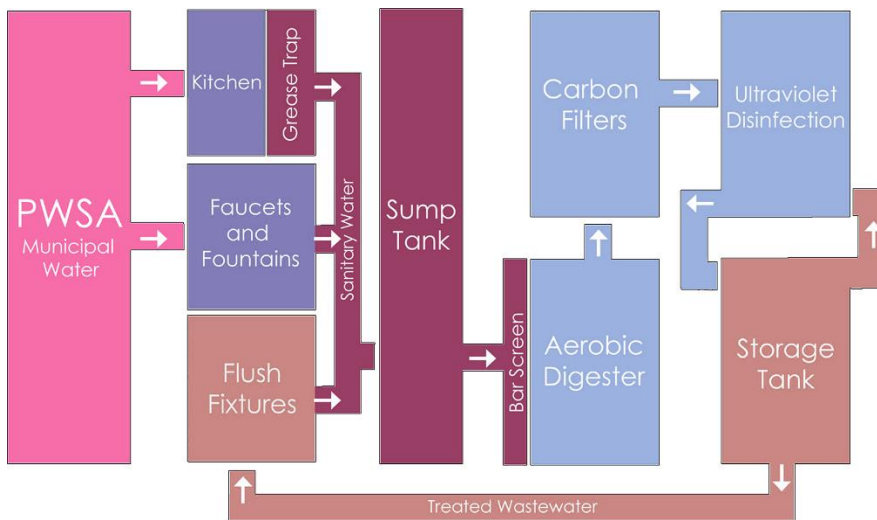


Fig. 6.1.8 Green Roof Section [Image Source: DLCC Green Report, 2016]

6.1.3. Wastewater Treatment

The DLCC has a 50,000-gallon capacity on-site wastewater treatment plant that collects and treats wastewater from sanitary and potable uses. This water is recycled throughout the building for toilet flushing once it has been treated.



The plant’s treatment components include a sump tank, aerobic digester, carbon filter system, and ultraviolet disinfection system.

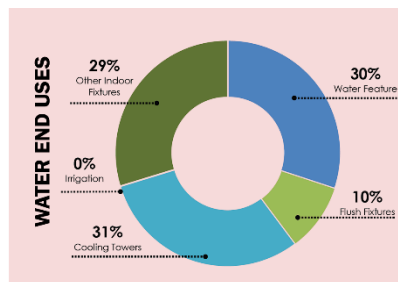
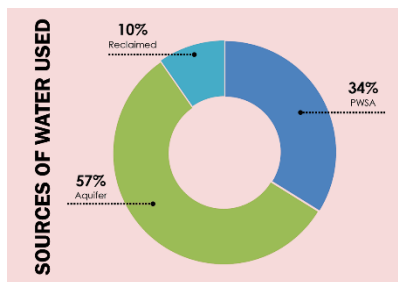


Fig. 6.1.9 Wastewater System [Image Source: DLCC Green Report, 2016]

6.2. MAHATMA MANDIR CONVENTION CENTRE

Location: Gandhinagar, Gujarat

Site Area: 1,37,593 m²

Capacity: 15,000

Owner: The Leela

Developer: Govt. of Gujarat

Completed: 2013



Fig. 6.2.1
view [Image
Source:
www.theleela.com]



Fig. 6.2.2 Site Plan [Image Source: www.theleela.com]

MGCC is full of necessary facilities such as exhibition halls, open air amphitheater, rich lawns, souvenir shops and conference and meeting rooms. It is the only and largest convention centre which is followed by museum on the life of Mahatma Gandhi. The most focal and large portion visible from a far distance is Dandi Kutir. It is made on the concept of Mahatma Gandhi's Dandi Yatra.

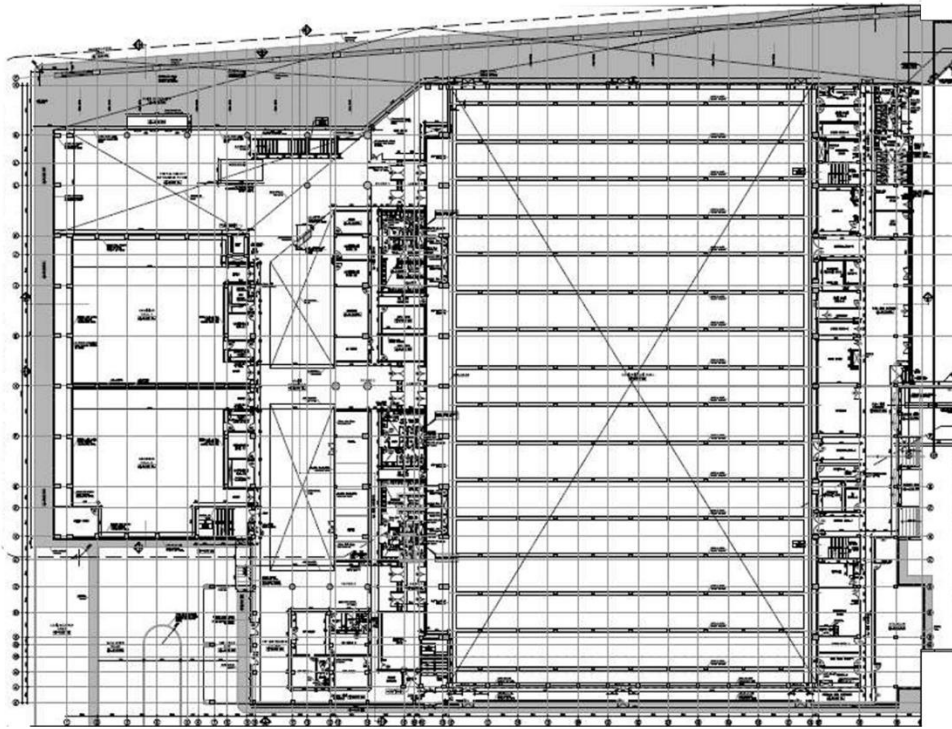


Fig. 6.2.3
Ground Floor Plan
[Image Source:]

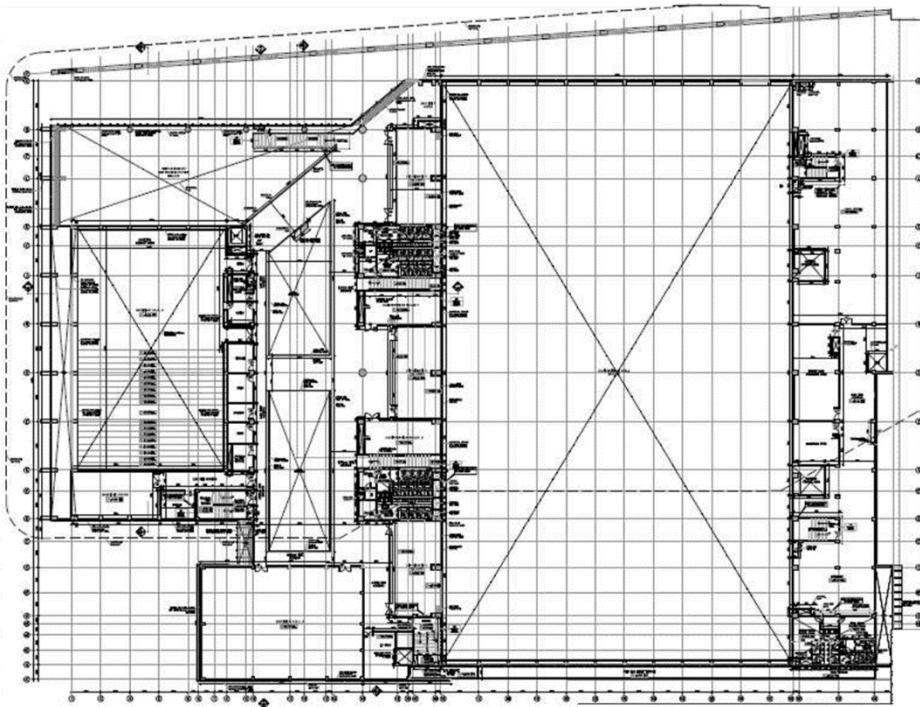


Fig. 6.2.4 First Floor Plan
[Image Source:]

6.2.1. Key Features

The Convention Centre

- Main Convention Hall and the VIP Viewing Galleries -5500 delegates in theatre style.
- Main Convention Hall-divisible into 3 halls

- Ceiling height of 11m, multi-purpose pillar-less air-conditioned space of 93m x 58m
- 8 Simultaneous Interpretation booths for multi-lingual translations
- Movable modular stage-pieces, lighting trusses, in-built hanging hooks with a capability to hold up to two tones
- 20 additional meeting venues to accommodate parallel sessions ranging from 6-1000 delegates
- Plug and Play Sound Reinforcement System
- Controlled temperature and lighting for thermal and visual comfort
- Sizeable pantry area
- Video Conferencing
- Projection System

The Exhibition Centre

- 3 pillar-less air-conditioned Exhibition halls with Viewing galleries and spaces for Exhibitor's offices
- Flexible, heavy duty floor for showcasing heavy machinery and other industrial / medical equipment
- Service trenches with electrical & water-based exhibitions.
- Easy plug & play SRS Facilities and telecommunication systems.
- Wide alley back of the house service areas to aid swift movement of exhibits and equipment.
- Adequate storage facilities within the Exhibition halls.

Other Spaces

- Heads of State Centre to accommodate over 250 VIP delegates in multiple meeting spaces.
- Open air amphitheater to seat 1000 guests
- Mahatma Lawns can accommodate over 2000 guests
- Multi-level Food Court that can accommodate 2500 covers.
- 16 Retail Shops to facilitate shopping requirements

6.2.2. Area Programming

Dimensions and Seating Capacities of Mahatma Mandir Convention and Exhibition Centre												
Venue	Level	Area		Dimensions (L x W x H)		Seating Capacities						
		Sq Ft	Sq Mt	Ft	Mt	Theatre Style	Classroom	U Shape	Board Room	Sit Down Buffet	Cluster Style	Reception
CONVENTION CENTRE												
Main Convention Hall with VIP Viewing Galleries & Simultaneous Interpretation Booths	Ground/First/Second	63917	5935			5500	2772	264	408	-	2000	10000
1 Convention Hall 1	Ground	19703	1830	190x104x36	58x32x11	1500	924	162	204	-	650	2500
VIP Viewing Gallery 1	First	1343	125	51x26x10	16x8x3	185	-	-	-	-	-	-
2 Convention Hall 2	Ground	19703	1830	190x104x36	58x32x11	1500	924	162	204	-	650	2500
VIP Viewing Gallery 2	First	1292	120	49x26x10	15x8x3	185	-	-	-	-	-	-
3 Convention Hall 3	Ground	19703	1830	190x104x36	58x32x11	1500	924	162	204	-	650	2500
VIP Viewing Gallery 3	First	1343	125	51x26x10	16x8x3	185	-	-	-	-	-	-
Auditorium with Projection Room & Pantry	First	10495	975	128x82x26	39x25x8	1000	-	-	-	-	-	-
Meeting Room 1	Ground	5942	552	79x76x10	24x23x3	500	243	72	96	-	200	800
Meeting Room 2	Ground	5683	528	79x72x10	24x22x3	500	243	72	96	-	200	800
Meeting Room 3	First	4964	461	83x60x10	25x18x3	500	243	72	96	-	200	800
Meeting Room 4	First	217	20	14x16x10	4x5x3	9	-	9	10	-	8	-
Meeting Room 5	First	217	20	14x16x10	4x5x3	9	-	9	10	-	8	-
Meeting Room 6	First	136	13	14x10x10	4x3x3	9	-	5	6	-	8	-
Meeting Room 7	First	150	14	14x11x10	4x3x3	9	-	7	8	-	8	-
Meeting Room 8	First	145	13	11x14x10	3x4x3	9	-	7	8	-	8	-
Board Room 1	Ground	194	18	14x14x10	4x4x3	-	-	-	6	-	-	-
Board Room 2	Ground	194	18	14x14x10	4x4x3	-	-	-	6	-	-	-
Board Room 3	Ground	194	18	14x14x10	4x4x3	-	-	-	6	-	-	-
Board Room 4	Ground	207	19	16x13x10	5x4x3	-	-	-	6	-	-	-
Board Room 5	Ground	207	19	16x13x10	5x4x3	-	-	-	6	-	-	-
Board Room 6	First	580	54	36x16x10	11x5x3	-	-	-	21	-	-	-
Board Room 7	First	580	54	36x16x10	11x5x3	-	-	-	21	-	-	-
Board Room 8	First	1194	111	47x25x10	14x8x3	-	-	26	-	-	-	-
VIP Lounge 1	Ground	543	50	23x23x10	7x7x3	-	-	-	-	-	30	-
VIP Lounge 2	Ground	200	19	16x13x10	5x4x3	-	-	6	8	-	12	-
VIP Lounge 3	Ground	280	26	20x14x10	6x4x3	-	-	8	14	-	18	-
Organiser's Office	Ground	969	90			-	-	-	-	-	-	-
Organiser's Office	First	377	35			-	-	-	-	-	-	-
EXHIBITION CENTRE												
Exhibition Hall 1 & 2 with VIP Viewing Galleries	Ground/First	77760	7224			-	-	-	-	-	-	-
1 Exhibition Hall 1	Ground	39508	3670	248x159x36	76x49x11	-	-	-	-	-	-	-
Viewing Gallery 1	First	1292	120	49x26x10	15x8x3	-	-	-	-	-	-	-
2 Exhibition Hall 2	Ground	35669	3314	226x158x36	69x48x11	-	-	-	-	-	-	-
Viewing Gallery 2	First	1292	120	49x26x10	15x8x3	-	-	-	-	-	-	-
Exhibition Hall 3	Ground	16533	1536	105x158x36	32x48x11	-	-	-	-	-	-	-
HEADS OF STATE CENTRE												
CEO Conference Room	First	2971	276	79x38x10	24x12x3	-	-	-	42	-	-	-
CM's Meeting Room 1	Ground	546	51	19x29x10	6x9x3	35	24	24	30	-	16	40
CM's Meeting Room 2	Ground	677	63	27x24x10	9x7x3	-	-	11	-	-	-	-
CM's Meeting Room 3	Ground	172	16	9x19x10	3x6x3	15	9	15	18	-	12	20
CM's Meeting Room 4	Ground	465	43	31x15x10	9x5x3	30	18	21	24	-	16	35
PM's Meeting Room 1	First	468	43	18x26x10	6x8x3	40	12	18	24	-	16	25
PM's Meeting Room 2	First	374	35	24x15x10	7x5x3	-	-	-	13	-	-	-
PM's Meeting Room 3	First	672	62	26x26x10	8x8x3	-	-	-	16	-	-	-
PM's Meeting Room 4	First	620	58	24x26x10	7x8x3	44	36	21	30	-	24	25
PM's Meeting Room 5	First	723	67	26x28x10	8x8x3	60	36	27	36	-	24	40
PM's Meeting Room 6	First	431	40	26x16x10	8x5x3	36	18	24	30	-	12	30
OTHER SPACES												
Open Air Amphitheatre	Ground	7535	700			1000	-	-	-	-	-	-
Food Court	Ground	15177	1410	98x154x10	30x47x3	-	-	-	-	500	-	1000
Food Court	First	16792	1560	98x171x10	30x52x3	-	-	-	-	700	-	1500
Retail Mart (16 shops)	Ground	5570	517	243x23x10	74x7x3	-	-	-	-	-	-	-

Fig. 6.2.5 Area Programming [Image Source: www.theleela.com]

6.2.3. Views



Fig. 6.2.8 Convention Hall [Image Source: www.theleela.com]



Fig. 6.2.7 Exhibition Hall [Image Source: www.theleela.com]



Fig. 6.2.6 Auditorium [Image Source: www.theleela.com]

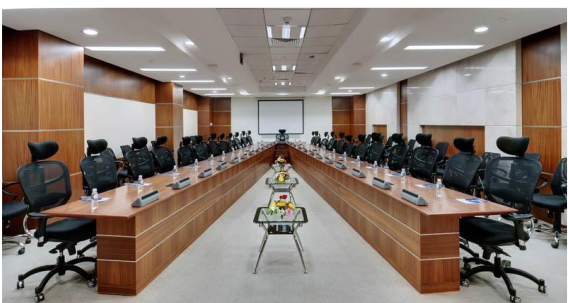


Fig. 6.2.10 Board Room [Image Source: www.theleela.com]



Fig. 6.2.9 Meeting Room [Image Source: www.theleela.com]

7. LIVE CASE STUDIES

7.1. INDIA HABITAT CENTRE

Location: Lodhi Road, New Delhi

Site Area: 53,241m²

Managed by: HUDCO

Architects: Joseph Allen Stein, B.V. Doshi, Bhalla and Associates

Completed: 1993



Fig. 7.1.1 Main Entrance view [Image Source: Author]

7.1.1. Introduction

India Habitat Centre is a multipurpose building which is India's most comprehensive Convention Centre. India Habitat Centre is considered as an environment which acts as a catalyst for relationship between Individuals and Institutions. It serves a variety of facilities and capable of conducting various events, meetings and exhibitions at the same time. It consists of exhibition halls, conference rooms, meeting rooms, auditorium, galleries, offices and open exhibition areas.

7.1.2. Objective of this study

- To understand various spaces of this Convention Centre.
- To study the area provision for those spaces.
- To study the vehicular and pedestrian circulation.
- To study the services required for the building.
- To understand landscape features.

7.1.3. Building Program

- 40000 sq.m. of office accommodation.
- Conference rooms (capacity: 1000).
- 60 Guest Rooms, 5 Suites, 5 Service Apartments.
- Convention Halls, Cafeteria, Restaurants and Dining rooms can accommodate 1500 persons.
- 700 sq.m. of Exhibition Space.
- 420 capacity auditorium, 250 capacity amphitheatres.

- Parking for 933 Cars and 2000 Two wheelers.
- 25% of landscaped area.

7.1.4. Architectural Design

The entire building consists of contemporary architectural expression with elimination of unnecessary details. Choice of material is such that it has a strong emphasis on balanced visual perception of the viewers. Exposed brickwork and Exposed RCC is used for the exterior façade. Domination of Horizontal and vertical lines can be observed from the exterior façade.

7.1.5. Structural System

Modern conventional method of construction is adopted. Beam-column, RCC, brickwork and steel girders are the main structural members of India Habitat Centre. Windows used are ribbon windows which has a slot for plantation of RCC. It has a structural stability as well as aesthetically pleasant appearance.

7.1.6. Circulation

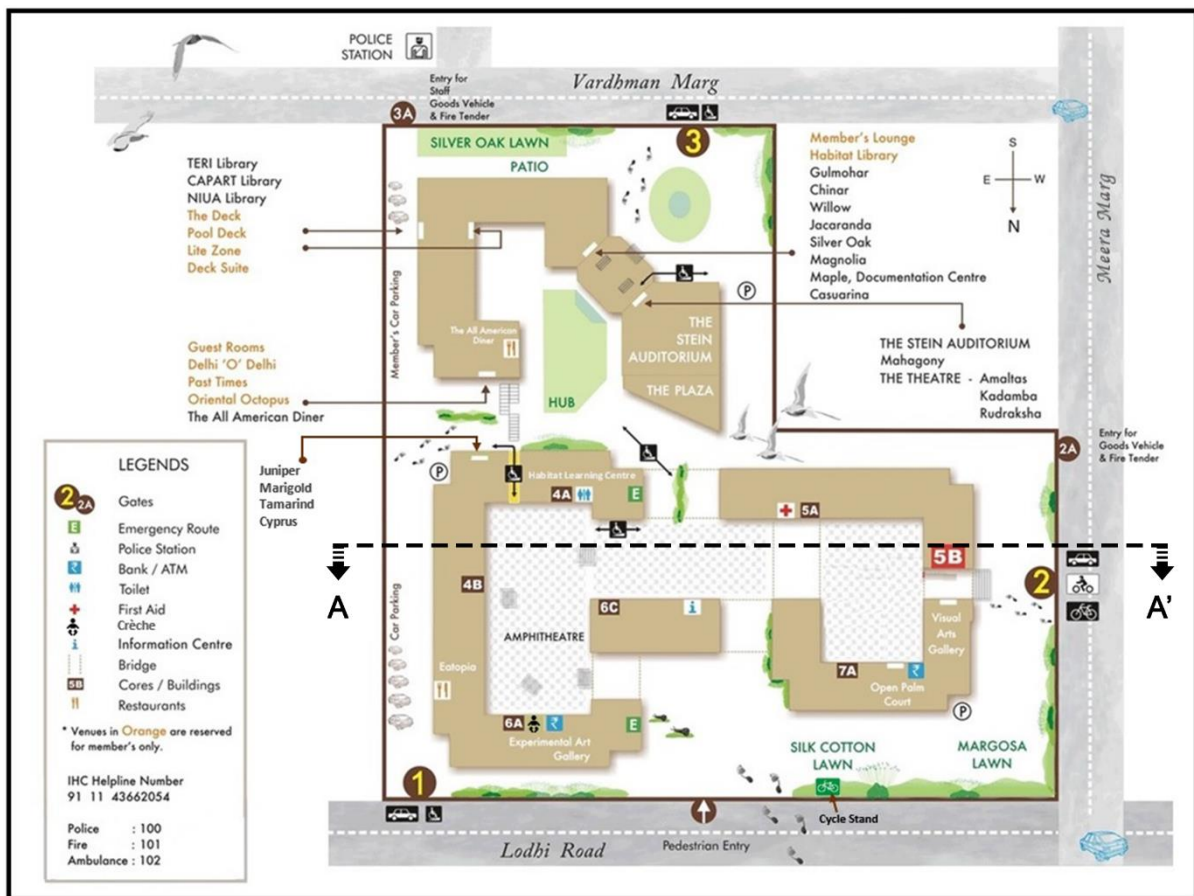


Fig. 7.1.2 Site Plan [Image Source: www.indiahabitat.org]

The entire building is divided into five building block of ring shape forming a courtyard within themselves. These courtyards are appreciated by landscaping such that it subdues the bulkiness of the building form.

