

NATIONAL CENTER FOR PERFORMING ARTS

A THESIS

*Submitted in partial fulfillment of the
Requirements for the award of the degree
Of*

BACHELORS OF ARCHITECTURE

By

RISHABH BHARDWAJ



**GALGOTIAS
UNIVERSITY**

SCHOOL OF ARCHITECTURE

GALGOTIAS UNIVERSITY

GREATER NOIDA

UTTAR PRADESH

CANDIDATE DECLARATION

The research and studio work in this report has been carried out by the undersigned student as part of the 5th year, X semester design studio of the undergraduate program at Galgotias School of Architecture, Greater Noida under the supervision of thesis guide Ar. Kusum Choudhary and thesis co-coordinator Ar. Ruchi Arora.

The undersigned hereby declares that this is his original work and has not been submitted in any previous application for any other purpose.

Place: Greater Noida

Rishabh Bhardwaj

Date: 8 July 2019

1421101023

CERTIFICATE

This is to certify that the above mentioned statement made by the candidate is correct to the best of my knowledge.

Thesis Guide

Ar. Kusum Choudhary

Associate Professor
School of Architecture
Galgotias University
Greater Noida, U.P
India

Thesis Coordinator

Ar. Ruchi Arora

Dean SOA

Prof. Atul Setia

ACKNOWLEDGEMENT

The culmination of this thesis report on the “**National Center for Performing Arts**” has brought me one step closer to the completion of the Bachelors of Architecture. The dissertation has led me to the acquisition of specialized and state of the art knowledge, required for the development of my dissertation thesis, and it was also an opportunity to improve my lecture presentation performance and research skills. Therefore through this I would like to show my appreciation to everyone that made this possible:

To my Supervisor, Professor, Galgotias School of Architecture, Prof. Ruchi Arora and Ar. Kusum Choudhary who provide me invaluable guidance and assistance in the preparation of this thesis report.

Finally but not least, I want to express my gratitude to all the Professor and non-teaching staff of the School, who has made possible my training as an Architect.

Place: Greater Noida
Date: 8 July 2019

Name **Rishabh Bhardwaj**
EnrollmentNo.**1421101023**

TABLE OF CONTENTS

Candidate Declaration

Certificate

Acknowledgement

CHAPTER 1 – INTRODUCTION

1.1 ABSTRACT	1
1.2 AIM	2
1.3 NEED OF THE PROJECT	2
1.4 METHODOLOGY	3
1.5 THE SITE	4

CHAPTER 2 – LITERATURE STUDY

2.1 PERFORMING ARTS	6
2.2 MUSIC	7
2.3 THEATER	7
2.4 DANCE	8
2.5 TYPES OF STAGE CONFIGURATIONS	11

CHAPTER 3 – BOOK LITERATURE REVIEW

3.1 DATA COLLECTION	15
3.2 BYE LAWS	22

CHAPTER 4 – THE SITE

4.1 DESIGN CRITERIA	32
4.2 THE PHYSICAL CONTEXT IN HISTORICAL PERSPECTIVE	35
4.3 LUTYENS DELHI	38
4.4 ARCHITECTURAL CHARACTER	40
4.5 THE URBAN STRUCTURE	43
4.6 LANDSCAPE AND WATER BODIES	45
4.7 CITY CONTEXT	47

CHAPTER 5 – CASE STUDIES

5.1 NCPA, MUMBAI	51
5.2 MAJOR THEATER COMPLEXES	52
5.3 ORIENTATION	54
5.4 HIERARCHY	55
5.5 SERVICES	55
5.6 RELATIONSHIP BETWEEN BUILDINGS	56
5.7 RAVINDRA NATYA MANDIR	57
5.8 ORIENTATION	59
5.9 HIERARCHY	59
5.10 SERVICES	60
5.11 RELATIONSHIP BETWEEN BUILDINGS	61

CHAPTER – DESIGN PROCESS

6.1 EXISTING STRUCTURES & TREES	62
6.2 CONCEPTS	67
Bibliography	77

LIST OF FIGURES

Fig 1.1: Methodology explained in graphical form	3
Fig 2.1: MAC Theater	7
Fig 2.2: Berlin philharmonic theater	11
Fig 2.3: Everyman Theater	12
Fig 2.4: Hess Theater	13
Fig 2.5: Goodman Theater	14
Fig 3.1: Sectional Diagram showing different parts of an Auditorium	15
Fig 3.2: Plan and elevation of seats	18
Fig 3.3: a Row to row dimension and clearway for fixed seating	19
b Row to row dimension and clearway for tipped up seating	
Fig 3.4: Proportions of a traditional auditorium for viewing angles	21
Fig 3.5: Auditorium Width	22
Fig 4.1: Figures showing the proposed cultural plaza on the intersection of Janpath and Rajpath	39
Fig 4.2: National Archives of India	41
Fig 4.3: Parliament House of India	42
Fig 4.4: The fountain placed axially in front of Rashtrapati Bhawan	45
Fig 4.5: Road leading towards Le Meridian hotel	47
Fig 4.6: The visual image around the site is that of dense greenery and wide open roads, which the basic character of the Central Vista is all along	48
Fig 4.7: Roundabouts near the site show the roads form an equilateral triangle and hexagon	48
Fig 4.8: Trees and water bodies are lined along the Rajpath	49
Fig 5.1: Layout plan of TATA Theater	52
Fig 5.2: Seating and stage of the Tata Theater	52
Fig 5.3: 3D diagrammatic block layout	53
Fig 5.4: Layout plan of Jamshed Bhabha Theater	53
Fig 5.5: Interior of the Jamshed Bhabha Theater	54
Fig 5.6: High rise modern buildings around the NCPA	54
Fig 5.7: Hierarchy around the NCPA site	55
Fig 5.8: Interior of the Jamshed Bhabha Theater	55
Fig 5.9: Exterior view of the Bhabha Theater	56
Fig 5.10: Exterior view of the TATA Theater also shows the usage of material	56
Fig 5.11: Plan of Ravindra natya mandir auditorium	58
Fig 5.12: Section of the auditorium	58
Fig 5.13: Image showing the basement	59
Fig 5.14: Interior of the auditorium	59
Fig 5.15: Exterior of the building showing the materiality	60
Fig 5.16: Interior of exhibition space	60
Fig 5.17: Typical zoning along the site	60
Fig 5.18: VIP room in the theater complex	61
Fig 5.19: Green rooms in the backstage area	61
Fig 6.1: Original drawing for the Mati ghar	63
Fig 6.2: Showing the plan of old IGNCA office building	64
Fig 6.3: Showing the plan of the Twin art gallery	65
Fig 6.4: Surveyors map of the IGNCA complex	66
Fig 6.5: Showing bellows of a musical instrument	67
Fig 6.6: Showing the wave formation radiating outwards	67
Fig 6.7: Process of concept development	69
Fig 6.8: Road network around the site showing hexagons and triangles	70
Fig 6.9: Shows the conceptual zoning	71
Fig 6.10: Shows the verticality along the site	71
Fig 6.11: Shows the elements used around the central vista in arches	72

LIST OF MAPS

Map 1.1: Shows the proximity of the cultural hub at Mandi house and the site at IGNCA	.....2
Map 1.2: Map of Delhi	.....4
Map 1.3: Showing buildings in the nearby vicinity	.....5
Map 4.1: Old map of Delhi showing ancient cities of Delhi	.....35
Map 4.2: Map showing relationship of Lutyens Delhi and major Points of Interest	.....37
Map 4.3: Map showing the planning of road networks based on hexagons and triangles	.....43
Map 5.1: Map showing location of NCPA	.....51
Map 5.2: Map of Ravindra Natya Mandir	.....57
Map 6.1: Shows the connection of People and the Usage	.....73

LIST OF TABLES

Table 2.1: Table listing different dance forms	.....8
Table 2.2: Table listing theater forms	.....10
Table 3.1: Table of seat dimensions	.....19
Table 3.2: Table of unit exit width per occupancy	.....21
Table 3.3: Table for staircase widths	.....23
Table 3.4: Table showing travel distance according to occupancy	.....24
Table 3.5: Showing off street parking norms	.....25
Table 3.6: Toilet fixture requirements for Cinema, theater	.....26
Table 3.7: Toilet fixture requirements for Museums	.....26
Table 3.8: Toilet requirements for restaurants and food courts	.....27
Table 3.9: Table of area size for electric sub station	.....28
Table 3.10: Table showing the water usage according to different building types	.....29
Table 3.11: Table showing the required water storage capacities for different building types	.....30

CHAPTER 1 INTRODUCTION

1.1 ABSTRACT

"The sign of a great state or a great city is the strength of its cultural life,"

"Our non-profit arts groups are a powerful economic force, and act as a magnet for tourism. Even more important, they help educate and inspire our citizens and stimulate creativity in the workplace and in our schools."

J. Clayton Hering, president of Northwest Business for Culture and the Arts

Our view of cities is a mix of reality and truth, hype and perception usually filtered through media representations, in a world rapidly growing today our cities lack emotion in this pursuit.

As all cities start developing using a similar basis of technology the uniqueness is getting lost. Hence, the only way to differentiate and give these cities their identity back is by creativity and arts.

Performing arts is a timeless concept of letting the inner emotions out.

Today, many policy makers believe that for cities to prosper they must be attractive for people. This is in contrast to the former view that attracting capital and companies was the most important criterion.

The situation has been reversed: an attractive "humane climate" will lead to the establishment of the knowledge industry. Vibrant cities offering an array of cultural qualities will be the most desirable places to live consume and produce, accordingly, the most competitive in the knowledge economy. The project involves striking a balance between folk art and international art forms.

According to Ministry of Culture the NCPA will come up on the sprawling lawns of the Indira Gandhi National Centre for Arts (IGNCA) — barely 1.5 km from the capital's cultural hub that houses Sahitya Kala Akademi, National School of Drama and the Sangeet Natak Akademi.

1.2 AIM

To design a socio-cultural institution for propagation of cultural activities and performing arts.

1.3 NEED OF THE PROJECT

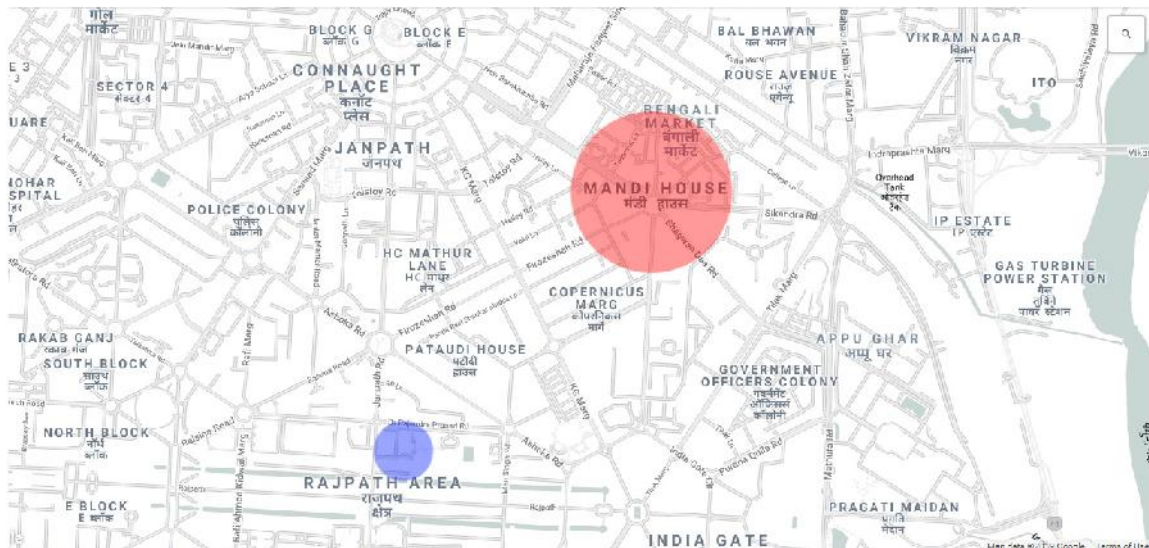
India being the fastest growing economy is ushering into a new era and is on the way to become an economic superpower.

The fact that India was only considered to be a place with rich culture and diversity by other countries and is now considered to be the fastest growing economy is a contrast in itself and ours is a country of contrasts.

To mark this development and make it more meaningful it is important that it goes hand in hand with the rich history and culture that we have.

Delhi being the capital city with rapid modernization is now a metropolitan. Mandi house is considered as a cultural hub and the site for this project is close to it.

It only makes sense to have center for performing arts of a national level at the center of the city.



Map 1.1: Shows the proximity of the cultural hub at Mandi house and the site at IGNCA.
Source: Google maps

1.4 METHODOLOGY

In this thesis I study and review the different types of performing arts as well as their impact on the people and society in larger context. This step is also important to have certain sensibilities and grow sensitivity to carry out the project.

The study for different styles of auditorium complexes and the intricacies involved in the design, to carry out an efficient design process so that the final output can be used by the public.

The study of the nearby context and the local byelaws is crucial as the site lies at a prime location i.e. near the central vista and it is important for the design to be a part of the whole existing urban scheme.

To carry out case studies of existing structures of similar scale is important to understand the building in a better way. Also studying how Indian elements have been used on the existing buildings in the nearby vicinity and how Indian architecture styles have changed and influenced the design of them.

The study and analysis of the site is important to understand the requirements of the site, integration of the site, climatic and sustainability considerations, population, cultural significance etc.

To generate concepts and program required based on the studies with respect to the site.

Finally, to detail out the final design solution for this thesis.

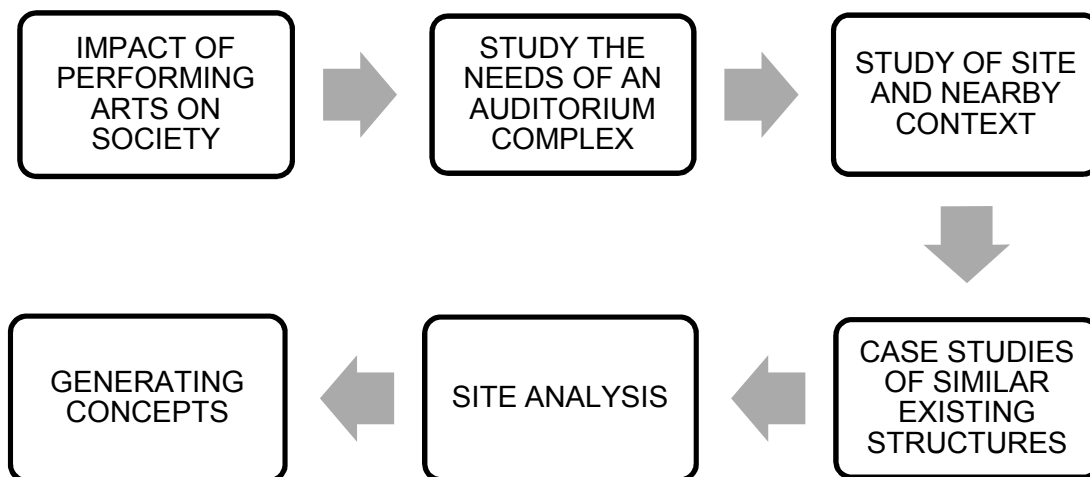
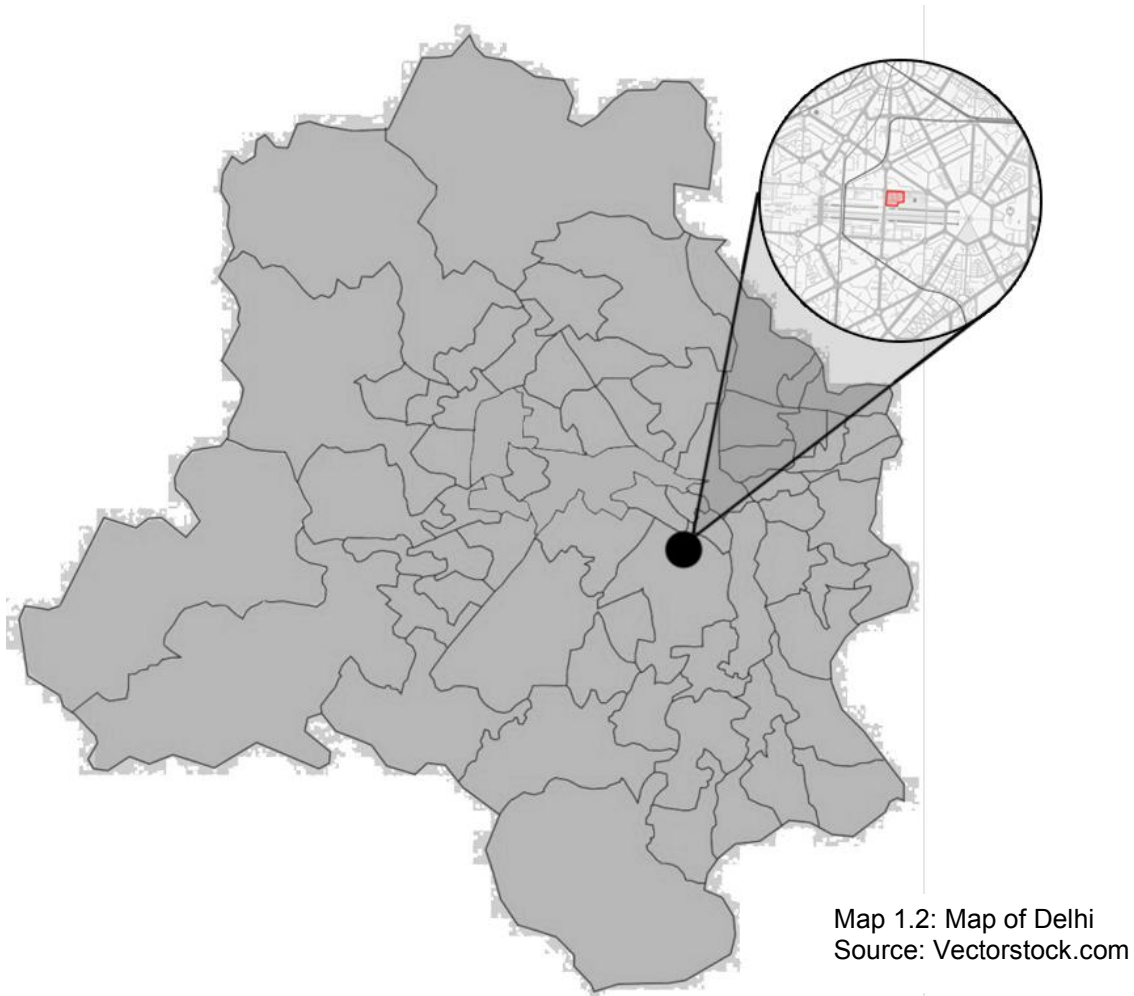


Fig1.1: Methodology explained in graphical form
Source: Made by author

1.5 THE SITE


The site lies on the lawns of the Indira Gandhi Center for the Arts (IGNCA) New Delhi – 110011.

It measures 45753 sqm which is 11.3 acres.



Total Site Area	11.3 acres
F.A.R.	100
GROUND COVERAGE	35%

 Distance from IGI airport is 18.4 km

 Distance from NDLS railway station is 3.7 km

 Distance from Central Secretariat metro station is 0.75km



Map 1.3: Showing buildings in the nearby vicinity

CHAPTER 2 LITERATURE STUDY

2.1 PERFORMING ARTS

The performing arts are those forms art which differ from the plastic arts insofar as the former uses the artist's own body, face, and presence as a medium, and the latter uses materials such as clay, metal or paint which can be molded or transformed to create some physical art object . The term "performing arts" first appeared in the English language in the year 1711.

MINOR ART FORMS

Magic

Puppetry

MAJOR ART FORMS

Theater – contemporary, folk

Dance – classical, folk, contemporary

Music – classical, folk, contemporary

Opera

Circus

GENRES

Drama

Romance

Tragedy

Satire

Comedy

Epic

Tragicomedy

Lyrics

2.2 MUSIC

Music is observed to be the most widely and perhaps universally performed art. It is found in every culture, often associated as an integral part to other performing arts. Music is an art form which uses a composition of sound and silence as the medium to convey itself. Its common elements are pitch (which governs melody and harmony), rhythm (and its associated concepts; tempo, meter, and articulation), dynamics, and the sonic qualities of timbre and texture. The word derives from Greek *μουσική* (*mousike*; "art of the Muses").

The creation, performance, significance, and even the definition of music as an art form, changes according to the cultural and social context that follows it. Music ranges from strictly organized compositions (and their recreation in performance), through improvisational music to aleatoric forms. Music can be divided into genres and subgenres, although the dividing lines and relationships between music genres are often subtle, sometimes open to individual interpretation, and occasionally controversial.

2.3 THEATER

These are performances that are used to convey stories. These usually include acting done in calibration with music, singing, dancing, narration etc. Theatre is the branch of the performing arts that deals with acting out stories in front of a live audience using a combination of speech, gesture, music, dance, sound and spectacle indeed any one or more elements of the other performing arts. In addition to the standard narrative dialogue style of plays, theatre takes such forms as plays, musicals, opera, ballet, illusion, mime, classical Indian dance, kabuki, improvisational theatre, stand-up comedy, pantomime, and non-conventional or art house theatre.



Fig 2.1: MAC Theater
Source: MAC theatercomp.com

2.4 DANCE

Dance can have a complex definition but it can be described more simply as a series of ordered bodily motions and movements, usually performed with dance as its basis. Dance (from Old French *dancier*, perhaps from Frankish) generally refers to human movement either used as a form of expression or presented in a social, spiritual or performance setting. Dance is also used to describe methods of non-verbal communication (see body language) between humans or animals (bee dance, mating dance), motion in inanimate objects (the leaves danced in the wind), and certain music genres.

Choreography is the art of making dances, and the person who does this is called a choreographer. Definitions of what constitutes dance are dependent on social, cultural, aesthetic artistic and moral constraints and range from functional movement (such as folk dance) to codified, virtuoso techniques such as ballet. In sports, gymnastics, figure skating, and synchronized swimming are dance disciplines while martial arts "kata" are often compared to dances.

INDIAN TRADITIONAL DANCES	Bharatnatyam
	Kathakali
	Kathak
	Manipuri
	Odissi
	Kuchipudi
	Sattriya
	Mohiniyattam
	Bihu
CLASSICAL WESTERN DANCES	Ballet
	Tap dance
	Latin
	Belly dance
	Folk dance
	Ball room dances

Table 2.1: Table listing different dance forms

Performing arts consisting of music, dance, theater and opera is a relationship between performers and an audience, conceived by an artist and performed in a venue.

The venues for performing arts are distinguished and defined by their mandate, management, programming, type, stage and audience seating capacity.

The Mandate: performing arts venues generally are oriented to presenting the art to an audience, renting facilities to user groups, producing performing arts or some combination of these three in an order of priority. While the main purpose of the performing arts is public service, these activities may be also described in commercial business terms. Depending on the size of the facility and the market that it serves, these three programming arrangements are listed in order of their possible risks and potential returns.

Renting: the management rent out the use of its facility to a user group for a fixed fee or guaranteed minimum plus a percentage of box office earnings. Management assumes no responsibility for the choice of the event or its promotion.

Presenting: the management buys a show for a fixed fee or cost profit sharing agreement and promotes the show to its audience which can bring in fixed revenue for the management.

Producing: the management creates and finances a show and promotes it with the aim of recovering costs through box offices, sponsorships, subsidy and future licensing agreements.

Management: professional caliber, not for profit facilities are usually owned by governments, government agencies, not for profit organizations or theater companies.

Programming: music, dance, theater and opera have subsets such as popular versus classical music, modern dance versus ballet, straight plays versus musical theater and operetta versus grand opera. Each programming subset has different physical, acoustical, visual and technical requirements of a performing arts venue.

Type: concert hall, dance, theater, playhouse, musical theater and opera house are all terms that imply a set of facility characteristics suited to a particular performing art. Multipurpose facilities combine characteristics of two or more venues.

Stage: proscenium, thrust, 3/4th and arena stages are some of the stage arrangements and refer to the type of stage and seating arrangement applicable to venues primarily designed for dance, theater and opera.

Seating capacity: the requirement of the seating capacity and type of venue are two crucial choices to be made while designing an auditorium. The choice should be made on the basis of user group demand, potential of audience size, expectations and the costs associated with it. 100- 600 seating capacity incubator space and 600 upwards they are presenting space.

INDIAN CLASSICAL THEATER	Bhand pather
	Swang
	Nautanki
	Rasleela
	Bhavani
	Jatra
	Maach
	Bhaona
	Tamasha
	Dashavtaar
	Krishnattam
	Mudiyettu
	Koodiyattam
	Yakshagaana
	Therukoothu
	Sufi

Table 2.2: Table listing theater forms

2.5 TYPES OF STAGE CONFIGURATIONS

Arena

It is a theater type in which the audience surrounds the play area or the stage completely on all the sides. Performers access the stage through in built vomitories or narrow walkways between the seating usually at the corners. These also consist of large outdoor spaces.



Fig 2.2: Berlin philharmonic theater
Source: <https://www.berliner-philharmoniker.de/en/>

Thrust

It is the theater type in which the stage is prolonged towards the audience which now surrounds it on three edges. The performers enter from the fourth edge which is an enclosed back stage, used for providing background landscape and sceneries. Actors can also enter through walkway gaps in the seating, which are connected to the stage.



Fig 2.3: Everyman Theater
Source: <https://www.everymantheatre.org.uk/>

End stage

It is a typology opposite to proscenium. Here the stage and the audience inhabit the same architectural space, on one end of which is the stage and on the other is the audience looking at the stage.



Fig 2.4: Hess Theater
Source: TheaterProjects.com

Proscenium

In this type of arrangement, the stage and the seating occupy two different spaces which are linked by a shared proscenium wall. Hence, this system is sometimes also called two box systems. The tall stage box contains the performing area, the wings, the fly tower and the under stage. The wings and the fly tower are used for stage modulation and introduction of sceneries and props. Lighting is also provided on these zones.



