# SCHOOL FOR THE BLIND, DELHI

A Thesis

Submitted in partial fulfillment of the requirements of

the Tenth Semester Curriculum for the

Degree of Bachelor of Architecture of the

APJ Abdul Kalam Technological University




## THESIS

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Guided by :
**Ar. Pooja P. Krishnan**
Assistant Professor
School of Architecture & Design
Bishop Jerome Institute, Kollam

Submitted by:
**Daya Sara Daniel**

*School of Architecture & Design*
*Bishop Jerome Institute,*
*Kollam-691001*

APJ Abdul Kalam Technological University
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# DECLARATION

I hereby declare that the Thesis entitled “SCHOOL FOR THE BLIND, DELHI ” was carried out by me during the year 2022 in partial fulfillment of the requirement for the award of the degree of Bachelor of Architecture of the APJ Abdul Kalam Technological University of Kerala. The Thesis is my effort and has not been submitted to any other University.

**Kollam**

**July 2022** **Daya Sara Daniel**

# ACKNOWLEDGEMENT

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I would like to express my gratitude to **other faculties, my friends** and **my family** for their unselfish support and assistance in appropriately acquiring data and paving the route to the findings.

# ABSTRACT

The Architectural Thesis project SCHOOL FOR THE BLIND, DELHI is to design a School for the Blind children from Kindergarten to 12th grade in Delhi. The project studies blindness in India, its causes and the supporting theories. It also focuses on different design considerations for the blind and how it is applicable as architectural elements. As part of this project, live case studies and literature case studies on numerous blind schools were done and the design focuses on implementing its inferences. A special topic to include sensory elements and tactile surfaces and related case studies were done. Detailed comparison between major case studies were done to identify prominent design parameters necessary to create an ideal environment for the blind . The design planning initially aimed to classify spaces based on its privacy while creating an efficient circular pathway . Each and every space and zone can be classified into primary, secondary and tertiary which makes them distinguishable and aids easier navigation and guidance with mere self-consciousness. The main spaces are kindergarten block, main academic block, recreational block, admin block, medical block, residential hostels, staff quarters and dining hall. All these spaces consider sensory and tactile elements for the blind. From this project the importance of exclusive education for the blind and how the incorporation of special elements for the blind can help is understood.

# TABLE OF CONTENTS

# LIST OF FIGURES

# LIST OF TABLES

## LIST OF CHARTS

# Chapter -1

# SYNOPSIS

## 2.1 Aim

Aim of the topic is a school that makes the school life of blind kids more lively with the help of interactive spaces, stimulating surfaces, and textures while enhancing the use of other senses.

## 2.2 Objective

- Understanding the user group to design a blind school
- Understanding suitable materials to resist smog
- Simple yet interactive design easy to use and remember
- Creating an ideal environment for the alternative senses to function
- Designing a kindergarten for the blind
- Treat the neighboring polluted Nala/river let



## 2.3 Research Questions

1. What are the architectural considerations for a visually impaired person?
2. How does the perception of space through other senses work?
3. How important is the use of different materials?

## 2.4 Methodology

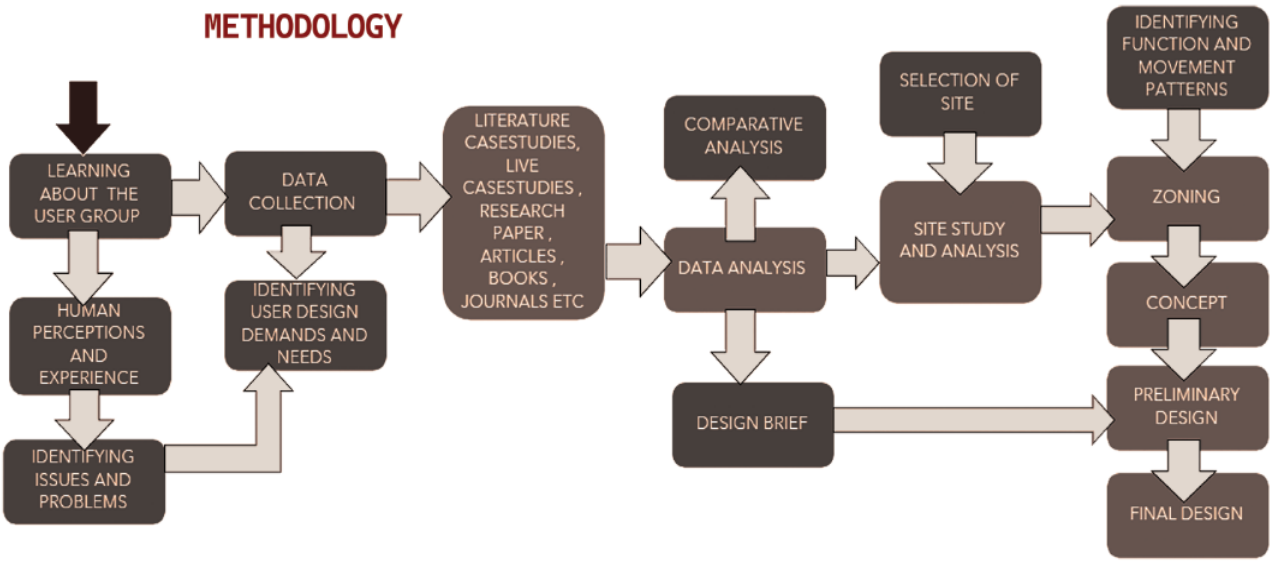



Chart 1: Methodology

Source: Author



## 2.5 Scope

This thesis topic is merely for blind school children. This could be done for a much larger category. This thesis is additionally connected to the visually impaired person's other senses (touch, smell, hear, feel). The main focus is on designing areas and functions of educational blocks and daily activities.

## 2.6 Limitations

- This thesis focuses only on school children.
- Not including other visually impaired categories such as color blindness.

# Chapter -2

# BLINDNESS

# 1.1 Introduction

Blindness is a lack of vision. Partial blindness means you have very limited vision. Complete blindness means you cannot see anything and do not see light.

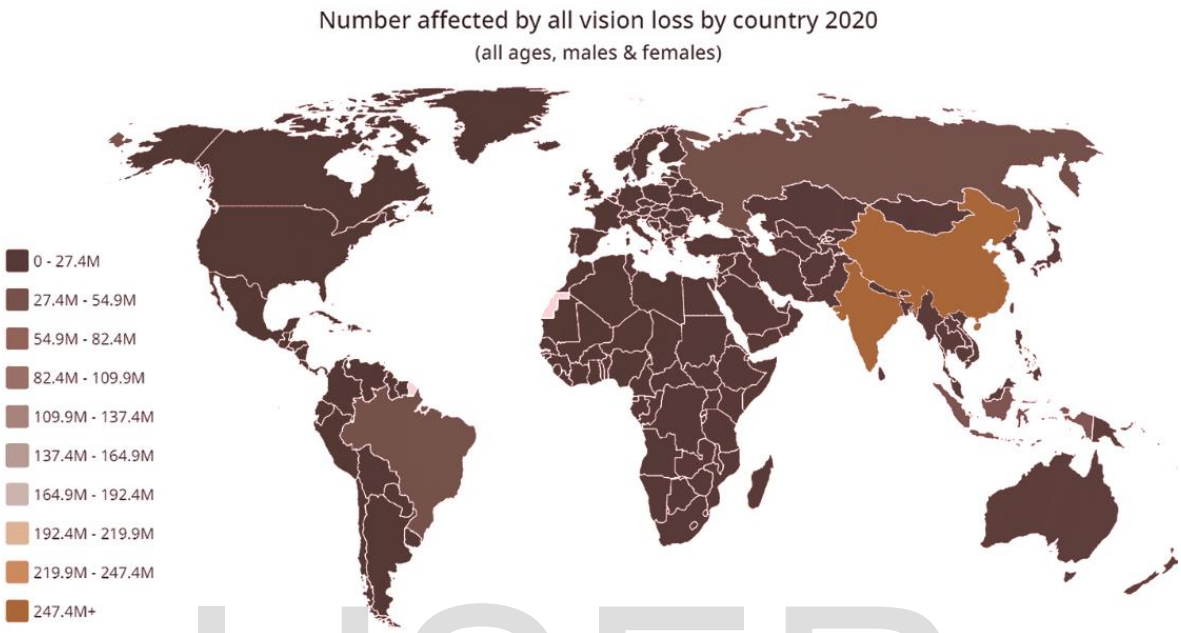



Fig 1: Number of People affected by Vision loss in the world

Source: https://www.iapb.org/learn/vision-atlas/magnitude-and-projections/gbd-super-regions/



## 1.1.1 Categories of Blindness - WHO

**Mild** –visual acuity worse than 6/12 to 6/18

**Moderate** –visual acuity worse than 6/18 to 6/60

**Severe** –visual acuity worse than 6/60 to 3/60

**Blindness** –visual acuity worse than 3/60

## 1.1.2 Indian Case of Blindness

India has a total of 15 million blind people that is 20% of the global blind population. Blind people are often denied education due to poverty. Only 1500 people go to blind school or rehabilitation services. More number blind schools are needed in the country with proper facilities.

Total blind people are estimated to be 2.8 million in Delhi. Delhi is where people approach from all states for education

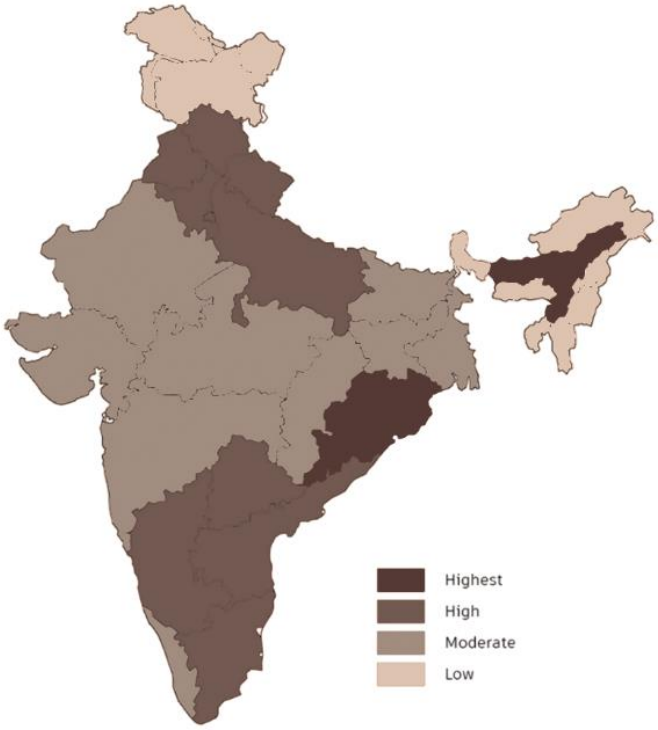



Fig 2 : Prevalence of visual impairment in India

Source: https://npcbvi.gov.in/



## 1.1.3 Magnitude of the Problem

Globally, 2.2 billion people have vision impairment. The prevalence of vision impairment in low- and middle-income regions is estimated to be four times higher than in high-income regions. Globally, India has the most number of people with visual disabilities. In 2020 there were 270 million people with vision loss and 9.2 million blind.