The site is surrounded by three major roads; Vardhman Marg, Meera Marg and Lodhi Road. Each road has an entry and exit point respectively. the entire building has 4 gates to provide vehicular, public and service circulations with respect to their corresponding vehicles. There are extra 2 gates for services.

7.1.7. Spaces

V. *Stein Auditorium*

- Auditorium capacity = 400
- Area = 576 m²
- Distance between two seats = 0.6 (approx.)
- Terrace is used to prepare and serve meals.
- Acoustics panels and gypsum boards are used as acoustic materials.

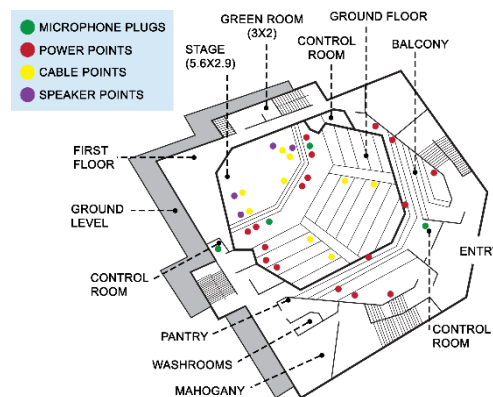


Fig. 7.1.3 Auditorium layout
[Image Source: Author]

VI. *Silver Oak Hall*

- Capacity = 250
- Area = 495 m²

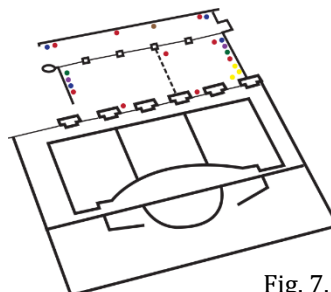


Fig. 7.1.4 Silver Oak Layout
[Image Source: Author]

VII. Gulmohar Hall

- Capacity = 130
- Area = 266 m²

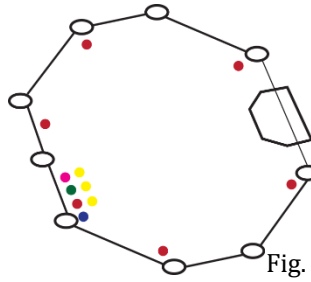


Fig. 7.1.5 Gulmohar Layout
[Image Source: Author]

VIII. Chinar and Willow

- Capacity = 51
- Area = 81 m²

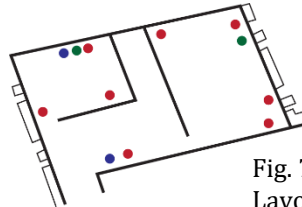


Fig. 7.1.6 Chinar and Willow
Layout [Image Source: Author]

IX. Magnolia

- Capacity = 120
- Area = 143 m²

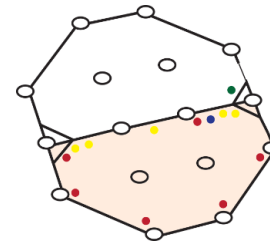


Fig. 7.1.7 Magnolia Layout
[Image Source: Author]

X. Casuarina

- Capacity = 60
- Area = 141 m²

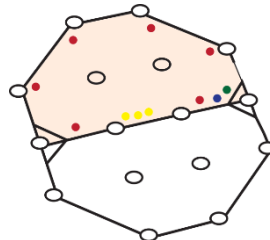


Fig. 7.1.8 Casuarina Layout
[Image Source: Author]

XI. Jacaranda

- Capacity = 120
- Area = 238 m²

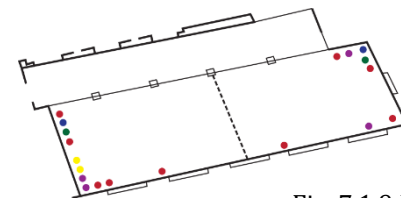


Fig. 7.1.9 Jacaranda Layout
[Image Source: Author]

7.1.8. Zoning

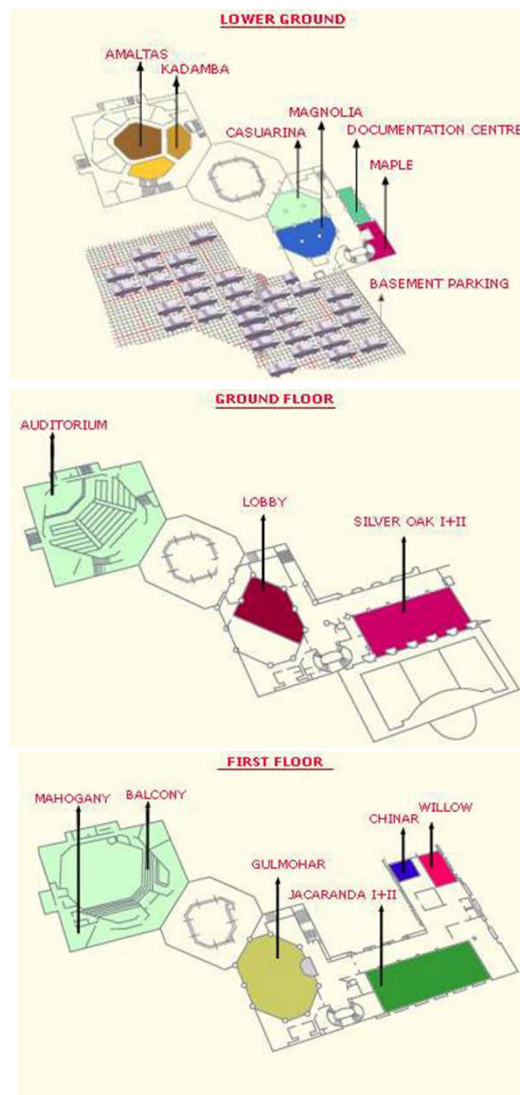


Fig. 7.1.10 Zoning Layout [Image Source: IHC, Brochure]

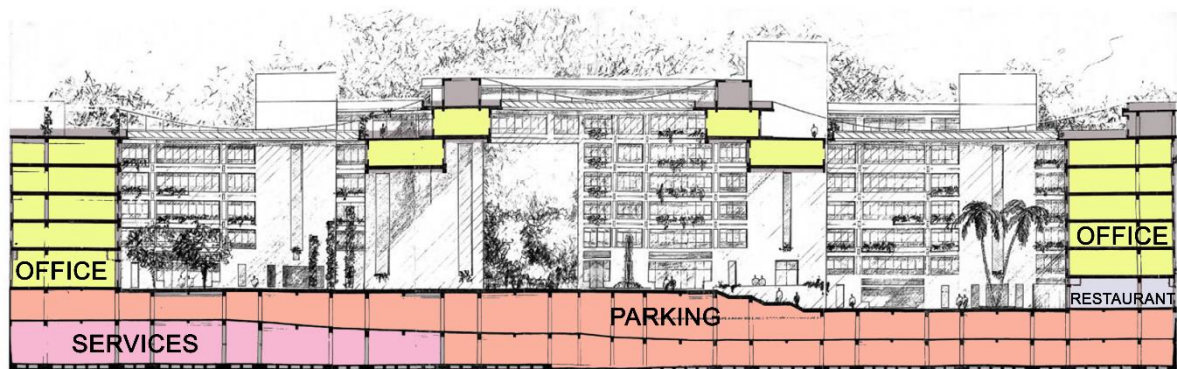


Fig. 7.1.11 Vertical zoning [Image Source: IHC, Library]

7.1.9. Area Program

AUTORIUM BLOCK			
SPACE	LEVEL	AREA (m ²)	CAPACITY
AUDITORIUM	GROUND FLOOR	576	400
MAHAGONY HALL	FIRST FLOOR	43	24
THE THEATRE	BASEMENT	278	120
KHADAMBA HALL	BASEMENT	57	24
RUDRAKSH	BASEMENT	57	24
AMALTAS	BASEMENT	163	55
TOTAL		1174	647

SERVICE AREA	
SPACE	AREA (m ²)
STORAGE	2340
OFFICE	41000
PUMP ROOM	20
WATER TREATMENT PLANT	125
RECYCLING UNIT	25
FIRE FIGHTING	150
WATER SUPPLY PLANT	500
HVAC PLANT	750
TOTAL	44910

FUNCTION BLOCK			
SPACE	LEVEL	AREA (m ²)	CAPACITY
MAGNOLIA	BASEMENT	143	60
SILVER OAK I	GROUND FLOOR	111	60
SILVER OAK II	GROUND FLOOR	78	40
SILVER OAK FOYER	GROUND FLOOR	306	150
CHINAR	FIRST FLOOR	29	16
WILLOW	FIRST FLOOR	52	35
GULMOHAR	FIRST FLOOR	266	130
JACARAND I	FIRST FLOOR	119	60
JAKARAND II	FIRST FLOOR	119	60
TOTAL		1223	611

Table 7.1-1 Area Analysis [Image Source: Author]

7.1.10. Services

I. Parking

- Levels = Upper (stilt) and Basement
- Capacity = 520 in Basement, 60 on Stilt, 500 for 2-wheelers
- Use of ducts for ventilation
- Clear Height = 4.5m
- Grid = 6mx6m



Fig. 7.1.12
Underground
Parking [Image
Source: Author]

II. HVAC

- Use of central AC system in Basement
- 97 AHU's, 20 tons each
- 4 chillers of 300 tons each
- 3 chillers of 600 tons each
- Area consumed = 30m x 25m
- Expansion tank used for maintaining water level
- Cooling tower situated near underground parking entrance.



Fig. 7.1.13
HVAC [Image
Source: Author]

III. Electrical

- 33kV of high-tension electricity is received in building
- 5 steps down transformers converting into 440v.
- Use of 4 diesel generators.
- Area Consumed = 40mx20m
- Total capacity = 10 Mva (Peak load capacity = 4Mva)



Fig. 7.1.14 Substation [Image Source:
Author]

IV. Water supply

- Underground tank = 1.25 lac liters, 2.5 lac liters, 3.5 lac liters
- 2.5 lac liters is used for plantation daily
- Use of hydropneumatics system for water supply.
- Filter water = 1.25 lac liters
- Area of plant = 20mx25m
- Drinking water = 60,000 liters



Fig. 7.1.15 Water Supply Room [Image Source: Author]

V. Fire protection

- Pump Used = DG driven Pump, Jockey pump, Hydrant pump and Sprinkler pump
- Sprinklers, heat detectors and fire alarms are used for firefighting.
- Area consumed = 10mx15m
- 3.5 lac liters main tank is used
- ABC type fire extinguishers are installed.



Fig. 7.1.16 Fire Pump Room [Image Source: Author]

VI. Security

- Two rooms of 6mx4m are used as control room.
- CCTV is installed in entire building

- Bag scanning system

VII. Sewage Treatment Plant (STP)

- Oil discharge is conducted manually in collection sump.
- Aeration sump is supported by 2 tanks
- 240 min cycle one at time in air filter
- Activated carbon filter
- Filtered water is used in flushing



Fig. 7.1.17. STP [Image Source: AITSAP, Library, Noida]

7.1.11.Landscaping

The entire building is provided with green courtyard and lawns. Use of native plants has been the first priority while considering landscaping features. Plants over the window slot gives a pleasant appearance with the combination of façade materials.



Fig. 7.1.18 Courtyard view [Image Source: Author]

7.2. NCUI AUDITORIUM AND CONVENTION CENTRE

Location: New Delhi

Site Area: 10,593 m²

Capacity: 2,672



Fig. 7.2.1 Front View
[Image Source: Author]

7.2.1. Introduction

National Cooperative Union of India (NCUI) Auditorium and Convention Centre has come forward with the new range of advance and renovated services, establishing itself as a locus for organizing events and offering wide spectrum of convenient setting thus allowing solution for Conference and Seminar access. It encompasses a physical environment with holistic approach. It enables dissemination of very large venue with flexible capacity for attendees with facility of fully air-conditioned halls and Guest Rooms, professional interpreting, and fine class management with ample parking facility.

7.2.2. Circulation

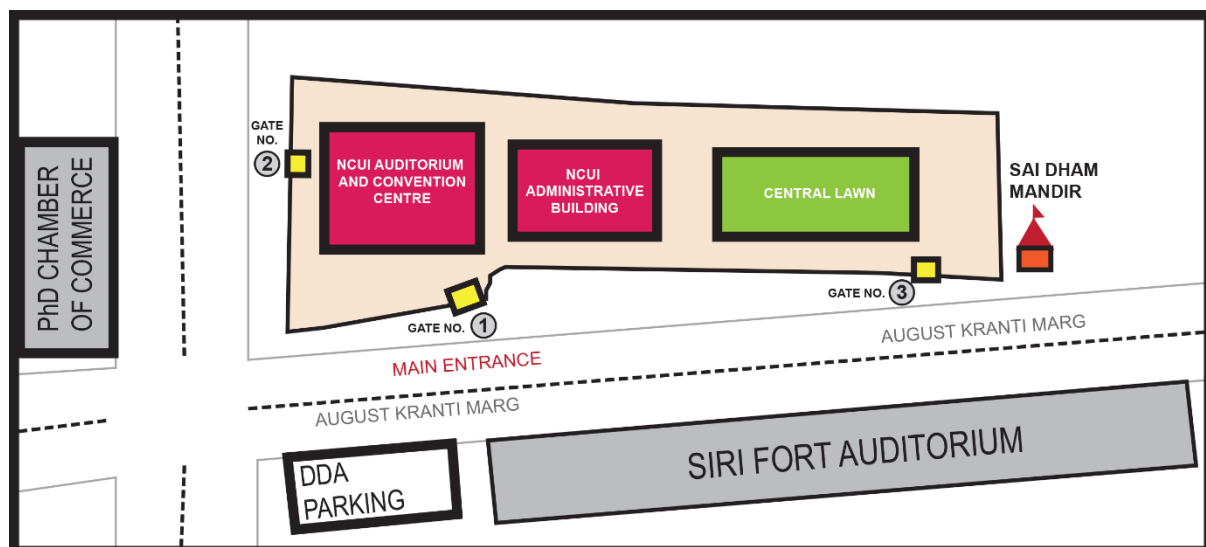


Fig. 7.2.2 Site layout [Image Source: NCUI, Brochure]

The Convention Centre is located along the August Kranti Marg in front of Sir Fort Auditorium. There are 3 gates for the entrance and exit. The entire building is placed in form of two separate building blocks followed by a central lawn. First is convention block and second Administrative building. the vehicular movement is along the periphery of the building where 150 car parking is provided on stilt.

7.2.3. Functional Spaces

I.Alpha

Capacity: 120

Facilities: Installed table mics

Functions: Conferences,
Workshops,
Discussions,
Board meeting,
Seminars



Fig. 7.2.3 Alpha [Image Source: Author]

II. Beta

Capacity: 80

Facilities: Customized AC

Functions: Conferences,
Seminars,
Workshops,
Presentations,
Press interactions.



Fig. 7.2.4 Beta [Image Source: Author]

III. Gamma

Capacity: 50 people

Facilities: AC, Fixed mics

Functions: Projector
Seminars,
Product launches,
Small gatherings



Fig. 7.2.5 Gamma [Image Source: Author]

IV. Royal

Capacity: 50 people

Facilities: Air Conditioned

Functions: Services to VVIP's,
Dinner



Fig. 7.2.6 Royal [Image Source: Author]

V. Regale

Capacity: 20 people

Facilities: AC, Banquet

Functions: VIP dignitaries,
Preview rooms,
Small gathering,
Seminars,
Workshops.



Fig. 7.2.7 Regale [Image Source: Author]

7.2.4. Central Lawn

Capacity: 1500 people

Facilities: Banquet

Functions: Concerts,
Gathering,
Team activities,
Exhibitions,
Dinners.



Fig. 7.2.8 Central Lawn [Image Source: NCUI, Brochure]

7.2.5. Auditorium

A premier amphitheater well equipped with state-of-the-art audio visual & sitting facilities. The Auditorium provides ample of space with comfortable seating arrangement. With a capacity of 622 people, this auditorium serves as Theatre, Cultural Performances, fashion shows, branding etc. purposes. Key features observed in auditorium is Excellent Acoustics, Advanced Interiors, Motorized Curtains, Green Rooms and Standard Lighting System. Acoustic panels, Gypsum boards and carpet are used as acoustic interior materials.

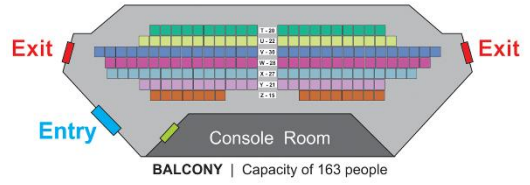
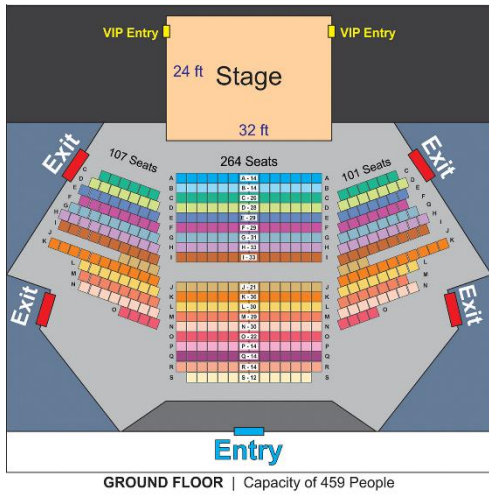


Fig. 7.2.9 Auditorium Layout [Image Source: NCUI, Brochure]

7.2.6. Area Program

S.No	Hall Name	L (M)	R (M)	Area (m ²)	Remarks
1	Auditorium				
	Seating till Stage	20.42	19.81	404.59	-
	1st floor Seating Balcony area	5.49	11.22	61.54	-
	Stage Area	8.53	9.75	83.24	-
	Back Stage Area	5.49	8.84	48.5	-
	Ground Floor Pre Function Area	5.18	5.18	26.85	-
	GF Reception Area	6.4	14.63	93.65	-
2	Parking Area				
	Front	18.29	27.43	501.68	-
	Backside	6.1	45.72	278.71	-
3	1st floor Area	10.06	9.45	95.04	-
		11.89	7.32	86.96	-
		9.45	7.32	69.12	-
4	Lift Area GF Main Entry	6.1	5.49	33.45	-
5	Aplha Hall	17.86	11.34	202.52	-
6	Beta Hall	17.37	7.5	130.27	-
7	Gamma Hall	15.24	7.01	106.84	-
8	D Lounge	10.97	9.14	100.34	-
9	Regale	10.97	11.28	123.75	-
10	Central Lawn	21.03	64.31	1352.58	-
11	Royale Room	6.4	10.06	64.38	-
12	Black Masking Inside Auditorium	6.71	1.83	12.26	2
TOTAL				3876.27	

Table 7.2-1 Area Program [Image Source: Author]

7.3. DALY COLLEGE AUDITORIUM

Location: Indore

Site Area: 21,71 m²

Capacity: 1,100

Completed: 2007



Fig. 7.3.1 View [Image Source: Author]

7.3.1. Introduction

Located in Core of the Indore city, Daly College has a unique identity within the city. It is one of the oldest yet functioning well at present times. The auditorium consists of various building components but prime focusing on auditorium building. the auditorium was built much later after the construction of original college building. with capacity of 1100 people, this auditorium has rich identity because of its façade treatment. Exposed brickwork, Exposed RCC and glass has been primarily used at façade.