Fig 2.5: Goodman Theater
Source: TheaterProjects.com

CHAPTER 3 BOOK LITERATURE REVIEW

3.1 DATA COLLECTION

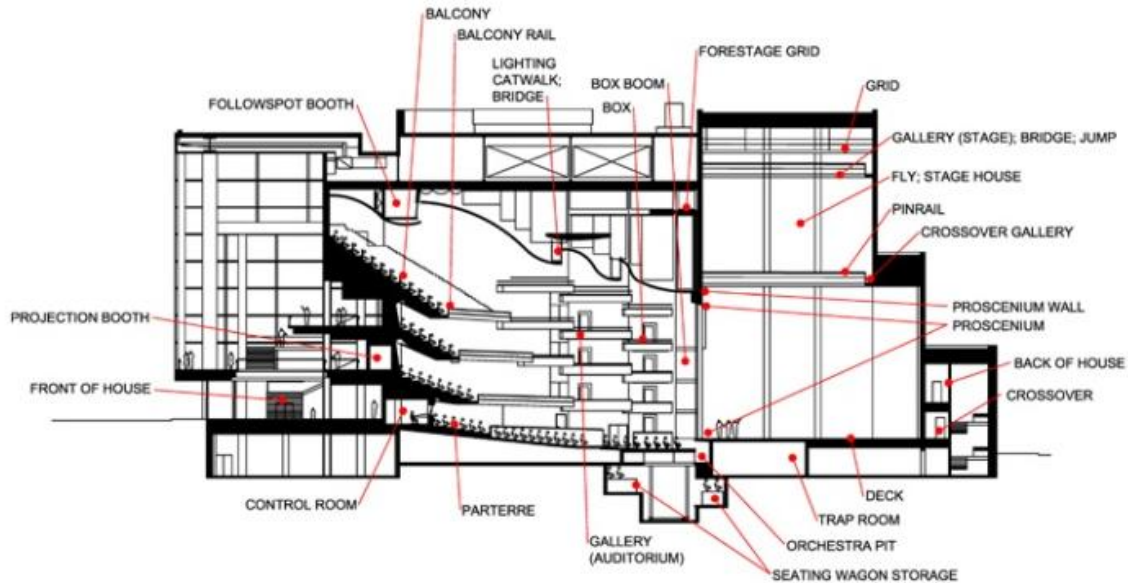


Fig 3.1: Sectional Diagram showing different parts of an Auditorium
Source: The theater projects-Parts of a theater building document

Stage

It is the performance area for a performance. Sometimes the stage is sloped to give a perspective illusion, which enables the audience to see activities at the end of stage. Many times the stage is equipped with trap doors for surprise entrances or exits and special effect.

Wings

These are the side flanks to a stage, on both the sides, used by the performers, or props as a waiting area, before they enter the stage. Large props, sceneries etc. can be stored here when not in use, this section is called the scene dock.

Prompt Corner

It is the corner located at the left of the downstage. Traditionally used by a person to stand or sit and read the script through the play, and prompting performers if they forgot their verses. The stage manager also uses this part to direct the show.

Fly floor

Or balconies are galleries located above the wings in the fly tower, used by the fly men for operating the flying system that helps in lowering or raising the fly in sceneries.

Fly tower and Grid

This is a large vertical hollow space above the stage where the sceneries are suspended. Attached to the ceiling of the fly tower is a grid. Cables run up along the side walls in the wings, past the fly platforms over some pulleys and through into the grid. The grid has the provision for servicing by the riggers who set the mechanism for the fly men to operate. These riggers used to be sailors because they were good with rigging ropes on ships.

Safety Curtain

It is a metallic fire proof partition screen that is placed between the stage and the seating usually along the proscenium frame. This screen descends quickly in case of fire on either side. By law this has to be lowered once before every show for assurance purposes much like a drill.

Stage Door

Is from where all the cast, crew and the staff enter the theater. It usually has a keeper who supervises entries, takes deliveries, greets visitors and takes messages if required.

Dock doors

These are large doors at the side of the stage used by set trucks to unload or reload sets, props or equipment for each performance. Setting in and getting down of sets is also known as get in or get out.

Green rooms

These are rooms used by performers as their base. These usually have their changing rooms, lounges and pantries. Traditionally they used to be green because it is calm colour.

Quick change room

This is small and temporary area near the stage possibly in the wings, with temporary partition or curtains. This is used for quick costume changes. The area can have a mirror, lighting, dresser and costume rails.

Rehearsal room

It is a room containing a rehearsing space equivalent in size to that of the stage. There are mirrors around the space for the performers to see themselves and observe their actions. There are bars along the walls for the benefit of the dancers.

Scenery

This is a collective term used for all printed, painted or photographically produced flats or backdrops, generally made of cloth, fabric or paper. These are brought to the stage using trolleys, can be unrolled from the fly tower. These sceneries can be same size as the stage or can be twice or thrice as big.

Props

These are properties that can be used during the play as supportive objects. These are generally portable or movable objects and are generally stored in the wings when not required.

Workshops

These are spaces where all the props and sceneries are created and maintained. Not all theaters generally have workshops it depends on the scale and size of the theater and the usage also depends on the scale of the production.

Orchestra pit

It is a pit below the audience seating or the stage, where the orchestra sits, during the performance. These pits have gone rare nowadays due to technical advancement in sound and lighting design.

Lighting

There are generally two areas of lighting in a theater. House lights are those that illuminate the auditorium and the seating area, but are dimmed prior to the starts of the show. Stage lighting are lights hidden in the false ceiling above the audience or is suspended using bars above the stage.

Sound

Traditionally theaters are designed to facilitate performer's voices or musical instruments to be audible without the use of amplification. Performers

usually practice this skill. Most of the performances now-a-days use sound amplification.

Control box

These are rooms required to manage all the lighting, sound and other technical systems prior and during the plays. These are located in special sound proof boxes, at the back of the seating, with a clear view of the stage.

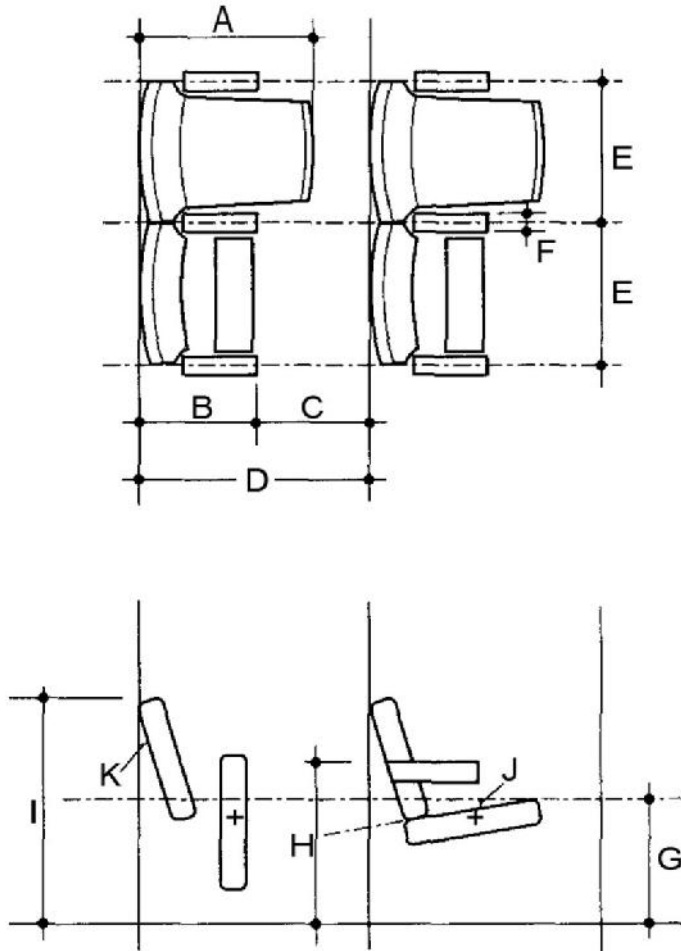


Fig 3.2: Plan and elevation of seats
Source: Metric Handbook Planning and design data

Dimensions of Auditorium seats

DIMENSION	DESCRIPTION	MINIMUM	MAXIMUM
A	Overall seat depth	600	720
B	Tipped seat depth	425	500
C	Seat way	305	
D	Back to back seat spacing	760	
E	Seat width for seats with arm	500	750
	Seat width for seat without arms	450	
F	Armrest width	50	
G	Seat height	430	450
H	Armrest height	600	
I	Seatback height	800	850
J	Seat inclination from horizontal	7°	9°
K	Back inclination from vertical	15°	20°

Table 3.1: Table of seat dimensions
Source: Metric Handbook Planning and Design data

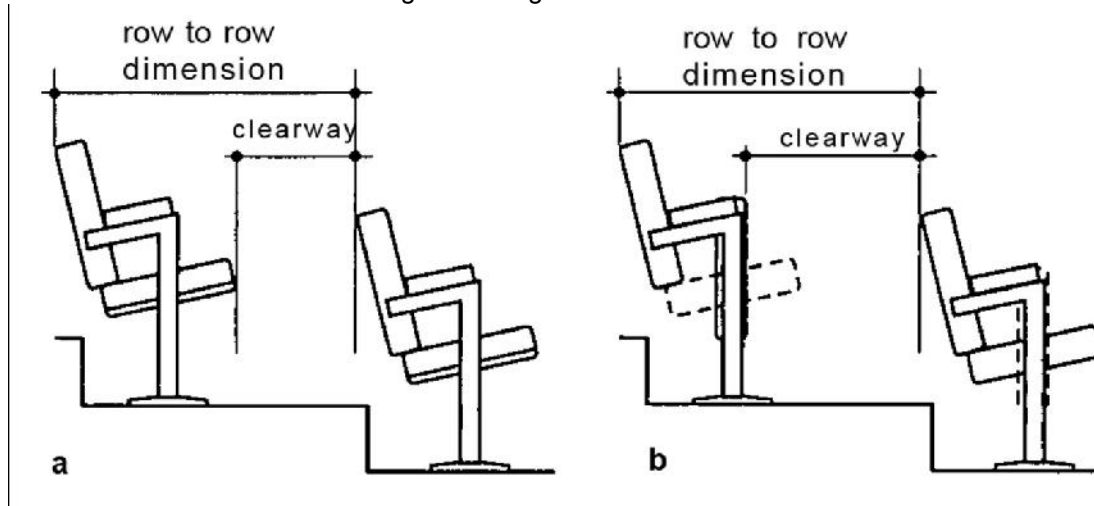


Fig 3.3: a Row to row dimension and clearway for fixed seating
b Row to row dimension and clearway for tipped up seating
Source: Metric handbook Planning and design data

Row to Row Spacing

Spacing is controlled by the clearway between the leading edge of the seat and the rear of the back of the seat in front. For traditional seating the minimum clearway for people to pass along the row is 300 mm and this dimension increases with the number of seats in a row. For continental seating the clearway is not less than 400 mm and not more than 500 mm. Legislation also dictates the minimum row to row dimension at 760 mm: this is usually not adequate and the minimum should be 850 mm for traditional seating.

Gangways

As gangways are essential escape routes, their widths are determined by the number of seats served. The minimum is 1100 mm. They can be ramped up to 10%, but only 8.5% if likely to be used by people in wheelchairs. If the seating rake is steeper, gangways must have steps extending the full width and these must have consistent treads and risers in each run. This means that the row-to-row spacing and row rise should be compatible with a convenient gangway tread and riser; and this in turn means that the shallow curve produced by sightline calculations should be adjusted to a straight line.

Number of seats in a row

With traditional seating the maximum number is 22 if there are gangways at both ends of the row, and 11 for gangway at one end. Thus in all but the smallest auditorium the gangways divide the seating into blocks.

Exits

From each level of the auditorium two separate exits must be provided for the first 500 seats with an additional exit for each further 250 seats. Table below gives the minimum total of exit widths required by legislation. Each exit from the auditorium must lead directly to a place of safety.

Total Exit Widths Required

NUMBER OF PEOPLE	MINIMUM TOTAL EXIT WIDTH
Up to 200	2.2
201-300	2.4
301-400	2.8
401-500	3.2
501-750	4.8
751-1000	6.4
1001-2000	14.4
2001-3000	20.8

Table 3.2: Table of unit exit width per occupancy
Source: Metric Handbook Planning and Design data

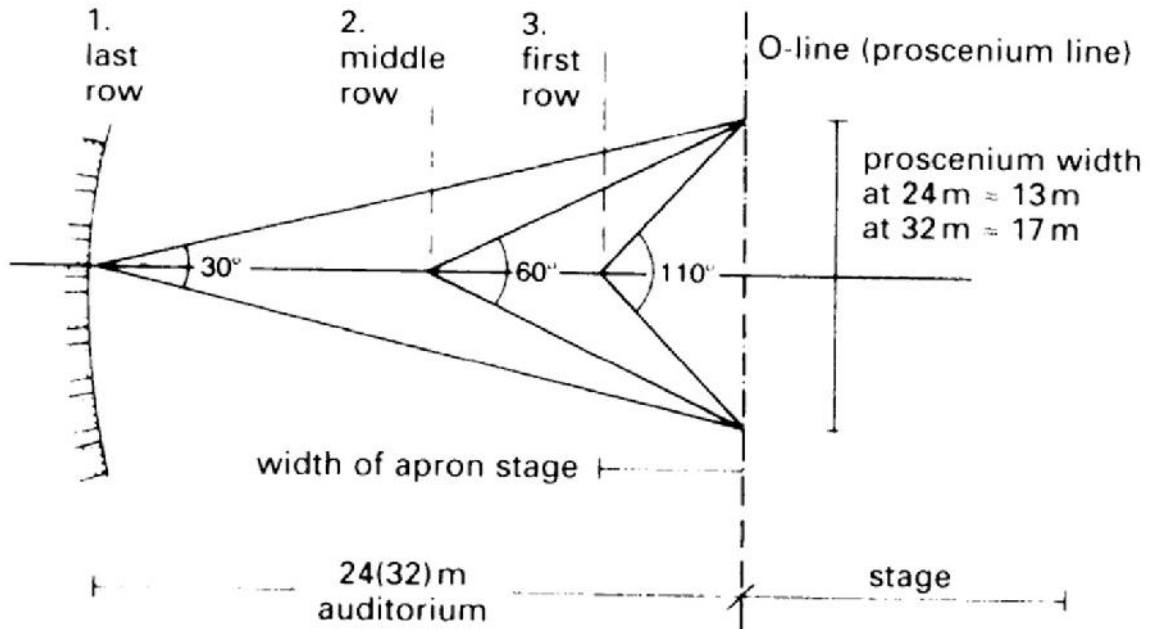


Fig 3.4: Proportions of a traditional auditorium for viewing angles
Source: Neuferts Data

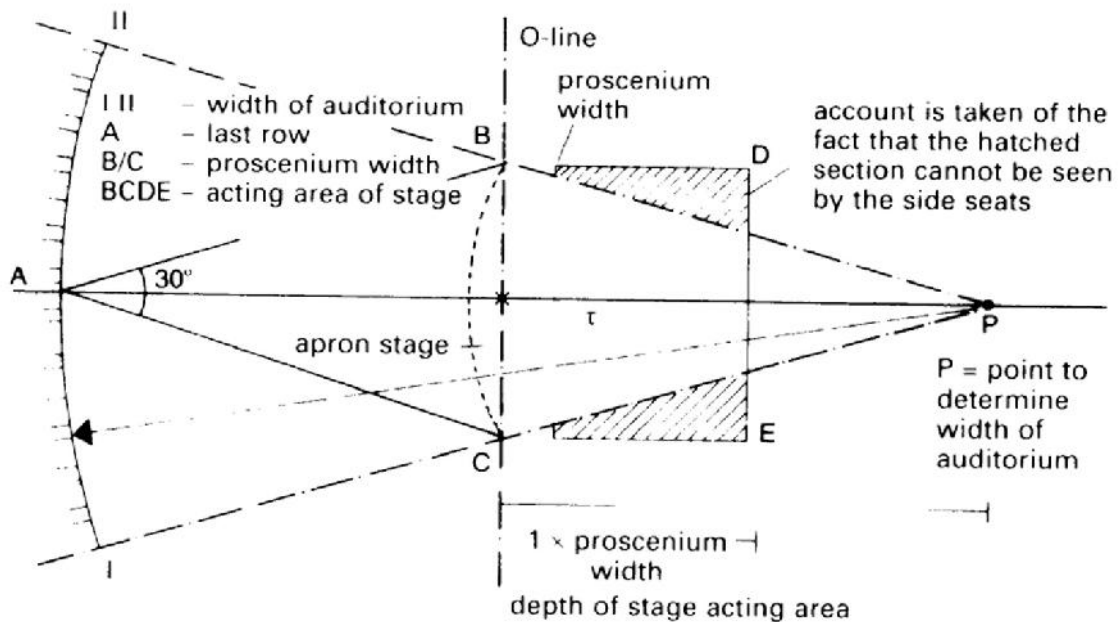


Fig 3.5: Auditorium Width
Source: Neuferts Data

Maximum distance of last row from the proscenium line

- for playhouse 24m (maximum distance from which it is possible to recognize facial expressions)
- for opera 32m (important movement still recognizable)

3.2 BYELAWS

Basement

The construction of the basement shall be allowed by authority/ concerned local body in accordance with the land use and other provisions specified under the Master Plan for Delhi / Zonal Development Plan. The basement shall have the following requirement:

Every basement shall be in every part be at least 2.4 m in height from the floor to the soffit of the beam and 2.4 m minimum width.

Adequate ventilation shall be provided for the basement. The standard of ventilation shall be the same as required for the particular occupancy according to Building Bye-Laws 7.14 and 8.4.5.

Staircase

All buildings, as follows, shall have a minimum of two staircases:

- a) Buildings of 15m in height or above
- b) Irrespective of height of the building (s), the buildings used as business, educational, assembly, institutional, industrial, storage and hazardous occupancies and mixed occupancies having floor area more than 500 sqm on any floor.

Interior stairs shall be constructed of non-combustible material throughout.

Interior stairs shall be constructed as a self-contained unit and shall be mechanically ventilated if completely enclosed in low rise residential buildings.

A staircase shall not be arranged round a lift shaft.

The maximum height of riser shall be 19 cm in the case of low rise residential buildings and 15 cm in the case of other buildings including high rise residential building and maximum number of risers per flight shall be limited to 15 per flight.

Minimum width of the staircase

Type of building	Minimum Width
Residential buildings	1.35 m
Hotel buildings	1.5m
Assembly buildings like auditoriums, theaters etc.	2m
Educational buildings up to 30m height	1.5m
Above 30m	2m
Institutional buildings	2m
Other buildings including commercial	1.5m
Industrial buildings	1.5m

Table 3.3: Table for staircase widths
Source: Delhi building bye laws

S No	Group of Occupancy	Maximum Travel Distance Construction (m)	
		See NBC.	
		Type 1 & 2	Type 3 & 4
i.	Residential (A)	30.0	22.5
ii.	Educational (B)	30.0	22.5
iii.	Institutional (C)	30.0	22.5
iv.	Assembly (D)	30.0	30.0
v.	Business (E)	30.0	30.0
vi.	Mercantile (F)	30.0	30.0
vii.	Industrial (G)	45.0	Construction type 3 and 4 not permitted.
viii.	Storage (H)	30.0	Construction type 3 and 4 not permitted.
ix.	Hazardous (J)	22.5	Construction type 3 and 4 not permitted.

Notes:

1. For fully sprinkled building, the travel distance may be increased by 50% of the values specified in above table

2. Ramps shall be counted as one of the means of escape wherever permitted in National Building Code.

Table 3.4: Table showing travel distance according to occupancy

Source: Delhi building bye laws

Parking

In case of high-rise buildings parking would be permitted at any or all of the following:

- i. Open Area: 23 sqm per ECS
- ii. Basements: 32 sqm per ECS
- iii. Stilts: 28 sqm per ECS
- iv. Podium: 28 sqm per ECS
- v. Roof top: 28 sqm per ECS

Table 9 Norms for Off-Street Parking Spaces
(Clause A-1)

SI No.	Occupancy	One Car Parking Space for Every				
		Population Less than 50 000	Population Between 50 000 and 200 000	Population Between 200 000 and 1 000 000	Population Between 1 000 000 and 5 000 000	Population Above 5 000 000
(1)	(2)	(3)	(4)	(5)	(6)	(7)
i)	a) Multi-family	—	—	a) 2 tenements having built-up area 101 to 200 m ²	1 tenement of 100 m ² built-up area	a) 1 tenement of 75 m ² built-up area
				b) 1 tenement of built-up area above 200 m ²		b) ½ tenement of built-up area above 75 m ²
	b) Lodging establishments, tourist homes and hotels, with lodging accommodation	12 guest rooms	8 guest rooms	4 guest rooms	3 guest rooms	2 guest rooms
ii)	Educational (see Note 1)	—	—	70 m ² area or fraction thereof of the administrative office area and public service areas	50 m ² area or fraction thereof of the administrative office area and public service areas	35 m ² area or fraction thereof of the administrative office area and public service areas
iii)	Institutional (Medical)	20 beds (Private) 30 beds (Public)	15 beds (Private) 25 beds (Public)	10 beds (Private) 15 beds (Public)	5 beds (Private) 10 beds (Public)	2 beds (Private) 5 beds (Public)
iv)	a) Assembly halls, cinema theatres	120 seats	80 seats	25 seats	15 seats	10 seats
	b) Restaurants	60 seats	40 seats	20 seats	10 seats	5 seats
	c) Marriage halls, community halls	600 m ² plot area	400 m ² plot area	200 m ² plot area	50 m ² plot area	25 m ² plot area
	d) Stadia and exhibition centre	240 seats	160 seats	50 seats	30 seats	20 seats
	e) Sport complex (without stadium), parks and multipurpose open spaces	—	—	1 000 m ² plot area	500 m ² plot area	250 m ² plot area
v)	a) Business offices and firms for private business	300 m ² area or fraction thereof	200 m ² area or fraction thereof	100 m ² area or fraction thereof	50 m ² area or fraction thereof	25 m ² area or fraction thereof
	b) Public or semi-public offices	500 m ² area or fraction thereof	300 m ² area or fraction thereof	200 m ² area or fraction thereof	100 m ² area or fraction thereof	50 m ² area or fraction thereof
vi)	Mercantile (see Note 2)	300 m ² area or fraction thereof	200 m ² area or fraction thereof	100 m ² area or fraction thereof	50 m ² area or fraction thereof	25 m ² area or fraction thereof
vii)	Industrial	400 m ² area or fraction thereof	300 m ² area or fraction thereof	200 m ² area or fraction thereof	100 m ² area or fraction thereof	50 m ² area or fraction thereof
viii)	Storage	—	—	500 m ² floor area or part thereof	250 m ² area or fraction thereof	125 m ² area or fraction thereof
<p>NOTES</p> <p>1 In the case of auditoria for educational buildings, parking space shall be provided as per SI No. (iv).</p> <p>2 For plots up to 50 m², as in the case of shops, parking spaces need not be insisted upon.</p> <p>3 For other institutions, transport/communication centre, parking space requirement shall be assessed based on the proposed building.</p> <p>4 In case of permitted mixed residential-commercial or mixed residential-industrial areas the parking requirements shall be double the number for residential use.</p> <p>5 The requirements specified in this table shall not be applicable for buildings meant for parking alone, including the multi-level car parking buildings which shall be as decided by the Authority.</p> <p>6 Designated accessible parking spaces shall be provided in accordance with B-3 for the occupancies specified in 13.</p>						

Table 3.5: Showing off street parking norms
Source: National building code vol. 1

Toilet Requirement

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

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

Table 3.6: Toilet fixture requirements for Cinema, theater
Source: National Building Code Vol.2

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

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

Table 3.7: Toilet fixture requirements for Museums
Source: National Building Code Vol.2

Table 10 Restaurants
(Clause 4.2.5.1)

Sl No.	Fixtures	Public Rooms		Non-Residential Staff	
		Males (3)	Females (4)	Males (5)	Females (6)
i)	Water closets	1 per 50 seats up to 200 Over 200 add at 1 per 100 or part thereof	2 per 50 seats up to 200 Over 200 add at 1 per 100 or part thereof	1 for up to 15 2 for 16 to 35 3 for 36 to 65 4 for 66 to 100	1 for up to 12 2 for 13 to 25 3 for 26 to 40 4 for 41 to 57 5 for 58 to 77 6 for 78 to 100
ii)	Ablution tap	One in each water closet 1 water tap with draining arrangements shall be provided for every 50 persons or part thereof in the vicinity of water closets and urinals	One in each water closet	One in each water closet	One in each water closet
iii)	Urinals	1 per 50 persons or part thereof	—	Nil up to 6 1 for 7 to 20 2 for 21 to 45 3 for 46 to 70 4 for 71 to 100	—
iv)	Wash basins	1 per WC	1 per WC	1 per WC	1 per WC
v)	Cleaner's sink		1 per each restaurant		
vi)	Kitchen sink/dish washer		1 per kitchen		

NOTES
1 Some WCs may be Indian style, if desired.
2 Male population may be assumed as two-third and female population as one-third.
3 Provision for additional and special fittings where required shall be made.

Table 3.8: Toilet requirements for restaurants and food courts
Source: National building code vol. 2

Air Conditioning

Space requirement for central air conditioning plant shall be worked out on following basis:

Chilling unit

- Reciprocating - 25-30 sqm per unit (in case of single compressor unit).
- Reciprocating - 40 sqm per unit (in case of multi compressor unit)
- Centrifugal/ screw - 40-50 sqm per unit
- Centrifugal pump - 8-10 sqm each pump
- Electrical panel - 20-25 sqm per chilling unit
- Control panel - 20-25 sqm

Floor area requirement for the AHU room shall be as under:

For AHUs up to 340 CMM : 4.5 m X 3.5 m

For AHUs between 340 CMM & 680 CMM: 5.5 m X 4.5 m

Electricity

Area Requirements for Sub-Station for buildings

Total covered area	Transformer capacity	Size (sqm)
2500	1X400	70
4500	1X630	70
8000	2X630	100
10000	2X630	130
15000	4X630	160
20000	5X630	175
25000	6X630	200
30000	7X630	220

Table 3.9: Table of area size for electric sub station
Source: Delhi building bye laws

Transformer Rooms: The number and size of transformer rooms shall be ascertained from the total power requirements of the company. To determine the size of transformer and clearance around a transformer, reference shall be made to good practice (I.S.1887-1967 code of practice for installation and maintenance of Transformer). A 500 KVA transformer shall be provided with a minimum space of 4 m x 4 m. If transformer is to be installed outdoor space shall be provided on similar considerations and adequate provision for safety enclosure is to be made. Transformer can be installed inside or outside provided movement of fire tender is unobstructed. For transformer having large oil content (more than 2000 lt.) soak pits are to be provided in accordance with rule 64 of Indian Electricity Rules, 1956. Only dry type transformer shall be permitted if installed in 1st basement.

High Voltage Switch Rooms – In case of sub-station having one transformer, the owner is required to provide only one high voltage switch. In the case of single point supply for two transformers, the number of switches required is 3 and for 'n' transformers the number of switches is n+1. The floor area required in case of a single switch will be roughly 4 m x 1m and for every additional switch the length should be increased by 1mt.