The number of blind people in India is increasing. Population growth and aging are expected to increase the risk that more people acquire vision impairment. More than 40% of vision impairment is classified as blindness

# Chapter - 3

# FEASIBILITY

## 3.1 Need for Blind School in Delhi- Project Feasibility

In India, blind children are excluded and proper education for their upbringing is not provided, creating a non-self-sufficient Indian economy. Segregated schools can provide a welcoming atmosphere and special education and training can be provided like the braille. Studies have shown that the loss of one sense can develop the efficiency of other senses. Special schools

allow special design elements that aid their sensory developments. In most cases, existing blind schools are insufficient as it does not consider all the design parameters.

Blind schools support blind students in their transition into mainstream society and work. It also helps in realizing their fullest potential which cannot be achieved through inclusive education.


Fig 3: Newspaper articles showing the importance of exclusive Blind Education

Source: https://timesofindia.indiatimes.com/

# 3.2 Site Feasibility

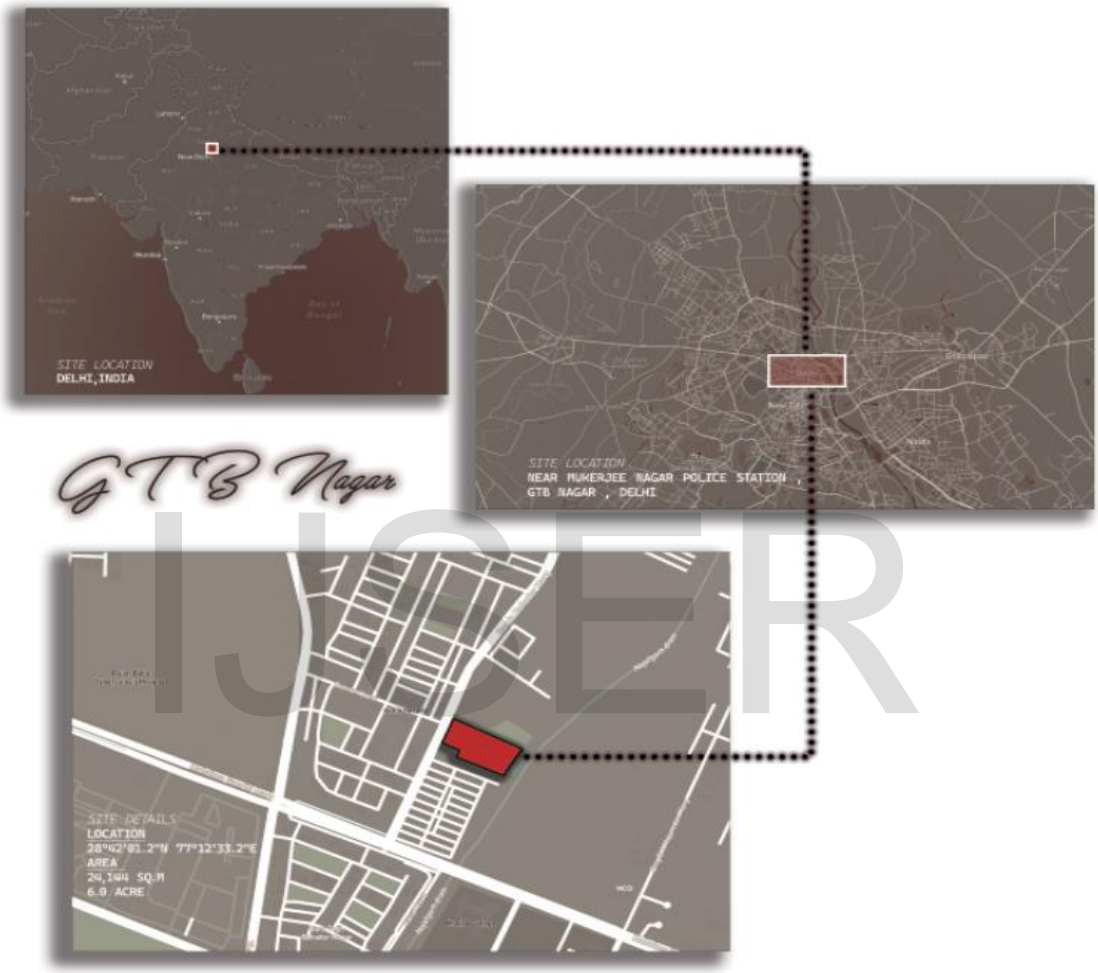
## 3.2.1 Present Situation in Delhi

Delhi has many institutions for the blind which are run by the government or by the NGO. Many of them are not functioning properly even though many people come to Delhi for education. Delhi has approximately 80,000 children suffering from vision loss. Delhi has almost 18 schools that accommodate around 4500 students, which is far from sufficient. Blind children

from neighboring states are also studying in such institutions. Many institutions have scattered locations and ownerships which makes the resources to be not shared.

Fig 4 : Site Location

Source: Author






## 3.2.2 Feasibility Study

The proposed site is in Mukherjee Nagar in Guru Tegh Bahadur Nagar next to the Mukherjee Nagar Police Station. The site belongs to The Ministry of Social Justice and Empowerment. It is allotted for social welfare projects. The site also provides a diseased home for boys, a district child protection unit, an observation home for the boys, etc in the nearby Sewa kutir complex.

### 3.2.2.1 Rapidly developing

Delhi is the capital of India and rapidly growing in its urban context . Infrastructure in Delhi is adapting to the growing economy. Institutional building is also growing with the demand for

population growth in the residential areas. The blind school Site is in such a context that can aid its development and help in improving the living standards.


Fig 5: Developing Delhi

Source: https://delhigreens.com/2022/03/16/watch-an-introduction-to-the-rapid-development-of-delhi/

### 3.2.2.2 Blind facilities available

The site has facilities and infrastructure for the blind nearby. Nearby Sewa Kutir complex has a blind school and a hostel for blind boys. Near to site is the NGO offices which aid the growth of the blind community and provide basic facilities. It also helps in creating institutional-level organizations to flourish with shared resources.




Fig 6: Sewa Kutir, Hostel for College Going Blind Boys

Source:https://www.youthkiawaaz.com/2011/08/independence-day-2011-at-sewa-kutir-photonama/

### 3.2.2.3 People come from different states

Delhi has around 4500 students of age group 5 to 19 with visual impairment. Surrounding states also have a high number of blind children. They come to Delhi for education. In order to meet the growing demand, Delhi is the ideal location for establishing a blind school.

Fig 7: Government-aided JPM Senior Secondary School in central Delhi

Source:https://www.hindustantimes.com/delhi-news/inside-delhi-s-schools-for-the-blind/story-AmE7G2EwG8JU4fHVQAka2K.html

### 3.2.2.4 Approachable by public transportation

The site is connected by public transportation. The nearest metro station is GTB Metro Station. It is also approachable by road and phat-phat service, bus transportation, and taxi services are also available. Delhi also has Indira Gandhi International Airport which facilitates inter-state transportation.


Fig 8: GTB Metro Station

Source: https://indiarailinfo.com/station/map/guru-tegh-bahadur-nagar-gtbn/8204

### 3.2.2.5 Institutional and residential context

Neighboring buildings are a combination of residential and institutional buildings. The institutional zone allows more people to approach the site thus allowing more functionality.

Residential facilities allow more to settle down in the region. A hostel facility is also available nearby for the blind boys in the Sewa Kutir complex.

Fig 9: Mukherjee Nagar

Source:https://www.navodayatimes.in/news/khabre/coronavirus-lockdown-delhi-mukherjee-nagar-students-in-trouble


## 3.2.3 User Groups

Different user groups will be accessing the site after the proposal this includes:


Fig 10: User Group

Source: Author

# CHAPTER - 4

# DATA COLLECTION

## 4.1 Blindness

Blindness is a lack of vision. It may also refer to a loss of vision that cannot be corrected with glasses or contact lenses. Partial blindness means you have very limited vision. Complete blindness means you cannot see anything and do not see the light. Blindness (who) –visual acuity worse than 3/60.

### 4.1.2 Causes of Blindness

Out of those 15 million, 3.5 million are reported cases of Corneal Blindness, one of the most common causes of blindness across the country with 30,000 cases added each year. The World Health Organization (WHO) has identified various sources which lead to blindness, which are diseases (like cataracts, diabetes, glaucoma, etc.), genetic defects, childhood blindness, accidents leading to an eye injury, etc.



| CAUSE FOR BLINDNESS | PERCENTAGE OF CONTRIBUTION |
|---|---|
| Cataract | 62.6% |
| Refraction Error | 19.7% |
| Glaucoma | 5.8% |
| Corneal pathologies | 0.9% |
| Other Causes | 11.00% |

Table 1: Causes of Blindness in India

Source: https://www.slideshare.net/manivmcon/blindness-186281059

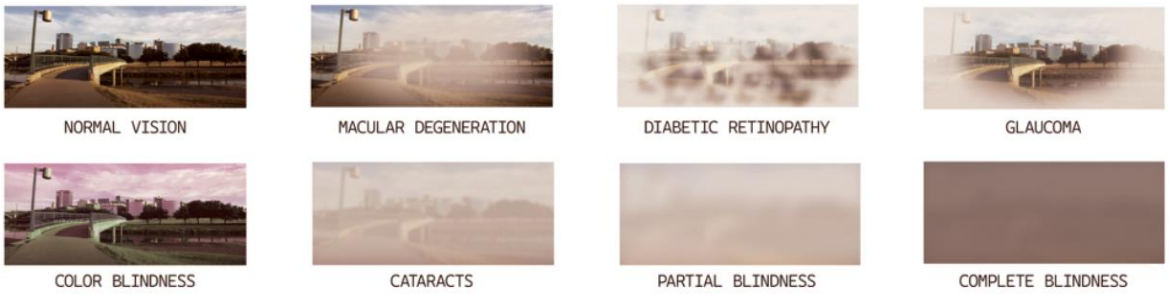



Fig 11: Types of Vision

Source: Internet

### 4.1.3 Categories of Blindness

WHO classifies visual functions based on the extent to which a person can see without any aid in 4 categories.

They are

- Normal vision
- Moderate visual impairment
- Severe visual impairment
- Blindness



The types of Blindness are:

#### 4.1.3.1 Vision loss

It refers to individuals who have trouble seeing, even when wearing glasses or contact lenses, as well as to individuals who are blind or unable to see at all.

#### 4.1.3.2 Self-reported vision loss

It is determined on an individual basis based on that person's perceived visual ability and its effect on daily functioning.

#### 4.1.3.3 Legal blindness

It is a level of vision loss that has been legally defined to determine eligibility for benefits.

#### 4.1.3.4 Total blindness

It refers to an inability to see anything with either eye.

#### 4.1.3.5 Low vision

It is a term often used interchangeably with visual impairment and refers to a loss of vision that may be severe enough to hinder an individual's ability to complete daily activities such as reading, cooking, or walking outside safely, while still retaining some degree of usable vision.

#### 4.1.3.6 Visual impairment

It is often defined clinically as visual acuity of 20/70 or worse in the better eye with the best correction, or a total field loss of 140 degrees. Additional factors influencing visual impairment might be contrast sensitivity, light sensitivity, glare sensitivity, and light/dark adaptation.

| CATEGORY | CORRECTED VA-BETTER EYE | WHO DEFINATION STANDARD | WORKING | INDIAN DEFINATION |
|---|---|---|---|---|
| 0 | 6/6-6/18 | NORMAL | NORMAL | NORMAL |
| 1 | <6/18-6/60 | VISUAL IMPAIRMENT | LOW VISION | LOW VISION |
| 2 | <6/60-3/60 | SEVERE VISUAL IMPAIRMENT | LOW VISION | BLIND |
| 3 | <3/60-1/60 | BLIND | LOW VISION | BLIND |
| 4 | <1/60-PL | BLIND | LOW VISION | BLIND |
| 5 | NPL | BLIND | TOTAL BLINDNESS | TOTAL BLINDNESS |



Table 2: Categories of Blindness

Source: https://www.djo.org.in/printerfriendly.aspx?id=862

## 4.2 Blind Sensory Perceptions

Sense and perception need to be defined together as the definition of one call for defining the other. Sense is a faculty by which the body perceives an external stimulus; one of the faculties of sight, smell, hearing, taste, and touch. Whereas perception is 'the ability to see, hear, or become aware of something through the senses.