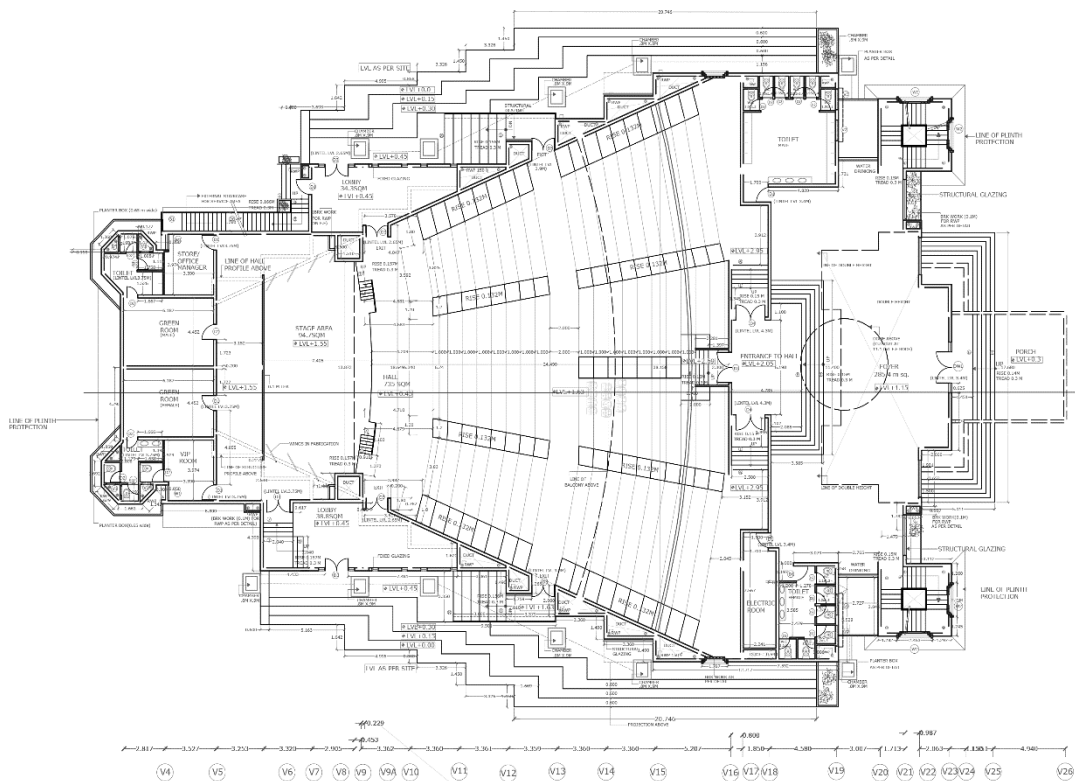


Fig. 7.3.2 Plan [Image Source: VIMA, The Dimension (Architecture Firm)]

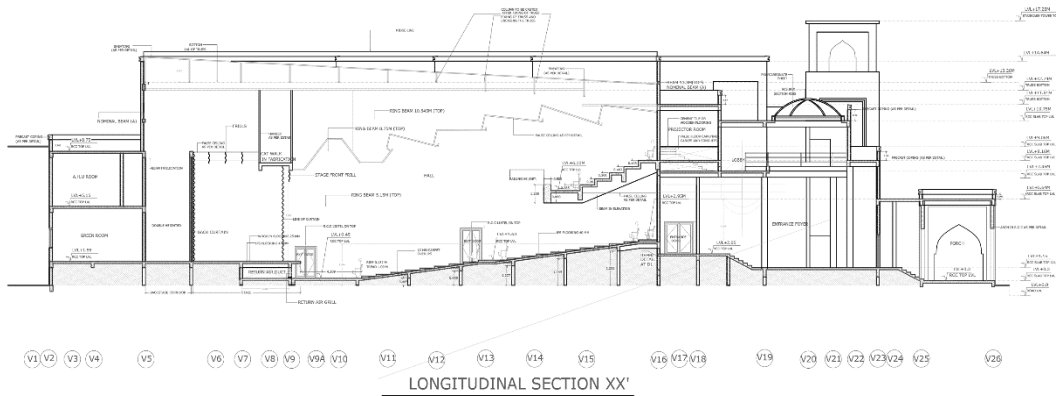


Fig. 7.3.3 Section [Image Source: VIMA, The Dimension (Architecture Firm)]

7.3.2. Area Program

VENUE	AREA
STAGE	94.7m ²
SEATING HALL	735m ²
GREEN ROOM (2)	27.5m ²
VIP ROOM	13.2m ²

VENUE	AREA
STORE/OFFICE	13.2m ²
TOILET (4)	49.35m ²
FOYER	285.4m ²
EXIT LOBBY (2)	38.8m ²

Table 7.3-1 Area Program [Image Source: Author]

7.3.3. Views

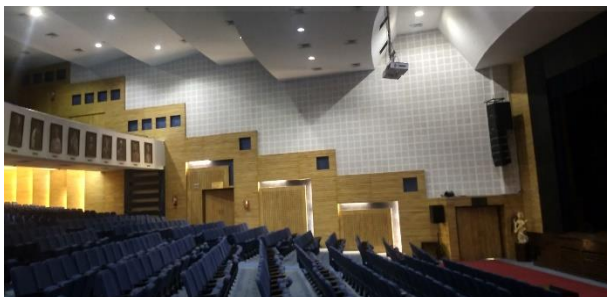


Fig. 7.3.4 Views [Image Source: Author]

7.4. INFERENCE








PARAMETERS	NCUI AUDITORIUM AND CONVENTION CENTRE	INDIA HABITAT CENTRE	DAVID L. LAWRENCE CONVENTION CENTRE	MAHATMA MANDIR CONVENTION CENTRE (DALY COLLEGE AUDITORIUM)	INFERENCE (FOR CONVENTION CENTRE AT UJJAIN)
LOCATION	New Delhi, India	New Delhi, India	Pittsburgh, USA	Gandhinagar, Gujarat, India	Ujjain Madhya Pradesh, India
CONCERN OF STUDY	Space programme, Flexibility of space, Acoustic materials, Facilities	Area Programme, Circulation, Services, Space programme, Landscape features.	Building Materials, Structure system, Green Building Features	Events conducted, Landscaping, Materials, Area Programme, User Study	Study of all mentioned building features and programme for implementation in project respecting restrictions
CAPACITY	2,672 Persons	16,372 Persons	37,368 Persons	15,000 Persons	As Per Requirement (1500)
SITE AREA	10,553.44 SQ.M.	5,3241 SQ.M.	1,39,394 SQ.M.	1,39,394 SQ.M.	37,000 SQ.M. (proposed)
BUILDING TYPE	Public Building	Public and Semi-public Building	Public and Semi-public Building	Public and Semi-public Building	Public and Semi-public Building
PROGRAM	Auditorium, Theatre, Seminar rooms, Conference Rooms, Meeting Rooms, Offices	Auditorium, Theatre, Meeting rooms, Offices, Art Galleries, Library, Restaurant, Member Facilities, Open and Covered Exhibition Areas	Auditorium, Theatre, Seminar Rooms, Meeting Rooms, Food Court, Lecture Halls, Exhibition Areas	Auditorium, Theatre, Seminar Rooms, Meeting Rooms, Food Court, Lecture Halls, Exhibition Areas	Selection of programme on the basis of requirement and capacity.
SITE PLANNING	Peripheral Movement of Vehicles, One building block, Presence of Lawn	Peripheral Movement of Vehicles, Built zoned into two blocks - Offices and Cultural, Masses connected by courts	More of a pedestrian movement, Programming respecting obstruction at ground floor, Form oriented planning	Vehicular movement at periphery, scattered masses of block, concept oriented planning	Planning with open spaces, peripheral movement of vehicles, form oriented planning (due to site conditions)
ARCHITECTURAL EXPRESSION	Use of sandstone as facade for pleasing appearance, Lower floors respond to human scale	Use of Materials and greenery to introduce humanizing scale to large project	Climate responsive form to reduce energy consumption with respect to lighting and cooling	Iconic design with minimalism for experiencing the concept of the project, modern architecture	Climate responsive form with minimum material to enhance the user experience
ZONING	Zoning on the basis of function	Zoning on the basis of function and user group	Zoning on the basis of function, Circulation and site conditions	Zoning on the basis of function and Circulation	Zoning on the basis of function, circulation and site conditions
PLAN FORM	Linear rooms with alternate entry as shown here 	Halls are provided at the corner zones of the plan 	Linear meeting rooms with entry to same corridor 	—	Linear meeting rooms as per concept grid
CIRCULATION	Linear circulation with direct access to convention halls 	Linear circulation with dead end convention hall resulting better wayfinding 	Linear circulation with zig-zag entry, chaos during functioning of adjacent halls 	—	Spline circulation to make interesting route for building experience 
GREEN BUILDING FEATURES	Climate responsive techniques adopted with allowing natural daylighting to lobbies.	Natural cooling by adapting appropriate landscaping, STP, Rooftop solar panels, Installation of LED Lights	Natural daylight, Water Reclamation system, Recycling solid waste, Natural Air Ventilation, Green Roof	Use of Heat Resistant materials, STP, Waste management.	Adapting climate responsive techniques with design introducing green roof, STP, Waste management, LED Lighting.

Fig. 7.4.1 Views [Image Source: Author]

8. AREA PROGRAMMING

SPACES	NO. OF UNITS	AREA PER PERSON	REQ. AREA (m ²)	PROVIDED AREA (M ²)	REMARKS
Basement parking	117 Cars	30	2970	4830	
Stilt parking (Front)	130 cars	25	4375	4647	
vip parking (Stilt)	22 cars			-	
restaurant/guest parking	33 cars			-	included in Stilt parking
Total no. of Car = 269			7345	9477	more than required i.e. 250
Open exhibition			APR	1850	
EXHIBITION HALL					
Lobby			535	845	
Exhibition hall	2000 ppl	0.8	1500	1850	
storage			30	195	
Multipurpose hall-1	175 ppl	2	300	300	
control room - security			100	130	
exhibition Toilet	APR			150	
Total			2465	3470	
STAFF					
staff mess	55 ppl	1.3	72	76	
staff changing/toilet-m	APR	0.4		140	PROVIDED FOR 50 PPL
Total			72	216	
SERVICE AREAS					
carpentry workshop			198	273.65	
plumbing workshop			100	212	
electrical workshop			91	303	
fire pump room			200	213	
dg room			300	360	
ahu room			18		included in AC Plant Room
ac plant room		295m ² on each fl	300	306.2	
kitchen store			60		Included in central kitchen-1
Total			1267	2378	
AUDITORIUM					
Lobby				385	
Seating Area	900 ppl	1.4	1260	1260	
Stage	8.5m height			125	
Administration					
Green Room (x2)	APR		APR	132	
Exit lobby	2 no.			20	
Vip Launge	APR		APR	130	including green room
Projection Room	APR		APR	45	
Toilets	APR		APR	123.3	
Total		1.4	1260	2220.3	
VIP					
vip prefunction (GF)			250	300	
vip lobby (ALL FLOOR)			85	1010	85 (Each)
vip tiolet (All Floor)	APR			201	all floor except basement
Total			335	1511	
GEN. PREFUNCTION					
General prefunction			265	300	
Toilet	APR			140	
Administration	11 offices		APR	331.2	Including back office area
organizers suite	APR		12	140	6 room, 1 suite
smoking area (x4)			18	24	
Total			295	935.2	

SPACES	NO. OF UNITS	AREA PER PERSON	REQ. AREA (m ²)	PROVIDED AREA (M ²)	REMARKS
RESTAURANT					
dining area	140 ppl	1.3	180	708	with mezzanine
flourist			APR		included in dining area
restaurant kitchen			120	432	
Restaurant toilet	apr			150	
Total			300	1290	
KITCHEN					
Central kitchen-1			260	567	AS PER STANDARD
deep refrigeration			60		included in C. Kitchen-1
Light refrigeration			35		included in C. Kitchen-1
Central kitchen-2			200	450	
central kitchen-3			200	450	
Receiving/weighing area	APR			90	
inspection office	4 no.		5		included in weighing area
Waste disposal	APR			46	included in C. Kitchen-1,2,3
Wash area					included in C. Kitchen-1,2,3
Total			760	1603	
MULTIPURPOSE HALL-3					
Multipurpose hall-3	150 ppl	2	250	300	
Toilet	APR			140	
disabled toilet	1			4.2	included in Toilet
Total				444.2	
CONFERENCE					
Lobby			90	373	Including guest lobby
Conference hall			76	200	
Total			166	573	
MULTIPURPOSE HALL-2					
Multipurpose hall-2	400 ppl	2	800	804	2 halls of 500m ²
storage			35	144.3	
Total			835	948.3	
MULTIPURPOSE HALL-4					
Multipurpose hall-4	150 ppl	2	250	300	
prefunction area			100	104	
toilet	APR			140	
disabled Toilet			APR		included in Toilet
Total			350	544	
RESTAURANT/BAR					
bar	50	1.5	75	500	Povided for 120
bBar Storage			220	432	
Total			295	932	
GRAND TOTAL (BUILTUP AREA)				28392	

Table 7.4-1 Proposed Area of spaces [Source: Author]

SITE AREA STATEMENT	VALUE	UNIT
PLOT AREA	36788	M ²
FAR	1	
PERMISSIBLE BUILTUP AREA	36788	M ²
PERMISSIBLE GROUND COVERAGE	30%	
PERMISSIBLE HEIGHT	12	M
ACHIEVED FAR	0.73	
PROPOSED GROUND COVERAGE (%)	23.03%	
PROPOSED BUILTUP AREA	28392	M ²

Table 7.4-2 Site Area Statement [Source: Author]

SPACE	NO. OF USERS
CONVENTION CAPACITY	3360
AUDITORIUM CAPACITY	900
RESTAURANT CAPACITY (ONE TIME)	340
TOTAL	4600

Table 7.4-3 Capacity statement [Source: Author]

9. DESIGN PROPOSAL

9.1. CONCEPT

The ultimate aim of this thesis is to design a Convention Centre accommodating required number of users with adequate space. The concept followed for achieving the aim is divided into 6 major features of the design i.e. Context, Materials, Structure, Landscape, Sustainability and function. The function is further divided into two categories as Circulation and Services as shown below.

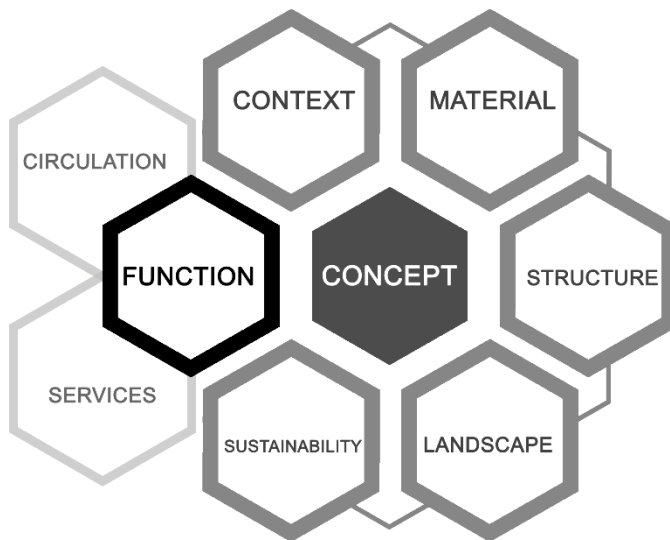


Fig. 9.1.1 Concept [Source: Author]

I. Materials

Design concept includes aesthetically pleasant appearance of the design. As aesthetics majorly depend on materials, some locally available, long lasting materials within approachable diameter of the site are shown in Figure below. One or more than one material as combination can be used for quality appear as well as for various climatic conditions.



Fig. 9.1.2 Material Palette [Source: Author]

II. Structure

The proposed design consists of combination of conventional and flat slab construction method along with truss system for auditorium roof. The roof is composite roof which is easy to install and durable as well. The structural grid adopted for conventional building is 4mx4m in which arrangement of spaces is shown in Fig. 9.1.3.

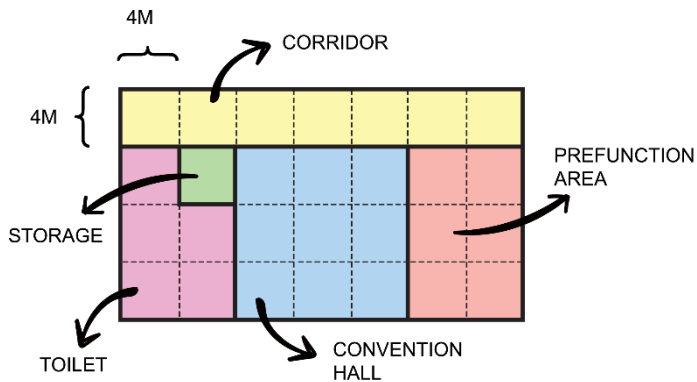


Fig. 9.1.3 Grid [Source: Author]

III. Landscape

The landscape feature is blessed by the existing vegetation of the site. Since the site has existing deciduous trees, the landscape concept is to retain the existing trees with provision of more deciduous trees respecting site planning. The type of trees and its provision and location depending on the purpose of the landscaping such that; trees with more height will be installed at northern side of the site to resist the unwanted cool northern wind in winters; shrubs at internal landscaping for pleasant environment; dense trees at south-west side of the site to prevent disturbances created by traffic and nearby factory; deciduous trees at periphery of the building block which will act as a sun shading devices (as they fall off their leaves in winter to allow sun and becomes dense in summers to block summer sun) over the façade.

IV. Sustainability

This feature is more emphasized by green roofs. As there is a requirement of open to air convention spaces, the provision of green roofs will be the best solution for attendee and environment as well. The green roof consists of various layers; roof deck, protection board, waterproof membrane, insulation, drainage layer, filter fabric, soil and then plants.

9.1.1. Special Features

- The provision of basement for the fulfillment of parking requirement.
- Peripheral movement of vehicles up to certain areas, while other corner of the site is kept for pedestrian circulation.
- Location of STP at the lowest point of the site to take advantage of natural slope.
- Separate pedestrian entry is provided for public reaching site by public transportation.
- Internal planning fulfilling the circulation requirement as well as privacy of public, semi-private and private spaces.
- The form is chosen such that there is a central courtyard at ground floor which is open to sky acting as a buffer space between private and public spaces. Also, can be utilized for conventional purpose.
- Service entry kept separated to prevent the circulation of public and vice versa.

9.2. SITE ZONING

Conceptual zoning of the site has been done by author keeping in mind the inferences from site analysis and literature study.