Water tank requirement

Table 1 Water Requirements for Buildings Other than Residences (Clause 4.1.2)				
Sl No.	Type of Building	Domestic Per Day litre	Flushing Per Day litre	Total Consumption Per Day litre
(1)	(2)	(3)	(4)	(5)
i)	Factories including canteen where bath rooms are required to be provided	30 per head	15 per head	45 per head
ii)	Factories including canteen where no bath rooms are required to be provided	20 per head	10 per head	30 per head
iii)	Hospital (excluding laundry and kitchen) (<i>see</i> Note 2):			
	a) Number of beds not exceeding 100	230 per head	110 per head	340 per head
	b) Number of beds exceeding 100	300 per head	150 per head	450 per head
	c) Out patient department (OPD)	10 per head	5 per head	15 per head
iv)	Nurses' homes and medical quarters	90 per head	45 per head	135 per head
v)	Hostels	90 per head	45 per head	135 per head
vi)	Hotel (up to 3 star) excluding laundry, kitchen, staff and water bodies	120 per head	60 per head	180 per head
vii)	Hotel (4 star and above) excluding laundry, kitchen, staff and water bodies	260 per head	60 per head	320 per head
viii)	Offices (including canteen)	25 per head	20 per head	45 per head
ix)	Restaurants and food court including water requirement for kitchen:			
	a) Restaurants	55 per seat	15 per seat	70 per seat
	b) Food court	25 per seat	10 per seat	35 per seat
x)	Clubhouse	25 per head	20 per head	45 per head
xi)	Stadiums	4 per head	6 per head	10 per head
xii)	Cinemas, concert halls and theatres and multiplex	5 per seat	10 per seat	15 per seat
xiii)	Schools/Educational institutions:			
	a) Without boarding facilities	25 per head	20 per head	45 per head
	b) With boarding facilities	90 per head	45 per head	135 per head
xiv)	Shopping and retail (mall)			
	a) Staff	25 per head	20 per head	45 per head
	b) Visitors	5 per head	10 per head	15 per head
xv)	Traffic terminal stations (<i>see</i> Notes 3 and 4)			
	a) Airports	40 per head	30 per head	70 per head
	b) Railway stations (Junctions) with bathing facility	40 per head	30 per head	70 per head
	c) Railway stations (Junctions) without bathing facility	30 per head	15 per head	45 per head
	d) Railway Stations (Intermediate) with bathing facility	25 per head	20 per head	45 per head
	e) Railway Stations (Intermediate) without bathing facility	15 per head	10 per head	25 per head
	f) Interstate bus terminals	25 per head	20 per head	45 per head
	g) Intrastate Bus Terminals/Metro Stations	10 per head	5 per head	15 per head

NOTES

- For calculating water demand for visitors, consumption of 15 litre per head per day may be taken.
- The water demand includes requirement of patients, attendants, visitors and staff. Additional water demand for kitchen, laundry and clinical water shall be computed as per actual requirements.
- The number of persons shall be determined by average number of passengers handled by stations, with due considerations given to the staff and vendors who are using these facilities.
- Consideration should be given for seasonal average peak requirements.
- The hospitals may be categorized as Category A (25 to 50 beds), Category B (51 to 100 beds), Category C (101 to 300 beds), Category D (301 to 500) and Category E (501 to 750 beds).

Table 3.10: Table showing the water usage according to different building types
Source: National building code vol. 2

Sl No.	Type of Building Occupancy	Type of Installation							Water Supply (litre)		Pump Capacity (litre/min)			
		Fire Extinguisher	First Aid Hose Reel	Wet Riser	Down Corner	Yard Hydrant	Automatic Sprinkler System	Manually Operated Electronic Fire Alarm Systems (see Note 1)	Automatic Detection and Alarm System (see Note 2)	Under-ground Static Water Storage Tank Combined Capacity for Wet Riser, Yard Hydrant and Sprinklers per Set of Pumps	Terrace Tank over Respective Tower Terrace	Pump Near Underground Static Water Storage Tank (Fire Pump) with Minimum Pressure of 3.5 kg/cm ² at Remotest Location	Pump Capacity At the Terrace Tank Level with Minimum Pressure of 3.5 kg/cm ²	
(1)	(2)	R	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
2)	10 m and above but not exceeding 15 m in height	R	R	R	NR	NR	R	R	R	R	100 000	5 000 (5 000)	(see Note 10)	NR
3)	15 m and above but not exceeding 24 m in height	R	R	R	NR	NR	R	R	R	R	150 000	10 000 (see Note 6)	(see Note 11)	NR
4)	24 m and above but not exceeding 30 m in height	R	R	R	NR	NR	R	R	R	R	200 000	20 000	(see Note 11)	NR
ASSEMBLY BUILDINGS (D) (see Note 16)														
a)	Buildings (D-1 to D-5)													
1)	Less than 10 m in height													
	i) Up to 300 persons	R	R	NR	R		NR	R (see Note 4)	R	NR	NR	20 000 (5 000) (see Note 6)	NR	450 (450) (see Note 6)
	ii) More than 300 persons	R	R	NR	R		NR	R (see Note 4)	R	NR	NR	25 000 (5 000) (see Note 6)	NR	900 (450) (see Note 6)
2)	Above 10 m but not exceeding 15 m in height	R	R	R	NR	NR	NR	R (see Note 4)	R (see Note 1)	R	100 000	5 000 (5 000) (see Note 6)	(see Note 10)	450 (450) (see Note 6)
3)	Above 15 m but not exceeding 24 m in height	R	R	R	NR	NR	R	R	R	R	150 000	10 000	(see Note 10)	NR
4)	Above 24 m but not exceeding 30 m in height	R	R	R	NR	NR	R	R	R	R	200 000	20 000	(see Note 11)	NR
b)	D-6	R	R	R	NR	NR	R	R	R	R	200 000	20 000	(see Note 12)	NR
c)	D-7	For details see 6.4.4												

Table 3.11: Table showing the required water storage capacities for different building types
Source: National building code vol.1

Storage tank calculation

$$\begin{aligned} 15 \text{ L water required for per seat per day usage} &= 1400 \times 15 \\ &= 21000 \text{ L} \end{aligned}$$

$$\begin{aligned} 70 \text{ L required per person in the restaurant kitchen} &= 176 \times 70 \\ &= 12320 \text{ L} \end{aligned}$$

Underground fire tank with combined sprinkler usage and hydrant of 100000 L required as well as 5000 L overhead tank.

CHAPTER 4 THE SITE

4.1 DESIGN CRITERIA

To understand what the project demands we need to understand what the site needs. It is well to reiterate that the NCPA will evolve its operational procedures through practice. The built form will have to allow for such evolution. So, below we try to list down the factors which will influence the design and have to be kept in mind.

Access and Circulation

Diverse visitors to the various components of the NCPA will approach the site from several directions. Vehicular access into the site however should be only through Dr. Rajendra Prasad road and/or Man Singh road. Access to the various facilities should be clearly visible, and the circulation system, both indoors and outdoors, easily comprehensible even to visitors from villages. The needs of children, the handicapped and those confined to wheelchairs (public, performer, scholars and staff) are to be accommodated in the design of the circulation system.

Security

Security will be of prime importance. A concentric system with checks at each boundary is envisaged. These boundaries are: the perimeter of the site, the entrance to buildings, and the demarcation between areas of public use and those used by scholars, performers and staff. Provisions for closed circuit TV monitoring are required. An additional requirement is for VIP entry and circulation to the public areas.

Zoning

Different parts of the Center will be in use simultaneously or separately at different times. Both for reasons for security and economy of operation, entire sections should be capable of being cordoned off and shut down without affecting the circulation and links. The air-conditioning systems should pay particular attention to this requirement.

Communications

The use of computers, sophisticated systems for monitoring and control of energy use, closed circuit TV for security and assorted communication channels will require the provision of generous ducts (cable/bus ways) to every section of

the complex. Construction in phases and future expansion will have to consider connections to ducts already in place.

Acoustics

Acoustics is of vital importance to the operation of some sections of the Center. Apart from the special requirements in the auditoria, the general requirements for installations are:

40 to 45 db (a) for offices (normal insulation)

35 to 40 db (a) for projections and conference rooms (special insulation)

25 to 35 db (a) for the recording studios (very special insulation)

Although these specifications are to be considered during detailed design, the layout of the built facilities should compliment and facilitate the provisions of indicated acoustic requirements. The need for diffusion and acoustic privacy in the 'open office' planning and in other spaces will have to be addressed.

Lighting and Ventilation

Natural light and natural ventilation is the norm. Exceptions include the stacks and storage areas for collections, specialized equipment storage, recording studios and the major portions of the auditoria. However, even in these areas the uncertain conditions of power supply should be kept in mind while designing.

Climate

The climate of Delhi is variable, from hot-dry in April-May to hot-humid in June-July to cold in December-January. The remaining six months range from moderately cool to warm. Shading and evaporative cooling are important control devices that conserve energy and are effective for all but the humid months. Detailed climatic data are included in the urban design guidelines.

Energy

Design solutions will optimize the use of energy in both capital and operational terms. The use of non-conventional sources, particularly passive systems of conservation are to be considered.

Basement

The sensitive site and the restrictions on the building envelope, ground coverage and permissible gross floor area, will demand efficiency in design. Basements may be considered with due regard for light and ventilation.

Public Convenience

Toilets, water fountains, information and ticket counters, eating facilities, garbage cans, etc., are to be provided as necessary in addition to those specified. These too should accommodate the needs of the handicapped. Toilets for both sexes are to be provided together in readily accessible locations with particular regard for natural ventilation. Numbers should be adequate and in the ratio M: F:: 60:40.

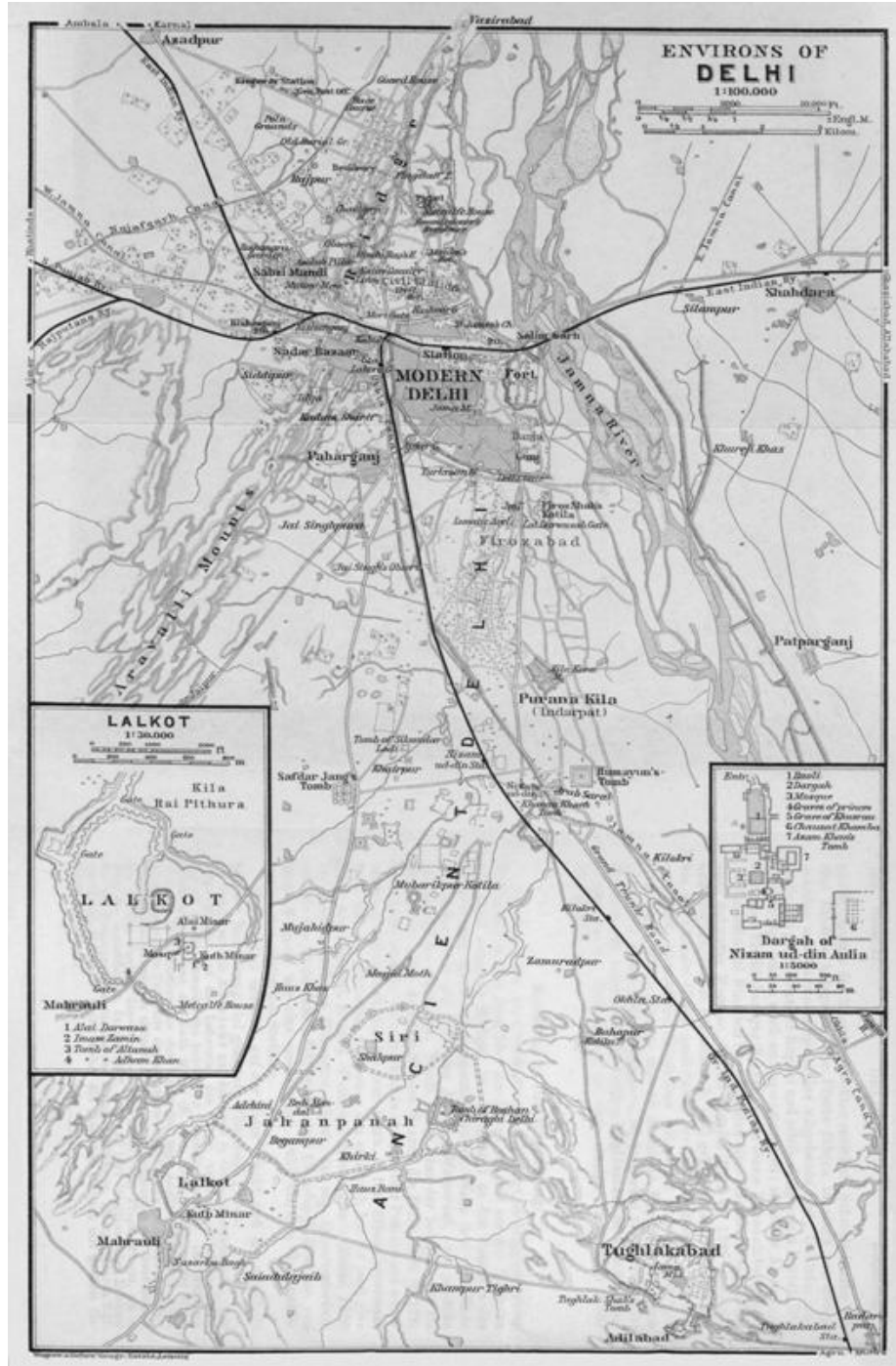
The site will have its own system for garbage collection and disposal. Provisions for an incinerator may be made. Other facilities are to include: a first aid center, a post office, bank, a tourist information office, shopping and a fire station.

Parking will include provision for cars, buses, two-wheelers and for taxis and three-wheelers. Parking is to be integral to the concept of landscaping and to be unobtrusive. Parking for staff may be covered. This can either be a central facility or distributed with the component sections.

The activities and programmes of the Centre will be interconnected and administered through the main admin building. It is thus situated at the entrance of the site in a pivotal position with respect to the two main poles and envisaged as a centre radiation towards the other institutions.

4.2 THE PHYSICAL CONTEXT IN HISTORICAL PERSPECTIVE

For over three thousand years the areas around Delhi have been the capitals of various rulers. Indraprastha, the legendary capital in the Indian epic Mahabharata, is also located at Delhi and is dated around 1000 B.C.



Map 4.1: Old map of Delhi showing ancient cities of Delhi
Source: ASI

The sacred river Yamuna flows southwards in this gentle terrain and the vicinity has known fifteen capitals through history. Before the British took over from the mughals in the early 19th century, the city, known as Shahjahanabad, was a thriving center of the arts, literature, architecture and also a major trade center. In 1877 at an ostentatious durbar, Queen Victoria was declared Empress of India, and in 1911, the capital of this empire was shifted from Calcutta to Delhi at another elaborate ceremony. This occasion marked the birth of New Delhi, known at that time as the 8th Delhi. Today's Delhi is an amalgam of all these older capitals and has a population of 7 million in the metropolitan area.

The old city of Shahjahanabad, a compact high density settlement, had its foci in the Red Fort and Juma Masjid, the two major building complexes, and in the bustling business street of Chandni Chowk. The city was enclosed by high masonry walls, punctured by strategic entrance gates linking it with other major towns in the region. Winding streets from these gates meandered into the close grained built form, creating a hierarchy of streets leading up to the major ceremonial and commercial thoroughfare of Chandni Chowk.

This principal artery, aligned in the east – west direction of the old city, addresses the main entry to the red fort, a walled, military / civic complex within the walled city. The skyline was, however dominated by the Juma Masjid, placed symbolically atop a hill and complemented by a large urban open space befitting the scale and prestige of the city. The surrounding built form was organically divided into introverted clusters reflecting the socio – economic structure supporting a high degree of functional mix.

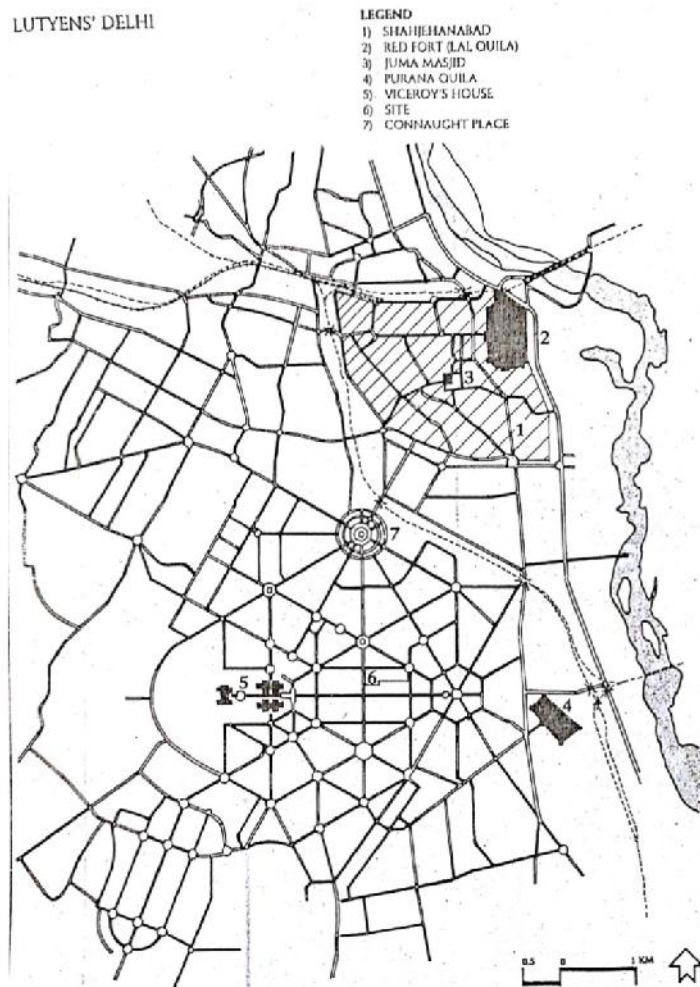
The northern parts of the town were settled by the British in the mid 19th century, where they established their churches, banqueting halls, bungalows and civic lines.

The introduction of the railways in the late 19th century, coupled with the British presence, induced new trade and developments around the north and west of Shahjahanabad. The traditional, dense, built form of the old city with central courtyards and narrow streets was counterpointed by the new prototype of the European – style bungalow with vast green spaces around structures, elaborate compound walls and wrought iron gates. With the decision to establish a new capital the British leap frogged the old city in a pattern familiar to other colonial cities in India and found a location south of it, leaving a large buffer open space between the two.

The site chosen was a sparsely populated area, sloping up gently from the Yamuna River and Purana Qila towards the west, culminating in a mound called

Raisina hill. The new site enjoyed aspect, altitude, water, virgin soil and afforded an excellent view of Shahjahanabad and other remains of the older capital cities of Delhi.

Raisina hill and the ridge are part of a long string of mountains stretching across North West India, extending far into the western desert state of Rajasthan and dotted with fortifications all along. The surrounding land is comparatively flat and, at that time, was uninhabited but for a few hamlets and burial grounds. However, the significant elements on the new site were the religious structures and charming old monuments of bygone settlements of Delhi that dotted the area. The proposed plan for New Delhi by Sir Edwin Lutyens envisaged the capital complex on top of Raisina hill and attempted to integrate existing monuments into the new plan.



Map 4.2: Map showing relationship of Lutyens Delhi and major Points of Interest
Source: ASI

4.3 LUTYEN'S DELHI

Lutyens' plan for New Delhi, conceived and constructed between 1912 and 1931, was very much in the genre of Versailles and L'Enfant's Washington. Characterized by formally laid out axial movement networks, strongly articulated terminal vistas and a low density, low-rise physical fabric, New Delhi was the prestigious capital of Britain's Indian Empire accommodating its governmental and other auxiliary functions.

The plan establishes two major visual corridors; one with Juma Masjid of Shahjahanabad and the other with Purana Qila an even older fortification of Delhi, culminating in the Capital Complex. The circular Parliament building marks the terminus of the axis towards the Juma Masjid. In the middle, along this axis is located Connaught Place, an immense circular, colonnaded commercial node which even today is the nerve centre of Delhi's central Business District. Along the Purana Qila axis in the east-west direction, is the major ceremonial green called the Central Vista with the King's Way (present Rajpath) penetrating in the Capital Complex between two major office blocks, and terminating in the Viceregal Palace. The integrated mass of the Capital Complex provides a visual climax to this dramatic linear open space, crisscrossed by lateral roads and punctuated by India Gate (a war memorial to the Unknown Soldier built in 1923) and a small but ingeniously designed pavilion (referred to as the Chhatra) to shelter the statue of King George.

The King's Way or Rajpath which runs in the middle of the Central Vista green, flanked by two shallow, linear water bodies on either side, is crossed in the middle by the Queen's Way or present Janpath. Queen's Way enjoyed a special status in Lutyens' plan by virtue of the fact that this was the only lateral road that directly interconnected the proposed railway station and the civic node with Anglican Cathedral (unbuilt). The Cathedral was to be the focus of the residential areas of higher officials of the government located south in Vista. More significantly in the present context, the intersection of King's Way and Queen's Way was to form a cultural or intellectual plaza with four symmetrical blocks of the National Museum, the Oriental Institute, the National Library and the Imperial Record Office. The visual linearity of the Central Vista was later considered more important and the four buildings were proposed not right at the intersection of the two roads, but flanking the Queen's Way on two sides where it enters the Central Vista. Of these, a part of the Imperial Record Office (now known as the National Archives) was designed and built by Lutyens on the north of the green, and the National Museum was designed and built on the south of the Vista, by the Central Public Works Department of independent India.

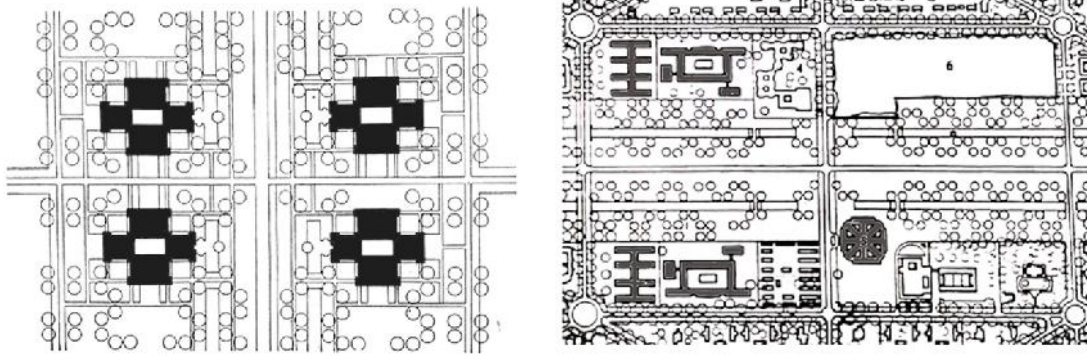


Fig 4.1: Figures showing the proposed cultural plaza on the intersection of Janpath and Rajpath.
Source: ASI

The site for the proposed National Center for Arts is also located at this historic intersection, as one more step towards realizing the original concept of node in Lutyens' plan.

4.4 ARCHITECTURAL CHARACTER

The formal nature of the New Delhi plain was often complemented by structures disposed symmetrically in space. The buildings are aligned in axis to movement lines and centrally are maintained in the placement of domes, spires and other elements in relation to building mass and plazas. This is particularly true of the central vista, where strict geometry is also observed on both sides of the green.

Even though the New Delhi plan was alien in spirit to indigenous planning practices, Lutyens attempted an interesting mixture of architectural styles blending Indian and European vocabularies. Innovative detailing using Buddhist, Hindu and Islamic elements abound in these buildings. Aware of the fact that local laborers had to be employed in the actual construction process the design adopted a vocabulary using materials and techniques familiar to them. The careful blending of alien elements expressed in red and pink sandstone has resulted in a unique style that at once has the gravity of European classicism and the humane charm of indigenous architecture.

Lutyens and his team of architects borrowed freely from Indian architectonic elements using them not only as appropriate building components, but also to create a contextual continuity. Purana Qila, which terminated the central Vista on the east in the original plan, is characterized by a unique element, the Chhatri which is a cupola-like structure that accentuates the skyline. The adaptation of this Chhatri in the Capital Complex, and more dominantly, in the structure sheltering the statue of King George along the main axis, provides an example of how a simple architectonic element was used by Lutyens to create symbolic and physical continuity.

Apart from the Chhatri, stone trelliswork, sunshades (called chhajja locally), balconies supported by brackets, characteristic door and window details, Cornices, moldings etc., are executed in combinations of red and pink sandstone in the central vista buildings. In Lutyens' own buildings concrete or masonry structures are often clad with stone, or stone is used directly as structural material. However, the scale of structures is broken by the use of Carved stone depicting European and Indian symbolic elements such as Elephants, snakes, shells, bells, fruits forms, leaves and so on at appropriate places. Compound walls, benches, lamp posts and other urban furniture scale to a human level.



Fig 4.2: National Archives of India
Source: Taken by author on site

The consistent use of sandstone, with the visually heavier red stone at the base of buildings and lighter pink stone on the upper parts, is another dominant factor that lends visual cohesion to the entire group of buildings. The warm hues of stone complement the vast green background in the Central Vista. The sandstone, available in plenty even today, is a versatile material traditionally used for structures and is easily amenable to ornamentation. In post-independent India, major government buildings have come up on either side of the Central Vista and conform to this general colour scheme.



Fig 4.3: Parliament House of India
Source: Livemint.com

4.5 THE URBAN STRUCTURE

The two major visual corridors in the plan determine the basic geometry in Lutyens' movement networks. Based on hexagons and equilateral triangles the road network has a radial configuration and use roundabouts for directional change. Terminal vistas are established wherever possible, often using proposed public buildings or an existing Mughal monument. The geometry is used as a device to integrate the old and new structures into a coherent visual experience.



Map 4.3: Map showing the planning of road networks based on hexagons and triangles.
Source: Made by author from Google earth

The streets are tree lined on both sides and the built form on the sides is low rise and set in large open spaces, and the street edge defined by thick foliage. The terminal structures at the vistas thus attain immediacy and the space between the spectator and the terminal points is scaled down by the compelling direction given to movement.

By the diverse use of this principle and the clever use of scale and perspective the plan achieves a distinct sensory differentiation between public and private spaces, within an ambience akin to the garden city. As a general pattern in a New Delhi, Lutyens adopted a technique where built form is defined by the space around it, generating on the whole, a low key urban fabric.

Climaxes are provided at important activity nodes where, in a dramatic of the space form relationship, the built form itself is used to define the space. This creates at these nodes an intense, urban experience as in the case of Connaught Place and, to a smaller degree, in Gole market where the centripetal nature of the circular configuration heightens the sense of place without negating its function as traffic rotary.

In Lutyens' original plan, the Cultural plaza at King's Way – Queen's way crossing as also one such climatic node, using rectangular forms at a four way junction.

4.6 LANDSCAPE AND WATER BODIES

In the Capital Complex, water is used as a landscape element in a formally laid out garden for the Viceregal Palace and in the office court on Raisina hill.