The sensation is the instant response of our sensory receptors (nose, ear, etc.) To basic stimuli like sound, texture, etc. Whereas perception is the process by which sensations are nominated, interpreted, and organized.

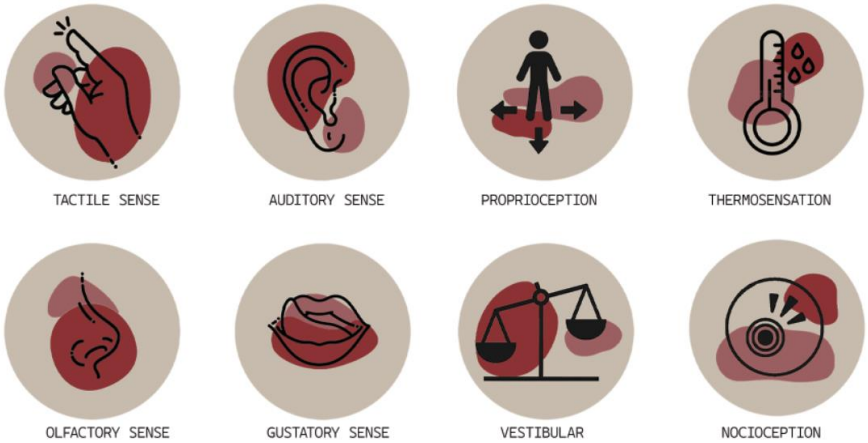



Fig 12: Different Sensory Perceptions of Blind

Source: Author

# 4.3 Theories Related to the Blind

## 4.3.1 Senses and Architecture



The perception of a space completely depends on the senses and the level to which they have developed in people. But it is also the responsibility of architecture to invoke and make us aware of the senses that have gone dormant.

Architecture doesn't happen in isolation. Architecture exists with nature and acts as an extension of nature into the man-made realm. Every experience of architecture, unless intentional, is perceived by all the senses together. One receptor feeds and collaborates with the other to create a multi-sensory experience.

All the four senses- vision, smell, hearing, and taste, acts as an interface between the tactile sense, which has skin as its receptor, and the world. It is an interface between the exterior and the interior of the body (**Pallasmaa, THE EYES OF THE SKIN, 2005**). We unconsciously or consciously associate some of the senses with almost all of the elements of a building or space. Say, a living room has the sense of vision and touch associated with it. But if we look closely, it can't function without responding to all the five senses.

## 4.3.2 Visual Perceptions

Visual perception has become one of the most important aspects of architecture. Master architects like **Le Corbusier** have always advocated the importance and dominance of visual sense through their design and writings.

**“I exist in life only if I can see (pallasmaa, THE EYES OF THE SKIN, 2005) - Le Corbusier”**

**“I am and I remain an impenitent visual; everything is in the visual (pallasmaa, THE EYES OF THE SKIN, 2005) - Le Corbusier”**

But there have also been master architects like **Alvar Aalto** and **Carlo Scarpa**, whose work has a rigorous appreciation of multi-sensory architecture. Be it a chair designed by Aalto or a staircase by Scarpa, it's all about a multi-sensory experience.

Approaches toward the visual sense can be completely different. **Le Corbusier's** constant advocation of the importance of light and vision in architecture projects architecture as something which only has meaning when put in light, whereas the **Japanese** favor shadows and darkness over the light in their architecture. Constant and uniform light freezes the imagination and time whereas darkness and shadows make us go inwards and take us towards the peripheral experience of the visual.

### 4.3.3 Tactile Sense

**“All the senses, including vision, are extensions of the tactile sense; the senses are specialization of skin tissue, and all sensory experiences are modes of touching and thus related to tactility.” (Pallasmaa, THE EYES OF THE SKIN, 2005)**



The tactile sense is the one that is present in us from the time we are born (the five senses). A child experiences the whole world mostly by hand -touch **(Jain philosophy).**

Touch is placed in the first place, which means all human beings are supposed to have tactile sense and anyone having any other sense will definitely have this. Vision is placed at fourth place after touch, taste, and smell. This also means that the visual sense can't exist independently in a person whereas the tactile sense can. Tactile sense only needs other developed senses to further enhance the experience of it.

Touch is divided into **active touch (to touch)** and **passive touch (being touched)** by **James Gibson**, a psychologist. In architecture we mostly have active touch whereas experience through passive touch is not explored much. Gibson explains active touch as more exploratory in nature, like touching a textured wall or putting the hand in a water pool, whereas passive touch is more receptive in nature.

QED came up with an interesting article based on a study done on mind wanderings by **John Tierney** in 2010, which was about the importance of touch in architecture **(The Importance of Touch in Architecture, 2010)**. The study suggests that tactile perception of a space shapes up not only what we perceive through other senses but also what we feel and think. So, whatever we see or feel is somewhere strongly connected to our tactile perception of it, be it active or passive. Textures, forms, motifs, etc. Have a much bigger role to play then visual only. Response to tactile sense makes a space more inviting at an intimate level.

Standing inside the **Taj Mahal** and looking at people going again and again to touch the intricate inlay work on the walls and the jail patterns and feel the precision and dedication devoted by the craftsmen, made me actually see the bond between a building and the observer being built through tactile sense. Weathered and discoloured white marble motifs, floors, and handrails told me that we have been touched, walked on, and felt before which made me a part of the experience which is rooted deep in history.

Mastery of human greek figures was achieved a thousand years before it was achieved in painting **(Hall, 1990) Edward T Hall** gives reason for this as the sculpture is a kinaesthetic and tactile art whereas painting is mainly a visual art. 'The message is from the muscles and joints of one body to the muscle and joints of another' **(Hall, 1990).**

## 4.3.4 Auditory Sense

**"Sight isolates, whereas sound incorporates; vision is directional whereas sound is omni-directional" (Pallasmaa, THE EYES OF THE SKIN, 2005)**

When auditory and visual sense is compared, the former is seen as the **passive receptor (which receives information)** whereas the latter is seen as the **active receptor (which reaches for information)**. Perception of sound is not focused, although it gives the sense of direction, once the sound reaches the ears.

**John Hull** in a lecture titled-'**Sound: An Enrichment or State (Hull, 2001**), said that '**a blind person lives in an infinite space**', which is free of any visual barriers. It is only the ground that makes them feel that they are in a world with physical limitations and gravity. Then why does the world look so complex to visually abled people? Being visually abled can't be the only reason and denial of visual sense can't be the solution to it.

## 4.3.5 Shadows and Light

Light and shadow exist together. Shadows are made when there is light, otherwise when there is no light, its darkness that exists.

Works of architects like **Tadao Ando**, shows a perfect blend of spaces with elements of shadows, darkness, and light.

**"In great architectural spaces, there is a constant, deep breathing of shadows and light; shadow inhales and illumination exhales light." (Pallasmaa, THE EYES OF THE SKIN, 2005)**

**"Homogenous bright light paralyzes the imagination" (Pallasmaa, THE EYES OF THE SKIN, 2005)**

Bright lights always keep us at our exteriors, focusing on the world around us, whereas shadows make us go inwards, in an imaginary world of thoughts .

Light is not just a source which helps us see things. There are many layers in which the whole perception of space or form in light happens.

In the **Holocaust museum, Israel**, designed by **Moshe Safdie**. Spaces have such a dramatic composition of light and shadow. Bold inclining concrete walls with a slit through which light comes and falls on its rough surface, not only adds richness to the concrete texture but also makes bold patterns on it.

## 4.4 Different Sense Evoking Elements in Architecture

### 4.4.1 Circulation and Mobility

The built network of spaces affects the way in which we interact and move through our surroundings. Visually impaired people use aural , tactile ,and kinaesthetic senses for this.

- **Movement pattern - simple and clear , create mirrored images and patterns**
- **Consistency - consistency and repetition helps way finding**
- **Volumetric Proportions - internal volumes help in directing and enhance experience**

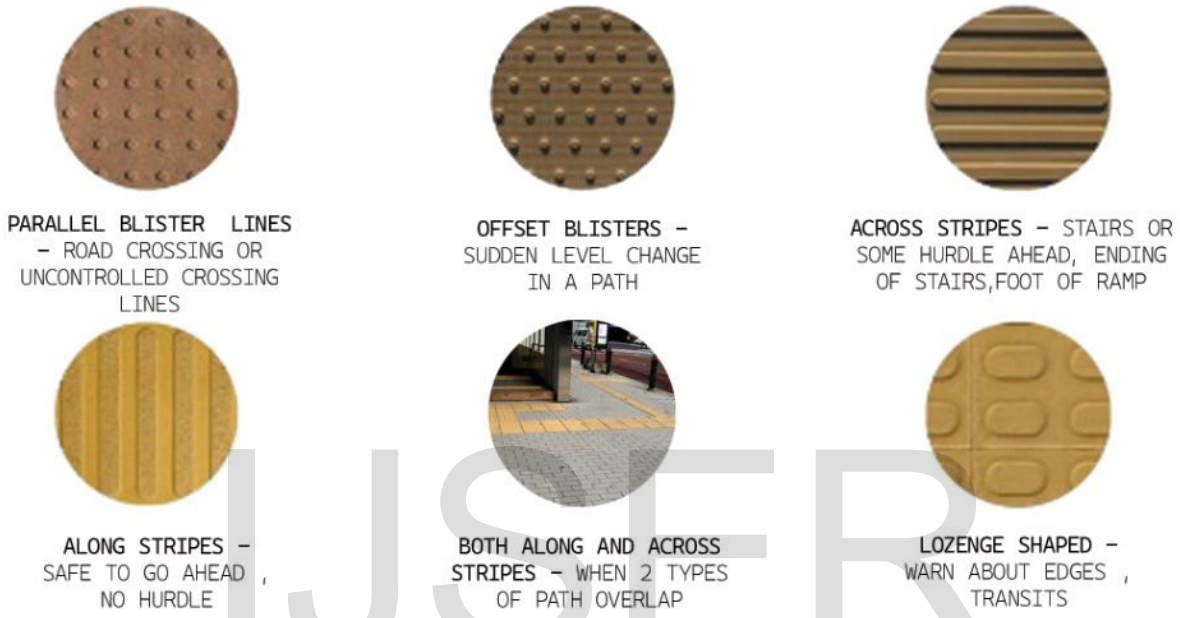
### 4.4.2 Surface

Tactile Surfaces are a system of textured ground surface indicators that can be found on footpaths, stairs and public transit platforms to assist the visually impaired. They feature truncated domes to create a clear warning of hazardous surfaces, or wayfinding bars for directional guidance. Tactile tiles serve as a navigation guide for visually impaired people.

These tiles serve to enhance the accessibility of a place. Although for most people these tiles may look mundane — but for blind people, these tactile tiles play a great role in their daily life.

Fig 13: Different Tactile Tiles

Source: Internet






## 4.4.3 Sound and Space

Sound can assist in providing orientation clues about a space. It can help in navigation. Blind people often outperform sighted people in hearing tasks such as locating the source of sounds.