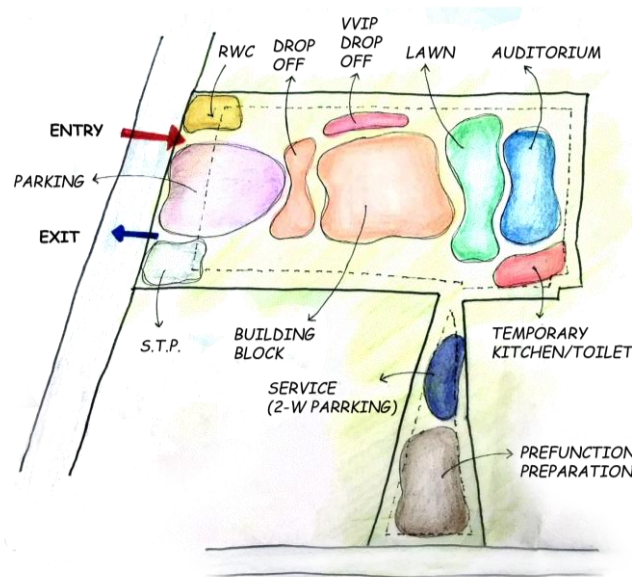
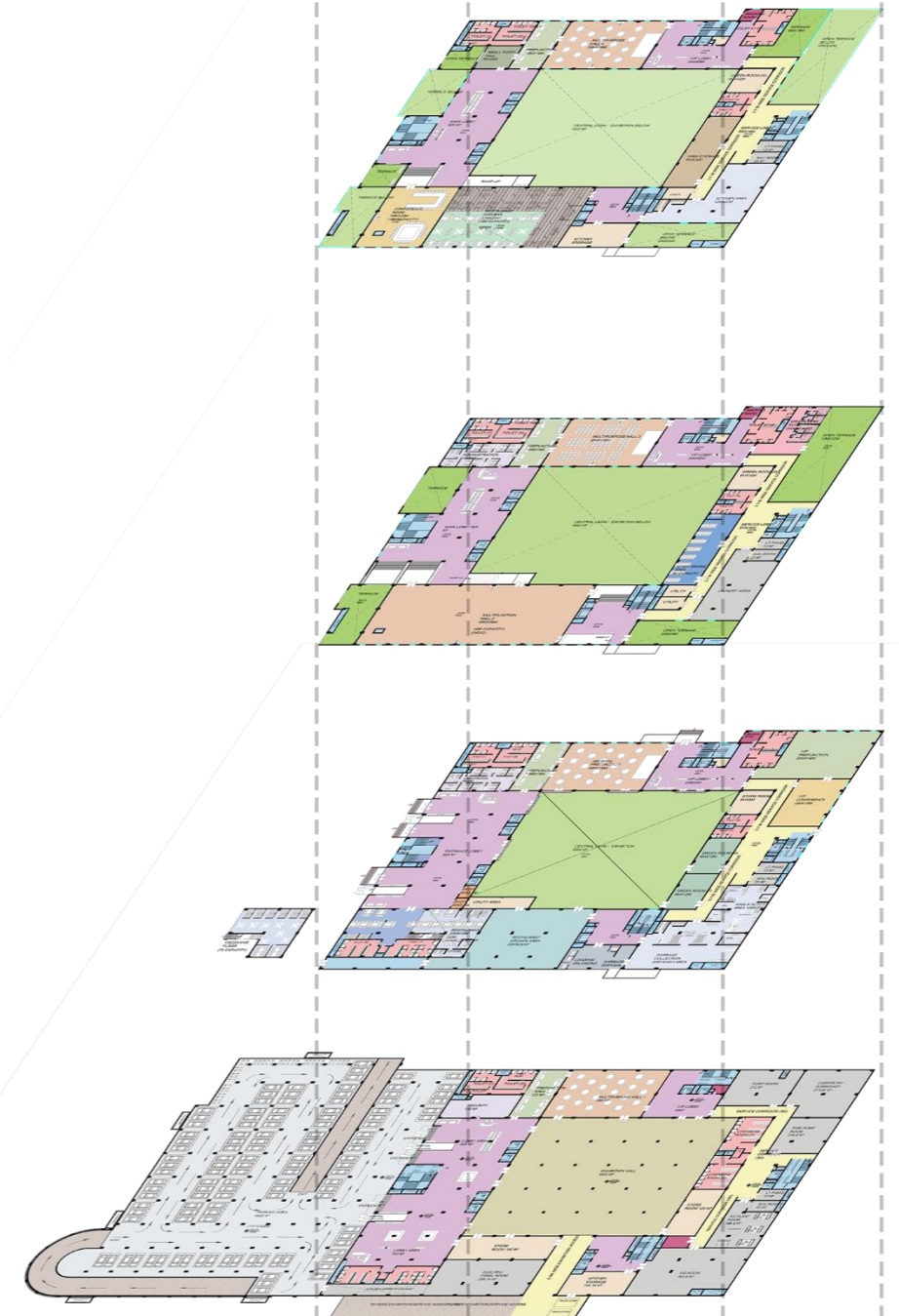
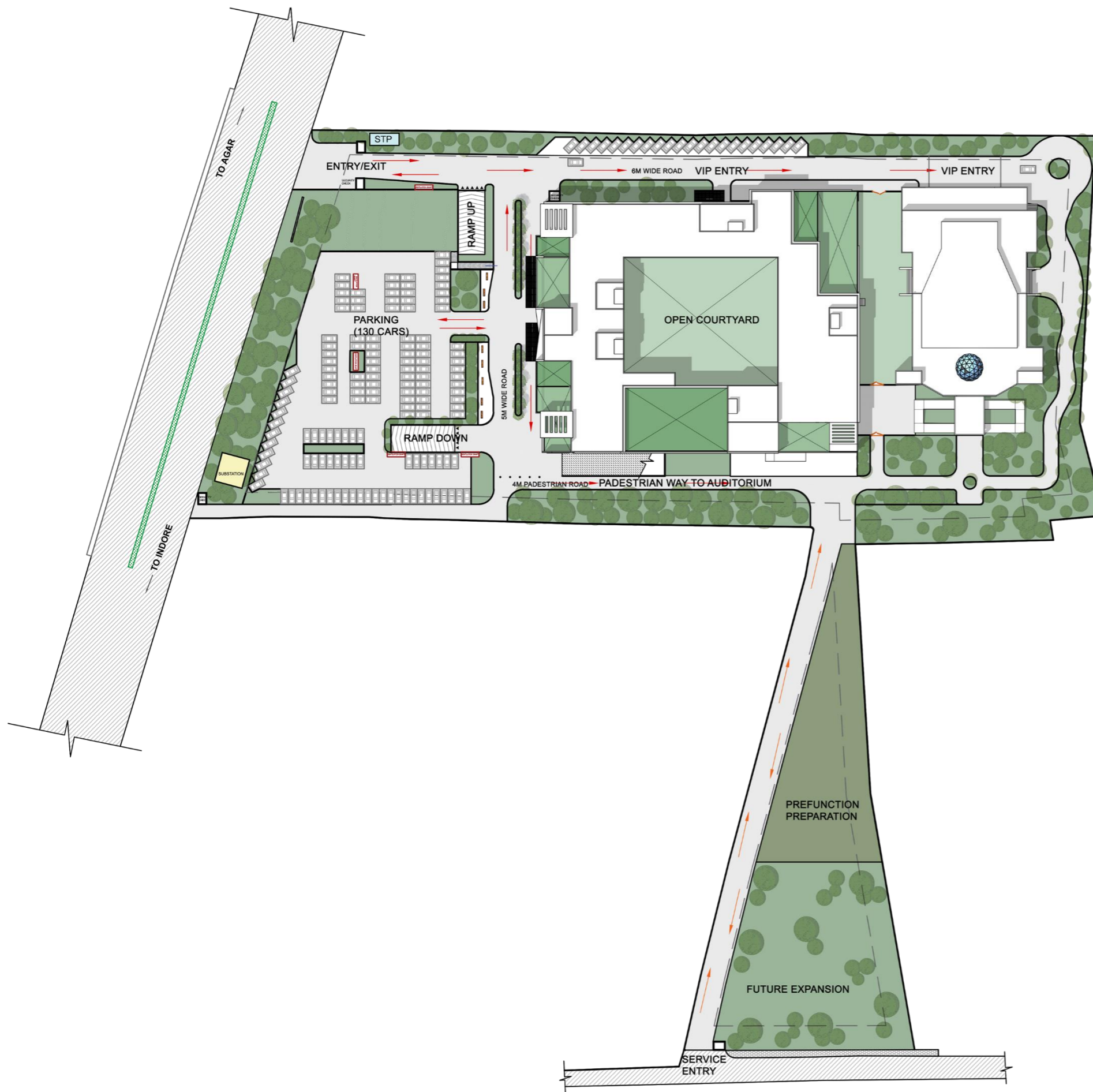


Fig. 9.2.1 Conceptual Site Zoning [Source: Author]

9.3. DETAIL DRAWINGS



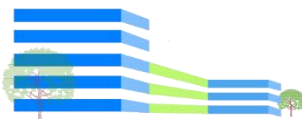
CONVENTION CENTER, UJJAIN
THESIS 2020

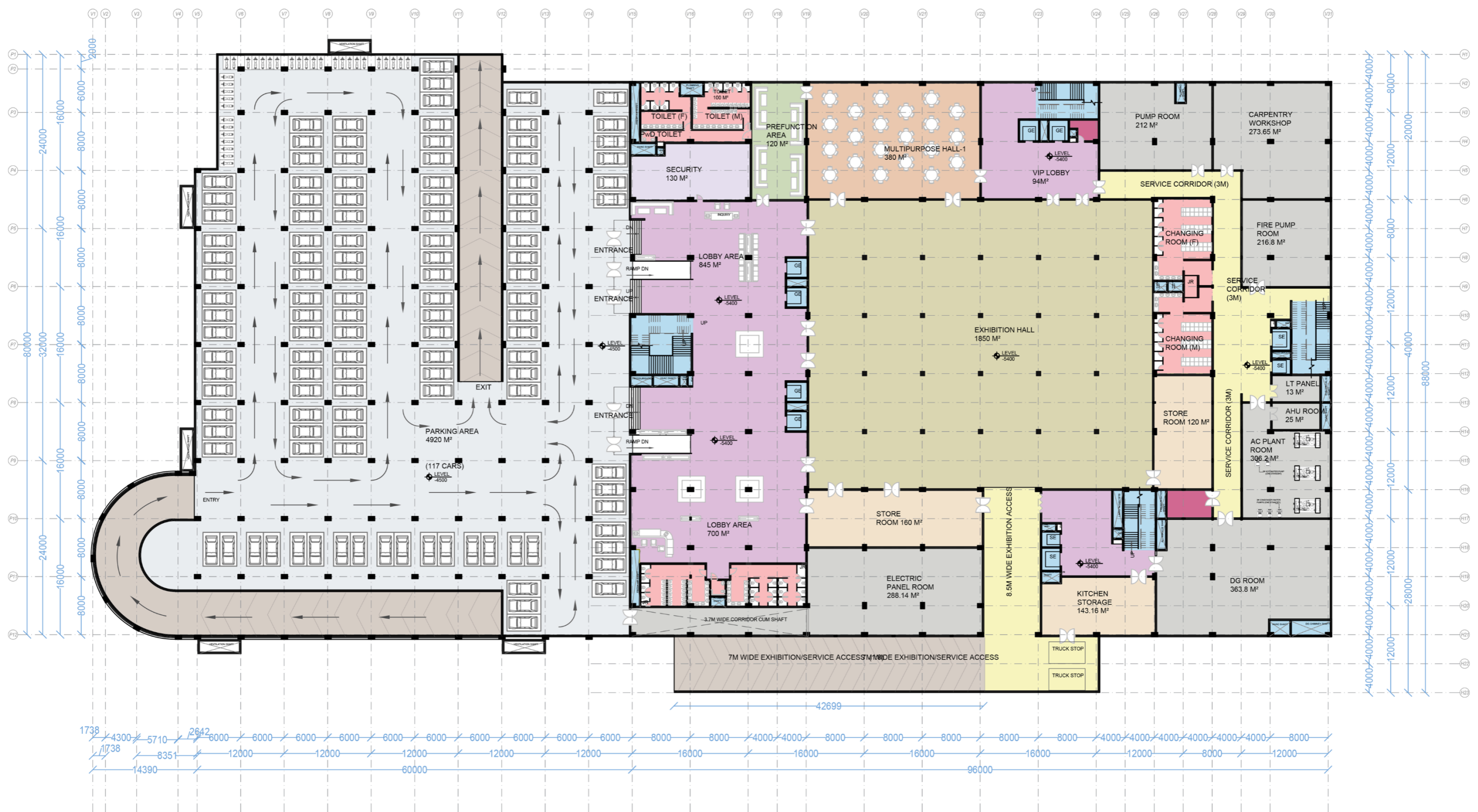
SITE PLAN



SHEET NO.
01

ROHIT PARMAR
 2015BARC007
 5TH YEAR. B.ARCH
SCHOOL OF PLANNING & ARCHITECTURE, BHOPAL





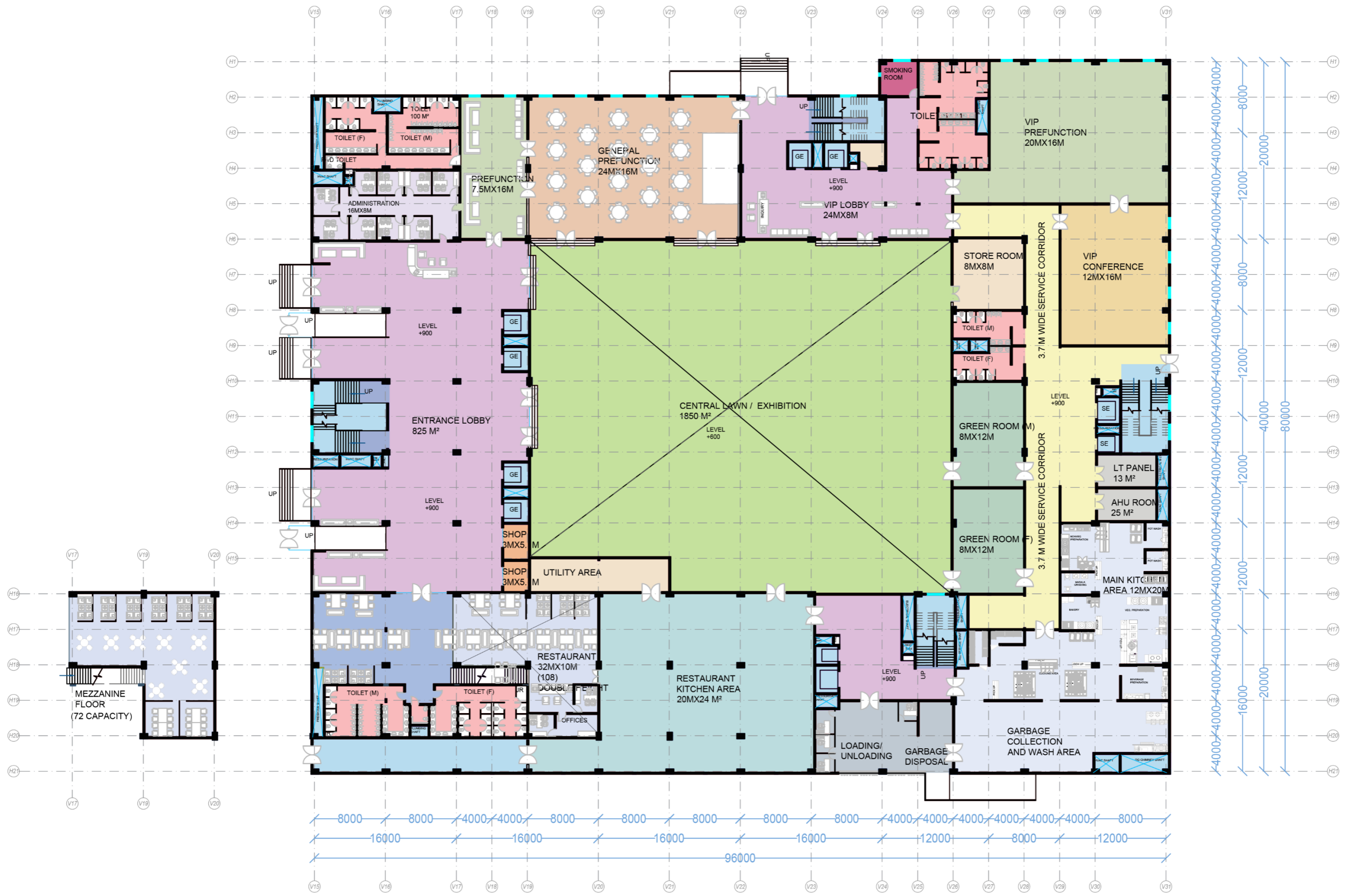
CONVENTION CENTER, UJJAIN
THESIS 2020

**BASEMENT
 FLOOR**



SHEET NO.
02

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SCHOOL OF PLANNING & ARCHITECTURE, BHOPAL



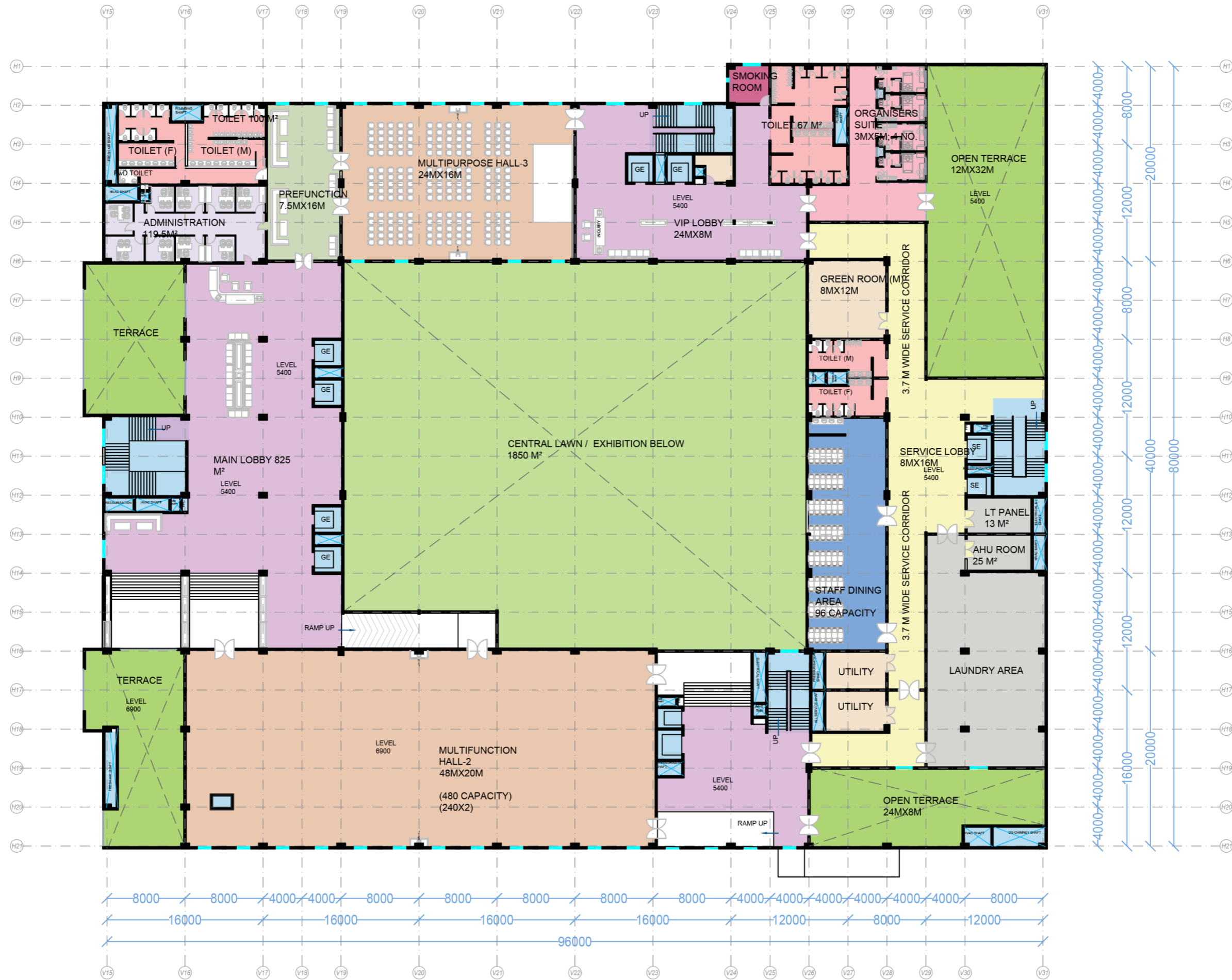
CONVENTION CENTER, UJJAIN
THESIS 2020

GROUND FLOOR



SHEET NO.
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SCHOOL OF PLANNING & ARCHITECTURE, BHOPAL



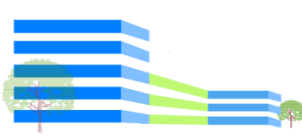
CONVENTION CENTER, UJJAIN
THESIS 2020

FIRST FLOOR



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SCHOOL OF PLANNING & ARCHITECTURE, BHOPAL