Fig 4.4: The fountain placed axially in front of Rashtrapati Bhawan.

Source: The Other Side blog

Two large fountains placed symmetrically below the office block mark the beginning of water bodies that flank Rajpath on either side. These are less than a meter deep and terminate near India Gate with another two symmetrically placed fountains. A small water body surrounds the Chhatri further east of India Gate, axially placed on the vista. A giant lake at the eastern end of the vista which was a part of Lutyens' original plan was never realized.

The Central Vista was conceived as a ceremonial green space and has very few structures within it. Along the axis are India Gate and the Chhatri. Services necessary for the irrigating the greens are physically underplayed along the civic amenities, such as toilets, restaurants etc by placing them below ground level. The land gently slopes from Raisina Hill downwards and the gradient is higher. Beyond the Chhatri towers the stadium in the east. Vast stretches of lawns, which contain the shallow ten meter wide water bodies, slope gently towards the water, facilitating surface drainage.

Trees with low crowns are planted in rows on either side of Rajpath accentuating the perspective.

Stone benches are provided at regular intervals and cast iron and stone lamp posts light up the green at night.

4.7 CITY CONTEXT

In 1947, when India became independent, New Delhi became the capital of India. The Viceregal Palace was converted to the President's estate and the Central Government of India has since functioned from the capital complex.

New Delhi, which was located south of Shahjahanabad, has today been engulfed by massive urban development all around. A huge influx of refugees at the time of the partition of India created a sudden swelling in the city structure. The subsequent growth of Delhi as the seat of the central government and its growth into a major commercial and industrial center have led to massive immigration. Metropolitan growth has taken place around Lutyen's Delhi, making it more or less geographic center.



Fig 4.5: Road leading towards Le Meridian hotel
Source: taken by author on site

On the two sides of the central vista, large government buildings have been erected, converting the area to a major work center but leaving the vista undisturbed. The ceremonial green of the central vista has retained its original function and form, and turns into a venue for the massive Republic Day parade

on 26 January, every year. Parades and pageants of various states of the republic and the armed forces are watched by millions of people every year. The event is telecast throughout the country and the central vista and capital complex become the most visible elements in the country. In the international media the visual image of New Delhi is often represented by the central vista and its buildings.



Fig 4.6: The visual image around the site is that of dense greenery and wide open roads, which the basic character of the Central Vista is all along.
Source: Taken by author on site



Fig 4.7: Roundabouts near the site show the roads form an equilateral triangle and hexagon
Source: Taken by author on site

In the evenings and on holidays, India Gate and the green space around it becomes a major picnic spot for citizens. The green space throughout is used by joggers and other sport enthusiasts and a boating facility in one section of the water body is very popular. Since the seat of government is in the capital complex, the green space in front of it has become an important venue for political and other demonstrations. Many political processions which start in the old city terminate with a demonstration at the boat club in the central vista green.

In the east west direction the vista becomes a division between the central business district at Connaught Place and the predominantly residential south Delhi. Commuters from the south cross this green every day to reach areas in the north. The Chhatri and the hexagonal movement around it become a major

traffic rotary for this purpose. Few buses are routed across the central vista, as the routes are designed to bypass it on the east and west ends. Major bus terminals for the city's public transport network are located near Parliament House and Connaught place. The areas around the proposed NCPA site are still comparatively low in traffic demand. Few buses ply on Janpath and Rajendra Prasad road which abut the site. Even though the NCPA as envisaged has a national and international catchment, its city level impact should not be underestimated.

At present the ring road and the railway are the main metropolitan level arteries. The airport is located in south Delhi and the major interstate bus terminal and the railway stations are in the north. Hotels, which become the interface elements between these nodes and the city, are scattered all over, with natural concentrations near the transport nodes and in the central business district. Connaught place has high concentrations of hotels and Janpath, the major access road to the proposed site, has four large hotels on it, between Connaught place and the site.



Fig 4.8: Trees and water bodies are lined along the Rajpath
Source: taken by author on site

Janpath, which means peoples route, requires special mention not only because it links the site to Connaught place but also because it enjoys a special status in the city. Starting in the north at Connaught place, Janpath changes its character drastically as it moves southwards. As its beginning it is a very popular, colorful bazaar street as well as a major office area. Flanked on two sides by the two colonial buildings of the eastern and western courts it slowly turns into a purely “offices and hotels” area. The change in function is articulated by traffic intersections and landscaped roundabouts. The bungalow area of the colonial period begins closer to the proposed site, marking the end of high rise structures. At the point of entry to the central vista, Janpath is flanked by the National Archives and the proposed NCPA site. Across the vista, Janpath leads to the National Museum and a few other institutional buildings and moves on to become a purely residential road housing higher officials of the government. Thus Janpath has on it, linearly disposed from north to south, all major land uses: from commercial, institutional to residential, and consequently has a varying intensity of traffic.

CHAPTER 5 CASE STUDIES

5.1 NATIONAL CENTER FOR PERFORMING ARTS, MUMBAI

Mumbai's National Center for Performing Arts is situated on a 7.4 acre reclaimed piece of land on the edge of the bay on marine drive. NCPA also is a major part of the socio cultural regeneration of marine drive, where marine drive acts as a catalyst for a number of socio interactive spaces. The main complex with performance spaces cover over 5.4 acres. It was designed by Philip Johnson and John Burgee.

It has five theaters and open performing spaces gardens, administration offices and residential towers. A complex dedicated to host and promotes performing arts, it was completed in 1980. It is a unique mega complex with a host of venues and state of the art facilities. Each building complex has wide staircases, art deco walls, classic sculpture showpieces, plush carpets and understated lighting.



Map 5.1: Map showing location of NCPA
Source: Made by author from Google earth

5.2 MAJOR THEATER COMPLEXES

TATA Theater

The Tata Theater was completed in 1980 and was designed by Philip Johnson. It can seat up to 1010 people. It is a theater without proscenium and fan shaped amphitheater and excellent acoustics, suitable for music, concerts, dance, and drama and film screenings. The stage is made up of hardwood timber on a concrete base; the semi circular stage has a rotatable inner portion and a fixed outer portion. The walls in the interior of the theater are angled for better sound amplification. It has 6 entry/exit points and 6 green rooms backstage.

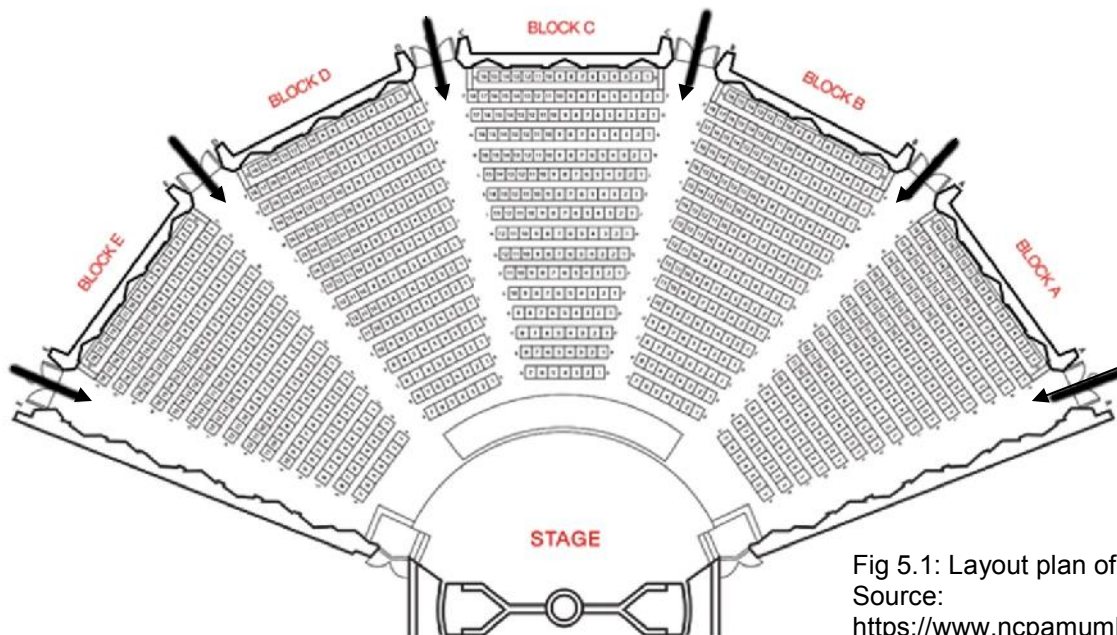
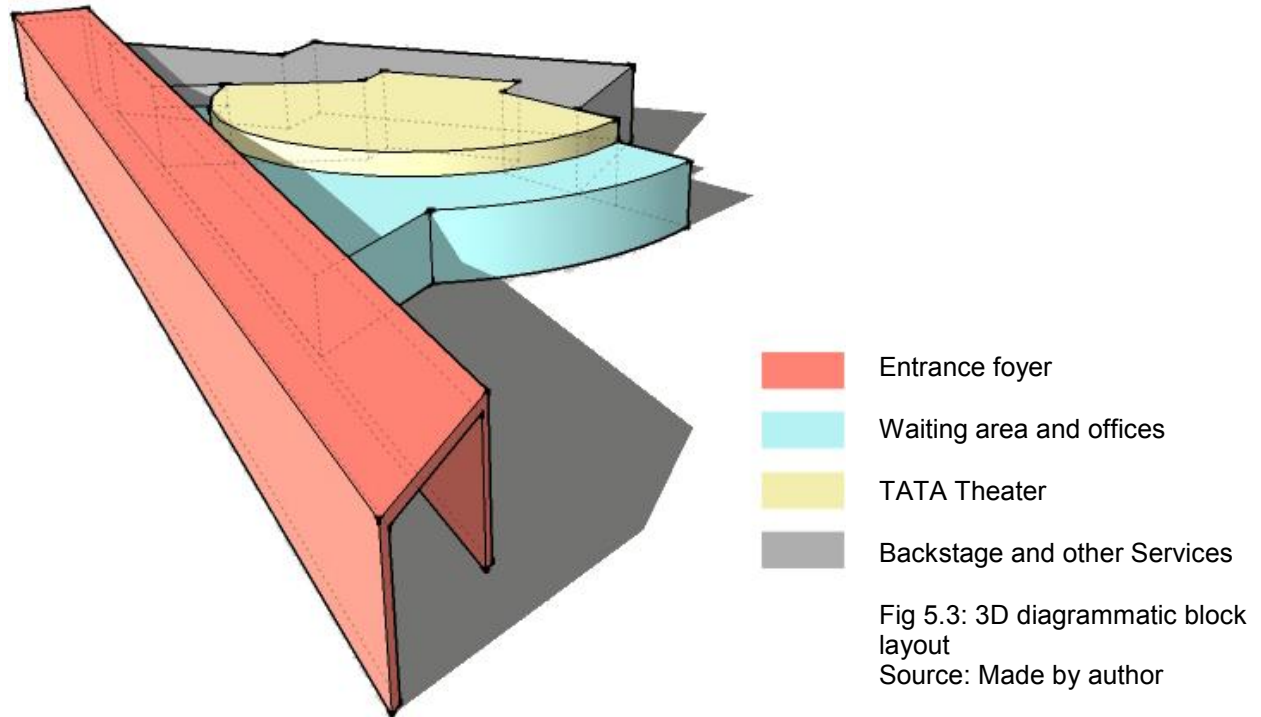


Fig 5.1: Layout plan of TATA Theater
Source:
<https://www.ncpamumbai.com/venue/tata-theater>



Fig 5.2: Seating and stage of the Tata Theater
Source: Photos taken by author



Jamshed Bhabha Theater

The Jamshed Bhabha Theater was completed in 1999 and was designed by Patel batliwala. It can seat up to 1109 people. The theater has hosted many high profile award ceremonies, seminars, ballet and western musical performances. It has 8 entry/exit points and 13 green rooms. Interiors were designed by Dr. Rajgopalan and are applauded because of splayed walls, diffusion and more reflection results in no need of amplification systems. Walls and ceilings are dense plaster and ceiling is elongated.

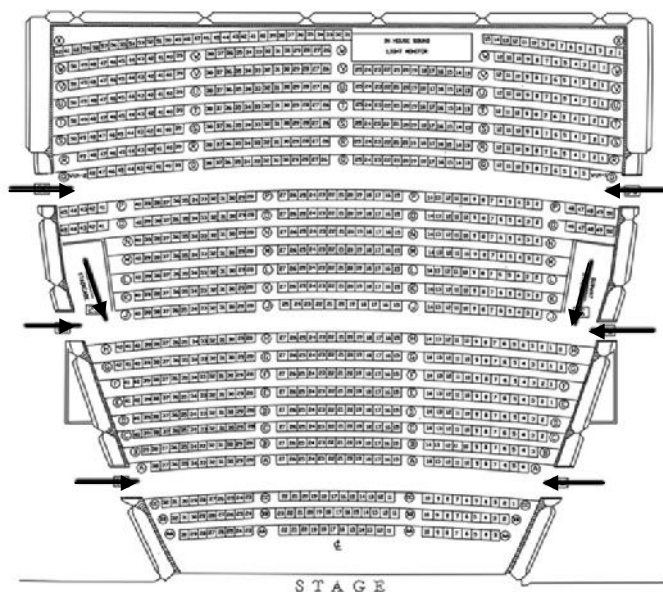


Fig 5.4: Layout plan of Jamshed Bhabha Theater
 Source: <https://www.ncpamumbai.com/venue/jamshed-bhabha-theatre>



Fig 5.5: Interior of the Jamshed Bhabha Theater
Source: Taken by author

At the Jamshed Bhabha Theatre, every seat is optimal to view the performance.

5.3 ORIENTATION

The location of the site could not have been better for a building of such stature. As it is an advantageous site with direct approach from marine drive. But the site is not developed as a whole, and each building seems drastically different than the other. The complex seems like a homogenous entity from the outside but the theaters are built by different architects at different times. The context around the site has high rise post modern building.



Fig 5.6: High rise modern buildings around the NCPA
Source: Taken by author

5.4 HIERARCHY

The massing of buildings around the site is based on importance and their function. Use of same material and pattern makes monotonous character. Malad kurla stone (yellow basalt) is used along with white bands.

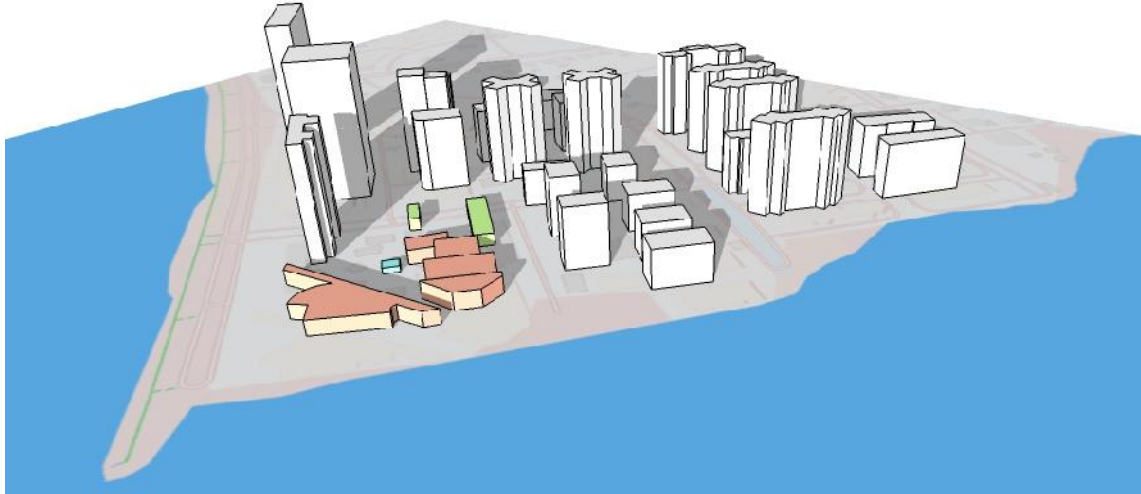


Fig 5.7: Hierarchy around the NCPA site
Source: Made by author

5.5 SERVICES

Centralized and underground location of most services has advantages in terms of - maintenance - Distribution

- Reduction of noise

AC ducts are kept large in size to dampen vibrations and inlets are on the theater ceilings.



Fig 5.8: Interior of the Jamshed Bhabha Theater
Source: Taken by author

5.6 RELATIONSHIP BETWEEN BUILDINGS

Relationship of closed and open spaces is well maintained in certain parts of the complex. The central courtyard connects the buildings. Individual buildings has individual interrelationship of spaces but not as whole. Segregated plan of the complex therefore the pedestrian flow is smooth.



Fig 5.9: Exterior view of the Bhabha Theater
Source: Taken by author



Fig 5.10: Exterior view of the TATA Theater also shows the usage of material
Source: Taken by author

5.7 RAVINDRA NATYA MANDIR

The P. L. Deshpande Maharashtra Kala Academy was established by the Government of Maharashtra to perpetuate the memory of late Shri. PL Deshpande for his rich, outstanding and invaluable contribution to Marathi Literature, Theatre and Music. The Academy was inaugurated by the then Honorable Chief Minister on 17th November 2002. It is situated at Prabhadevi, Mumbai which is at the heart of Mumbai. The location is one of the key strengths of this theater as it lies in suburban Mumbai with residential colonies in the nearby vicinity. Hence, it is booked for events and cultural programmes most of the time.



Map 5.2: Map of Ravindra Natya Mandir

Source: Google maps

The total site measures about 2.2 acres. The main Ravindra Natya Mandir auditorium building measures about 925 sqm. The Maharashtra Kala Academy building covers about 370 sqm.

The main objective of this Academy is to preserve and promote the rich cultural heritage of Maharashtra and the Classical, Traditional and Contemporary Performing Arts including Music, Dance and Drama and Visual Arts in the form of Painting, Sculpture, Photography and Graphics.

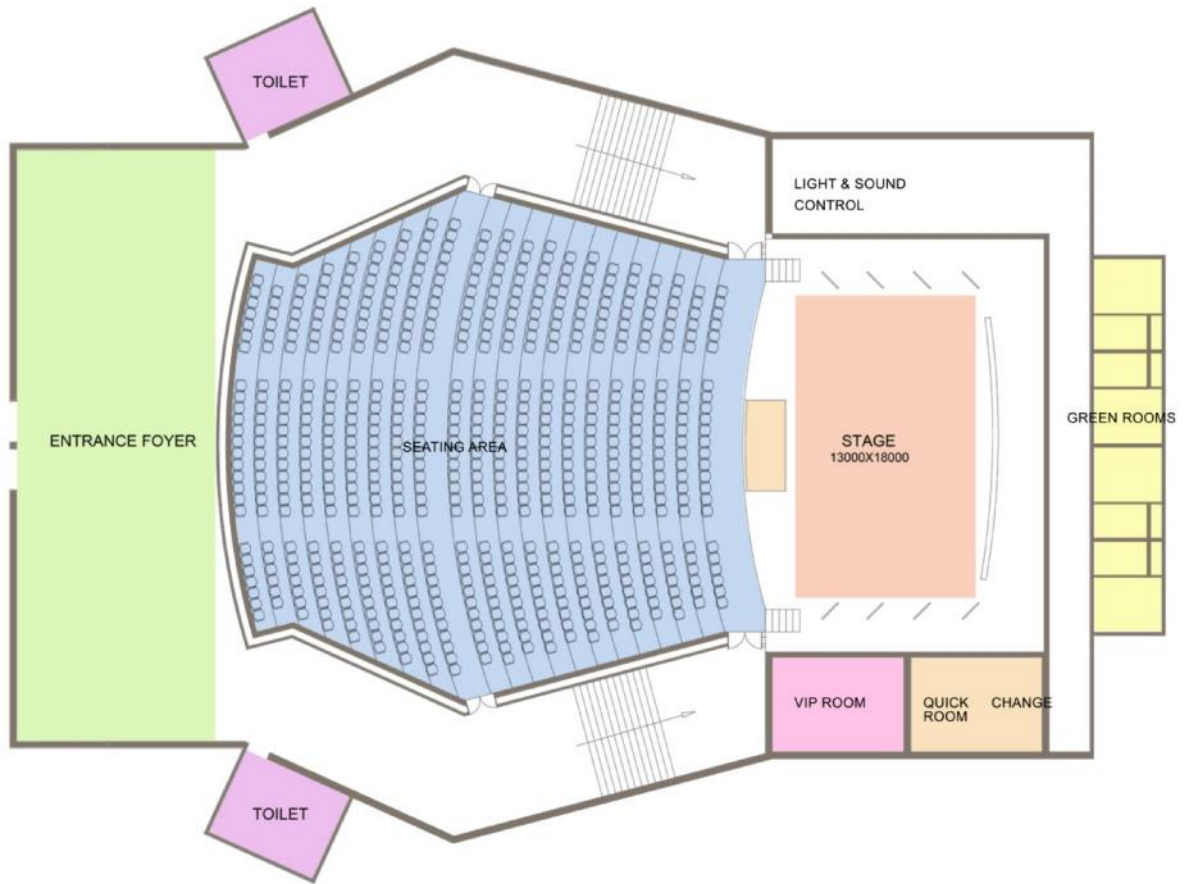


Fig 5.11: Plan of Ravindra natya mandir auditorium
 Source: Drawn by author

The facilities in the Academy include Ravindra Natya Mandir with a capacity of 911 seats, Mini Theatre with a capacity of 199 seats & an Art Gallery. The main auditorium has 630 plus 281 seats in the balcony.

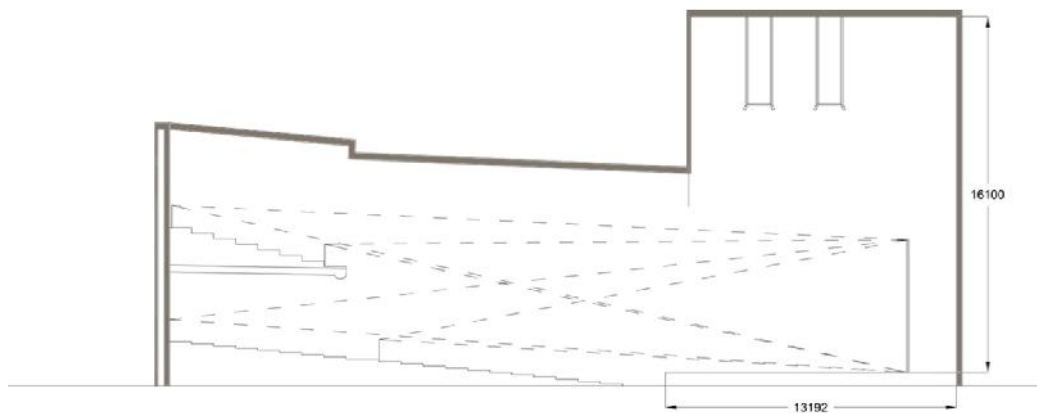


Fig 5.12: Section of the auditorium
 Source: Drawn by author

5.8 ORIENTATION

The complex is in the midst of the hustle and bustle of Mumbai so attracts a lot of crowd on the days of an event which can result in commotion on the roads.

The complex has a basement parking for 90 cars and no surface parking for visitors.



Fig 5.13: Image showing the basement
Source: Taken by author

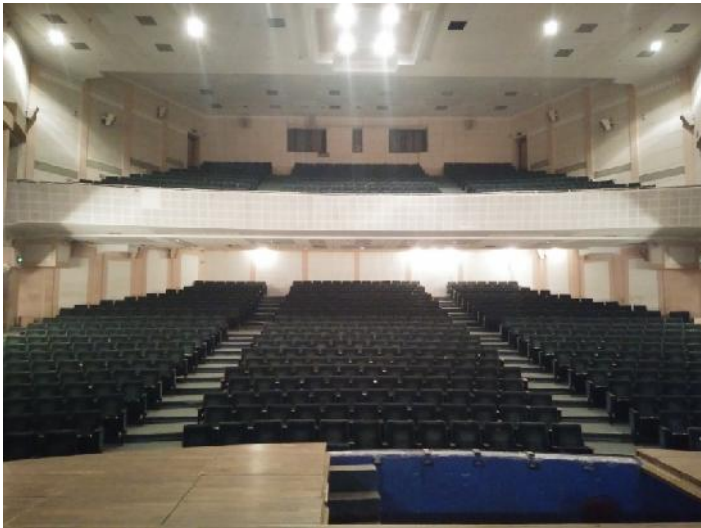


Fig 5.14: Interior of the auditorium
Source: Taken by author

5.9 HIERARCHY

The building facade comprises of ACP sheets and glass in terms of material usage. The maximum height is achieved by the auditorium block which has another smaller conference hall above it. This scale of the building is not observed on first visit to the complex due to dense plantation and welcoming human scale entry points.



Fig 5.15: Exterior of the building showing the materiality
Source: Taken by author



Fig 5.16: Interior of exhibition space
Source: Taken by author

5.10 SERVICES

The water storage tanks and firefighting tanks are in the basement. Due to heavy loads 3 phase electrical supply is made available and up to 40 kW is provided by the center.

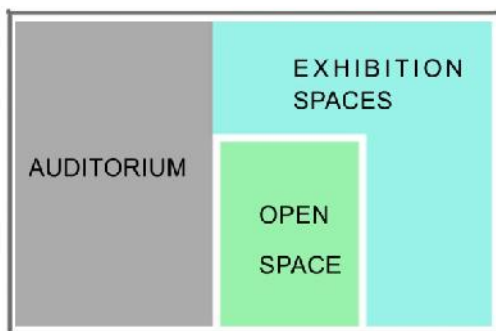


Fig 5.17: Typical zoning along the site
Source: Drawn by author

5.11 RELATIONSHIP BETWEEN BUILDINGS

There is not a lot of open space in this complex. The building blocks are tightly packed in a compact site area. The open space is at the center where cultural events or gatherings take place from time to time.



Fig 5.18: VIP room in the theater complex
Source: Taken by author



Fig 5.19: Green rooms in the backstage area
Source: Taken by author

CHAPTER 6 DESIGN PROCESS

6.1 EXISTING STRUCTURES & TREES

The existing trees on the site were an important aspect of the design process as cutting them down was not an option and tree transplanting is neither easy nor cost effective. As for the site, there are more than 500 trees of 33 different species in and around the site. The pre dominant species include

- Ashok
- Peepal
- Arjun
- Putranjiwa
- Bottlepalm
- Silver oak
- Papdi
- Amaltas

“Most trees cannot tolerate transplantation; success rate is extremely low,”

CR Babu, Professor Emeritus, Center for Environmental Management of Degraded Ecosystems

The ITPO Pragati Maidan project’s audit survey had highlighted how only 36 of 1,713 trees (2.1%) were actually found healthy to survive translocation. This tends to happen because usually after all the effort, most transplanted trees don’t survive the ordeal as due to the hot and humid climate of Delhi the roots go through a shock when taken out from their soil. Hence, even after proper transplanting the survivability is quite low.