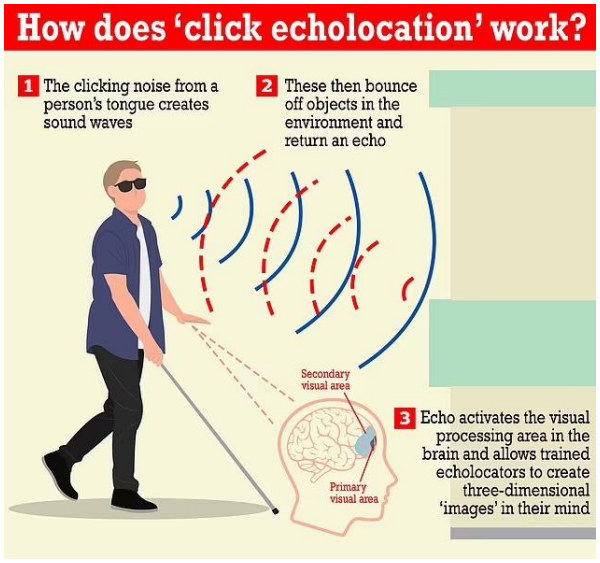



Fig 14: Sound Perceived by the Blind

Source: https://www.dailymail.co.uk/sciencetech/article-9645473/Echolocation-help-vision-loss-study.html

## 4.4.4 Logic of Space use

- Pattern of the plan should be easily recognizable.
- Mirrored space - mirrored spaces must be simple.
- It should be accessible easily with sense and logic. Door openings - can define the kind of function it provides



## 4.4.5 Sight

Vision has a strong connection to interior architecture. Visually challenged has no or very less vision, spaces should elaborate design on vision. The 3 main parameters to consider are color, lighting, and shadow.

### 4.4.5.1 Colors

High contrast colors should be used to orient pupils to recognize space.

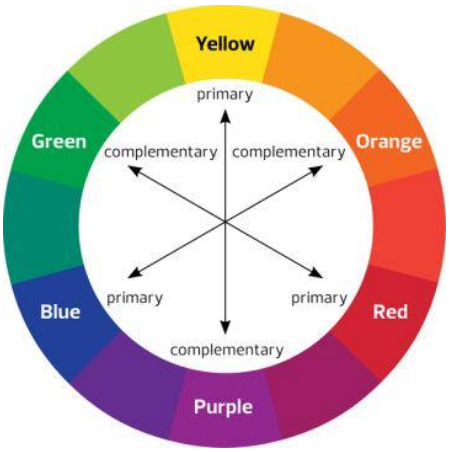



Fig 15: Color

Source: https://copicmarkertutorials.com/using-complementary-colors-effectively-video/

### 4.4.5.2 Lighting

Daylighting is important for schools. Glare should be avoided as it creates conflict.

### 4.4.5.3 Shadows

Light and shadow can be used to distinguish spaces as eyes react to it even for the blind.



Fig 16: Use of Shadows in Architecture

Source: Internet

## 4.4.6 Smell

According to the mobility training program smell can be used to identify the place we are in. Humans can smell thousands of smells . The smell is a strong impulse. Different species of scented plants can be used to trigger this sense and help in identification.


Fig 17: Ideal plants

Source: Internet

# 4.6 The Visual Language of Communication

## 4.6.1 Braille

Braille is the reading and writing code mostly used by readers with blindness and visual impairments. In braille, letters and numbers are made up of a rectangle with six dots in two columns. Each letter and number uses a different pattern of raised dots. A braille slate is used to write braille

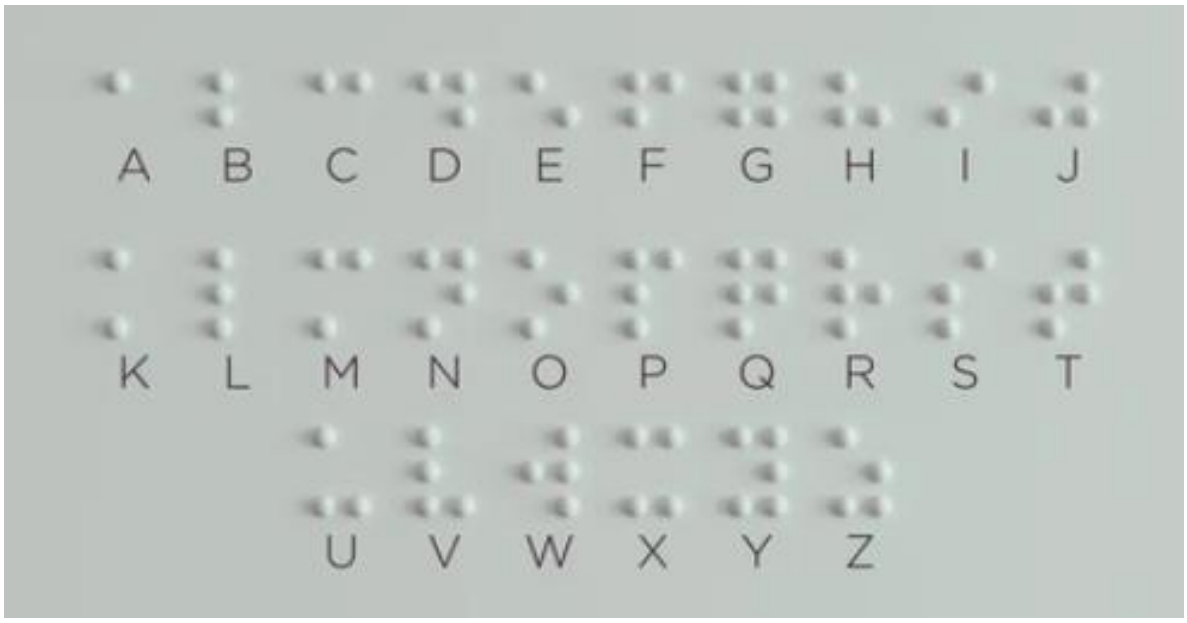



Fig 18 :Braille Print

Source: https://www.shutterstock.com/search/braille

## 4.6.2 Braille book for music

Braille music is a braille code that allows music to be notated using braille cells so music can be read by visually impaired musicians.

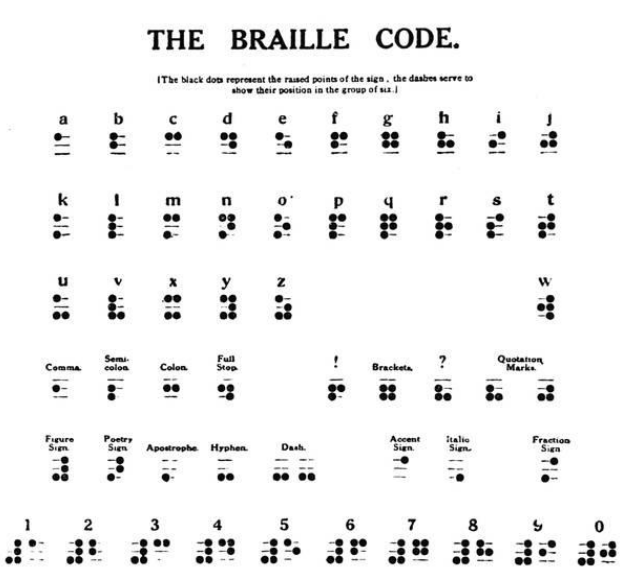



Fig 19: Braille Music Code

Source: https://www.classicfm.com/discover-music/braille-music-notation-method-history-inventor/

## 4.6.3 Audiobooks

An audiobook or a talking book is a recording of a book or other work being read out loud. Daisy (the digital accessible information system) is the emerging world standard for digital talking books for people who are blind or have a print disability.




Fig 20: Digital Talking Book

Source: https://blind.iowa.gov/newsroom/digital-talking-books-are-here

## 4.6.4 Moon type

Moon is not as well known as braille, but it is a valuable alternative touch reading scheme for the blind or partially sighted people of any age. Rather than the dots of braille type, moon type is made up of raised curves, angles, and lines.

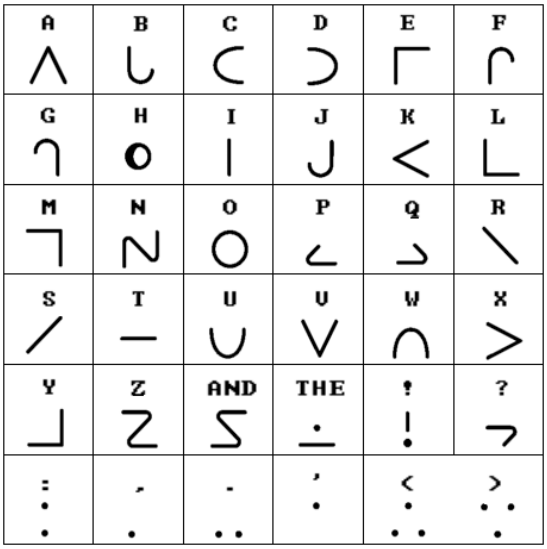



Fig 21: Moon Print

Source: http://www.deafblind.com/moon.html

## 4.6.5 Large prints

They are generally 16 to 18-point sizes. Giant print is anything larger than this. Regular print is usually 10 or 12 points.

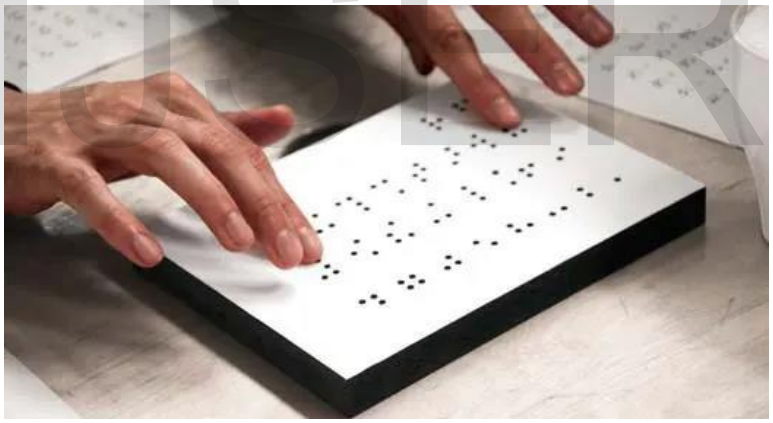


Fig 22: Large Print

Source: https://www.printmag.com/design-culture/design-history-of-braille-design/

## 4.6.6 Line type

It is an embossed roman alphabet that improved upon the style, or font, of other systems in use by compacting text and removing confusing flourishes.

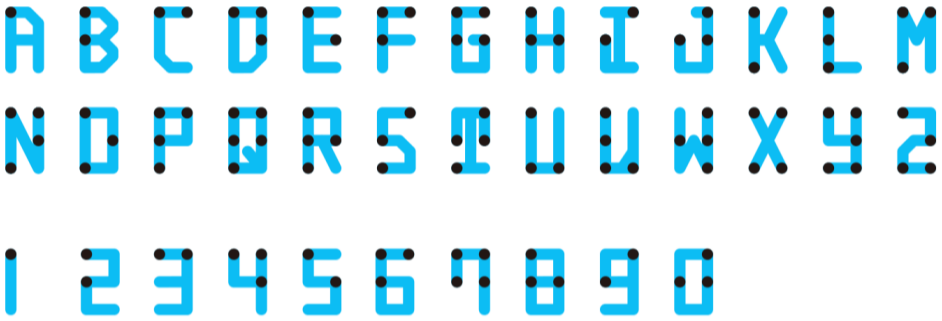


Fig 23: Line Print

Source: https://www.zmescience.com/other/design-other/braille-neue-fontface-26235234/

## 4.6.7 Elia frames

It is designed for maximum tactile discrimination by people who have a visual impairment. It is so easy to learn that it can be studied and applied.