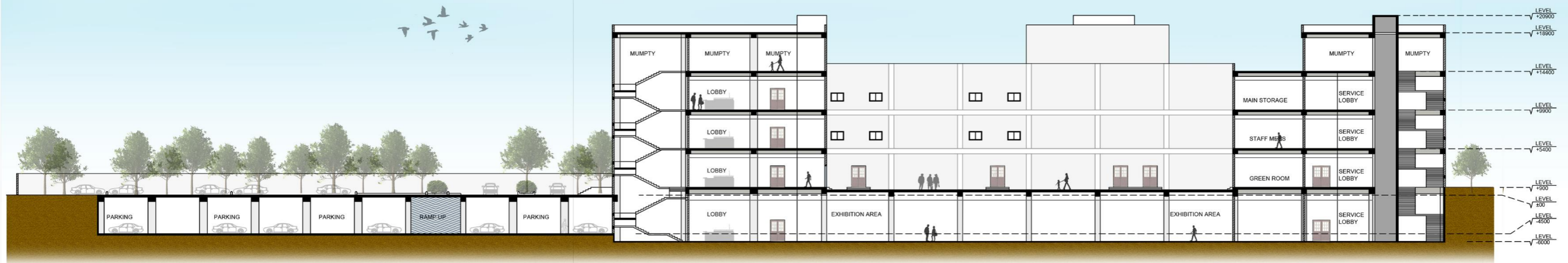
CONVENTION CENTER, UJJAIN
THESIS 2020

SECOND FLOOR

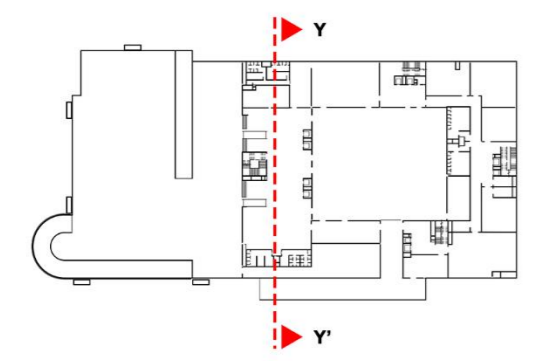
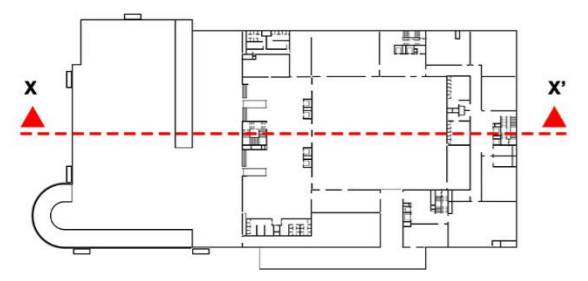


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2015BARC007
5TH YEAR. B.ARCH
SCHOOL OF PLANNING & ARCHITECTURE, BHOPAL



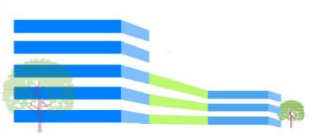
SECTION-XX'



KEY PLAN

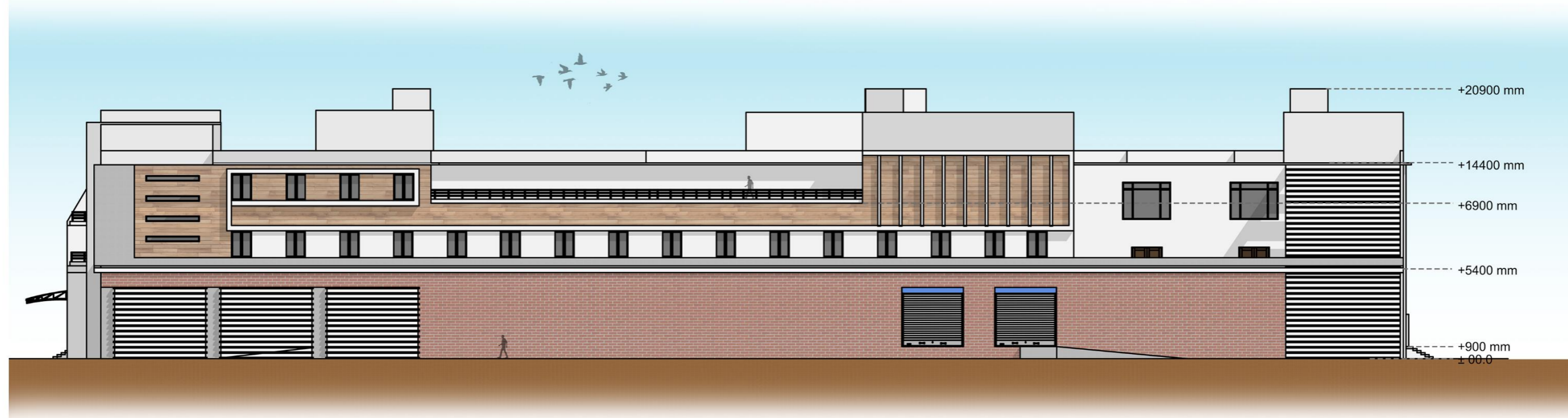


SECTION-YY'



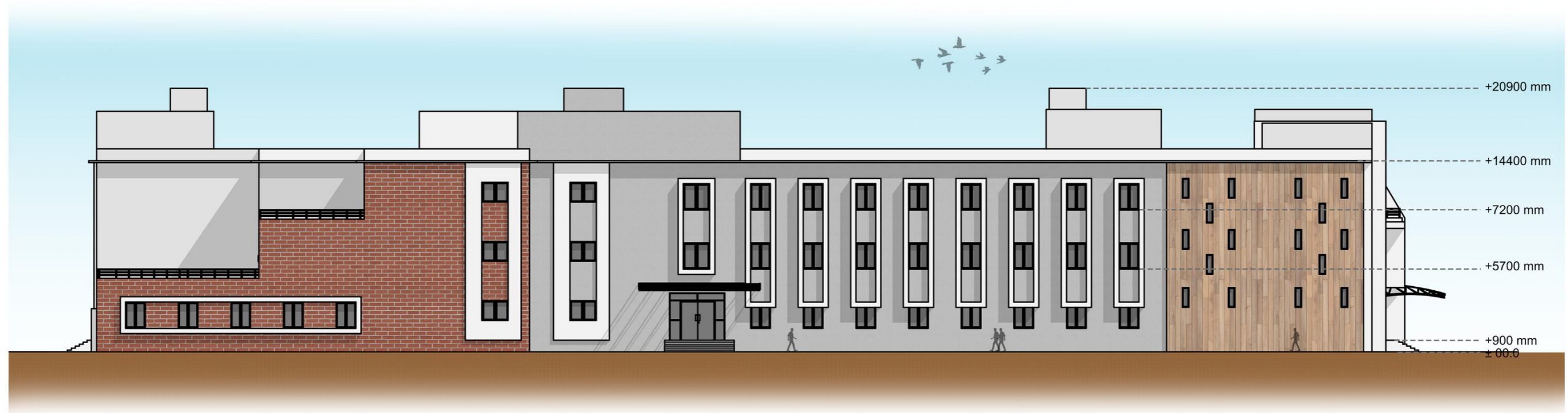


FRONT ELEVATION



RIGHT ELEVATION

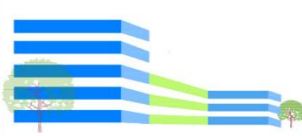




LEFT ELEVATION



BACK ELEVATION

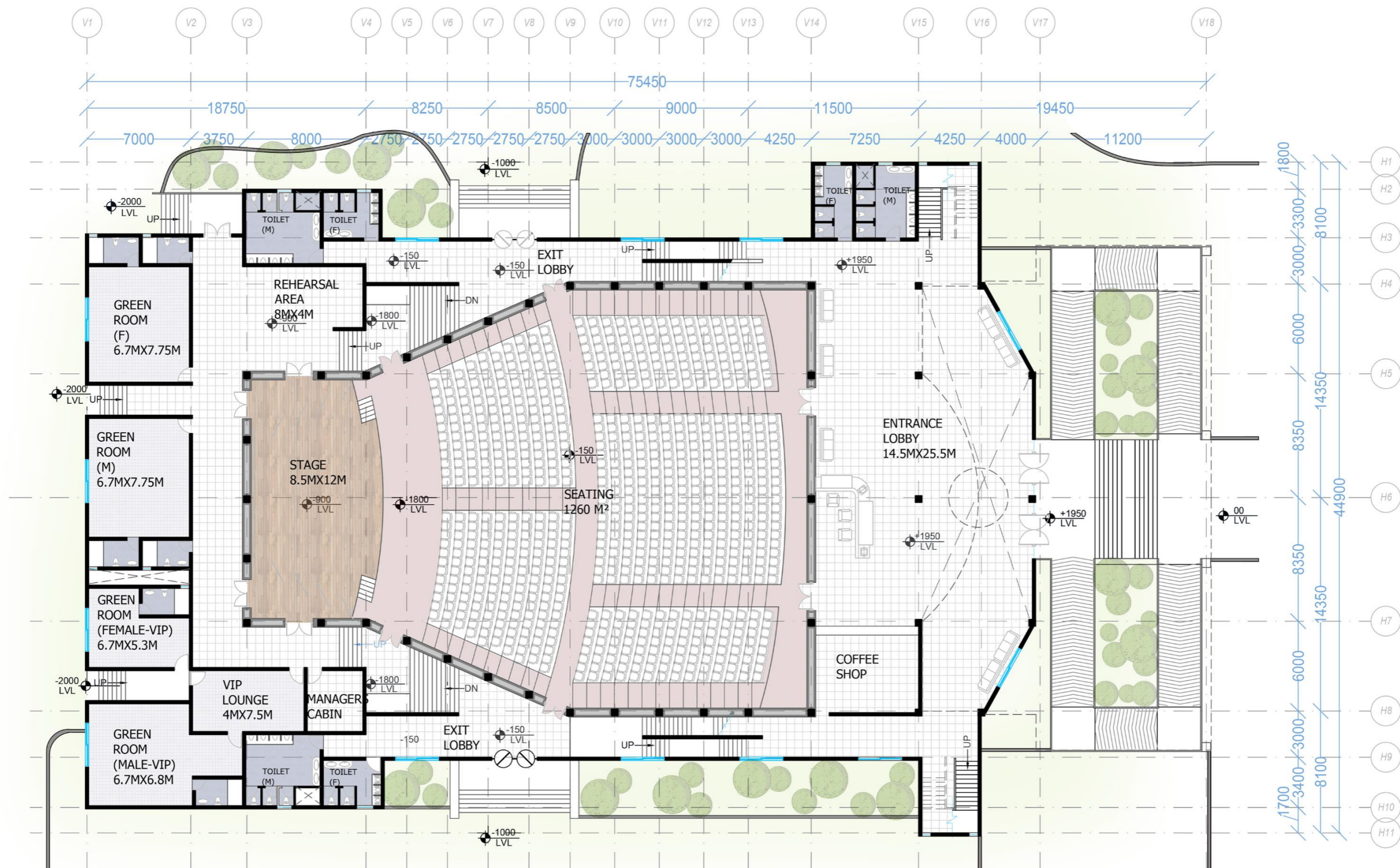


CONVENTION CENTER, UJJAIN
 THESIS 2020

ELEVATIONS

SHEET NO.
08

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 SCHOOL OF PLANNING & ARCHITECTURE, BHOPAL



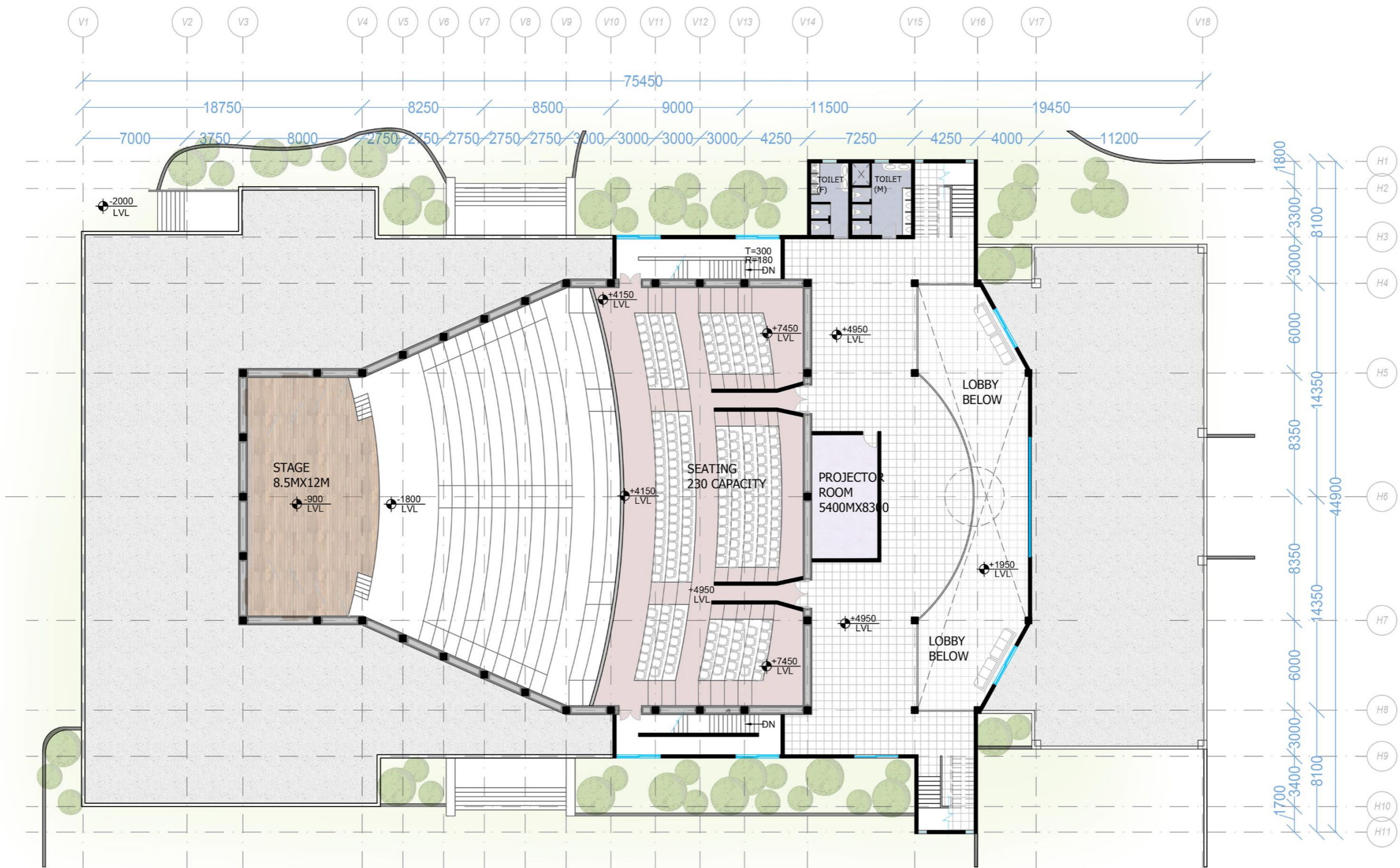
CONVENTION CENTER, UJJAIN
THESIS 2020

PLAN AT
 +3450MM



SHEET NO.
09

ROHIT PARMAR
 2015BARC007
 5TH YEAR. B.ARCH
SCHOOL OF PLANNING & ARCHITECTURE, BHOPAL



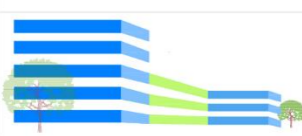
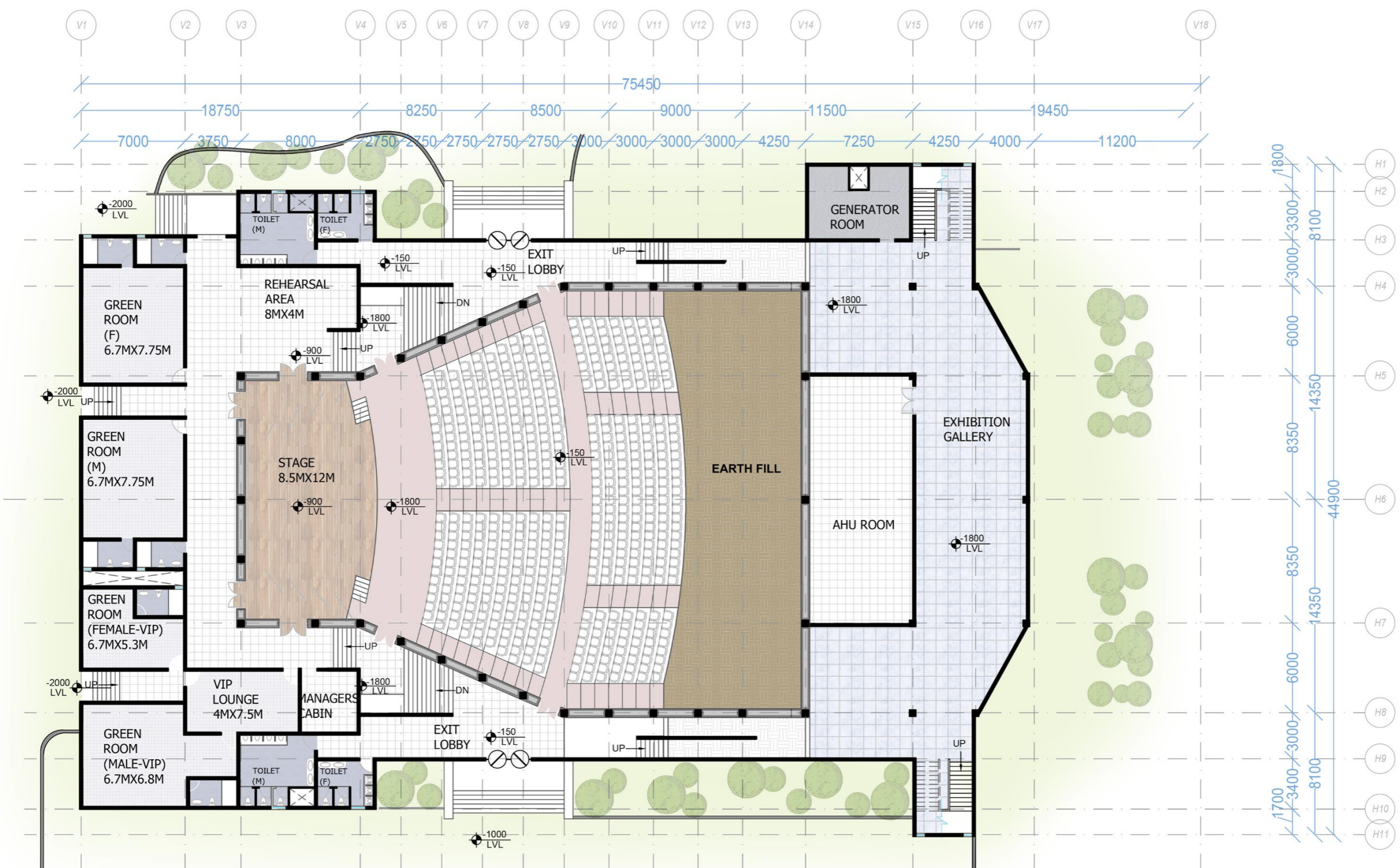
CONVENTION CENTER, UJJAIN
THESIS 2020

PLAN AT
 +7200MM



SHEET NO.
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ROHIT PARMAR
 2015BARC007
 5TH YEAR. B.ARCH
SCHOOL OF PLANNING & ARCHITECTURE, BHOPAL