Apart from the trees the existing structures in the site include

- old IGNCA building
- Mati ghar (temporary exhibition structure)
- Open air theater

The drawings for these structures are attached below as well as the survey plan from the survey office.

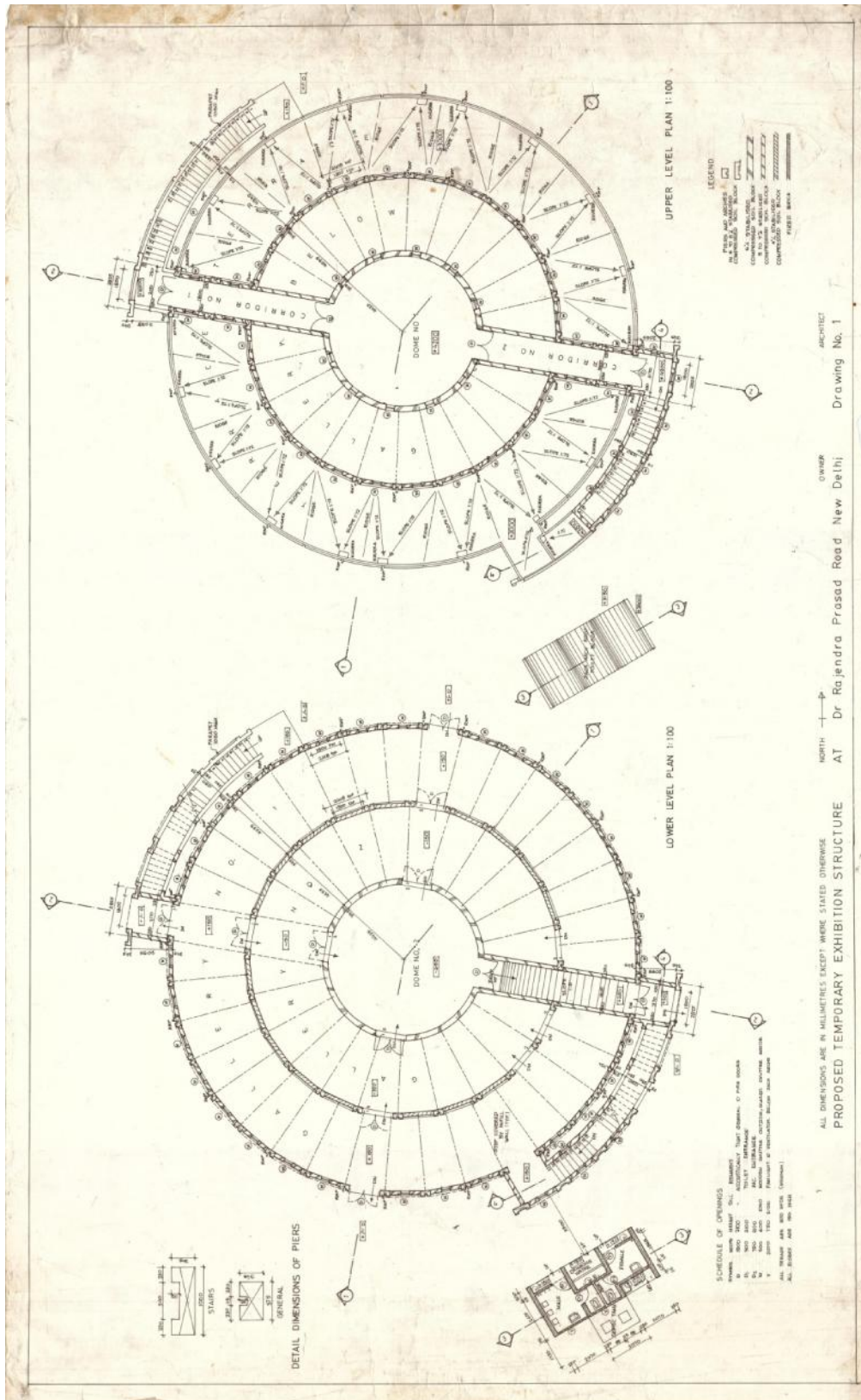


Fig 6.1: Original drawing for the Mati ghar
 Source: IGNCA planning committee

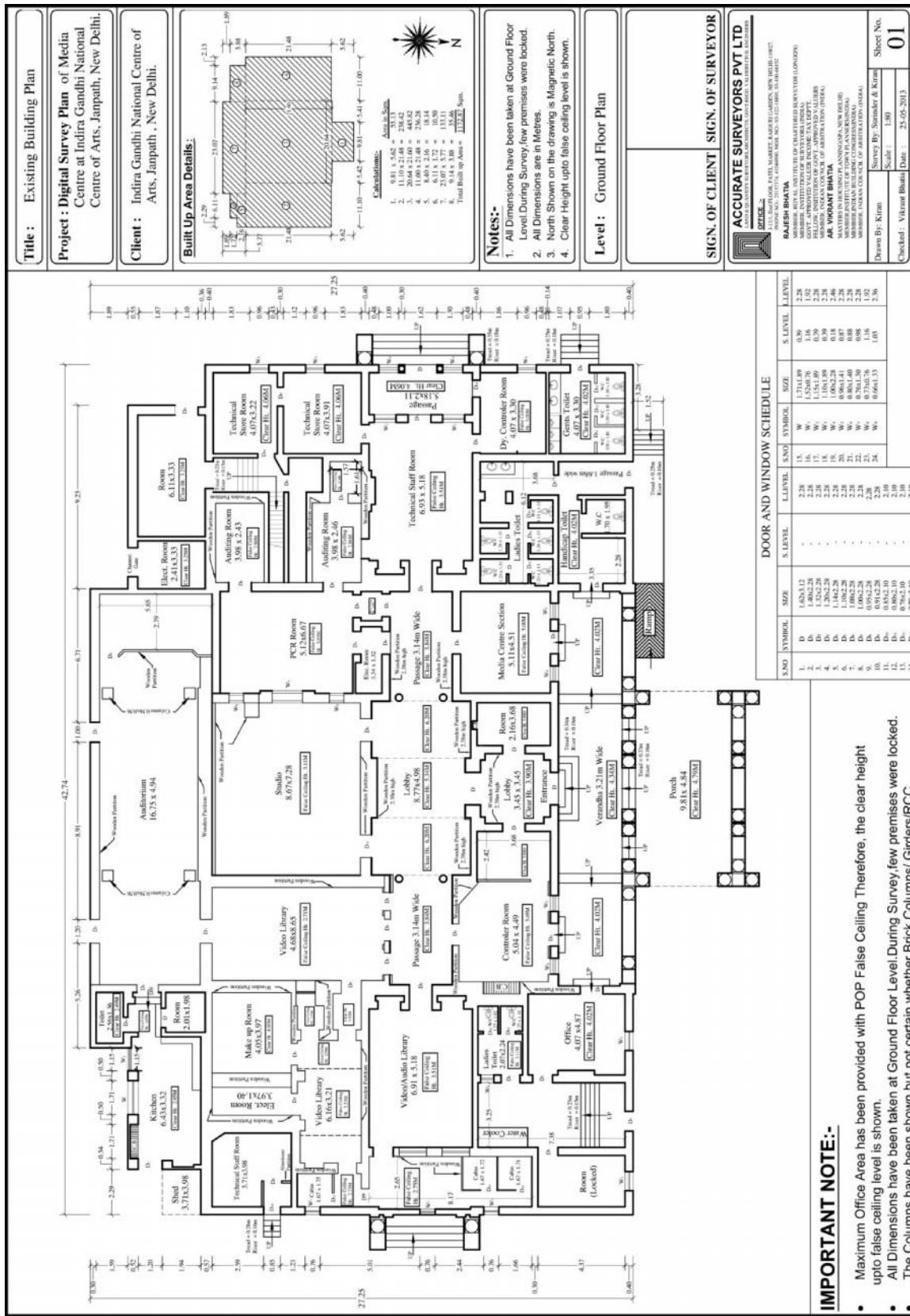


Fig 6.2: Showing the plan of old IGNC A office building
Source: IGNC A planning committee

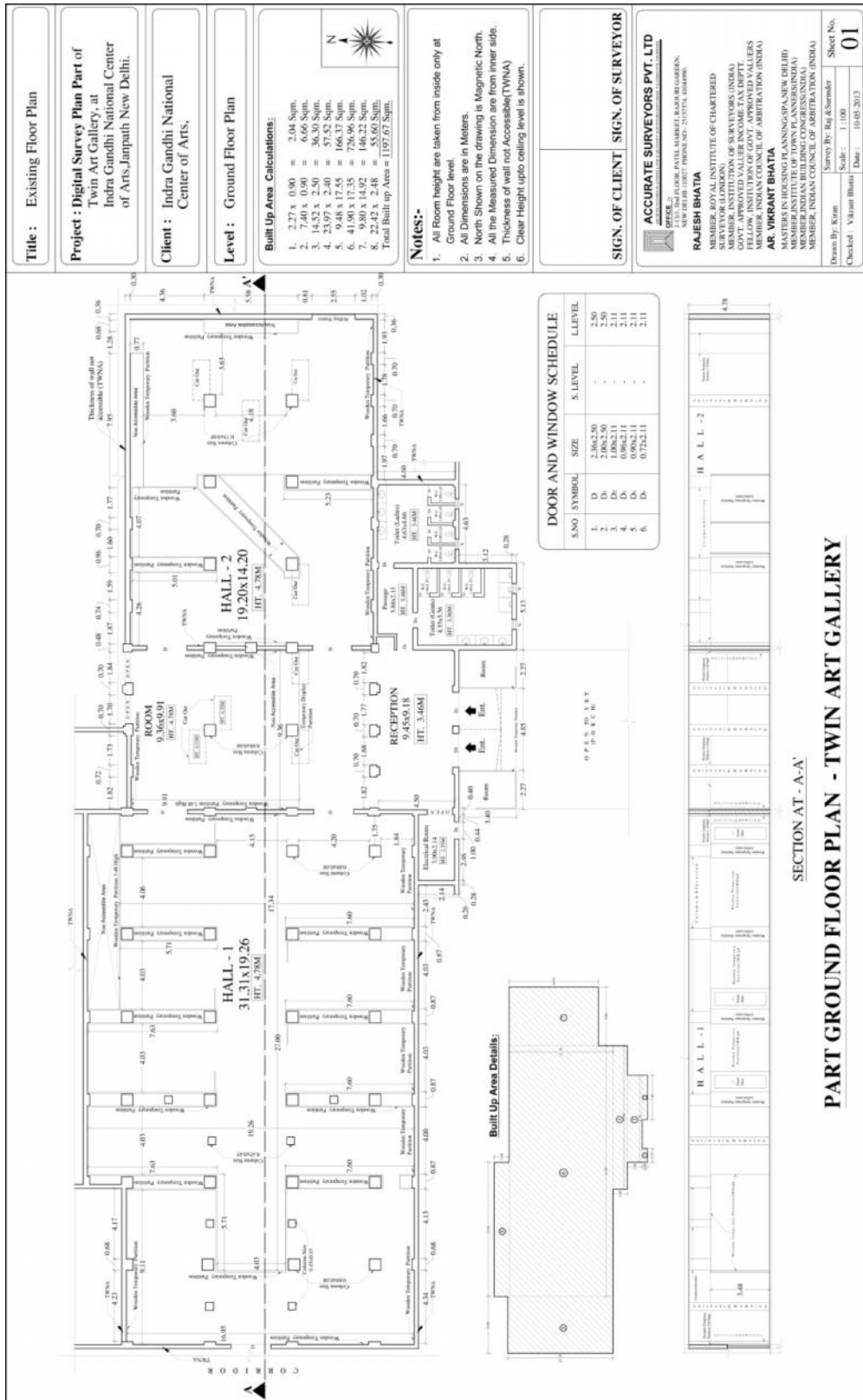


Fig 6.3: Showing the plan of the Twin art gallery
 Source: IGNC A planning committee

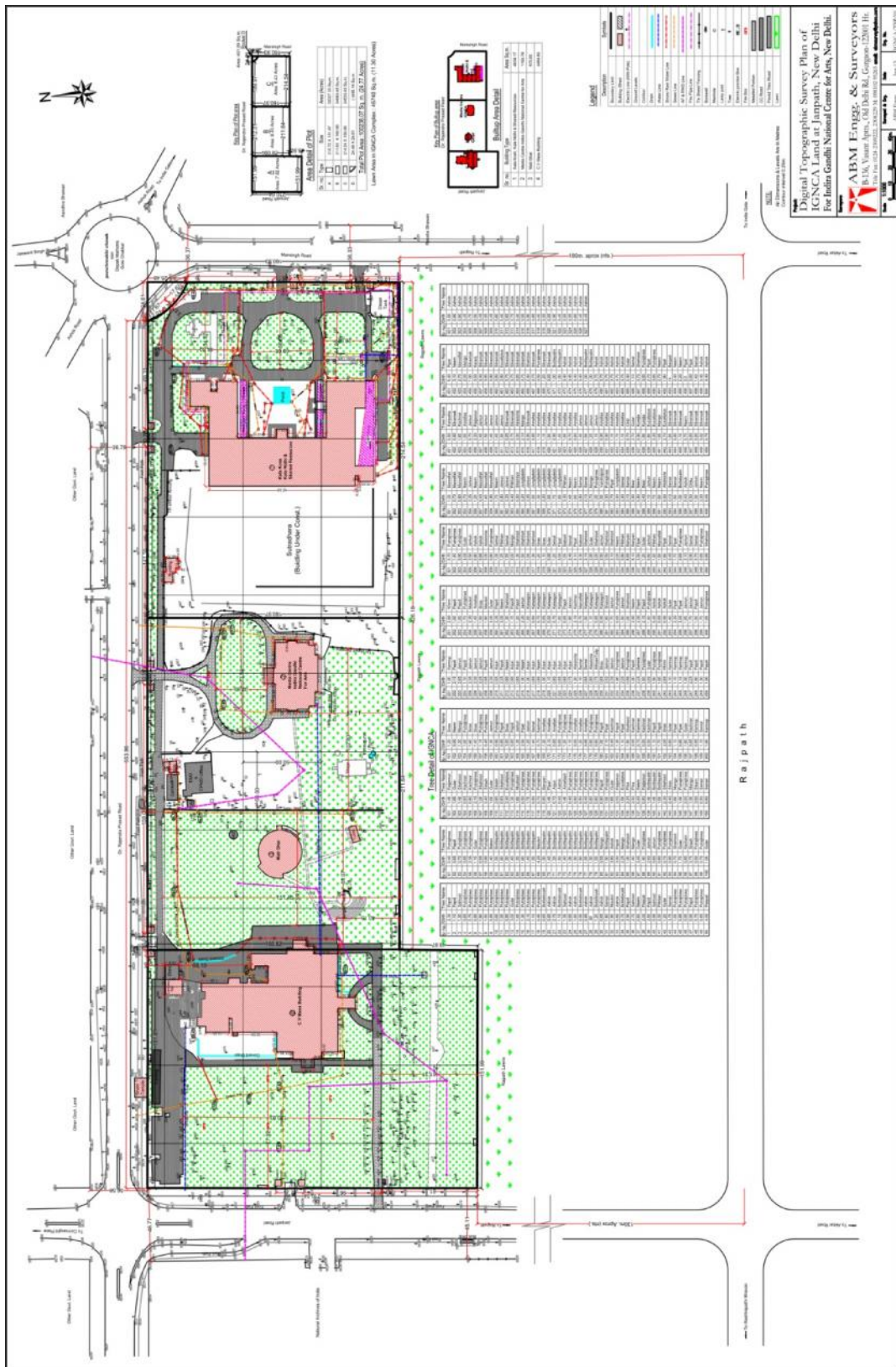


Fig 6.4: Surveyors map of the IGNSCA complex
 Source: Survey officials

6.2 CONCEPTS

For a form based design approach the complex was imagined as a set of bellows. The same way as the bellows expand and contract to make space for air that produces sound in a musical instrument the complex was imagined as space which should be accommodating for everyone as well as make space for their varied uses.

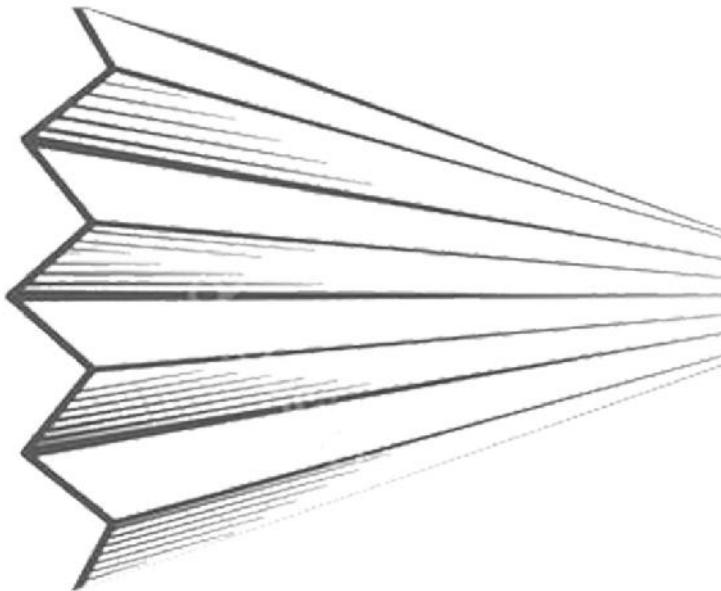


Fig 6.5: Showing bellows of a musical instrument
Source: Edited from a photo by author

From above the center is visualized as reflecting a still ocean surface. This ocean is thought of as the ocean of tradition and culture. On this stagnant and calm surface of water, this center will create waves as the new energy will be brought forth. This signifies radiating energy and emergence of something new.

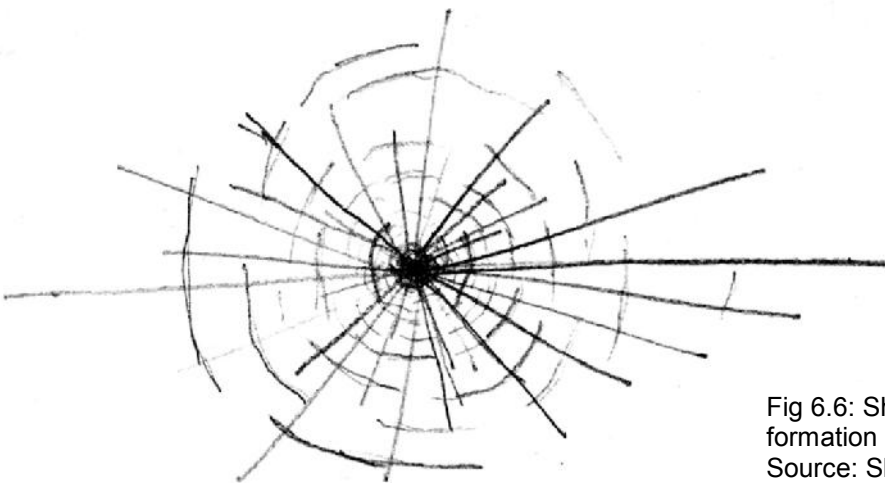
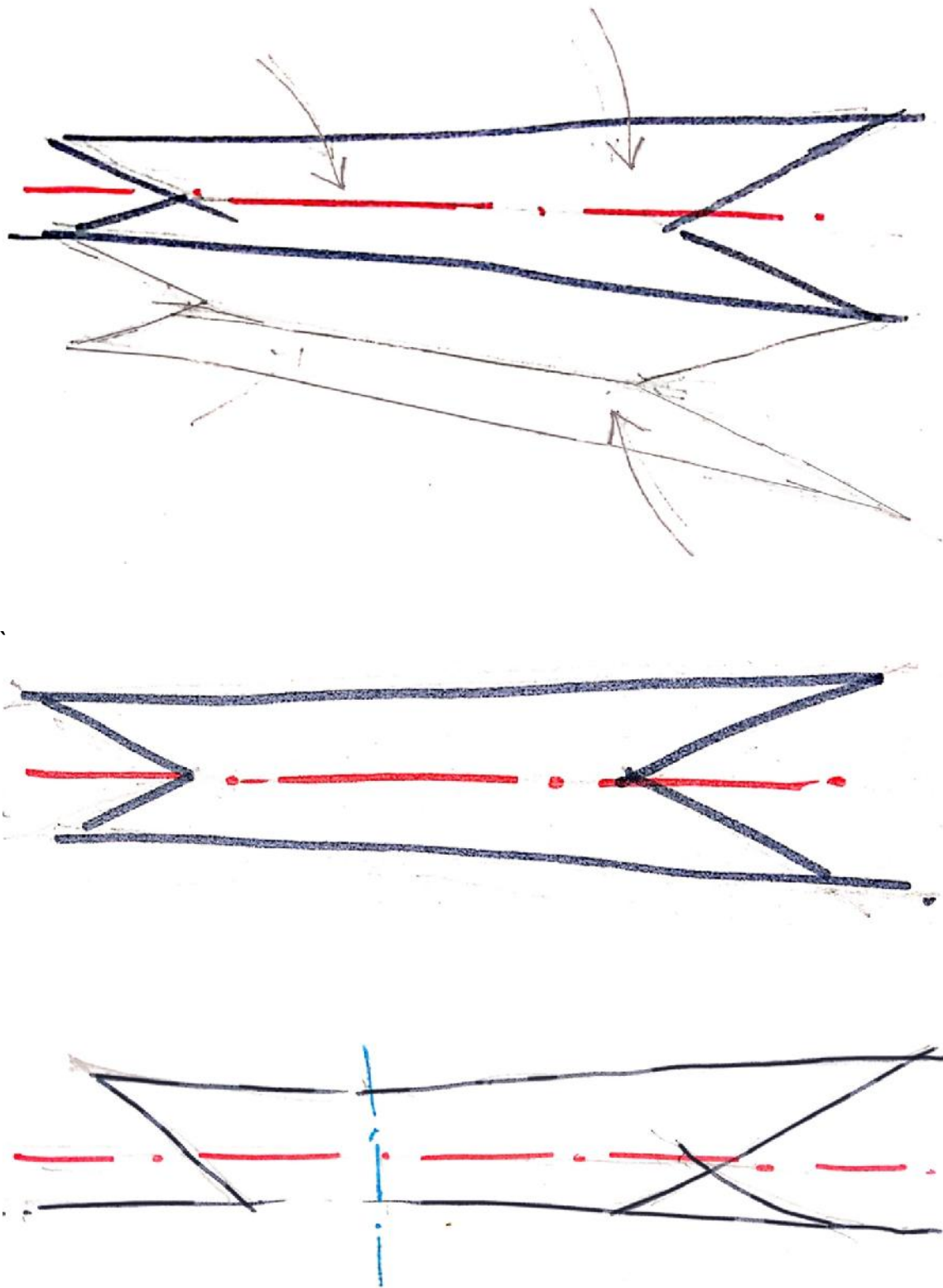


Fig 6.6: Showing the wave formation radiating outwards
Source: Sketched by author



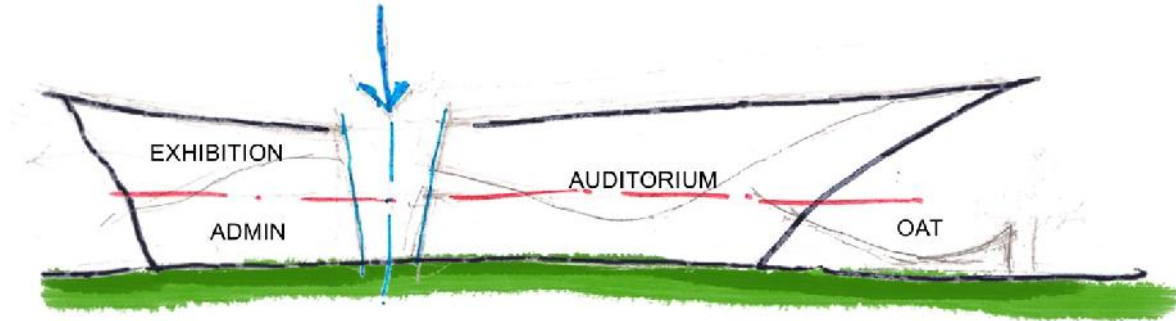


Fig 6.7: Process of concept development
Source: Sketches by author

This type of design iteration would result in a building that would not fit in the urban scheme of things and could result in a degradation of the visual image of the central vista by standing out. Better understandings of the requirements of the central vista were found by analyzing the comments by jury on the National War Memorial competition.

One of the conditions of the competition was that the new museum must be “harmonious” with the style of the structures in the nearby vicinity. The Central Vista Committee has rejected both designs outright. On February 26 this year, it concluded that the entry “does not match with the grandeur and style of Central Vista”. It arrived at much the same conclusion about the other plan on April 9, saying it “is not in consonance with the grandeur and style of Central Vista”.

With these types of comments about upcoming projects, we can take a look at projects that have been completed around the central vista. One of such projects is the parliament library by Raj Rewal.

Rewal knows his architectural pedigree and in the Parliament Library he develops themes that he has pursued with great rigour earlier. Rewal's long-term strategy has been to transform traditional elements of architecture for contemporary deployment, not merely transfer their images as Lerner has done in the IGNCA library. The other related reason is that even as Rewal fulfils the functional requirements, he seeks to do so at a deeper level. It is the deep structure of his architectural methods that set his work apart from that of Lerner's, or for that matter any other architect in India.

Viewing the architecture of India from this perspective enables one not only to understand the architecture of the Parliament Library but also to distinguish between architecture with gravitas and that without, to tell the work of a serious practitioner from that of a journeyman.

For a different approach the site was looked at along with the major roads and connections at an urban level. The major axis i.e. Rajpath starts from mughal gardens and terminates at the newly constructed war memorial. The mughal gardens are in square form and the war memorial is circular, these are in line with Lutyen's vision of the Kings way. The site lies approximately in the middle of this king's way.

So, an imaginary square form is considered along the site but as the site lies within a hexagon which has its roads at an angle to the site, this square is tilted and the building blocks are placed at the edges of this square.