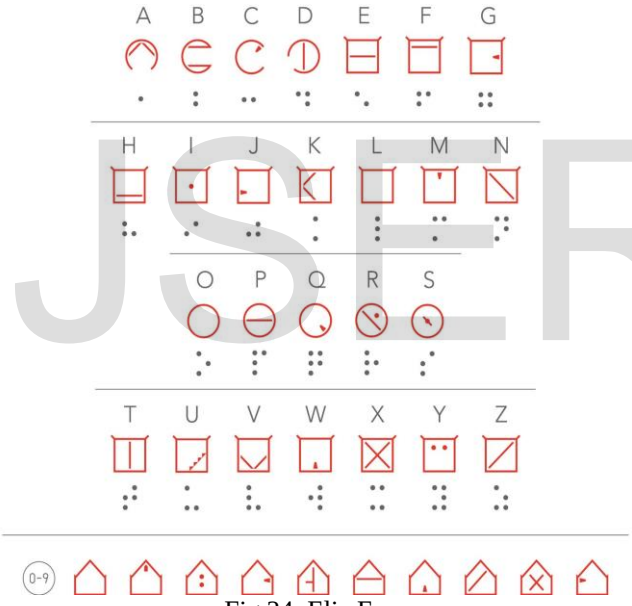



Fig 24: Elia Frames

Source: http://www.theeliaidea.com/elia-frames2

## 4.6.8 Other methods

Deaf-blind manual spells, block alphabet spells, moon uses raised lines, curves, and dots to touch, tadoma uses lipreading by touch,hand-under-hand signing using touch.

# 4.7 Universal Design by World Blind Union 2019

## 4.7.1 Creating a barrier-free society

The built environment, communication, and products should be universal. Universal design is different from accessible design, accessible design creates products and environments for people with disabilities, which often tend to segregate people creating separate systems. Universal design is considered to be usable and inclusive to all, including disabled people.

## 4.7.2 Principles of universal design

- **Equitable use** : design is useful and marketable to people with diverse abilities
- **Flexibility in use** : accommodates a wide range of preferences and abilities.
- **Simple and intuitive use** : easy to understand, regardless of the user's experience
- **Perceptible information** :communicates necessary information effectively to the user
- **Tolerance for error** : minimizes hazards of accidental or unintended actions.
- **Low physical effort** : used efficiently and comfortably and with minimum fatigue.
- **Size and space for approach and use**: appropriate size and space regardless of user



## 4.7.3 Lighting

Adequate lighting is the single most important aid to vision. The lighting needs of persons who are blind or visually impaired vary according to particular eye conditions.

## 4.7.4 Color Contrast

Color contrast is another key component in designing spaces for persons who are partially sighted; its importance cannot be overemphasized enough. 70% contrast is ideal.

## 4.7.5 Acoustics

Sounds can assist in providing orientation clues about a space. reflected sound can be used to determine a room size, the presence of corridors and proximity of walls and structural barriers

## 4.7.6 Tactile Signage

Ideal is to include raised print and braille in signage that .Signage should be consistently located at a height and distance from the door to which it defines. The raised lettering should be color contrasted.

### 4.7.7 Protruding Objects

Objects that protrude into the paths of travel can be hazardous to a person who is visually impaired they may not be detectable by white canes.

### 4.7.8 Detectable Warning Signals

Surfaces having texture that can be felt BY foot or detected by a long cane. Detectable warning surfaces should be ON platforms top of stairs, ,curb ,ramps etc

### 4.7.9 Quiet Vehicles

The emergence of quiet transport vehicles poses difficulty for blind vehicles as they do not produce sufficient sound for identification. Such vehicles should have audible vehicle alert systems that produce sounds to alert pedestrians of their approach; pitch shifting to alert a pedestrian that the vehicle is accelerating; and sound at stationary to alert pedestrians to the presence of a vehicle that may begin moving at any moment.