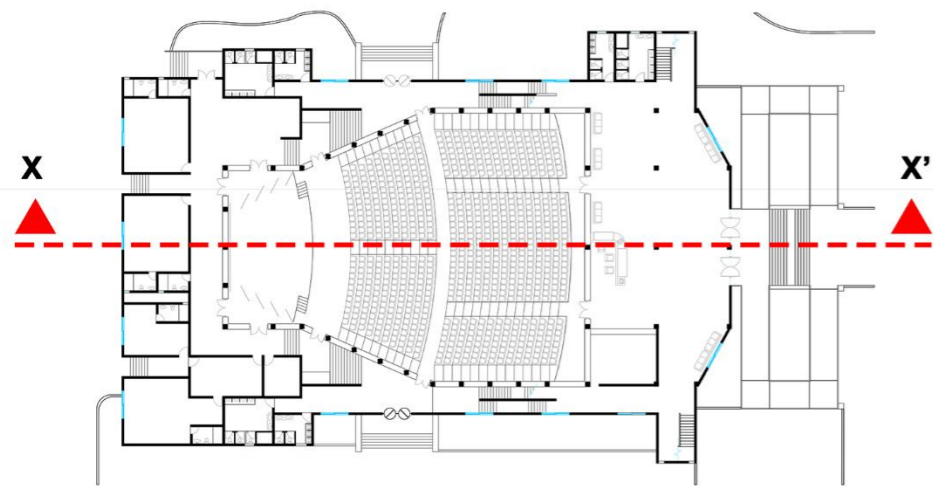
CONVENTION CENTER, UJJAIN
THESIS 2020

PLAN AT
 +2700MM

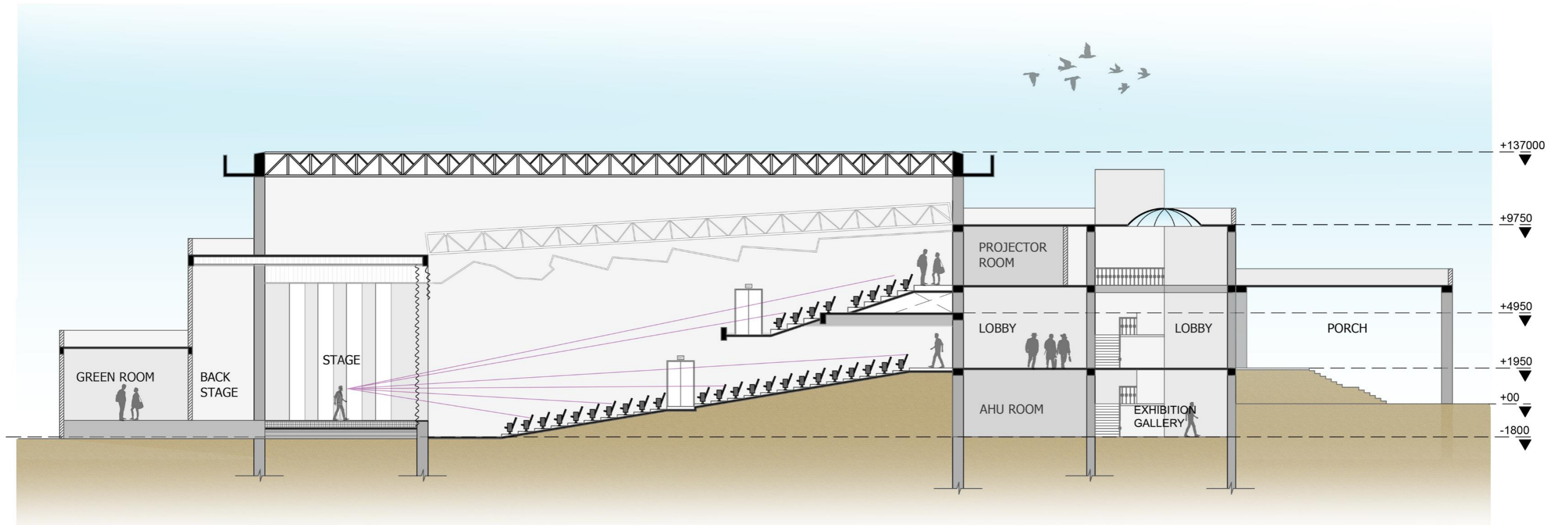


SHEET NO.
 11

ROHIT PARMAR
 2015BARC007
 5TH YEAR. B.ARCH
 SCHOOL OF PLANNING & ARCHITECTURE, BHOPAL



KEY PLAN

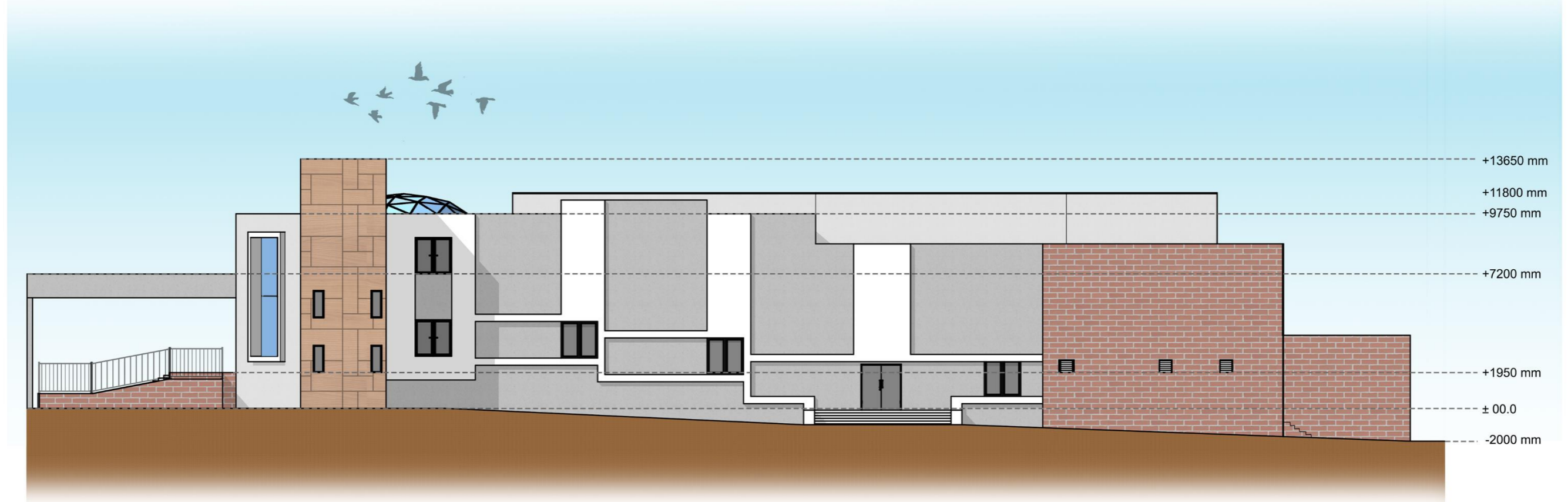


SECTION-XX'





FRONT ELEVATION



SIDE ELEVATION





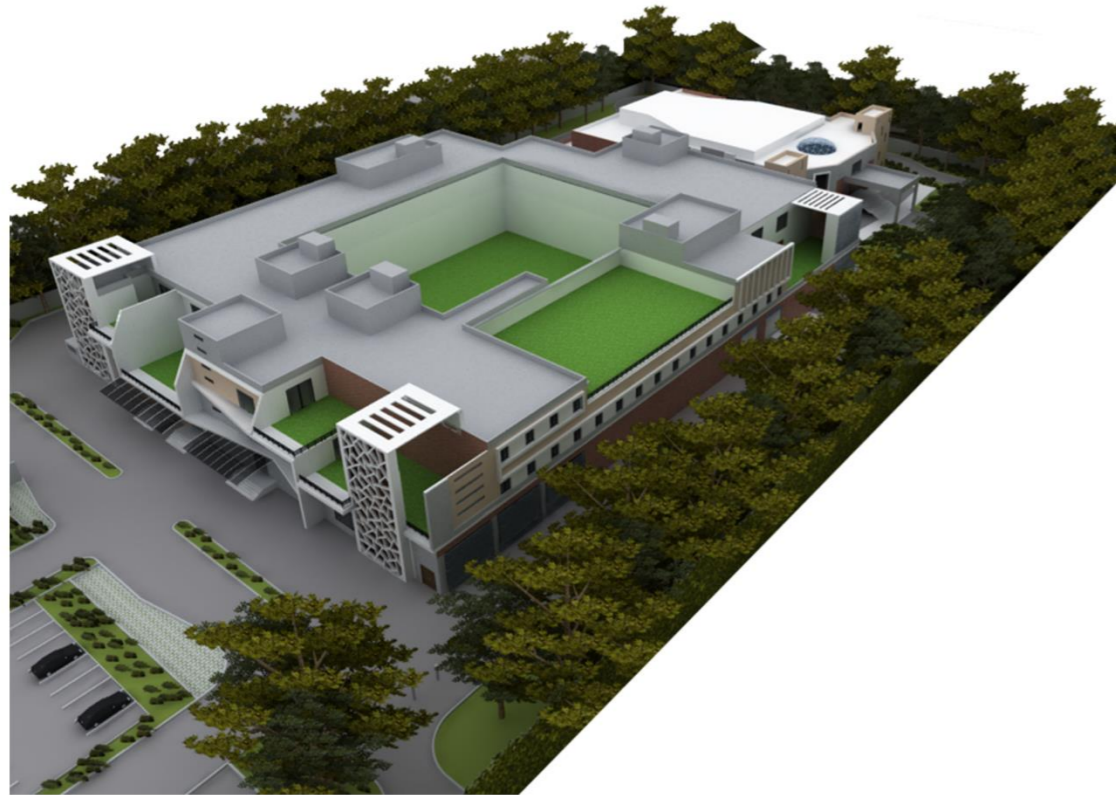
VIEW FROM PARKING



VIP ENTRANCE ROAD



AUDITORIUM



AERIAL VIEW



EXTERIOR SHAFT TREATMENT



BIRD EYE VIEW

10. ADVANCED OBJECTIVE (ACOUSTICS)

Auditorium Buildings are made for the purpose of entertainment (also lectures, dramatic plays, band, award ceremonies, musical theatre, orchestra, dance competitions etc.) and learning something new. Along with Functionality, aesthetics, sustainability and durability, Acoustics is the main factor considered during the initial design process of Auditoriums. Acoustics can be understood as the quality of sound for a better experience of the space allotted for the functioning of lectures, dramatic plays, band, award ceremonies, musical theatre, orchestra, dance competitions etc. It is that factor by which users feel comfortable in the acoustic environment. Hence, there is another definition of acoustics that, “A state of mind that expresses satisfaction with the acoustical environment”.

The acoustic quality of an auditorium is verified by parameters such as Early Decay Time (EDT), Reverberation Time (RT), Sound Distribution, Definition (D50), Clarity (C80), Sound Distribution, Speech Transmission Index (STI), Sound Pressure Level (SPL) and Sound Energy Propagation and distribution.

There have been many researchers conducted for the acoustic quality for an auditorium depending on its purpose (musical, Speech, Theatre etc.). Many studies are based on acoustic simulation by using acoustical simulation software. Barron M. & Kissner S. conducted research for potential acoustical design impendent for a multipurpose auditorium and two acoustical models were simulated using acoustical building simulation (Barron & Kissner, 2017). Navarro and Escola no presented the diffusion equation framework by enforcing various acoustic assumptions (Navarro & Escolano, 2015). Kwangbok Jeong and Taehoon Hong conducted a study in which they put their views on the acoustical design of a classical concert hall and evaluation of its acoustical parameters (Jeong & Hong, 2018). Another study aims to propose design recommendations for auditorium buildings projects using building simulation to increase acoustic quality (Gou & Lou, 2017). This study based on two corresponding studies to achieve the listed objectives.

10.1. NEED OF ACOUSTICS

Auditoriums are being used for a long time. It has been evolved from a basic plan as seen in our history to an enclosed space which can be seen in modern buildings. These are being designed to enhance the acoustic quality for a better experience of the indoor acoustic environment. There has been much concern that has been raised in the perception of architects because of the low-quality acoustics in auditoriums. The preponderance of echoes and reverberations with difficulty in hearing and perceiving to listener defeats the purpose of the auditorium and decreases its value. Hence, it can be stated that acoustics is the soul of auditoriums.

When a speaker spreads sound to the audience, it proceeds in the form of light rays as spherical waves. They continue to spread until they get impacted to the boundaries of the room. Here, the sound is distributed in 3

categories i.e. reflected, transmitted and absorbed. The amount of distribution on this sound wave depends upon the character of the surface on which it is striking. Smooth surface mostly reflects the sound wave and less absorbed and less transmitted. A porous or yielding surface distributed the incoming sound into more of transmission and absorption and less reflection. After striking with surfaced, the reflected sound wave gets diminished. Most of the sound is absorbed by the audience (and their body surface in an occupied room). Acoustics deal with the behaviour of sound waves of different frequencies towards the listener for improved hearing experience during the functioning of the auditoriums. Use of appropriate materials with the proper finish to control the defects and improve the quality of sound is the key fundamental of acoustics.

10.2. DESCRIPTION OF ACOUSTIC MATERIALS

Materials have a high impact on the acoustic quality of auditoriums. To achieve the acoustic performance of DALY College auditorium, there has been categorization of interior acoustic materials on the basis of its function as (i) Stage and (ii) Auditorium seating hall [See Table 10.2-1].

The stage of the multipurpose auditoria was designed firstly in such a way that it is elevated of 900mm from the lowest floor level for appropriate sight for viewers and distribution of sound as directly as possible. The sidewalls of the stage are designed linear. The stage ceiling has angle of 5°. The finish material for former was plyboard (75mm air gap) and later was glass wool tiles. The finish material for floor and the posterior wall was Wooden (Solid) and Plyboard, respectively.

Second, Auditorium seating hall prevents the formation of flutter echo by sidewalls, though the sound reflected from the rear wall can reach the front of the auditorium by travelling through reflections and transmissions (Kamisinski, 2010). Sound reflectors as plyboard were used at the lower part of the side walls in order to reflect incoming sound to the audience. The upper portion of sidewalls (above the height of 3m. from each step of seating row) are covered with glass wool tiles or gypsum acoustic tiles in the grid as sound absorbers. The floor of the seating area is covered by Carpet (lined) whereas the seating finish is observed to be of fabric. Also, the seating is upholstered seats with a fixed base. The ceiling of auditorium hall is treated with Plaster of Paris of 50mm suspended with roof truss. The ceiling is designed so that the sound is transmitted to the audience while functioning. Also, Sound waves are reflected towards audience by using large surfaces. Other than this, Soundproof doors are also treated as sidewalls of the auditorium to ensure the continuous reflections of sound along the entire wall.

Plan and section of the auditorium is shown in Fig. 7.3.2 and 7.3.3 respectively.

CLASS		FINISH MATERIALS
Stage	Floor	Wooden Floor (on Solid)
	Posterior wall	Plyboard (75mm Air gap)
	Ceiling	Glass wool Tiles
	Sidewall	Plyboard (75mm Air gap)
Auditorium	Wall (Lower Portion)	Plyboard (75mm Air gap)
	Wall (Upper Portion)	Glass wool Tiles
	Floor	Carpet (Lined)
	Ceiling	POP (50mm-suspended)
	Chair (seated)	Fabric
Other	Soundproof Door	Plyboard (75mm Air gap)

Table 10.2-1 List of Acoustic Materials [Source: Author]

10.3. DESIGN RECOMMENDATIONS

This research discovers some key findings which is recommended by the author while designing an auditorium in India. The recommendations were provided on the basis of the study of DALY college Auditorium which is located in Indore and has a capacity of 1100 persons with a volume of approximately 8969.8 m³. Following considerations are best for designing any auditorium in the same region and same capacity. The considerations are as follows:

I. Shape: On the basis of the study of fan shape auditorium, the posterior wall should be flat rather than concave or convex in shape. It will help the sound waves to reflect back in multidirectional dimension. According to Gou and Lau, the sound waves are accumulated at the foci of the concave posterior wall after reflection from the acoustic surfaces in auditorium. This collected sound energy will results in sound distortion, which should be avoided. The main reason is that the real wall is concave. This form should be avoided in auditorium design (Gou & Lou, 2017).

II. Reverberation Time: The reverberation time was simulated under the condition of occupied audiences. The standard reverberation time range was set between 1.4s to 1.7s which should be satisfied by the corresponding design. The reverberation time depends on acoustic material properties and mostly on absorption coefficients. Hence, the material palette of DALY College auditorium can be one of the design considerations while designing an auditorium. The following materials can be seen in Table 10.2-1, *Sound absorption coefficient by frequency band for the finish materials used for DALY College Auditorium*. Other materials with more efficient acoustical properties should be applied to the choice of designer.

III. Ceiling Height: The standard height for small auditoriums is 6m and for large halls, it is 7.5m (IS : 2526 - 1963). Ceiling height of the studied auditorium was measured to be 7.5m (average from the false ceiling). The studied auditorium was functioning well in terms of volume of the hall. Hence, it is recommended to keep ceiling height between 6m to 7.5 m.

IV. Clarity: The clarity aspect of the auditorium should be kept in mind while designing the auditorium. This factor depends on the choice of materials and their application with appropriate surface exposure. The interior design of DALY college Auditorium needs to be modified in terms of texture and surface exposure because it is observed that the surfaces are dull in texture. Hence, it is recommended to provide rough surfaces in interior material of the Auditorium.

11. REFERENCES

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WHAT IS CONVENTION ?



- Conventions are often planned and coordinated by professional meetings and convention planners, generally by the staff of the hosting company.
- Twenty First Century Convention centres are constructed and promoted by sponsorship of Global Tourism Industry, MICE.



REQUIRED SPACES

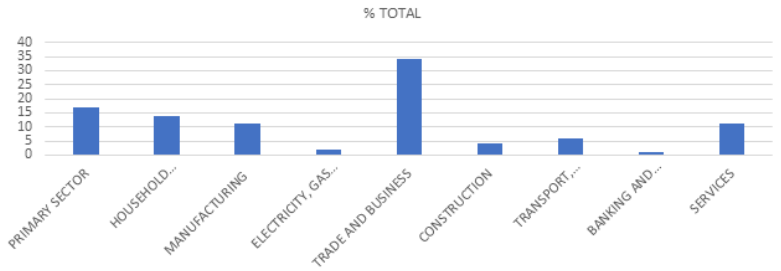


- Development of Convention Centers are increasingly being acknowledged by their role in stimulating local economics and improving quality of life of Nations' citizen. Conference and business tourism are very important sector of the global tourism industry.
- In order to accommodate the functions of business hub, technology and infrastructure should also be a major contributing factor.

NEED OF CONVENTION ?



Below graph from Ujjain Municipal Corporation shows the work profile of Ujjain city as marked in year 2001



- The strong religious and heritage image of the city has yet not been fully exploited. Ujjain has got a very high tourism potential and the local economy can get a boost if proper strategies are adopted.



PROJECT DESCRIPTION

Project Title	Convention Centre, Ujjain
Site Location	Samajik Nyay Parisar, Ujjain (M.p.)
Site Area	36,788 m ²
Built-up Area	36,788 m ²
Proposing Authority	Ujjain Smart City Limited (USCL)

- Site is situated at core of the city. Site is currently serving public administrative services and other cultural events in an open space.
- Site is surrounded by mixed land use i.e. commercial and residential buildings.