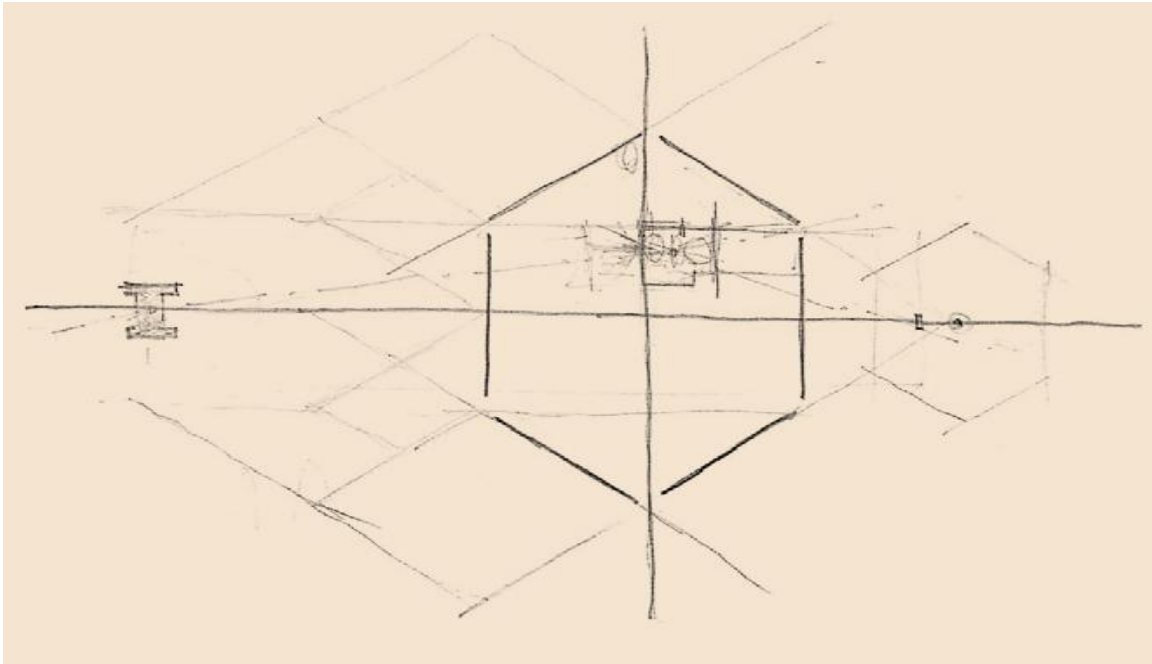


Fig 6.8: Road network around the site showing hexagons and triangles
Source: Sketch by author

To place the built masses on site the trees were marked and adequate open spaces were identified. There is dense plantation along the boundaries of the site, the southern extent of the site and the middle.

Giving a lot of emphasis to this axis that Lutyens created can also result in a contrast as he was a foreign architect; the only logical solution to these problems lies in the creation of a happy union of the past and present to reflect a true expression of indian-ness.

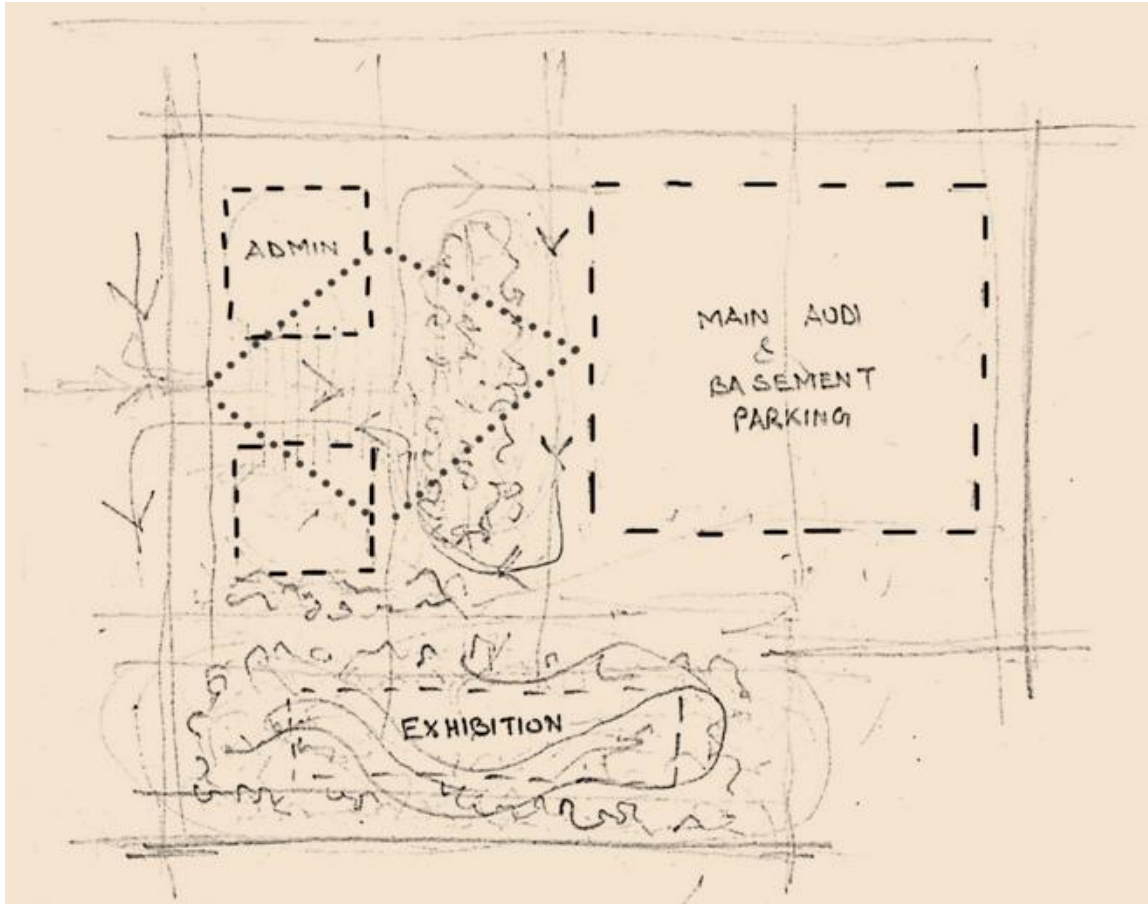


Fig 6.9: Shows the conceptual zoning
Source: Sketch by the author

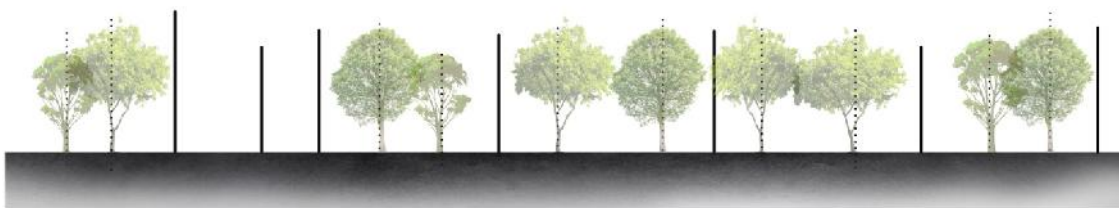


Fig 6.10: Shows the verticality along the site
Source: From the author

Along the site we have a lot of trees, so at the ground level these were treated as the vertical elements as branches and greenery are visible to the visitors. The building was also conceived to have similar verticality along its facades. The building will be having a combination of fenestration and masonry walls generating contrast due to materiality and adding on to the verticality.

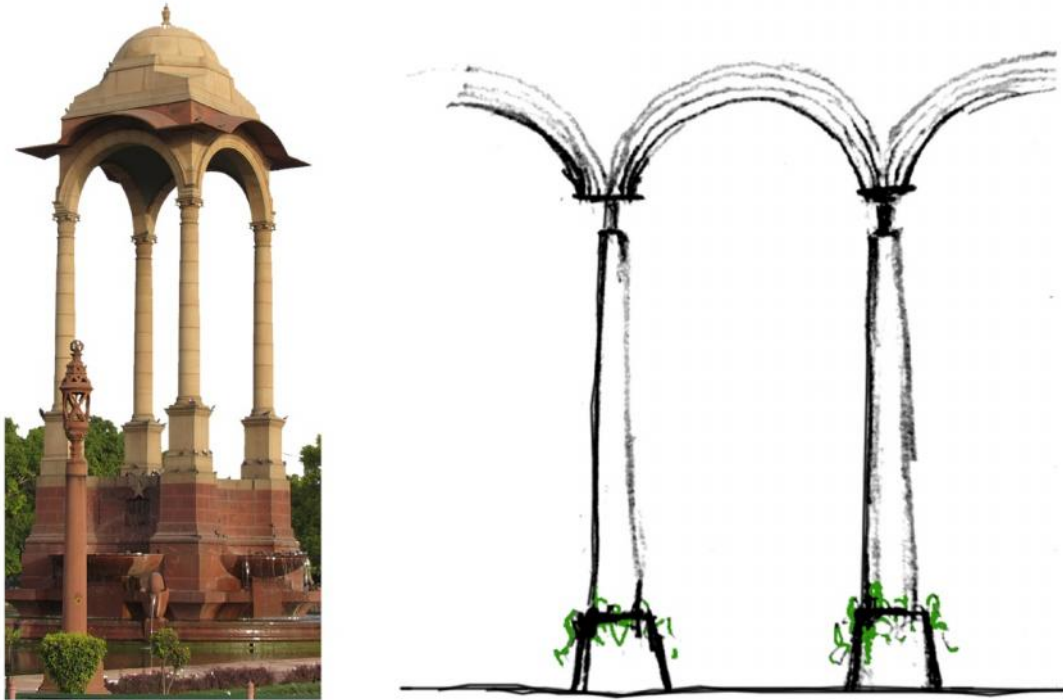
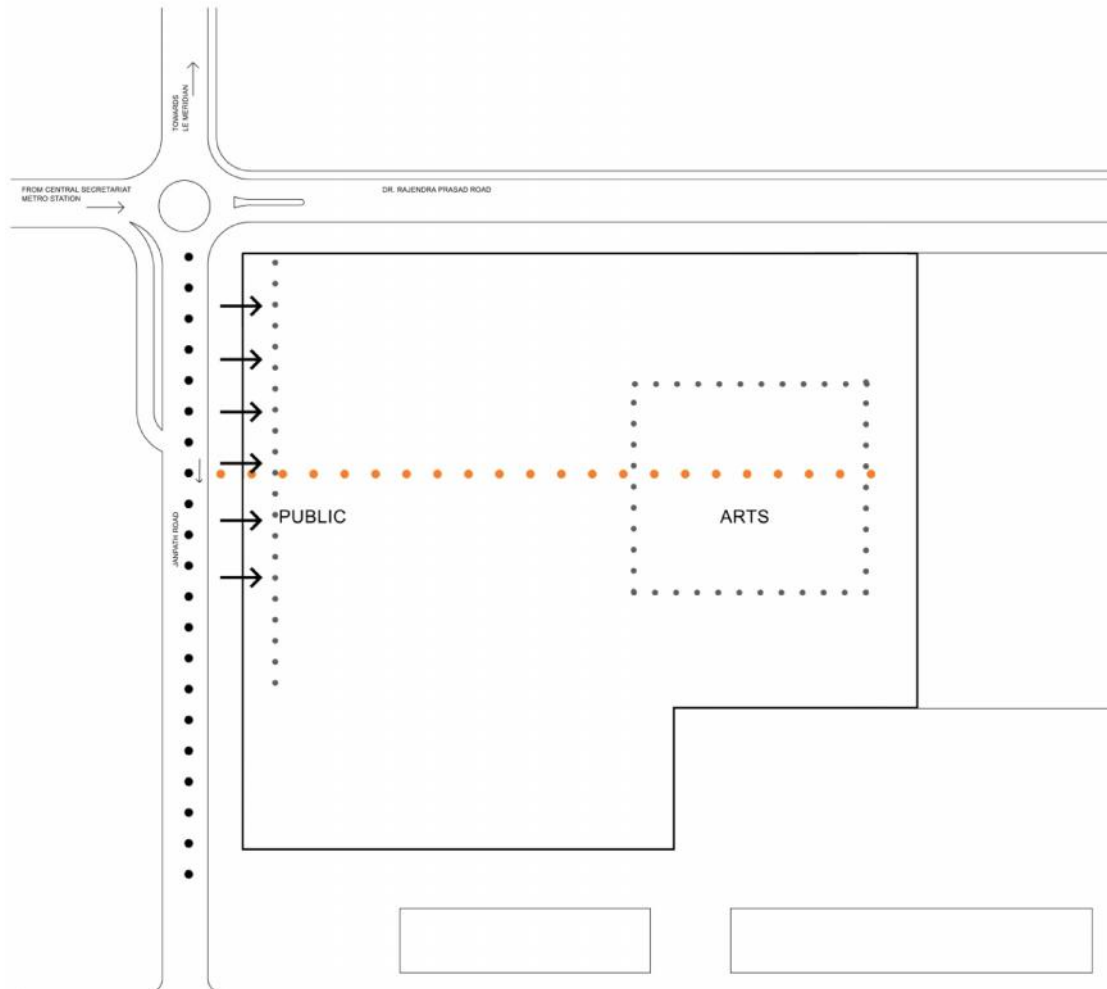


Fig 6.11: Shows the elements used around the central vista in arches
Source: Image and sketch by the author

“Whatever influences came to this country, the end product was unmistakably Indian” - **INDIRA GANDHI**

One of the elements found in the nearby context (National Archives) is arches which can be used here which is a classical element used by Lutyens. At the same time it must be contemporary and not merely a transfer of the image but amalgamation of the old and new.

So, that it looks familiar but not the same.



Map 6.1: Shows the connection of People and the Usage
 Source: Made by the author

The idea is that the main connection should be of the public or the people, with the use i.e. the arts. The main entry point is kept from the Janpath which literally translates to the People's Way; it is also the nearest side from the Central Secretariat metro station. From there a visual and physical connection is conceptualized of the people to the main auditorium.

SPACE	NO.	CAP.	AREA
Security booth	3	4	5
- Entrance foyer		50	100
- reception	1	2	8
- lounge	1		
- administration offices	1	2	25
- directors office	1	1	25
- deputy director office	1	1	25
- toilets	2		
- public relations office	1	2	20
- management office	1	2	25
- arts directors offices	2	2	25
- accounts and audits office	1	2	25
- first aid/ medical	1	2	30
- maintenance eng.	1	4	45
- chief security officer	1	1	20
- sr. planning assistant	1	2	40
- pantry	1	20	60
- staff & pantry	1		40
- conference room	1		40
Total			553
Cafeteria seating	1	250	550
Kitchen	1		200
cold storage	2		10
grain storage	1		6
public toilets	2		
washing/drying area	1		14
staff lockers	2		15
toilets	2		2
Indoors Exhibition space			
- exhibition space	1	150	415
- public toilets	2		30
- toilet for phy. Challenged	1		4
Outdoors Exhibition space			
- main gallery	2	150	400
- semi covered	2	100	250
- open gallery	2	50	250
- exhibitions coordinator office	1	1	20
- toilets	2		40

- toilet for phy. Challenged	1		4
- storage/collection	1		100
Folk/puppetry theater	1	150	400
OAT	1	<200	300
Main Auditorium			
ticket counter	1		3
foyer	1		400
toilets for females	2		200
toilets for males	2		200
auditorium	1		
- stage	1		180
- seating area	1	1000	1050
- balcony seating	1	400	450
- VIP room	1		30
- green rooms	6	5	25
- toilets	6		2
- quick change room	1		12
- orchestra pit	1		
- light/sound control room	1		
- stage workshop	1		700
- costume design	1		300
- workshop store	1		20
- parking	1	375	
- loading/unloading dock	1		100
- ahu	6		25
- elec. room	4		15
Mini Theater	1	200	356
ac plant room	1		150
cooling tower	2		3
electric sub station	1		100
water tanks		138500l	
pumping station			
garbage disposal	1		30
sewage treatment plant	1		60
fire fighting	4		3
Total Area			7982

40% circulation
20% structure

3050
1525

BIBLIOGRAPHY

Theatre Projects Consultants (2012). Parts of a Theater Building from theaterprojects.com

(2008), Delhi Cinematograph Rules.

Bureau of Indian Standards, (2016). <https://bis.gov.in>

Kala Nidhi online resources. <http://ignca.gov.in/online-digital-resources/online-books/>

Sabiki, Ranjit, (1985) Concepts and Responses: International Architectural Design Competition for the Indira Gandhi National Centre for the Arts, New Delhi

Ching, Francis D.K., (1943), Architecture- Form, Space and Order

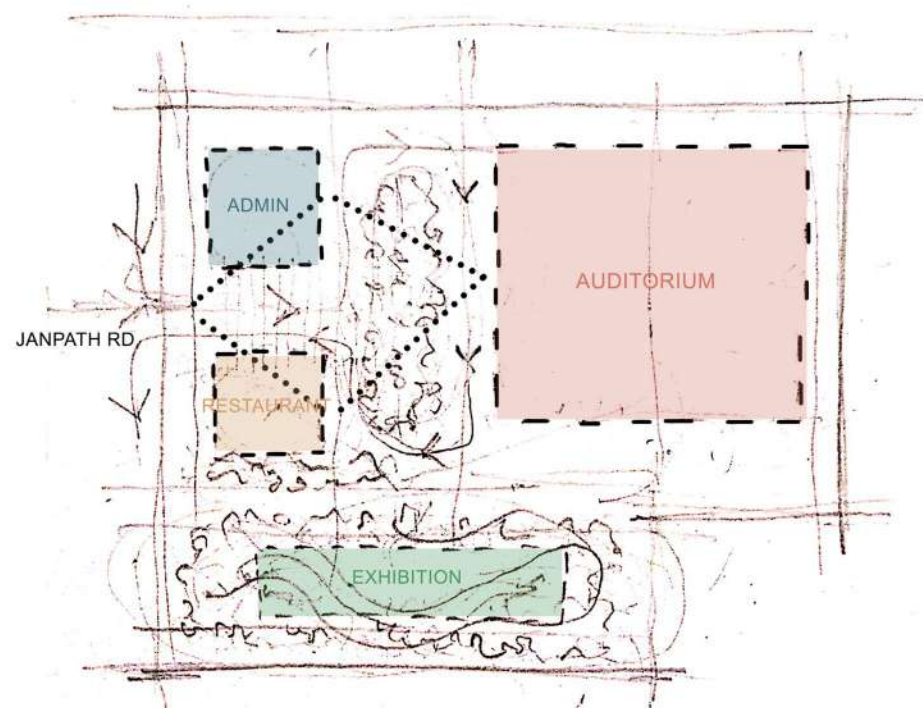
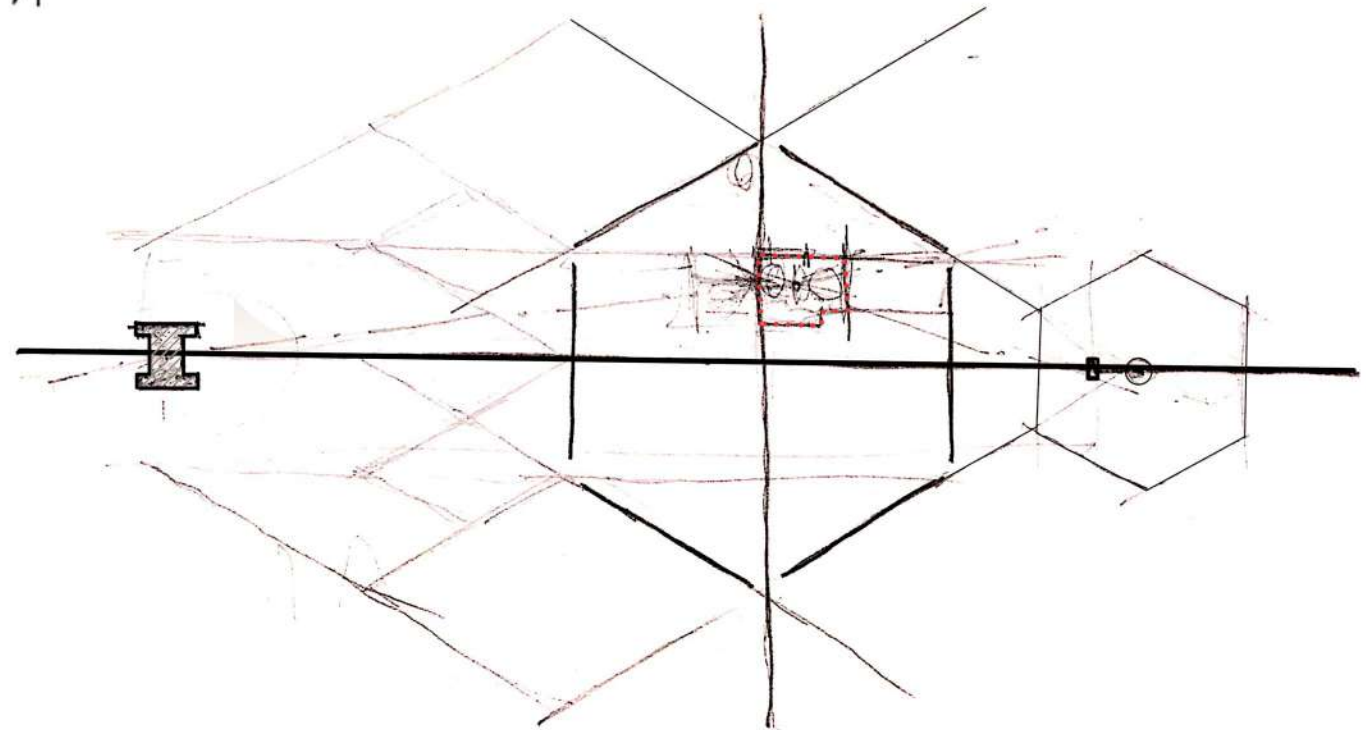
Lawson, Bryan (1991), The Language of Space.

Nallanathel, Manoj. Bhasker, Ramesh. Kumar, Pavan. International Journal of Pure and Applied Mathematics. Analysis and Design of Auditorium.

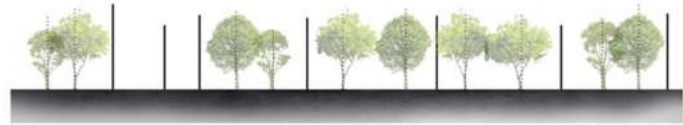
Central Public Works Department (2017), HVAC specifications and guidelines.



NATIONAL CENTER FOR PERFORMING ARTS



Slender and tapered columns of buff sandstone and planters at the base of red sandstone



The built mass should also have a similar verticality as the existing trees.

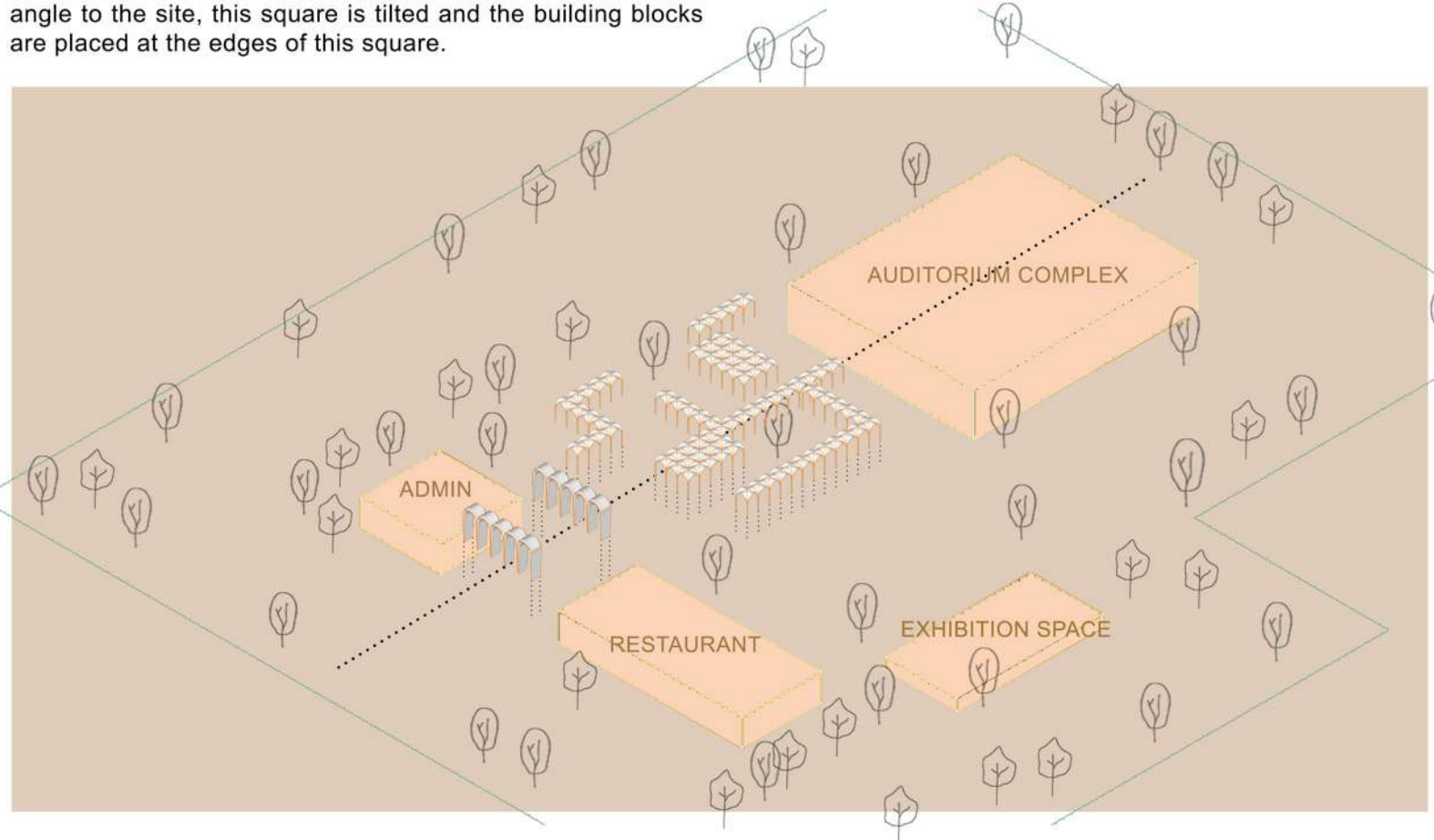
With a different approach, the site was looked at along with the major roads and connections at an urban level. The major axis i.e. Rajpath starts from mughal gardens and terminates at the newly constructed war memorial. The mughal gardens are in square form and the war memorial is circular, these are in line with Lutyen's vision of the Kings way. The site lies approximately in the middle of this king's way. So, an imaginary square form is considered along the site but as the site lies within a hexagon which has its roads at an angle to the site, this square is tilted and the building blocks are placed at the edges of this square.

To place the built masses on site the trees were marked and adequate open spaces were identified. There is dense plantation along the boundaries of the site, the southern extent of the site and the middle. Giving a lot of emphasis to this axis that Lutyens created can also result in a contrast as he was a foreign architect; the only logical solution to these problems lies in the creation of a happy union of the past and present to reflect a true expression of Indian-ness.