# 4.8 Neuferts Architectural Data

## 4.8.1 Classroom

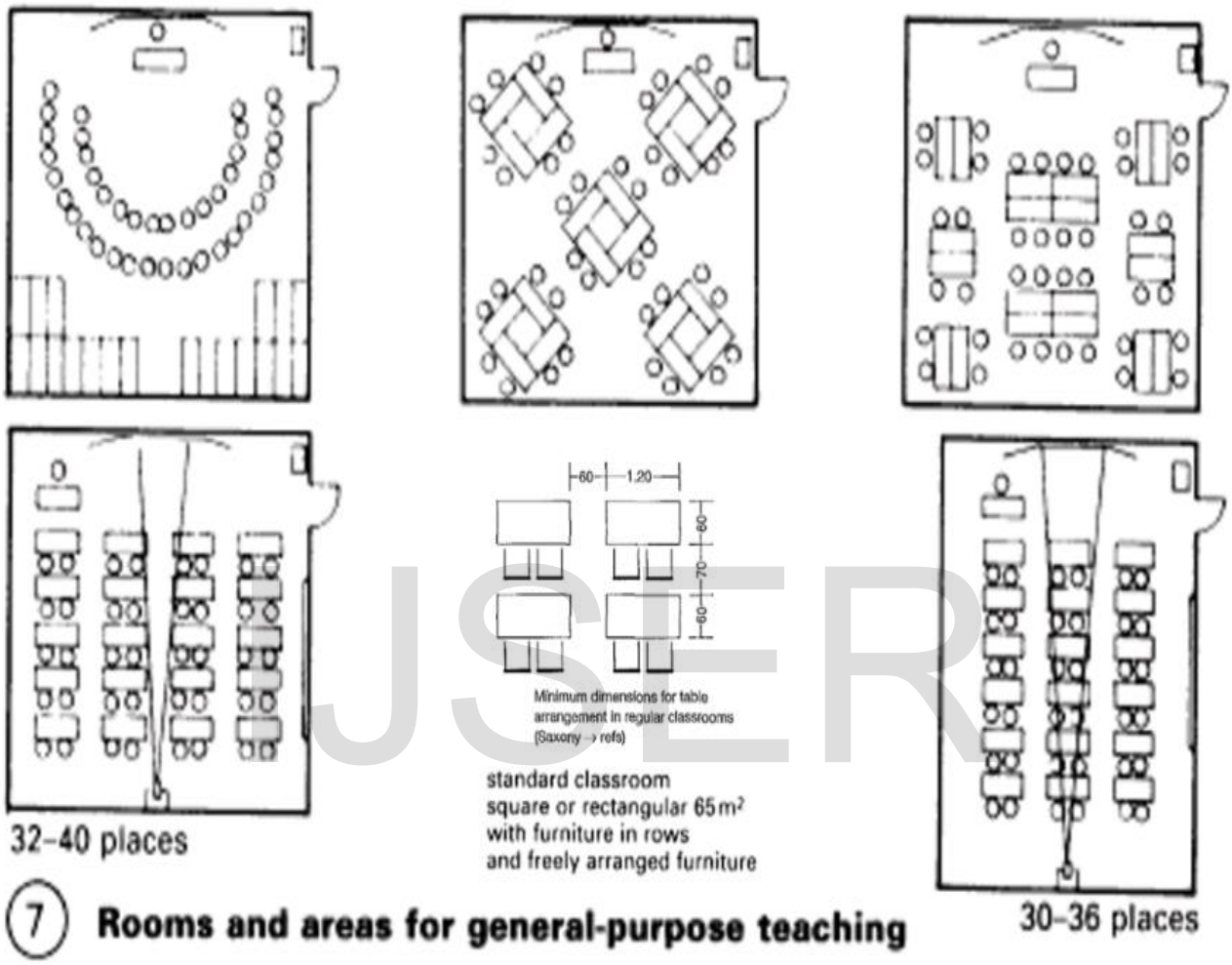



Fig 25: Classroom

Source:Neuferts

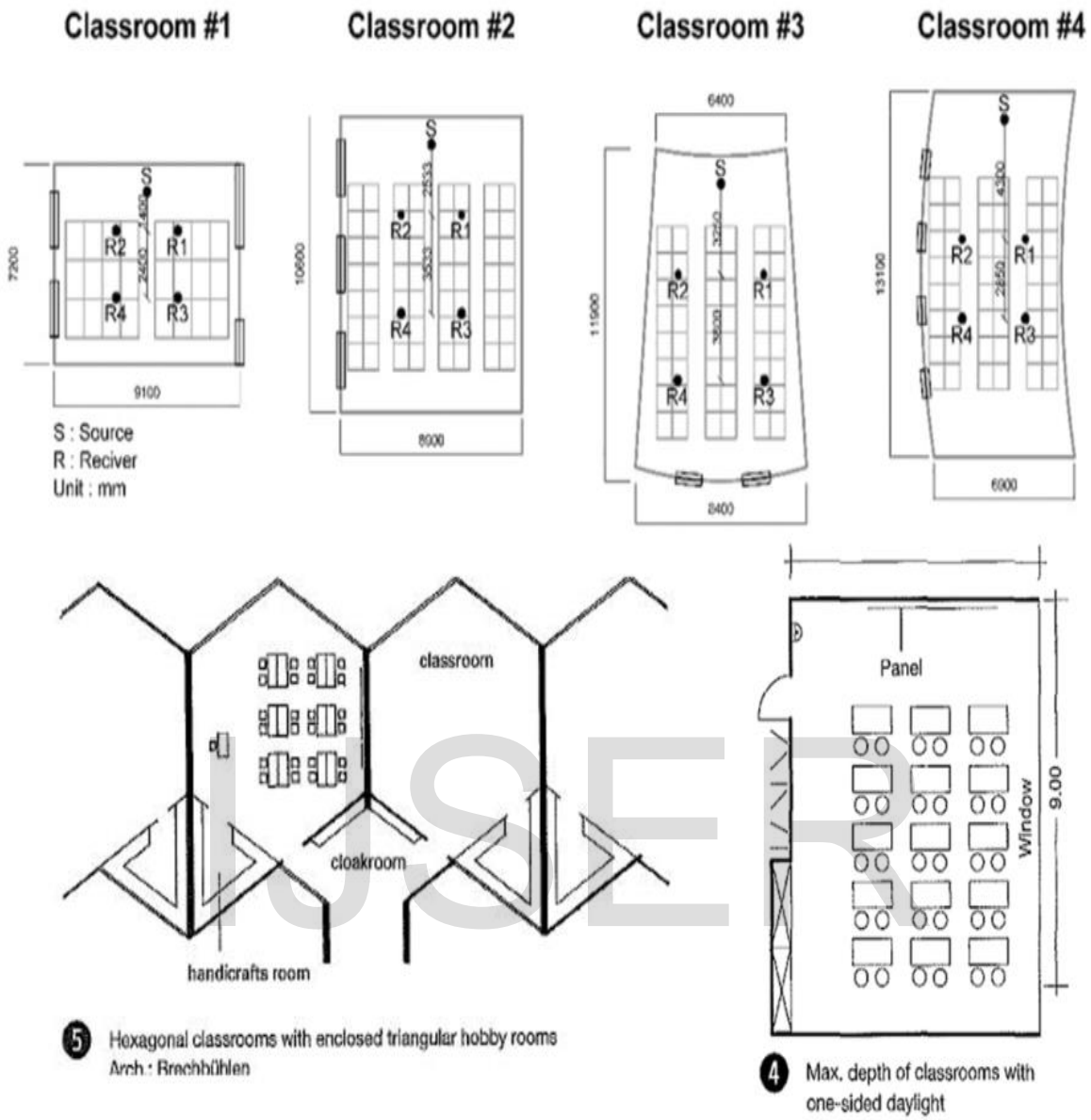



Fig 26: Classroom

Source:Neuferts

# 4.8.2 Administration

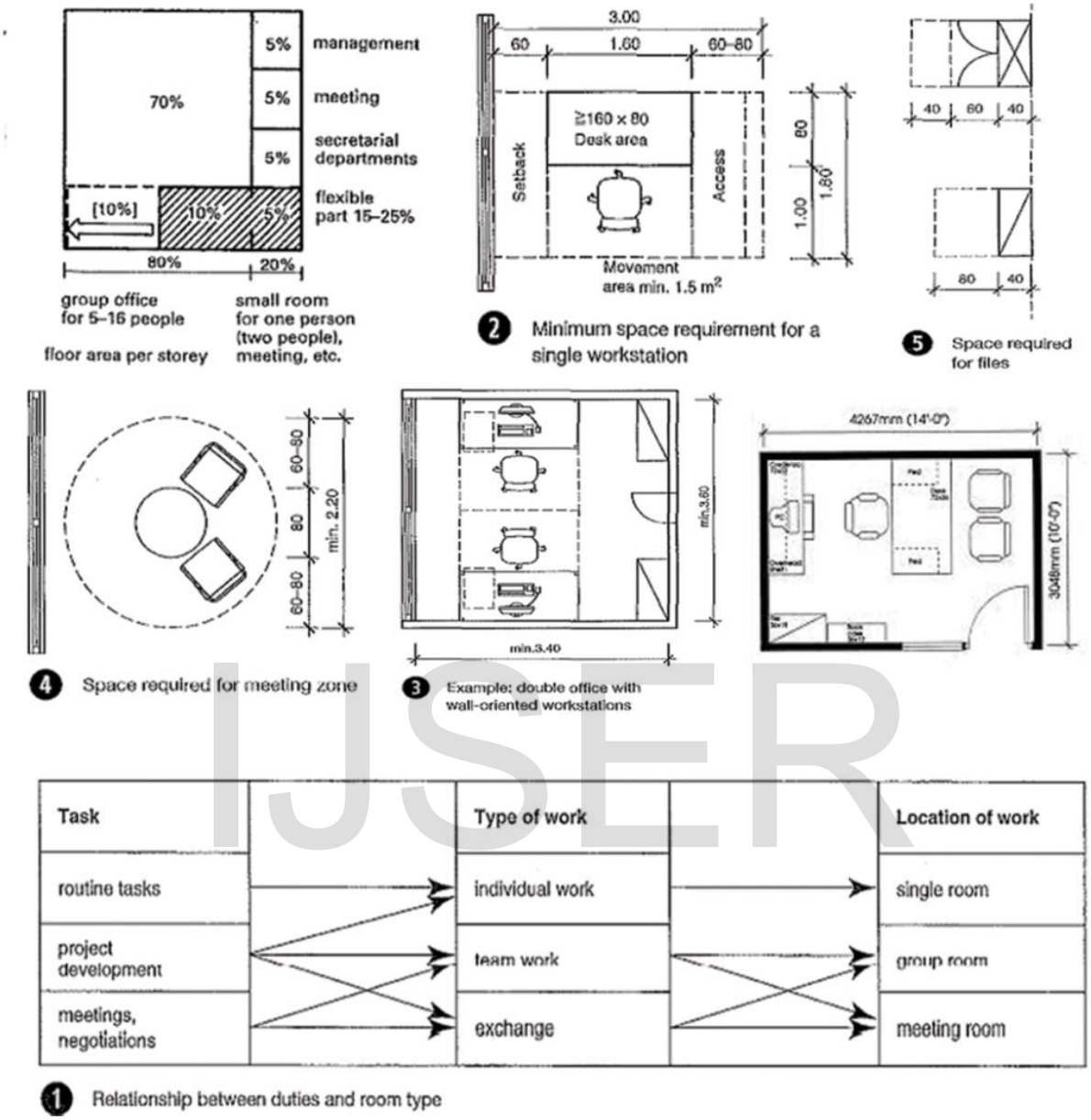



Fig 27: Admin

Source:Neuferts

# 4.8.3 Cultural Venues

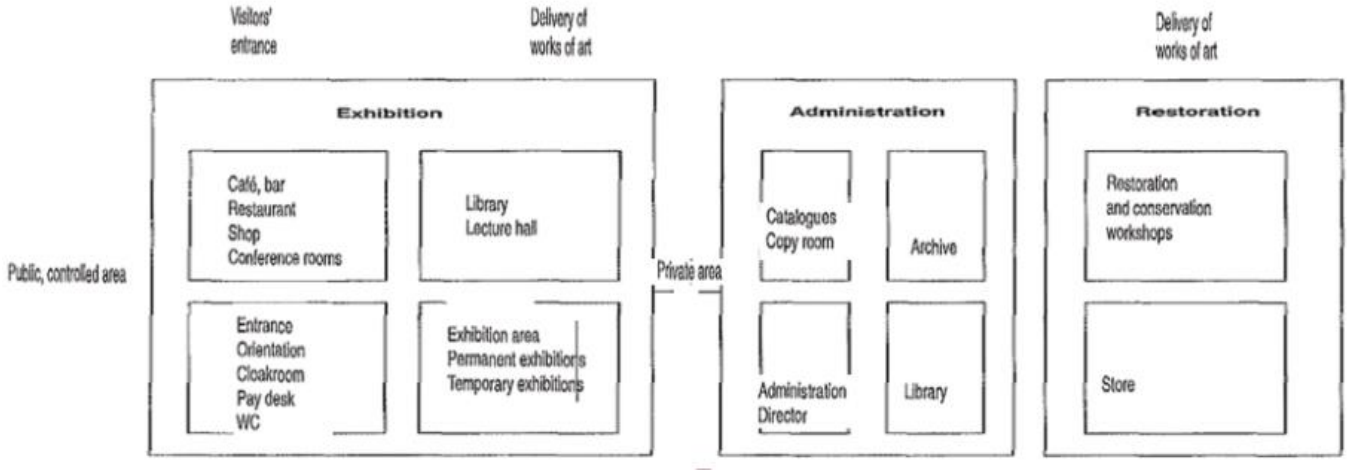



Fig 28: Cultural Venues

Source:Neuferts

# 4.8.4 Toilets

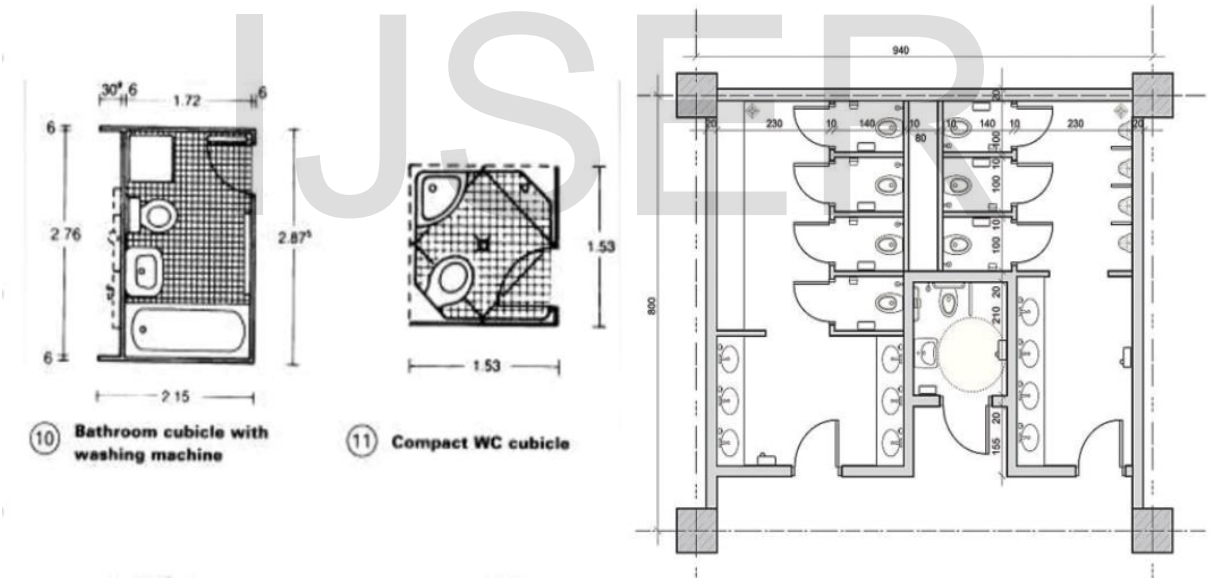
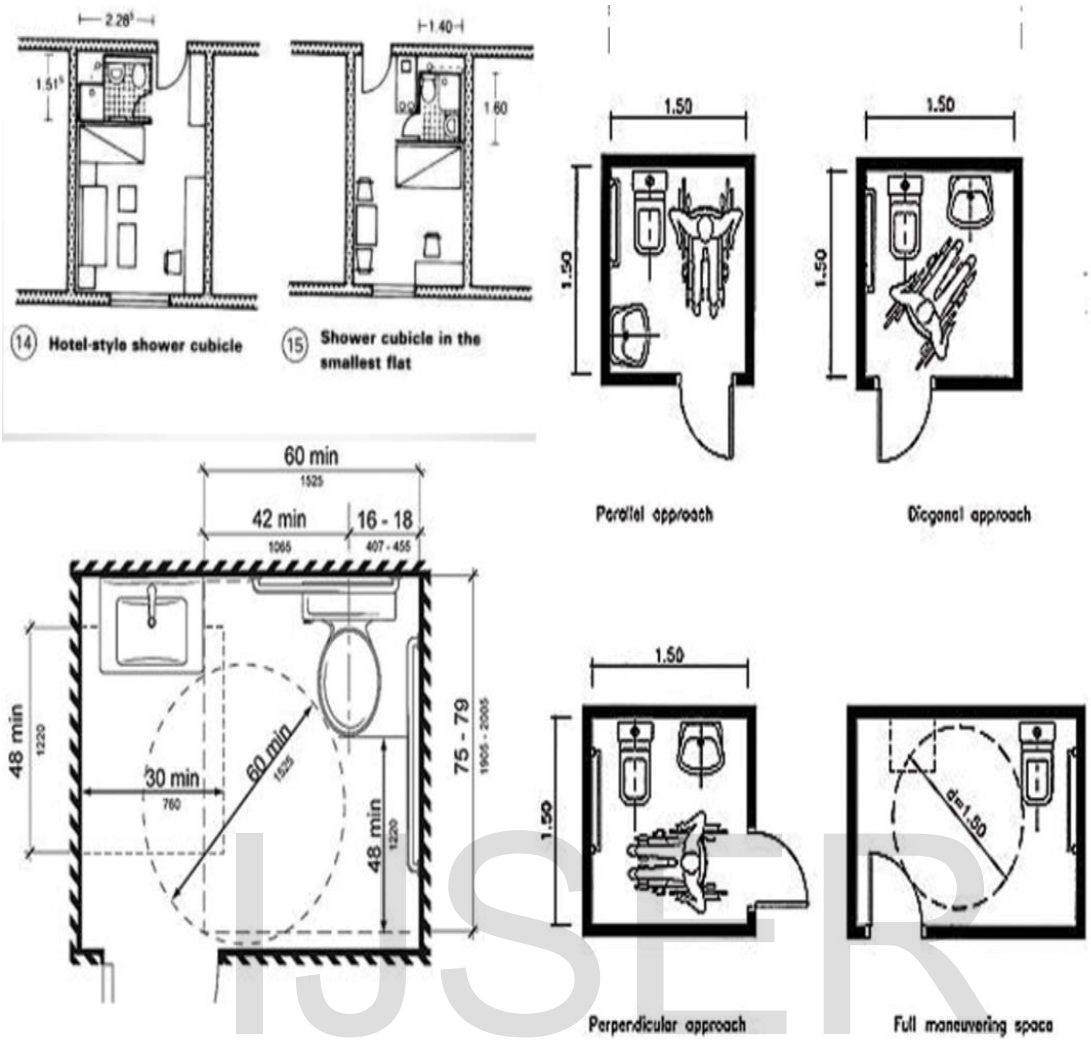