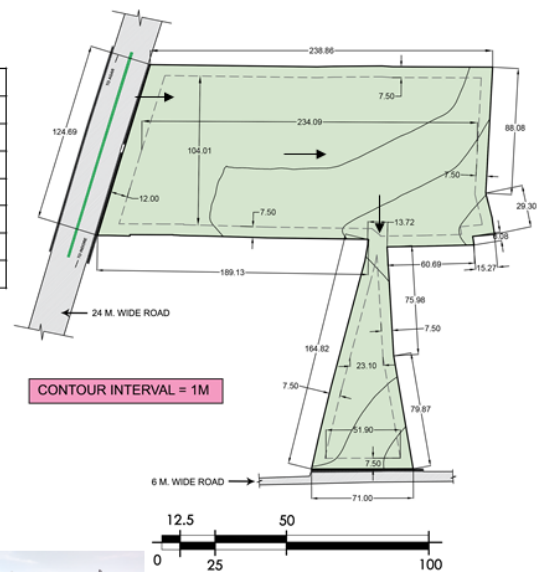
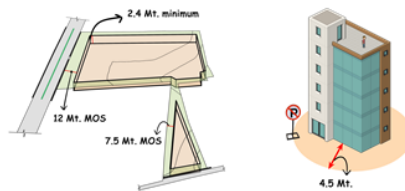
SITE BYE LAWS

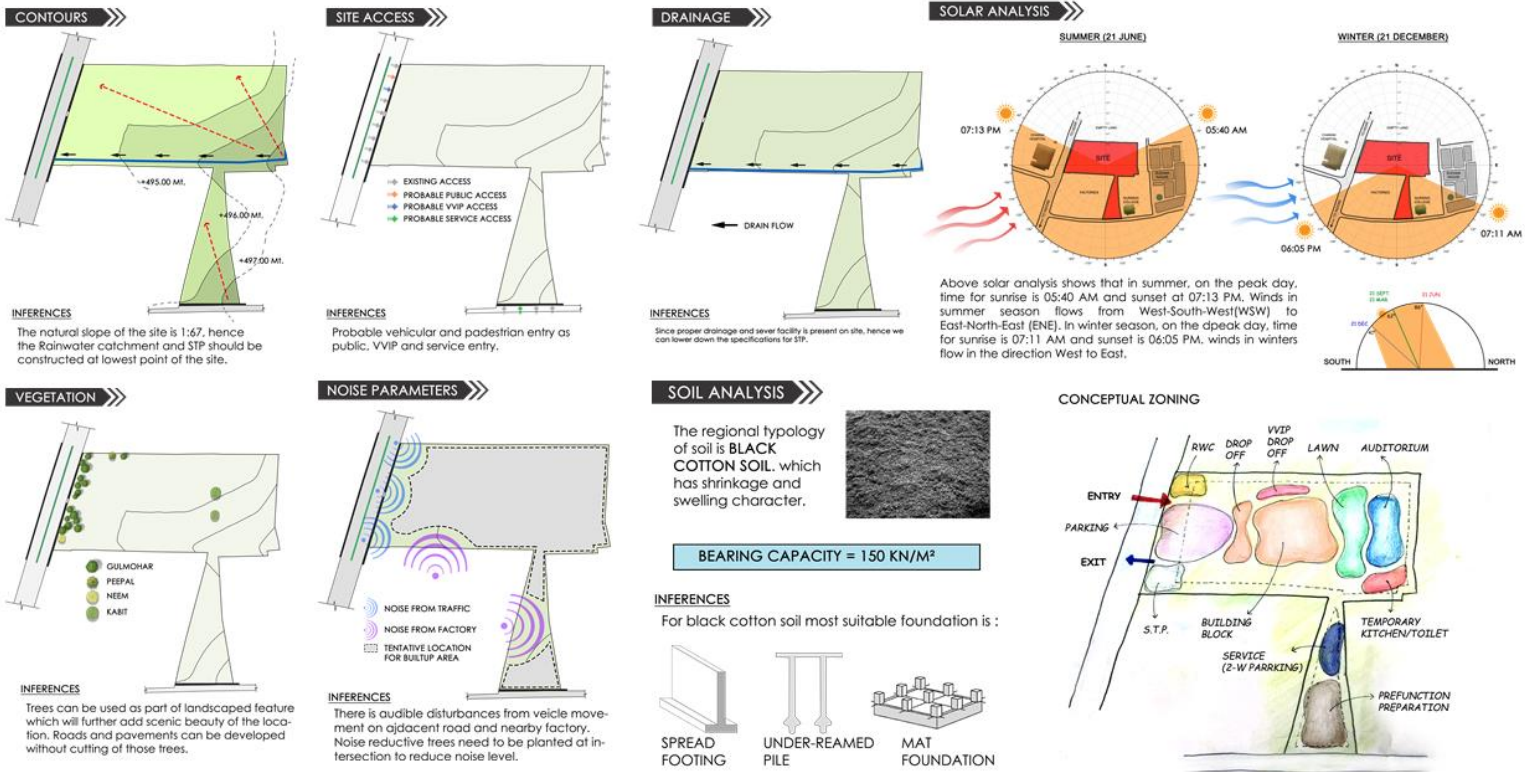
SITE AREA	36,788 m ²
F.A.R.	1
PERMISSIBLE BUILTUP	36,788 m ²
GROUND COVERAGE	30% (11,036.4 m ²)
PERMISSIBLE HEIGHT	30 m
FRONT M.O.S	12 m
REAR M.O.S	7.5 m
SIDE M.O.S	7.5 m

CONNECTIVITY TO AMENITIES



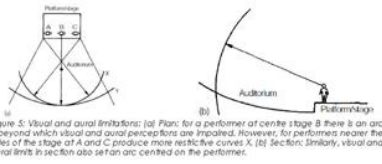
SITE AND SURROUNDING





PARAMETERS	NCUI AUDITORIUM AND CONVENTION CENTRE	INDIA HABITAT CENTRE	DAVID L. LAWRENCE CONVENTION CENTRE	MAHATMA MANDIR CONVENTION CENTRE (DALY COLLEGE AUDITORIUM)	INFERENCES (FOR CONVENTION CENTRE AT UJJAIN)
LOCATION	New Delhi, India	New Delhi, India	Pittsburgh, USA	Gandhinagar, Gujarat, India	Ujjain Madhya Pradesh, India
CONCERN OF STUDY	Space programme, Flexibility of space, Acoustic materials, Facilities	Area Programme, Circulation, Services, Space programme, Landscape features.	Building Materials, Structure system, Green Building Features	Events conducted, Landscaping, Materials, Area Programme, User Study	Study of all mentioned building features and programme for implementation in project respecting restrictions
CAPACITY	2,672 Persons	16,372 Persons	37,368 Persons	15,000 Persons	As Per Requirement (1500)
SITE AREA	10,553.44 SQ.M.	5,3241 SQ.M.	1,39,394 SQ.M.	1,39,394 SQ.M.	37,000 SQ.M. (proposed)
BUILDING TYPE	Public Building	Public and Semi-public Building	Public and Semi-public Building	Public and Semi-public Building	Public and Semi-public Building
PROGRAM	Auditorium, Theatre, Seminar rooms, Conference Rooms, Meeting Rooms, Offices	Auditorium, Theatre, Meeting rooms, Offices, Art Galleries, Library, Restaurant, Member Facilities, Open and Covered Exhibition Areas	Auditorium, Theatre, Seminar Roms, Meeting Rooms, Food Court, Lecture Halls, Exhibition Areas	Auditorium, Theatre, Seminar Roms, Meeting Rooms, Food Court, Lecture Halls, Exhibition Areas	Selection of programme on the basis of requirement and capacity.
SITE PLANNING	Peripheral Movement of Vehicles, One building block, Presence of Lawn	Peripheral Movement of Vehicles, Built zoned into two blocks - Offices and Cultural, Masses connected by courts	More of a pedestrian movement, Programming respecting obstruction at ground floor, Form oriented planning	Vehicular movement at peripheri, scattered masses of block, concept oriented planning	Planning with open spaces, peripheral movement of vehicles, form oriented planning (due to site conditions)
ARCHITECTURAL EXPRESSION	Use of sandstone as facade for pleasing appearance, Lower floors respond to human scale	Use of Materials and greenary to introduce humanizing scale to large project	Climate responsive form to reduce energy consumption with respect to lighting and cooling	Iconic design with minimalism for experiencing the concept of the project, modern architecture	Climate responsive form with minimum material to enhance the user experience
ZONING	Zoning on the basis of function	Zoning on the basis of function and user group	Zoning on the basis of function, Circulation and site conditions	Zoning on the basis of function and Circulation	Zoning on the basis of function, circulation and site conditions
PLAN FORM	Linear rooms with alternate entry as shown here	Halls are provided at the corner zones of the plan	Linear meeting rooms with entry to same corridor	—	Linear meeting rooms as per concept grid
CIRCULATION	Linear circulation with direct access to convention halls	Linear circulation with dead end convention hall resulting better wayfinding	Linear circulation with zig-zag entry, chaos during functioning of adjacent halls	—	Spline circulation to make interesting route for building experience
GREEN BUILDING FEATURES	Climate responsive techniques adopted with allowing natural daylighting to lobbies.	Natural cooling by adapting appropriate landscaping, STP, Rooftop solar panels, Installation of LED Lights	Natural daylight, Water Reclamation system, Recycling solid waste, Natural Air Ventilation, Green Roof	Use of Heat Resistant materials, STP, Waste management.	Adapting climate responsive techniques with design introducing green roof, STP, Waste management, LED Lighting.

AUDITORIUM



SEATING DENSITY

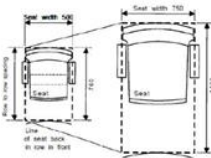


Figure 9: Seating density, from 0.38 m² to 1.0.5 m² per person

SIGHTLINES FOR SEATED AUDIENCE

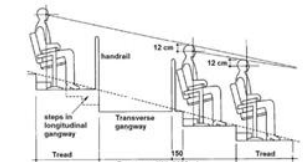


Figure 10: Graphic representation of vertical sightlines of a transversal gangway

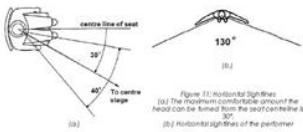


Figure 11: Horizontal sightlines. (a) The maximum comfortable amount the head can be turned from the left to the right is 30°. (b) Horizontal sightlines of the performer

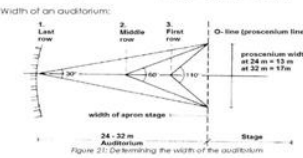
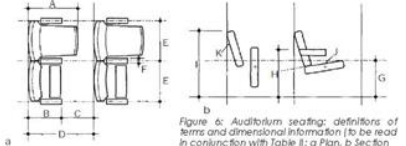


Figure 21: Determining the width of the auditorium

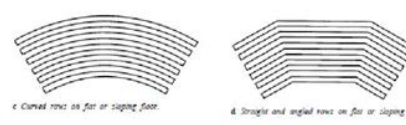
SEATING



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

SEATING GEOMETRY



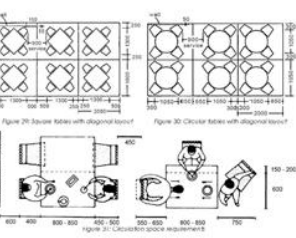
CONFERENCE ROOM

Type	Description	Layout
1. Unseated	• Seating around perimeter of the room. • It is good for presentations from front. • Presentation space in the middle of the room. • Can be used for up to 30 persons. • Per seat area is 3.25m ² .	
2. Boardroom style	• Centrally located table. • Classic board style for decisions and discussion. • Seating capacity 5-30 persons. • Per seat area is 3.7m ² .	
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 1.57m ² .	
4. Theater style	• Used for product launches, presentations, displays. • Used to present to large numbers of delegates. • Can be used for 500-250 persons. • Per seat area is 0.85 m ² .	

Figure 22: Seating standards for a conference table

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

RESTAURANT



LIFT/ELEVATORS

TYPE	CAPACITY/LOAD Person/Kg	SHAFT SIZE mm	CAR SIZE mm	DOOR mm	PIT mm
General Purpose Passenger Traffic (Speed:1m/s) (GE)	21/1600	2600x2800	1950x1750	1100	1900
General Purpose Goods Lift, Electric Traction (Speed:1m/s) (SE)	13/1000	2100x2500	1400x1800	1400	1500
Heavy Duty Goods, Electric Traction (SE)	26/2000	2900x2500	2000x2100	1800	1500

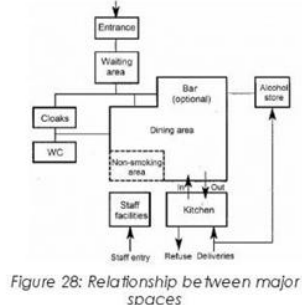


Figure 28: Relationship between major spaces

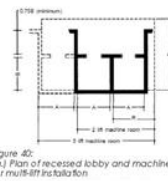
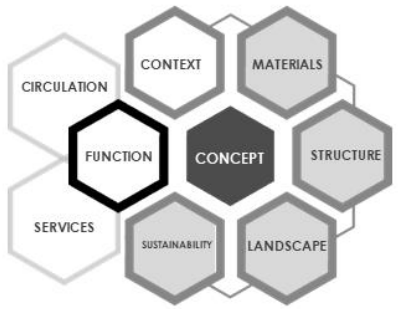
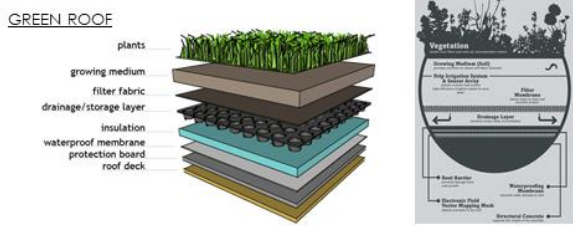


Figure 40: Plan of recessed lobby and machine room for multi-RIT installation

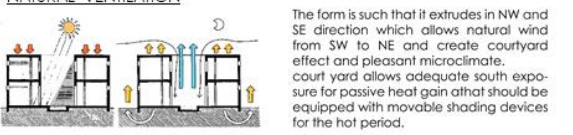
MATERIALS



SUSTAINABILITY

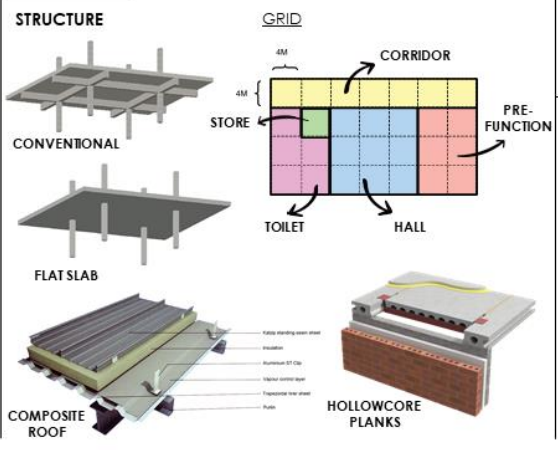


NATURAL VENTILATION

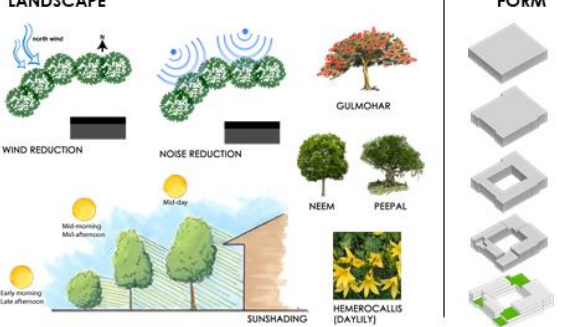


The form is such that it extrudes in NW and SE direction which allows natural wind from SW to NE and create courtyard effect and pleasant microclimate. courtyard allows adequate south exposure for passive heat gain that should be equipped with movable shading devices for the hot period.

ACOUSTIC MATERIALS

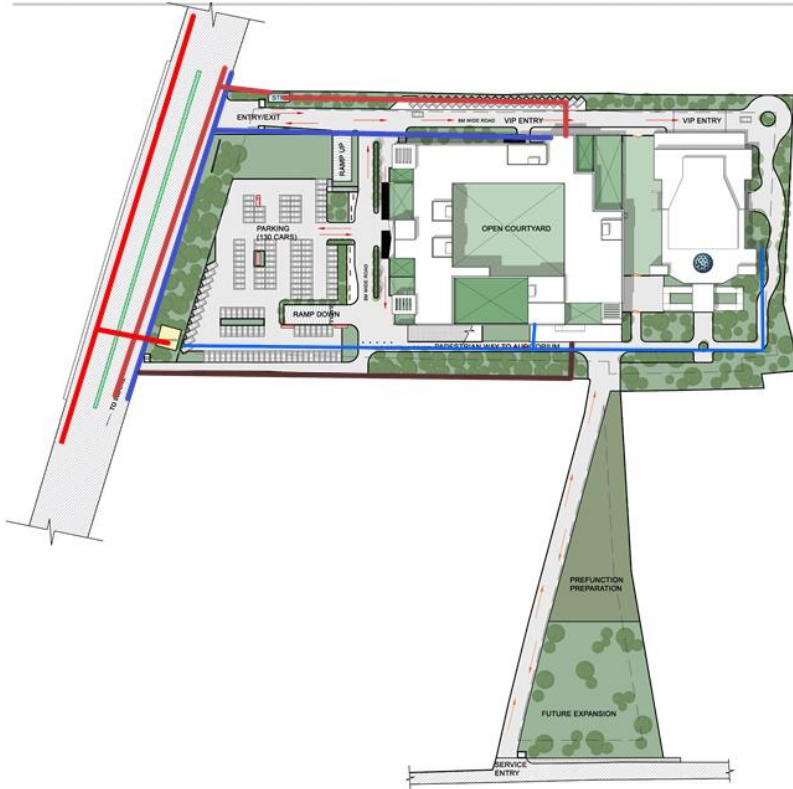


LANDSCAPE



FORM

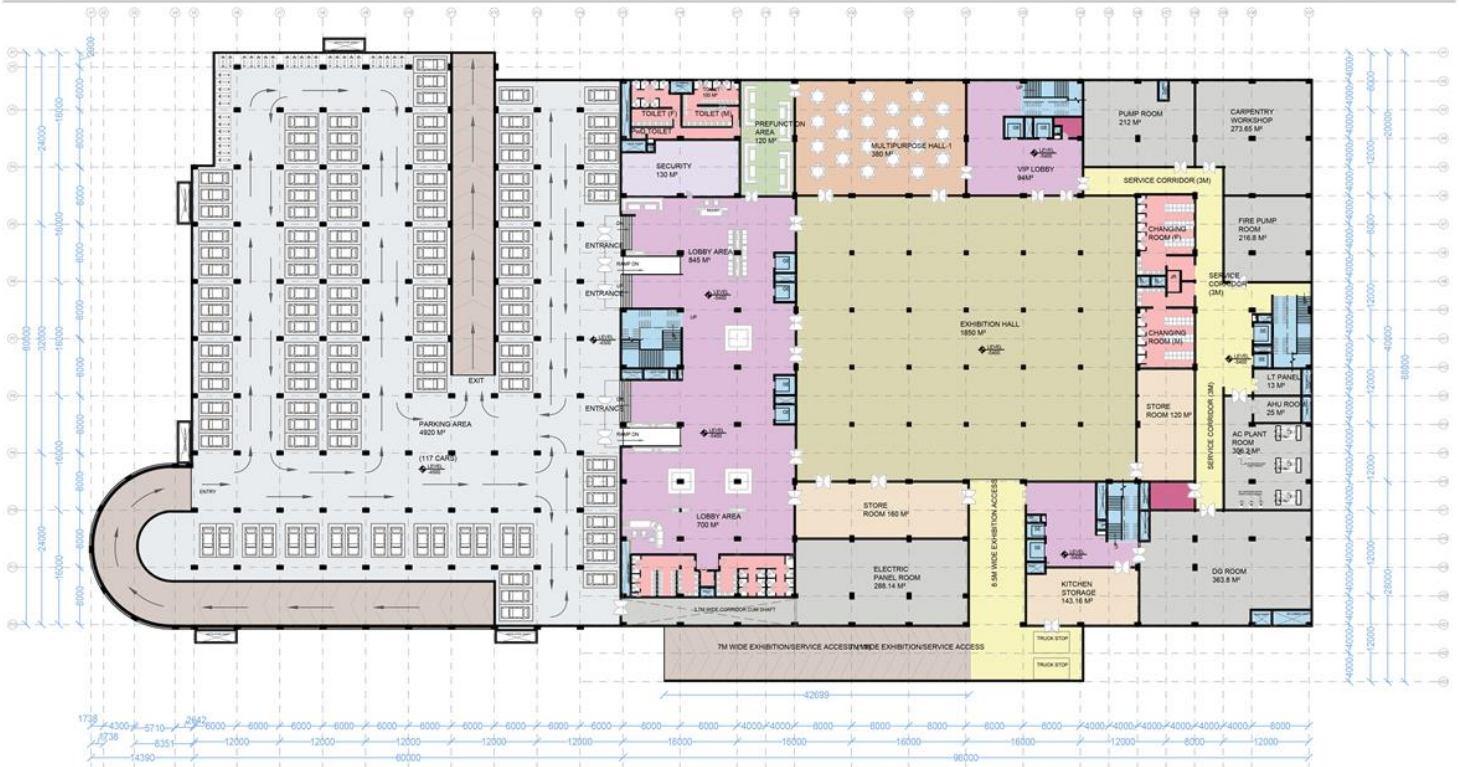
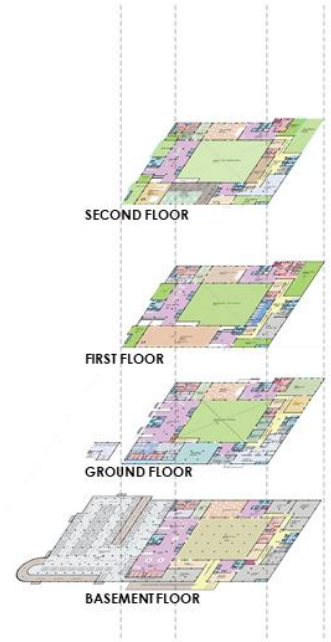