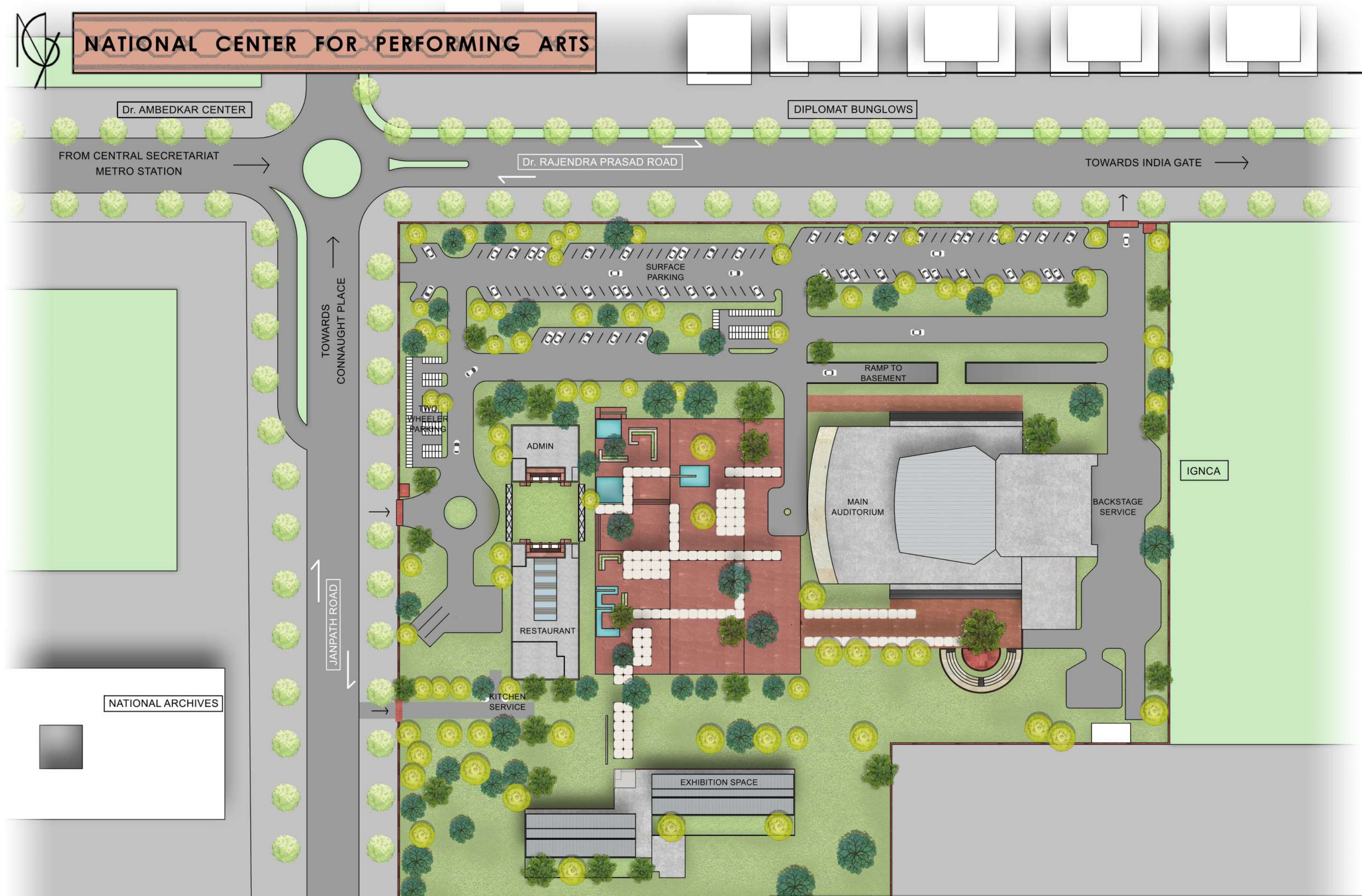
The main entrance is kept from the Janpath Rd. (translates to People's Way) and focuses on the connection between the people and the performance space. An axis is formed from the entrance to the main building and there is always a visual connection to the main building from anywhere on the site. The height of the buildings are kept below the level of the trees but the main building's height was raised just above the trees to make it into a looming figure all over the site. So, that it becomes an entity that has a strong presence in our scheme.

"Whatever influences came to this country, the end product was unmistakably Indian"
- INDIRA GANDHI

One of the elements found in the nearby context (National Archives) is arches which can be used here which is a classical element used by Lutyens. At the same time it must be contemporary and not merely a transfer of the image but amalgamation of the old and new. So, that it looks familiar but not the same.



NATIONAL CENTER FOR PERFORMING ARTS



Dr. AMBEDKAR CENTER

DIPLOMAT BUNGLOWS

Dr. RAJENDRA PRASAD ROAD

TOWARDS INDIA GATE

TOWARDS CONNAUGHT PLACE

JANPATH ROAD

RAJPATH LAWNS

IGNCA

NATIONAL ARCHIVES

ADMIN

RESTAURANT

KITCHEN SERVICE

EXHIBITION SPACE

MAIN AUDITORIUM

BACKSTAGE SERVICE

RAMP TO BASEMENT

SURFACE PARKING

TWO WHEELER PARKING



NATIONAL CENTER FOR PERFORMING ARTS



The arcuated system at the entrance is derived from the nearby context of Lutyen's Delhi which in turn was borrowed from mughal and buddhist styles of architecture. The typical pillar and arch which are extensively used around lutyen's delhi were thought of having different proportions. They were designed with slender columns to increase the sense of scale and height. The element of plantation and greens was also introduced to this system making the base of the pillars as planters and also having creepers over the arches. This makes it look less dry and damp

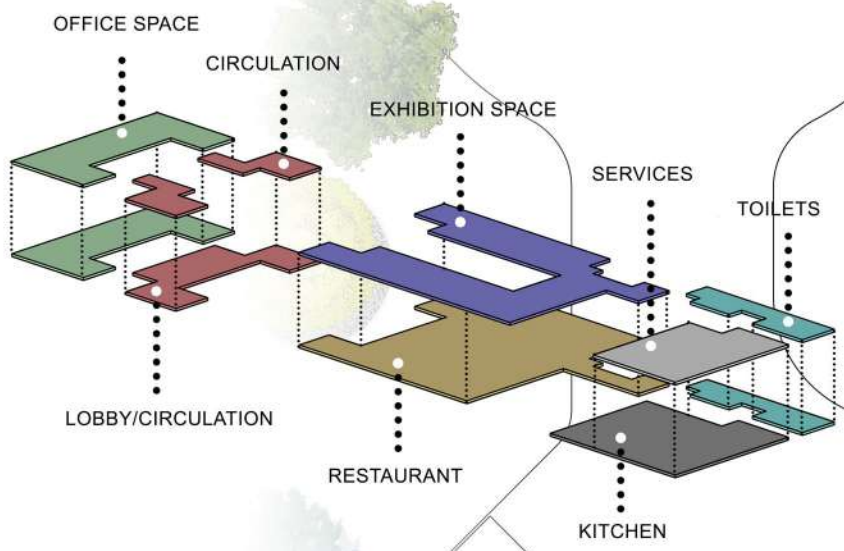


The area at the center is designed to be a socio interactive space and not just a thoroughfare. It is the space through which everyone shall pass but it should have more meaning to it. Hence, seating spaces are designed under the existing trees around the site so that it encourages conversation among visitors. Water bodies are also introduced to get rid of the dampness. A combination of groin vaulted arches and existing trees are used to create shaded areas around the central area. Walls that are parallel to the connection between the two buildings re used so that there is unhindered vision from one side to another.

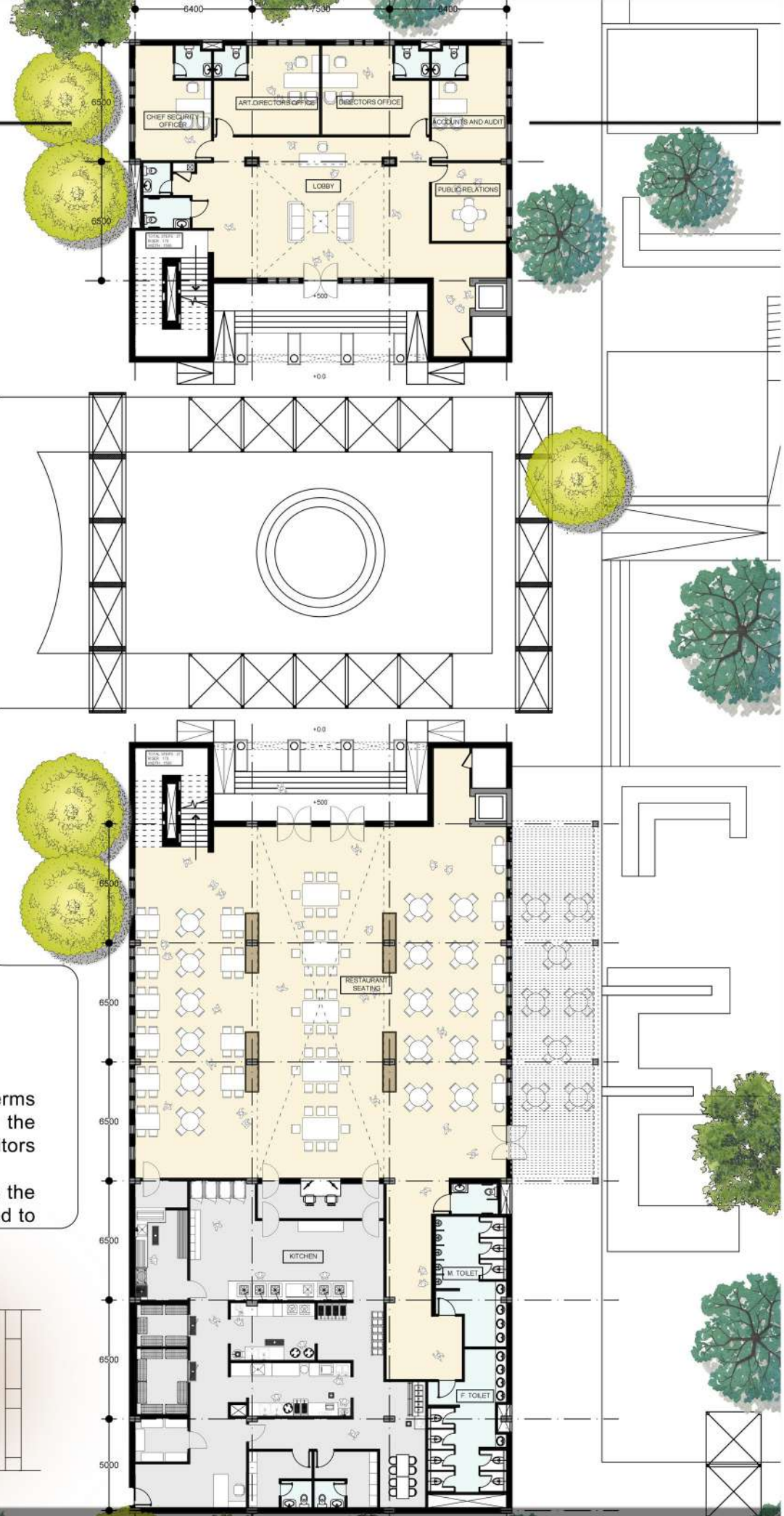
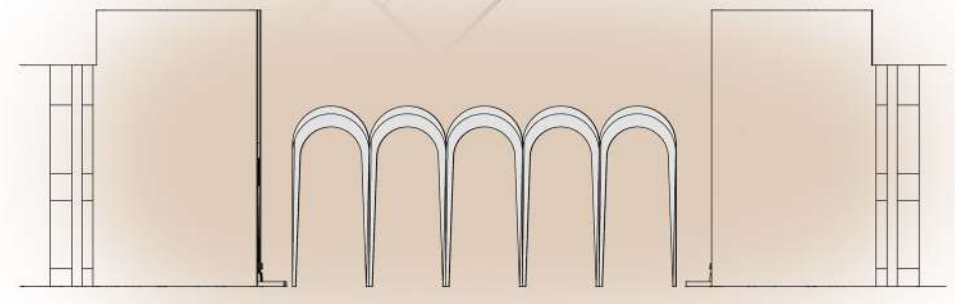
TOTAL BUILT UP AREA FOR ADMINISTRATIVE BLOCK (718 sqm) 380 sqm ON GROUND FLOOR

TOTAL BUILT UP AREA FOR RESTAURANT BLOCK (1828 sqm) 980 sqm ON GROUND FLOOR

WAITING LOBBY	90 sqm
CHIEF SECURITY OFFICER	26 sqm
ART DIRECTORS OFFICE	28 sqm
DIRECTORS OFFICE	28 sqm
ACCOUNTS AND AUDIT	26 sqm
PUBLIC RELATIONS OFFICE	18 sqm
RESTAURANT	380 sqm
KITCHEN	240 sqm
FEMALE TOILETS	30 sqm
MALE TOILETS	25 sqm



The arches designed around Lutyen's Delhi are slender and tapered. In terms of the materials buff and red sandstone is used extensively. So, for the entrance to the complex a series of arches were designed to greet the visitors into the restaurant and administrative blocks. These arches use the design cues of concentric arches which are used in the design of Chattri or canopy behind India Gate. These arches are designed to be tall and act as a place of interest around the site.





NATIONAL CENTER FOR PERFORMING ARTS

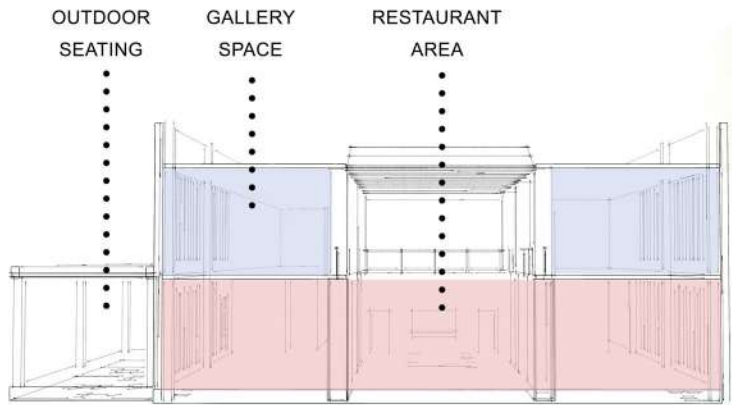


TOTAL BUILT UP AREA FOR ADMINISTRATIVE BLOCK (718 sqm) 338 sqm ON FIRST FLOOR

TOTAL BUILT UP AREA FOR RESTAURANT BLOCK (1828 sqm) 848 sqm ON FIRST FLOOR

- STAFF ROOM 35 sqm
- CONFERENCE ROOM 38 sqm
- MAINTENANCE ROOM 43 sqm
- EXHIBITION SPACE 357 sqm
- SERVICES 170 sqm
- MALE TOILETS 25 sqm
- FEMALE TOILETS 30 sqm

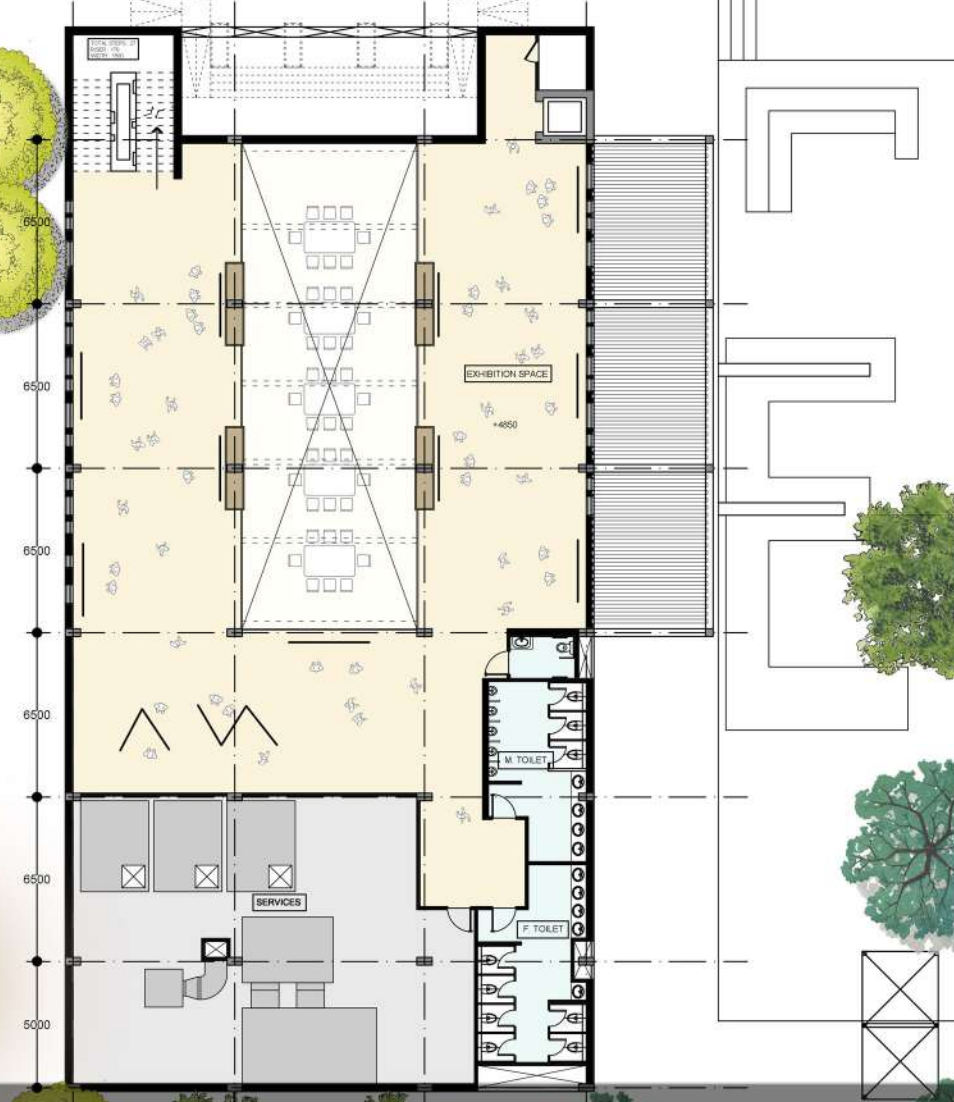
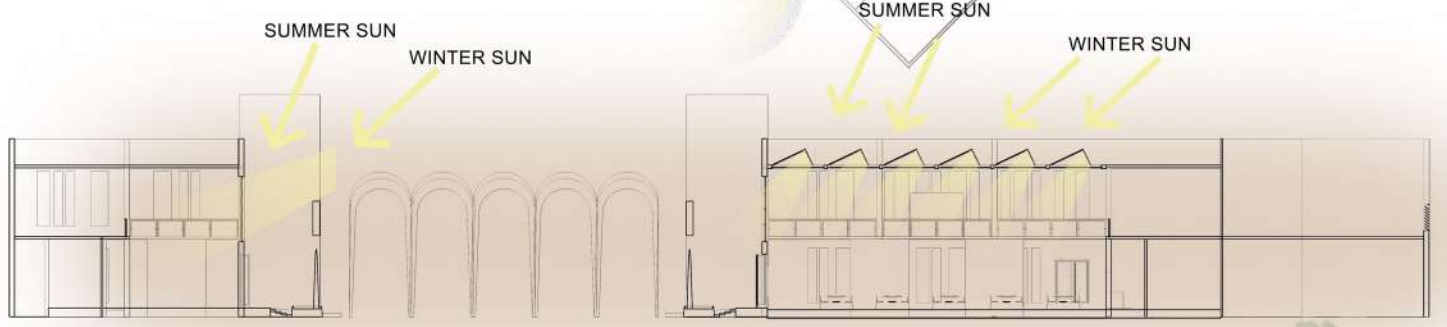
The total seating capacity for the restaurant is 176. The kitchen is situated towards of the back end of the building while being servicibly connected with the service entry from the back. Directly on top of the kitchen on the first floor are the mechanical services required for the whole building.



In the restaurant block openings are provided on the ceiling in the form of movable louvers which can light up the double height foyer beneath during the winters and help curtail sunlight during the summers. The windows on the sides allows sunlight filtered through the trees and plantation.

The built mass is placed with the shorter edge towards southern side to minimize the heat gain. There is also trees and plantatyon on the south side which can help curtail the harsh sunlight. In the administrative building windows can let the winter sun in and curtail the summer sun with diffused light also coming in from the sides.

In the restaurant block openings are provided on the ceiling in the form of movable louvers which can light up the double height foyer beneath during the winters and help curtail sunlight during the summers. The windows on the sides allows sunlight filtered through the trees and plantation.

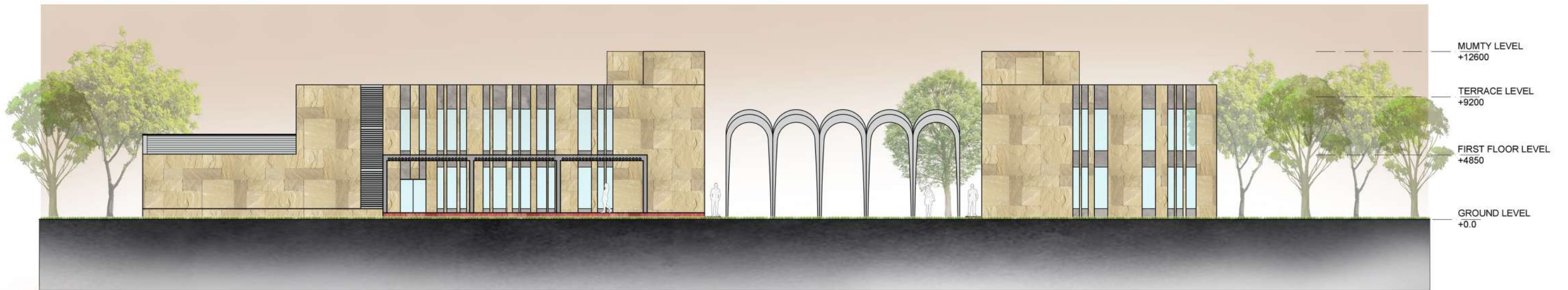




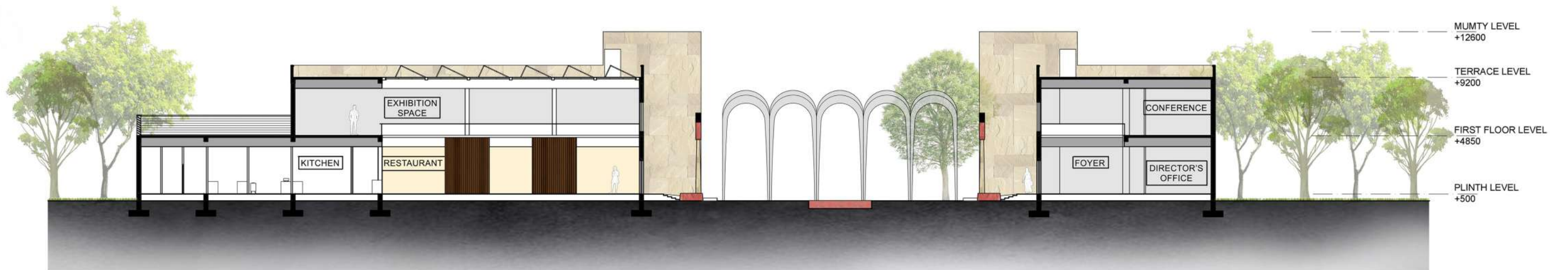
NATIONAL CENTER FOR PERFORMING ARTS



FRONT ELEVATION



ELEVATION FROM THE CENTRAL PLAZA



LONGITUDNAL SECTION THROUGH BOTH BUILDINGS



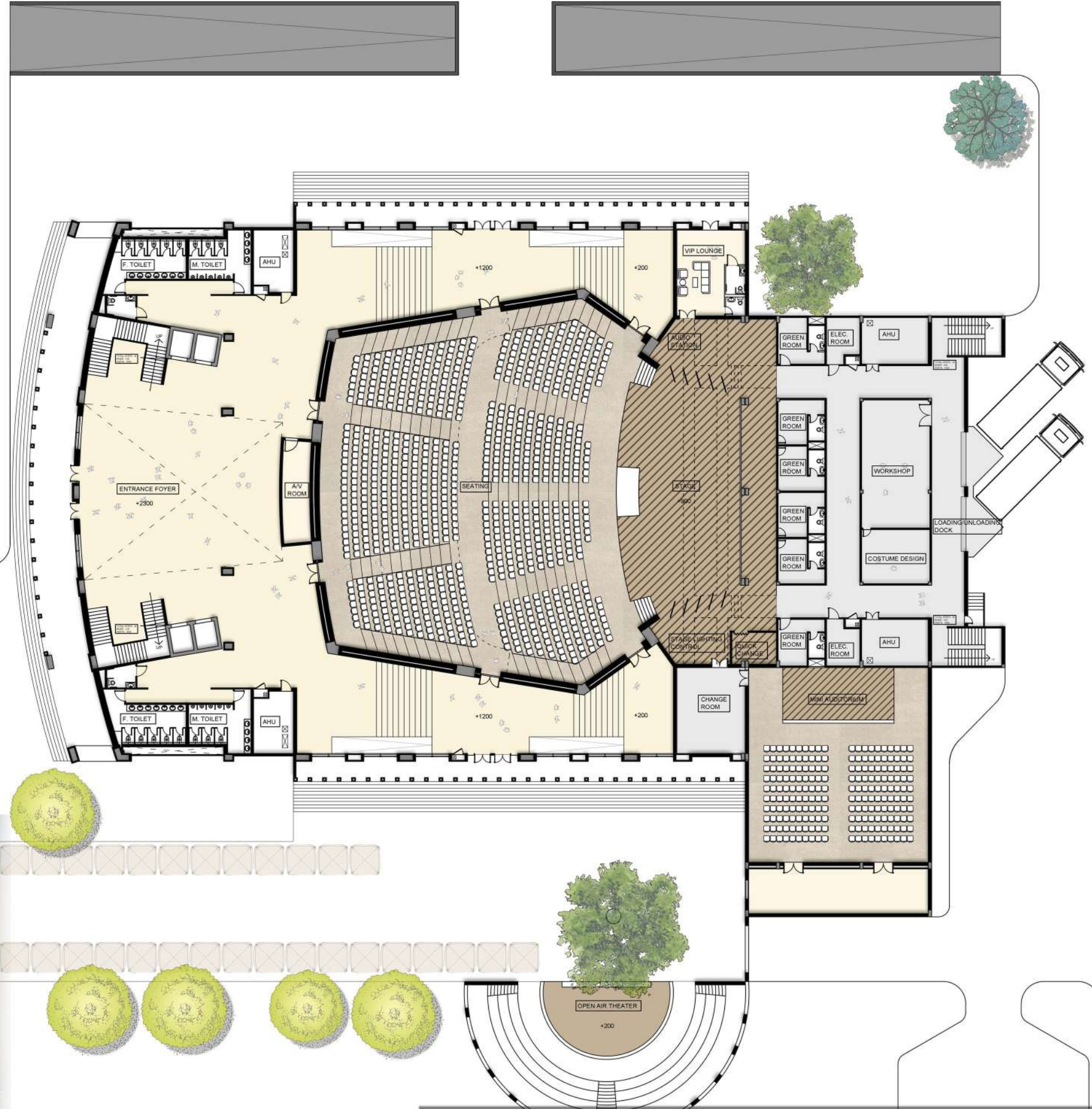
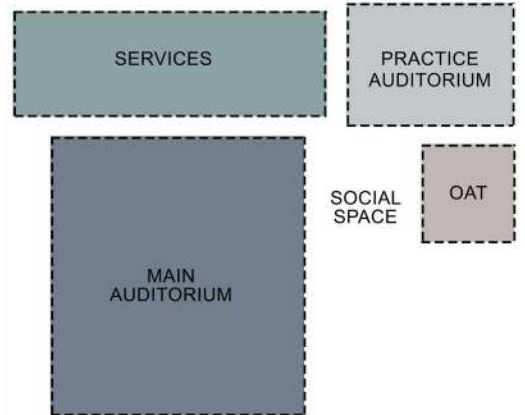
NATIONAL CENTER FOR PERFORMING ARTS

The auditorium building is divided into 3 major parts; one is the front entrance area, second would be the main theater and thirdly the backstage service area. Each part would have its own mechanical services as well in order to distribute the load.