Fig 29: Toilets

Source:Neuferts




| No. users | WC | Urinals |
|---|---|---|
| 40 boys | 1 | 2 |
| 20 girls | 1 | – |
| 15 teachers | 1 | 1 |
| 10 women teachers | 1 | – |

Fig 30: Toilets

Source:Neuferts

## 4.8.5 Library

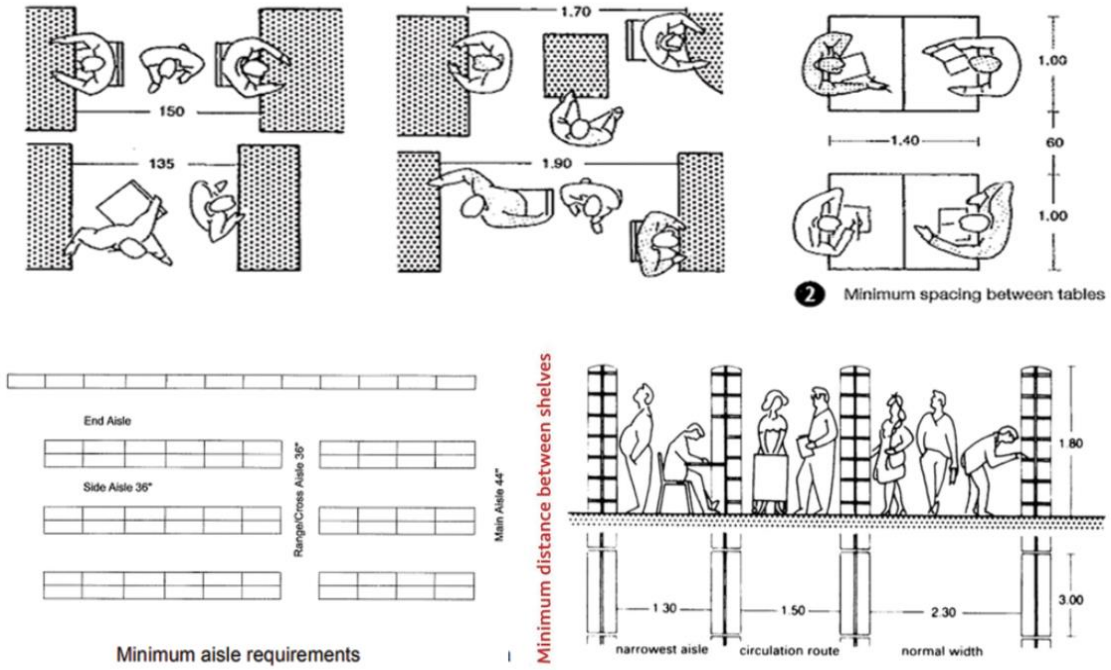
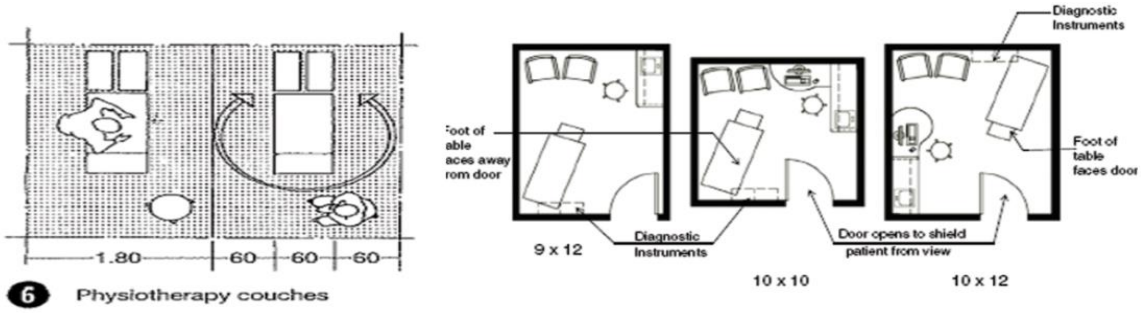