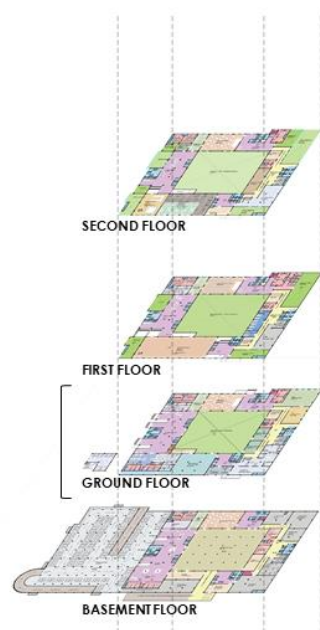


SITE AREA STATEMENT	VALUE	UNIT
PLOT AREA	36788	M ²
FAR	1	
PERMISSIBLE BUILTUP AREA	36788	M ²
PERMISSIBLE GROUND COVERAGE	30%	
PERMISSIBLE HEIGHT	12	M
ACHIEVED FAR	0.73	
PROPOSED GROUND COVERAGE (%)	23.03%	
PROPOSED BUILTUP AREA	28392	M ²

PARKING FACILITY	NO. OF CARS
BASEMENT PARKING	117
STILT PARKING (PUBLIC)	130
VIP STILT PARKING	22
TOTAL	269

SPACE	NO. OF USERS
CONVENTION CAPACITY	3360
AUDITORIUM CAPACITY	900
RESTAURANT CAPACITY (ONE TIME)	340
TOTAL	4600



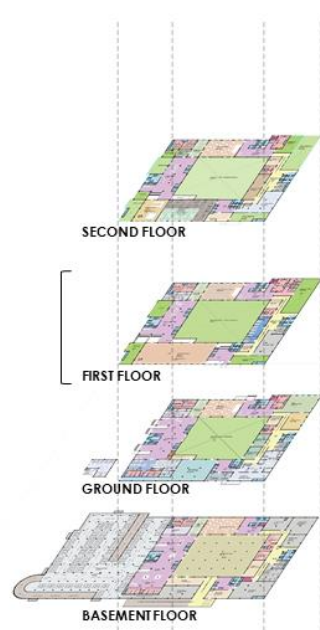


09 CONVENTOIN CENTRE, UJJAIN

GROUND FLOOR PLAN



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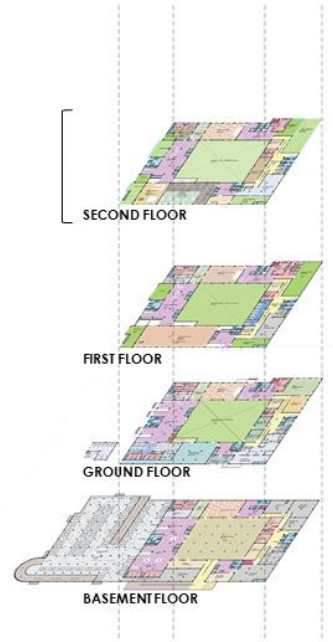


10 CONVENTOIN CENTRE, UJJAIN

FIRST FLOOR PLAN



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11 CONVENTOIN CENTRE, UJJAIN

SECOND FLOOR PLAN



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12 CONVENTOIN CENTRE, UJJAIN

SECTIONS



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FRONT ELEVATION



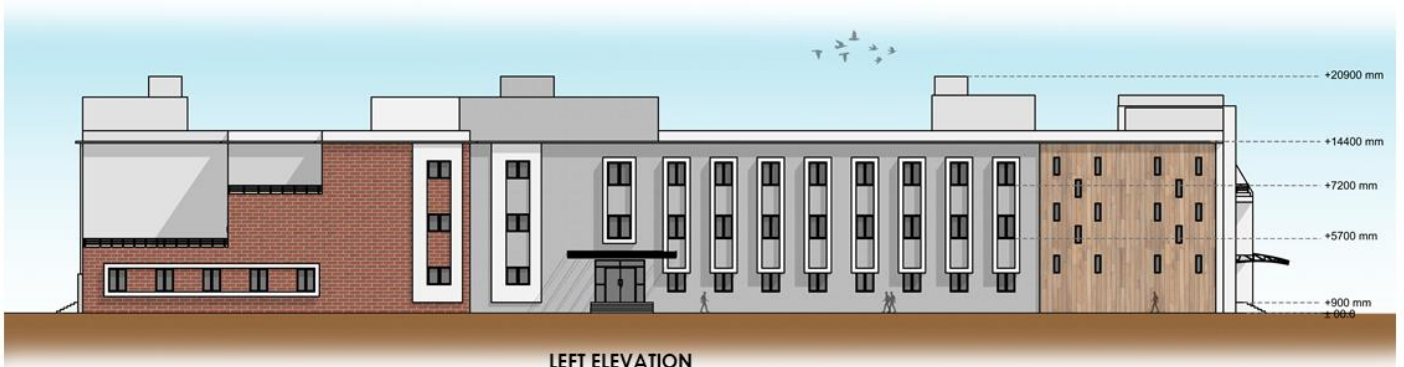
RIGHT ELEVATION

13(a) CONVENTOIN CENTRE, UJJAIN

ELEVATIONS



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LEFT ELEVATION



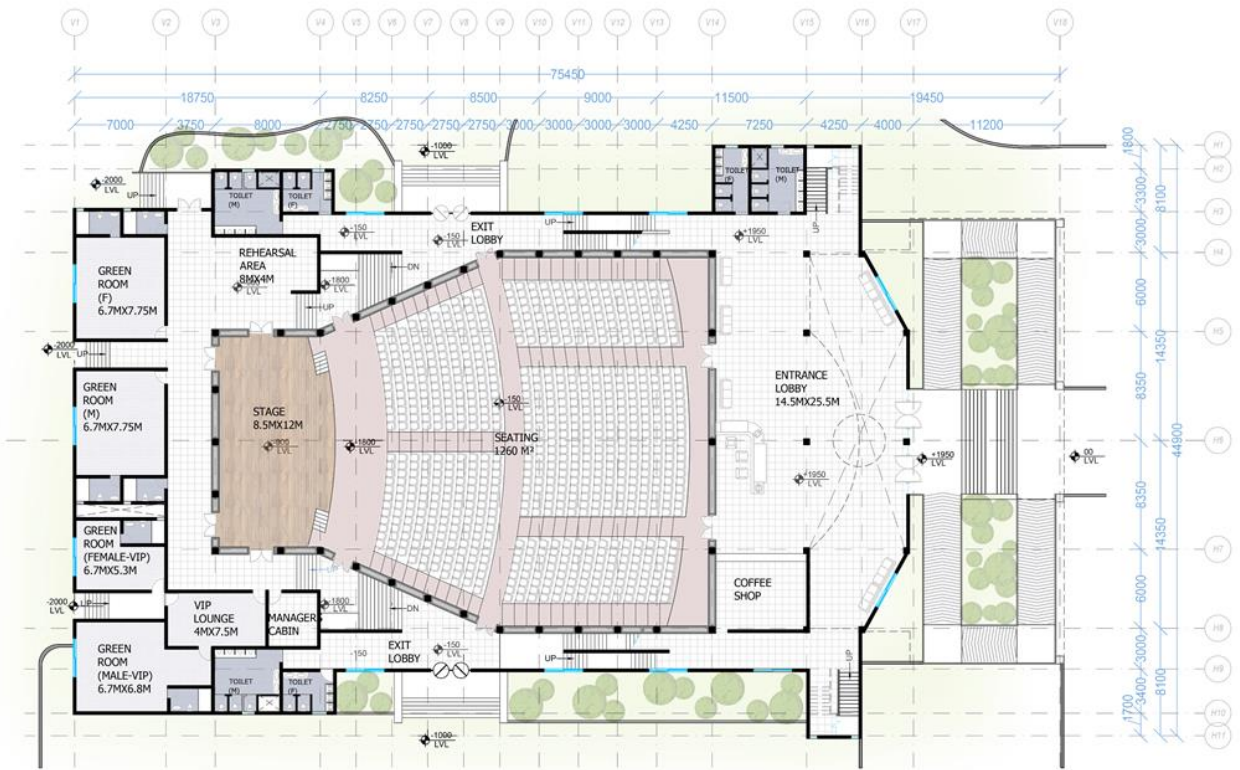
BACK ELEVATION

13 (b) CONVENTOIN CENTRE, UJJAIN

ELEVATIONS



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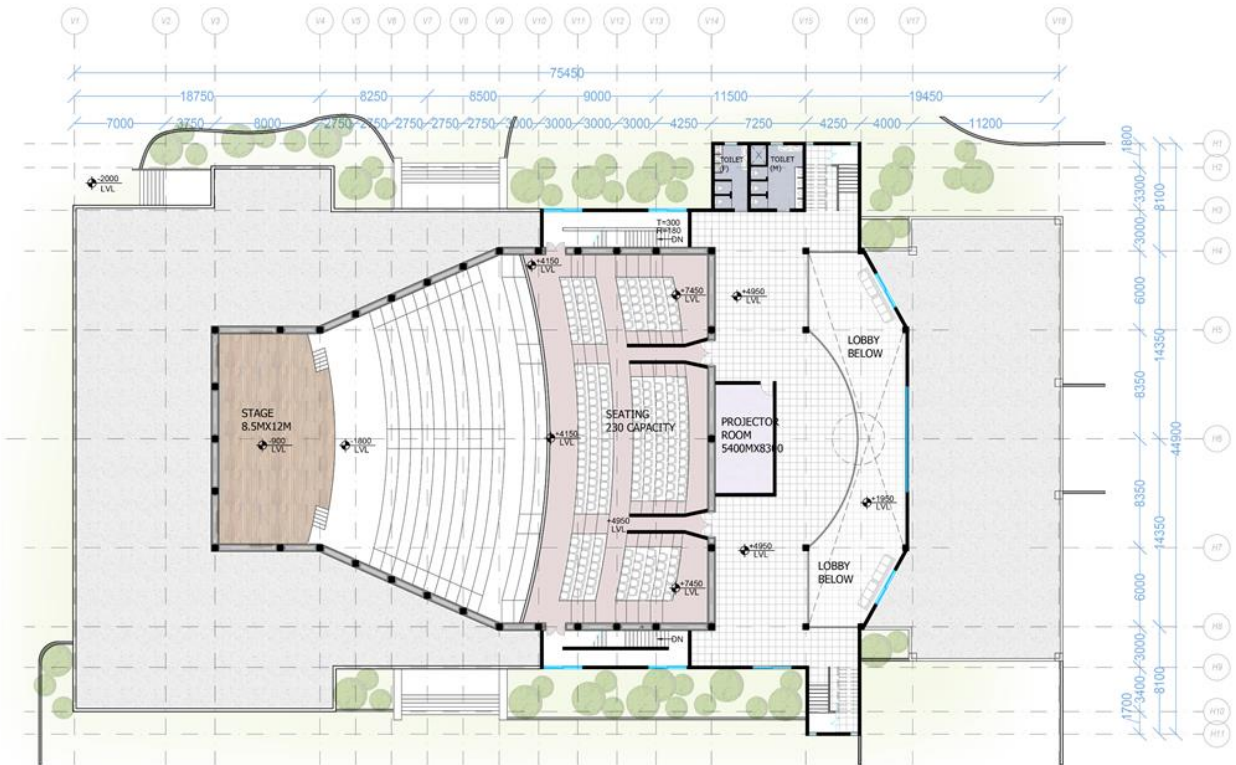


14 CONVENTOIN CENTRE, UJJAIN

PLAN AT +3450



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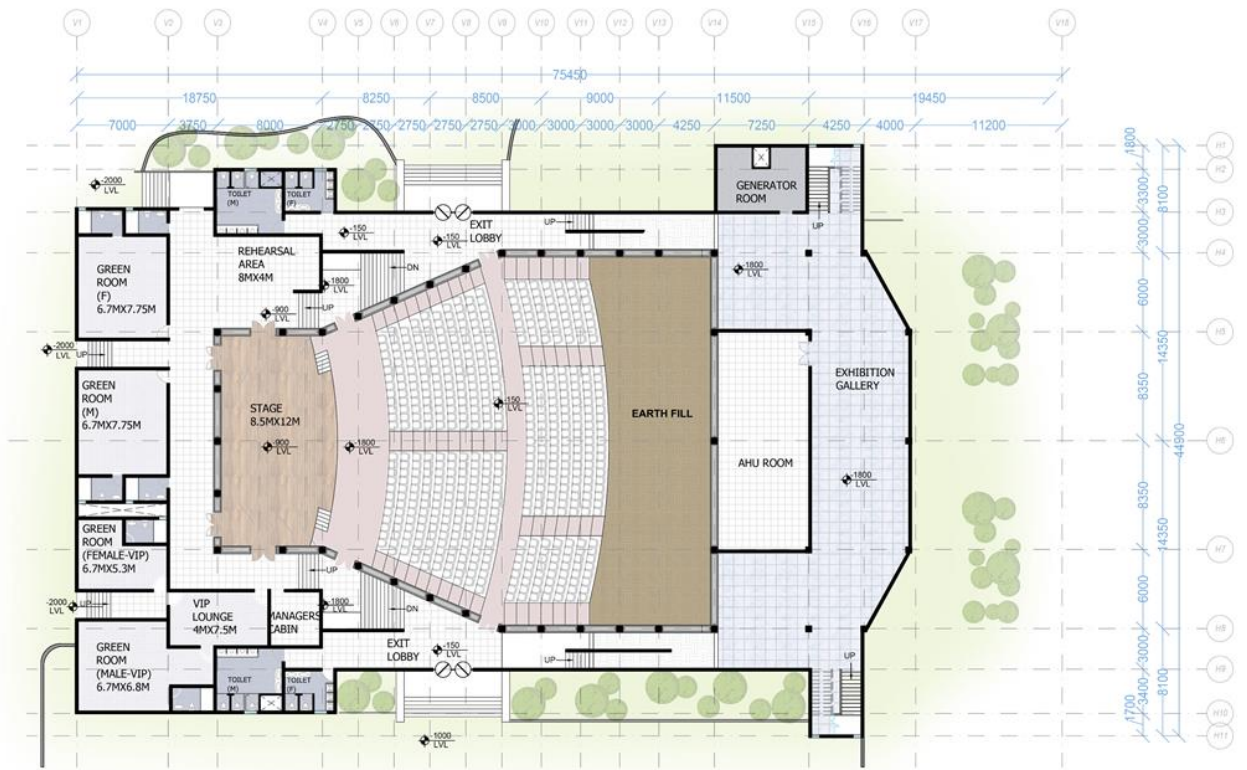


15 CONVENTOIN CENTRE, UJJAIN

PLAN AT +7200



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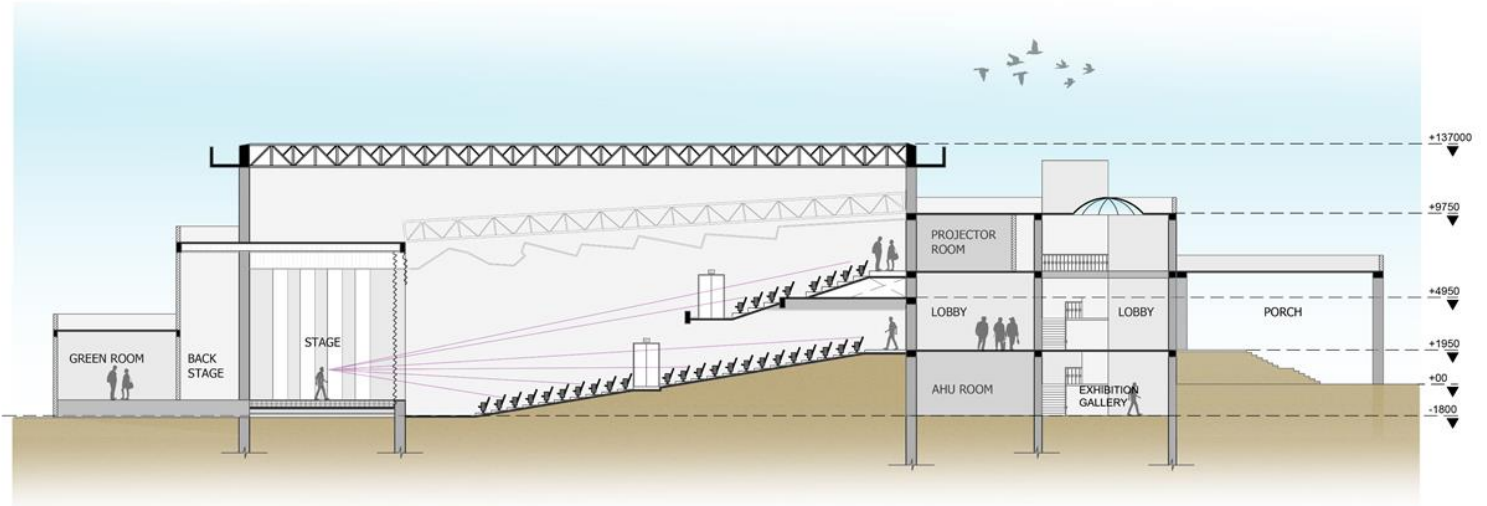
16

CONVENTOIN CENTRE, UJJAIN

PLAN AT +2700



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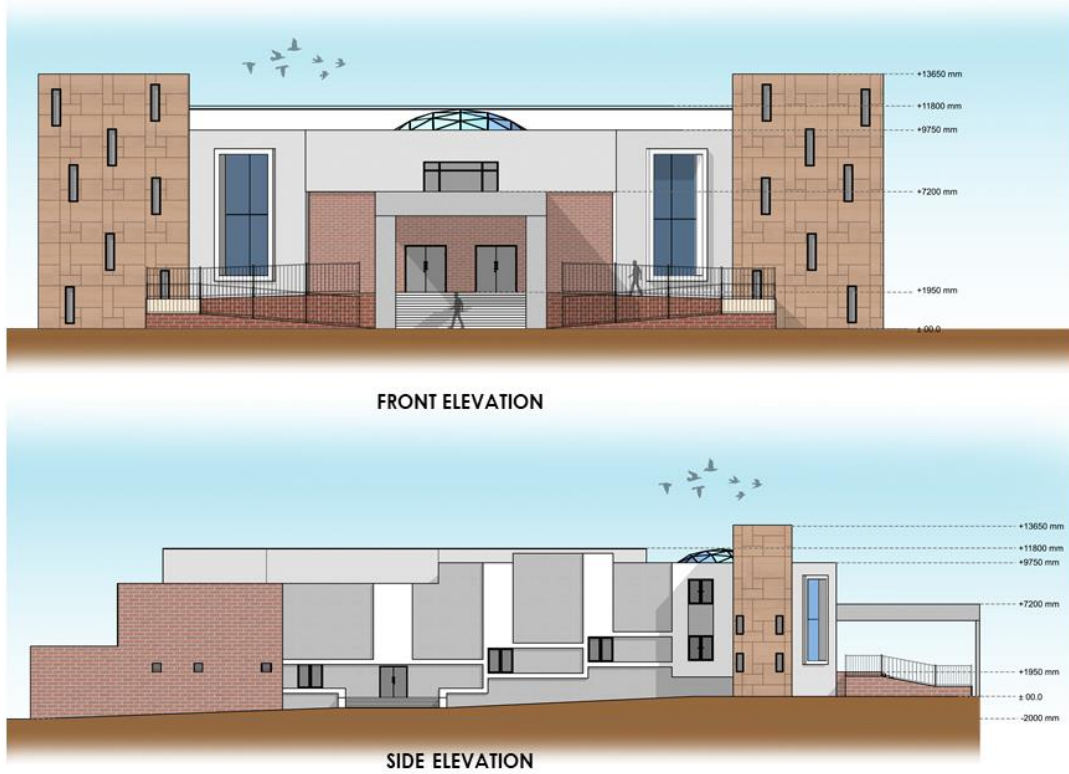
17

CONVENTOIN CENTRE, UJJAIN

SECTION



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18

CONVENTOIN CENTRE, UJJAIN

ELEVATIONS



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VIEW FROM PARKING



VIP ENTRANCE ROAD



AUDITORIUM



EXTERIOR SHAFT TREATMENT



AERIAL VIEW



AERIAL VIEW

19

CONVENTOIN CENTRE, UJJAIN

VIEWS



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