TOTAL BUILT UP AREA OF THE AUDITORIUM BLOCK AT GROUND FLOOR 4825 sqm

TOTAL SEATING CAPACITY 1410+200+150= 1760 cap.

ENTRANCE FOYER	470 sqm
AUDITORIUM SEATING	840 sqm
STAGE	210 sqm
GREEN ROOMS	102 sqm
VIP LOUNGE	50 sqm
WORKSHOP	110 sqm
MINI AUDITORIUM	360 sqm
CHANGE ROOM	48 sqm
ELECTRICAL ROOM	22 sqm
AV CONTROL ROOM	22 sqm
AIR HANDLING UNITS	90 sqm
FEMALE TOILETS	51 sqm
MALE TOILETS	48 sqm
AUDIO CONTROL	15 sqm
STAGE LIGHTING CONTROL	15 sqm

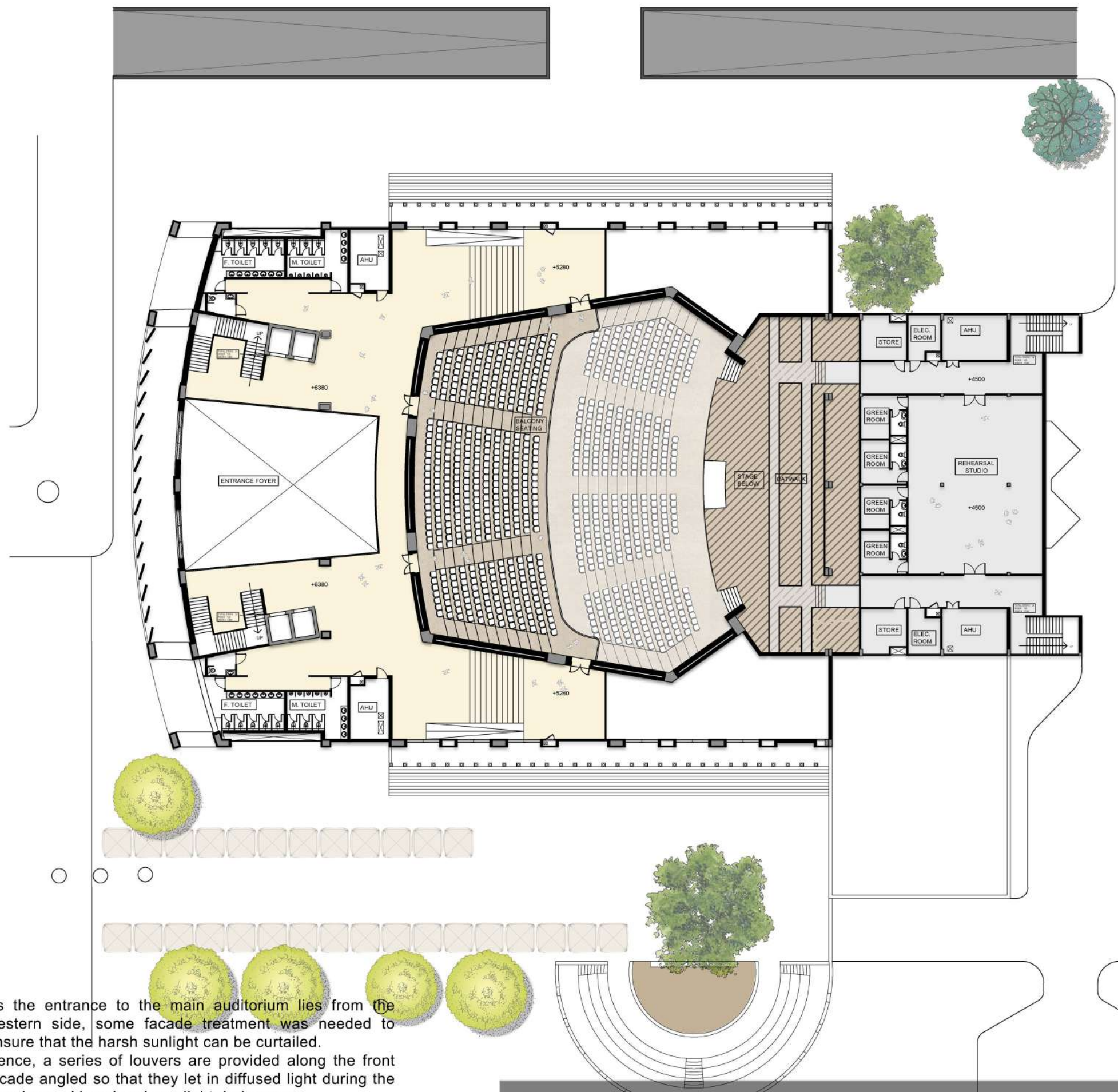




NATIONAL CENTER FOR PERFORMING ARTS



TOTAL BUILT UP AREA OF THE AUDITORIUM BLOCK AT FIRST FLOOR	2535 sqm
TOTAL SEATING CAPACITY	1410+200+150= 1760 cap.
ENTRANCE FOYER	268 sqm
BALCONY SEATING	380 sqm
GREEN ROOMS	75 sqm
REHEARSAL STUDIO	210 sqm
ELECTRICAL ROOM	22 sqm
AIR HANDLING UNITS	90 sqm
FEMALE TOILETS	51 sqm
MALE TOILETS	48 sqm
STORES	32 sqm



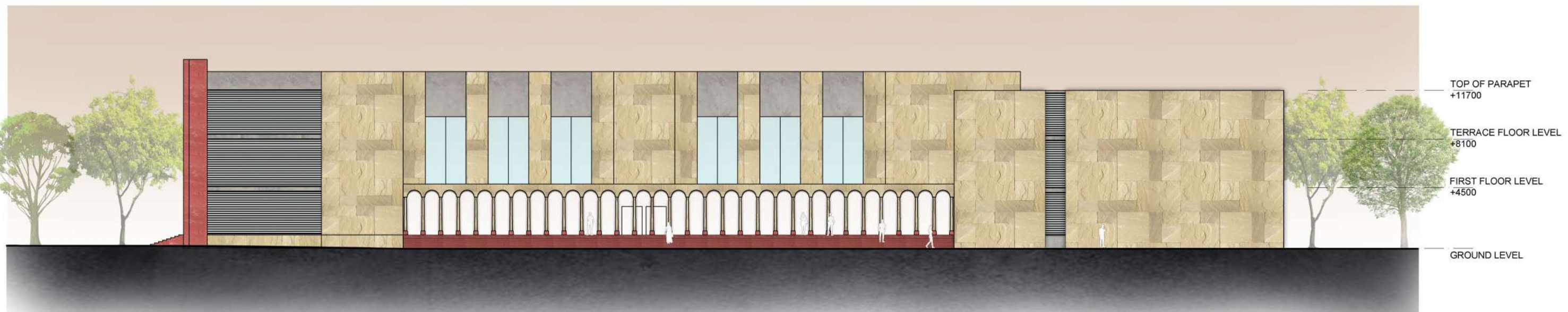
As the entrance to the main auditorium lies from the western side, some facade treatment was needed to ensure that the harsh sunlight can be curtailed. Hence, a series of louvers are provided along the front facade angled so that they let in diffused light during the morning and less harsh sunlight during noon.



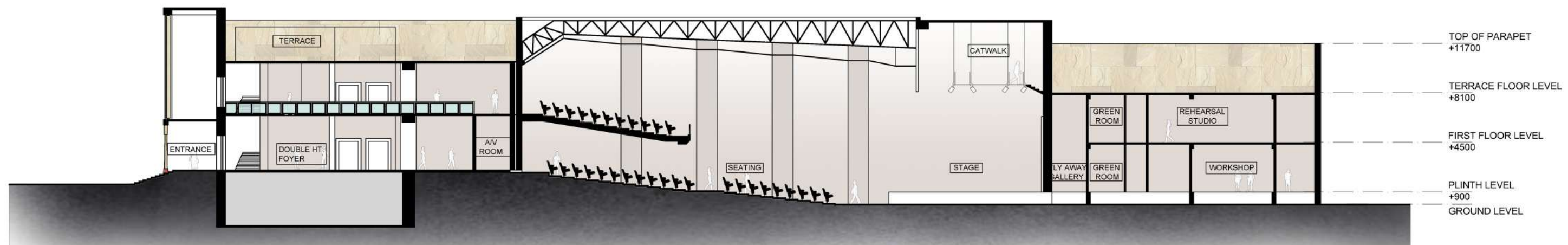
NATIONAL CENTER FOR PERFORMING ARTS



WESTERN SIDE ELEVATION



NORTHERN SIDE ELEVATION



LONGITUDNAL SECTION THROUGH THE AUDITORIUM



NATIONAL CENTER FOR PERFORMING ARTS



By studying about the current situation at IGNCA a portion of revenue generation happens through its exhibition galleries such as the twin galleries that exist on site. Hence, it was needed that the new program also features exhibition spaces which can flexibly be used as the need be.

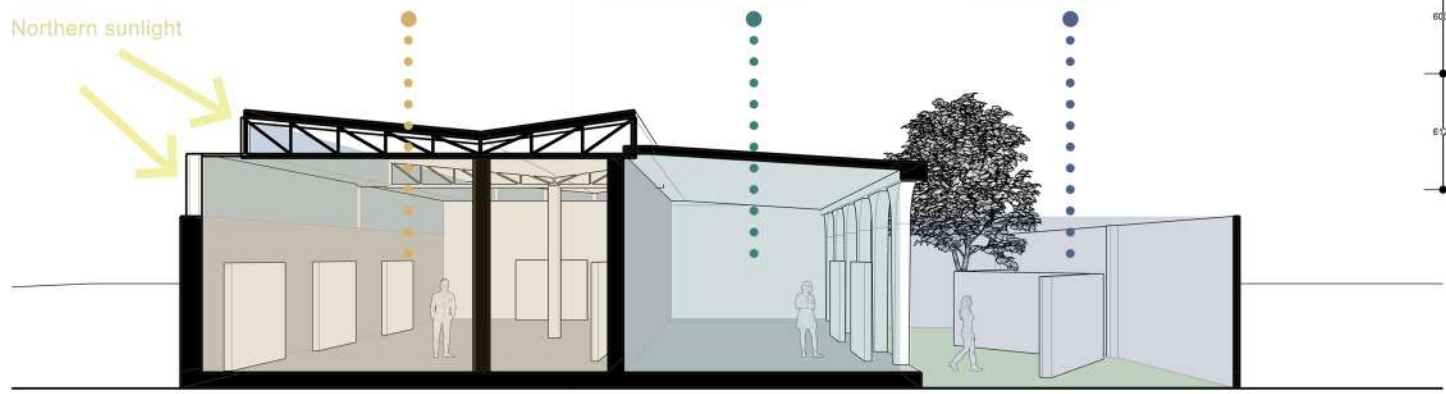
This exhibition space was designed around flexibility and the availability of the type of real estate on site. Six existing trees were identified around which a program of a covered, semi open and a open gallery was proposed. The elevation was composed using long horizontal lines and a shed roof to let in natural light.



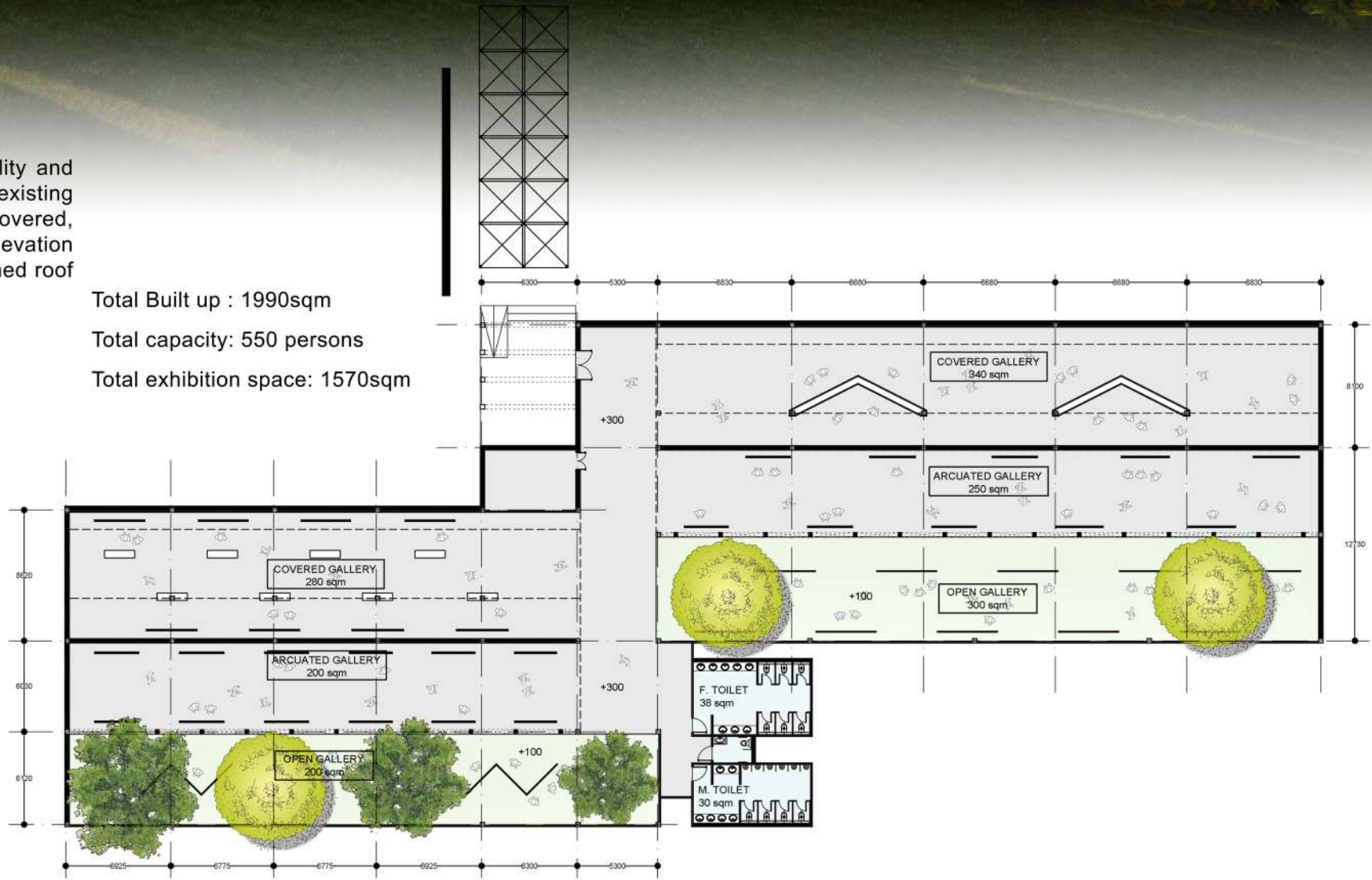
Covered exhibition space for linear flow experience with MDF covered white movable walls on either side and free movement space at the center.

Semi open exhibition space with an arcuated face on one side that lets in sunlight and opens to a green open exhibition space.

Open exhibition space with free standing walls for display to create an open setting for exhibitions under the tree shade.

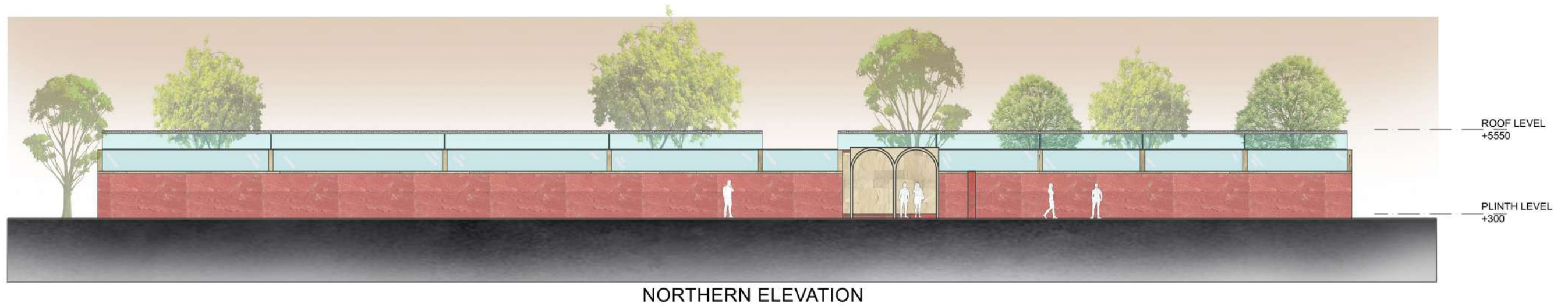
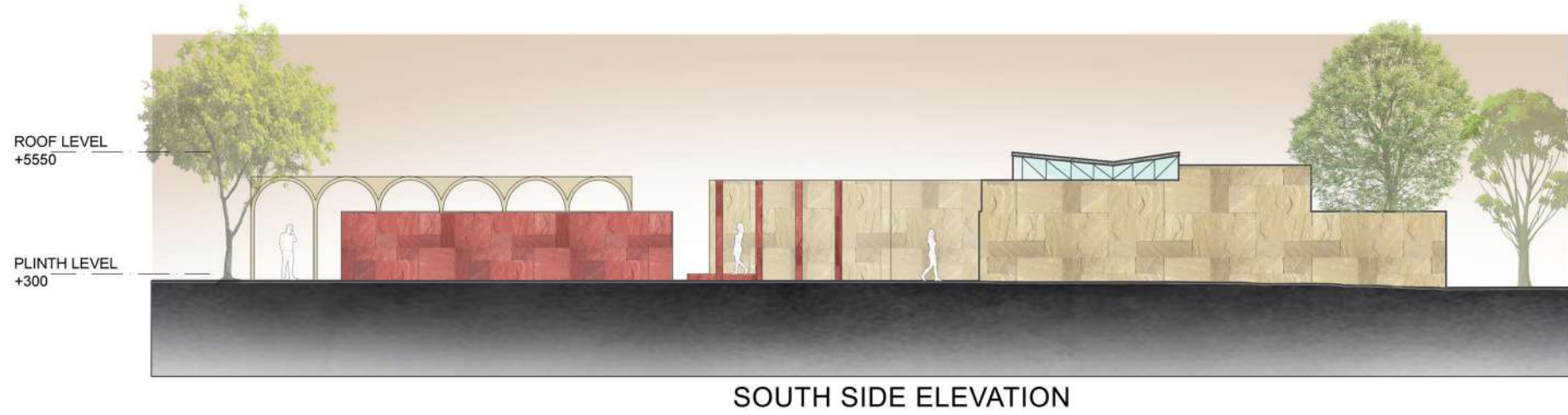


Total Built up : 1990sqm
Total capacity: 550 persons
Total exhibition space: 1570sqm





NATIONAL CENTER FOR PERFORMING ARTS

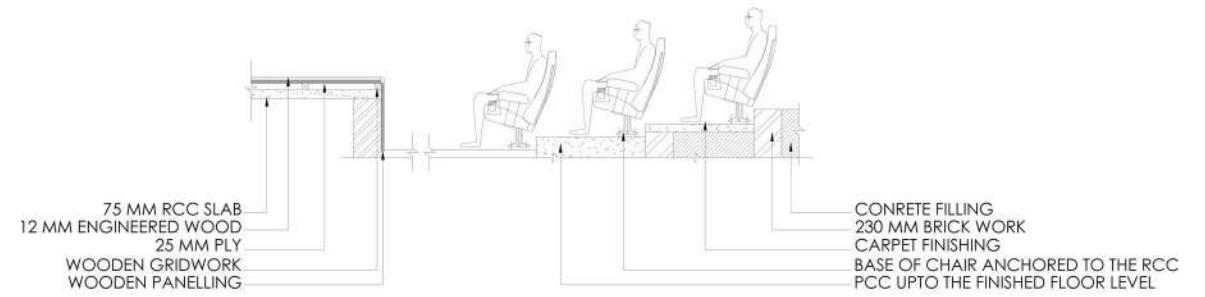




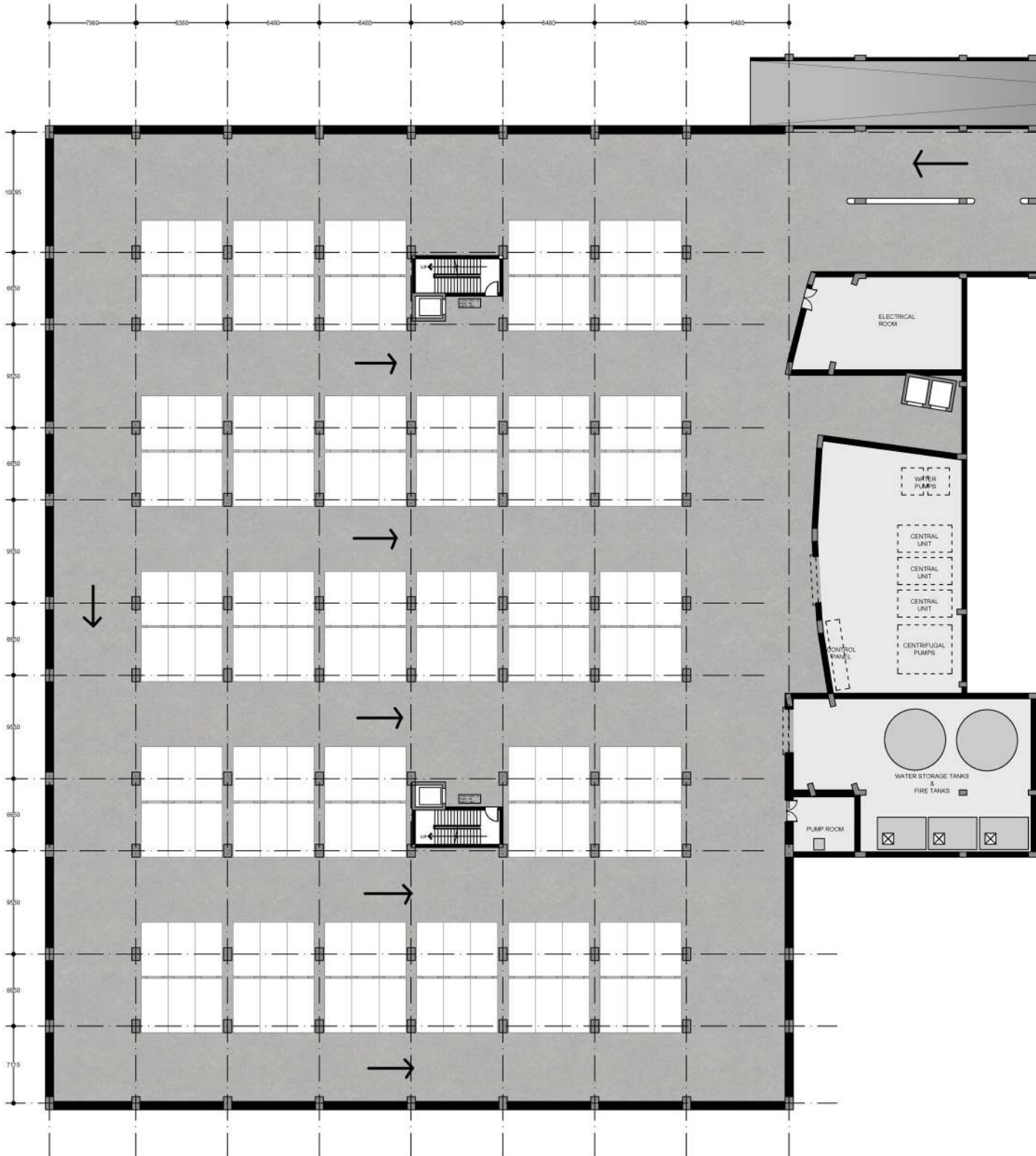
NATIONAL CENTER FOR PERFORMING ARTS

TOTAL NUMBER OF PARKING SPACES IN THE BASEMENT:
168 CARS
TOTAL NUMBER OF PARKING SPACES AT THE SURFACE LEVEL:
134 CARS
TOTAL NUMBER OF TWO WHEELERS: 130

The basement level also consists of the HVAC plant which will supply fresh conditioned air to the AH units on the main auditorium levels. Also the electrical sub station will be housed at the basement to meet the electrical requirements of the whole building. The fire and water storage tanks are placed in the basement. The fire tank requirement is for 100000L as well as an overhead tank of 5000L. Similarly the water storage tanks required are of 25000L capacity with respect to the byelaws followed.



SECTIONAL DETAIL THROUGH THE AUDITORIUM SEATING



Acoustic study of different design iterations for the auditorium were carried out so that optimal sound output and experience could be created inside. For this sound reflections were studied in different shapes in planar form as well as sections.

In fig.(a) shorter walls at the back was resulting in less sound being reflected towards the center of the auditorium. Hence, in fig.(b) longer and more slanting walls were designed towards the back end which resulted in more number of seats at the front which means more people can get a better view of the stage.

In section the last rows of the balcony would not get enough sound fig.(c) but by making a more angular ceiling structure at the back, the sound can be reflected towards the dead zones which can be seen in fig.(d).