Fig 31: Library

Source: Neuferts

## 4.8.6 Doctor's Cabin



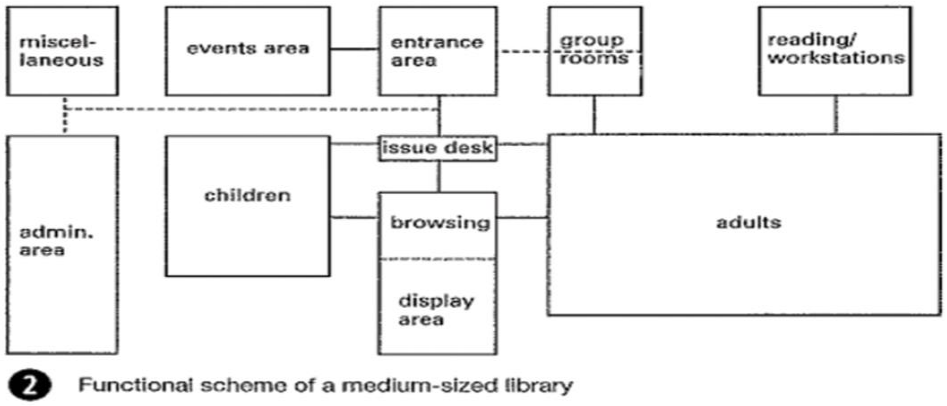



Fig 32: Doctor's Cabin

Source:Neuferts

## 4.8.7 Student's Accommodation

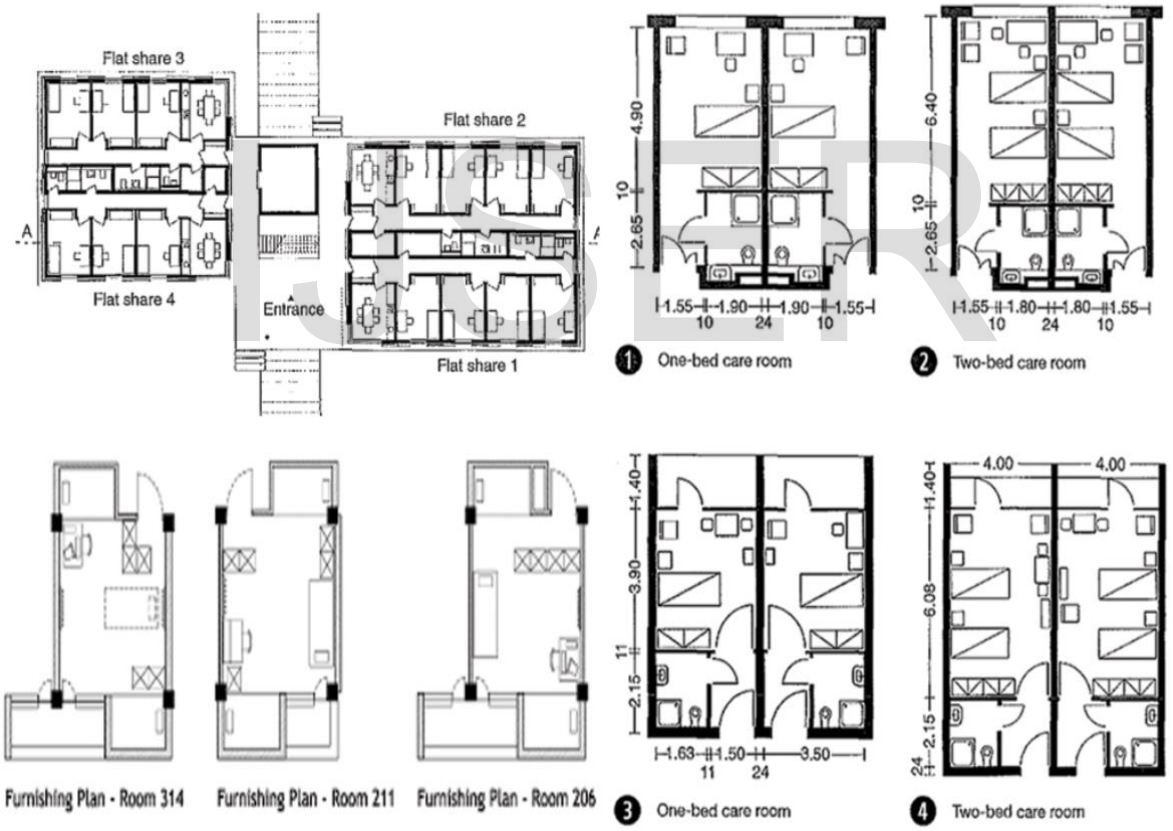



Fig 33: Hostel

Source:Neuferts

# 4.8.8 Windows and Openings

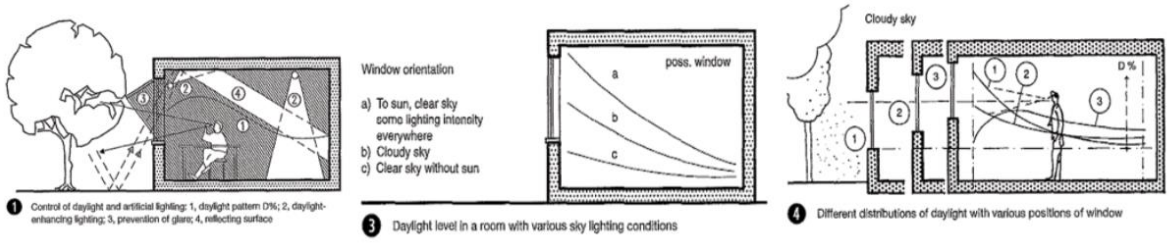



Fig 34: Windows and Openings

Source:Neuferts

# 4.8.9 Lighting

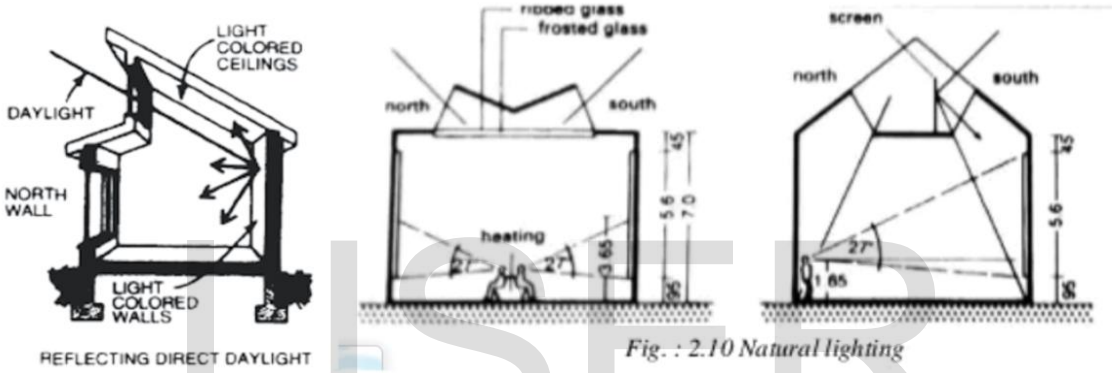



Fig 35: Day lighting

Source:Neuferts

# 4.8.10 Dining and Kitchen

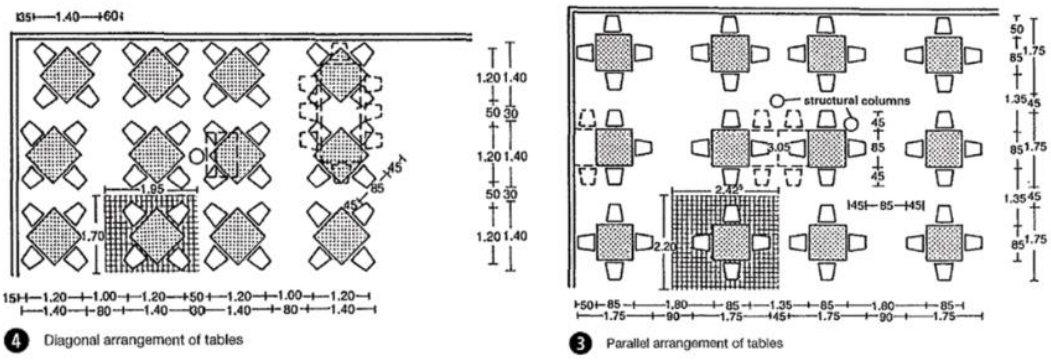



Fig 36: Dining

Source:Neuferts

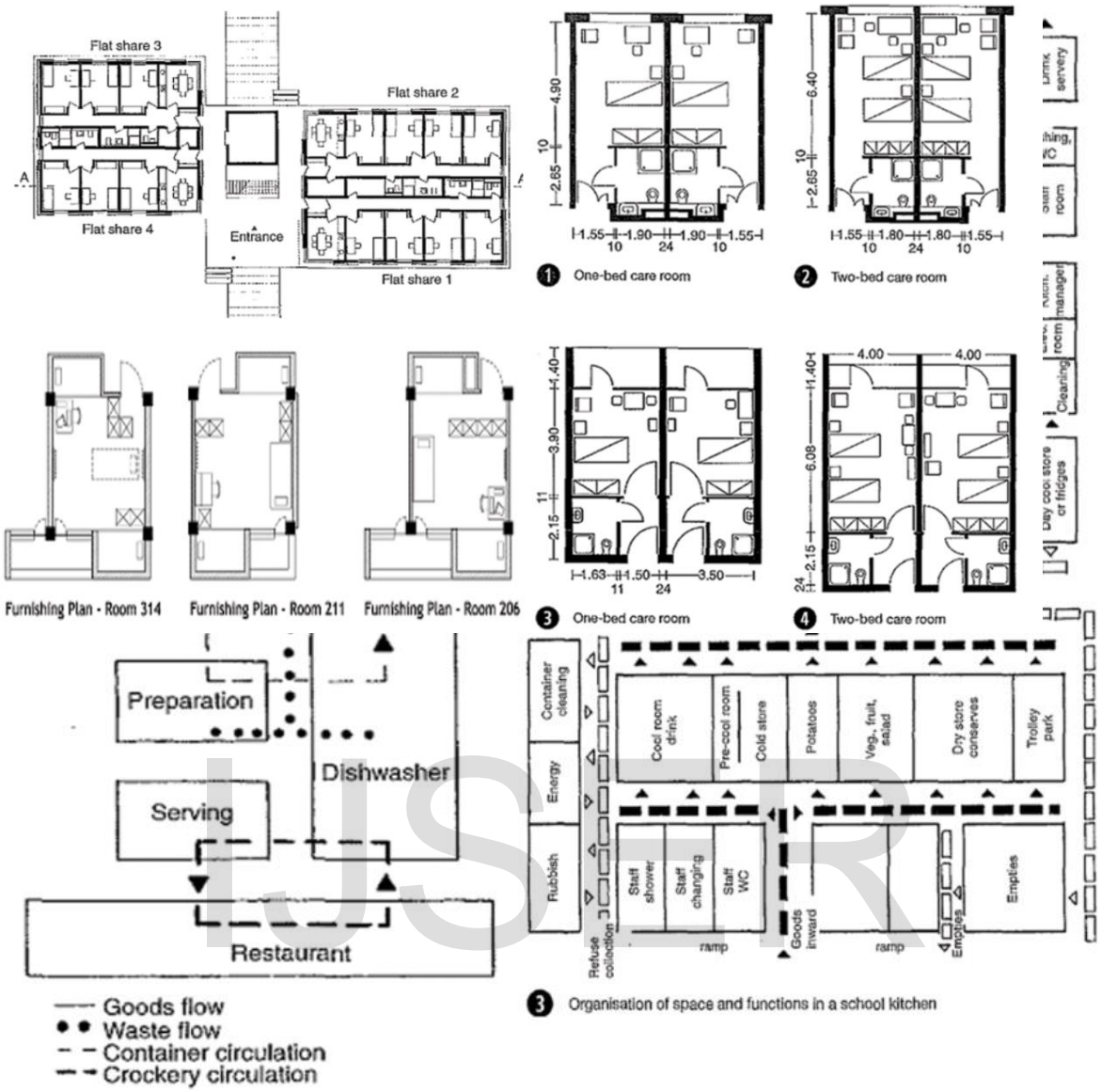



Fig 37: Kitchen

Source:Neuferts

# Chapter -5

# DESIGN CONSIDERATIONS

## 5.1 Few Barriers

For a person with visual imparity, a space with a dense cluster of walls or barriers can be hazardous. Even if the person is accustomed to the layout and planning, it would be better if space has fewer walls and "obstacles". Finding alternatives to standard walls like low walls, furniture elements, or creating openings within walls can be considered while designing, making the space more accessible.

## 5.2 Way Finding

**"Wayfinding refers to information systems that guide people through a physical environment and enhance their understanding and experience of the space."**

While wayfinding is extremely necessary for a visually impaired person to help them guide through space, it is the job of an architect to create designs that would inculcate this feature. It can be done by using different materials on the floor and creating a pattern to guide people or by using fragrance to lead the way or by incorporating tactile materials to create a pathway.

## 5.3 Universal Design

Universal design is one that can be accessed effortlessly by people with a diverse range of abilities, including people who have limited vision or complete visual imparity. The goal is to create a design that is "universal" and "accessible" for everyone. The American disabilities act (ADA) recognizes these forms of disabilities and ensures a law that defines a set of guidelines that makes sure that a space is inclusive of all these concepts and necessities.

## 5.4 Tactile Materials

Since a person with low visual ability cannot see the materials within a space, tactile materials or materials which encourage the sense of touch to perceive them, work wonders in a structure that is accessed by blind people. A variety of textures like that of a stone surface vs a textured concrete wall can create a significant impact for a visually impaired person to experience a

space. The combination of these materials and textures creates a system for wayfinding as well as enables a person to differentiate between the spaces.

## 5.5 Acoustical Treatments

Excessive noise or loud sounds can provide discomfort to a visually impaired person who relies the most on their hearing abilities. While moving through space, a blind person will take guidance from the sounds around, and hence, acoustic treatments of the walls and other surfaces are of prime importance. Canceling irritable noises like that of a mechanical vent or loud chattering and increasing the scope of natural sounds like that of people's footsteps or the dripping of a water droplet, makes the space "sound better" and more comfortable.

## 5.6 Braille

The best way to enable blind people to read a sign or even understand a plan is braille- the language for blind people. Many architects have incorporated braille in their architectural plans to help visually impaired people understand the layout. Architects at so & so studio created small models of the house to make their clients understand the renovations of her house! Braille can also be applied to signages at places like an elevator button or a fire extinguisher that would enable the people to visualize the functions as required.



## 5.7 Technology

Smart homes and gadgets help people with certain disabilities to a great extent. Smart technologies allow personal assistants to help the occupants with their daily tasks. People can now change the temperature on their thermostat and even turn their lights on and off using technologies that enable them to control everything from one position. Architects can look into these new systems and generate a mechanism to enable a blind person to transform their entire house concerning their particular requirements.

## 5.8 Frangarance or The Sense of Smell

Apart from hearing and feeling materials via a sense of touch, the sense of smell can be enhanced too. Using fragrant flowers or plants in space can also guide a person through the structure and allow them to distinguish one space from another. At the center for the blind and visually impaired in Mexico, fragrant flowers in the garden act as sensory guides that help individuals to orient themselves within the structure.

## 5.9 Soft and Natural Lighting

For people with low vision, extremely bright and glaring light can create strain in their eyes and cause a nuisance. Large glass surfaces without light protection that allow direct bright light to penetrate are very challenging. A survey shows that this is the biggest cause of the problem for a visually impaired person in a building. Thus, blinding lights and direct harsh sunlight should be curbed and soft lighting with low glare should be encouraged in a space for a visually impaired person.

## 5.10 Color Coding

People with low vision can visualize colors to some extent. Keeping this in mind, color composition and contrast is essential because an amalgamation of extremely bright color in one space can cause displeasure and thus inculcating different tones within a space is essential. A contrast can be for both color and luminance, which is associated with our ability to perceive depth and movement.



# Chapter-6

# DELHI MASTER PLAN AND BYE-LAWS 2021

# 6.1 Plot Area - Schools

| PLOT AREA REQUIREMENT FOR SCHOOLS | | | |
|---|---|---|---|
| S. No | Category | Population / unit (approx) | Plot Area |
| 1 | Primary School | 10,000 | 0.2-0.4 ha |
| 2 | Sr Secondary School | 10,000 | 0.6-0.8 ha |
| 3 | School for Mentally Challenged | 10.0 lakh | 0.2 ha |
| 4 | School for physically challenged | 10.0 lakh | 0.2 ha |

Table 3 : Plot Area

Source: Delhi Bye-laws 2021

# 6.2 Boarding House



HOSTEL/ GUEST HOUSE/ LODGING & BOARDING HOUSE/ DHARAMSHALA

- **Min. Plot size** : 500 sq. m
- **Maximum Ground Coverage** : 30%
- **Maximum FAR** : 120
- **Maximum Height** : 15m

I. Parking to be Provided @2 ECS per 1000 Sq.m. of built up area

I. These norms shall not be applicable for guest house under mixed use regulations.

Fig 38: Boarding Facilities

Source: Delhi Bye-laws 2021

# 6.3 Storm Water Drainage

Drains can be connected to municipal drainage network

# 6.4 Lift

Lift shall be provided in all buildings having habitable floor height above 15 m from plinth level.

# 6.5 FSI- Floor Space Index

| Zone | Permissible FSI | Remark |
|---|---|---|
| Residential(scheme area) | 1 | Max at G.F 0.4 |
| Residential(city area) | 4 | Width of road more than 12m |
| Residential(city area) | 3 | Width of road less than 12m |
| Industrial (scheme area) | 1.5 | Maximum allowed on G.F 1.0 |
| Commercial (scheme area) | 1.33 | Maximum allowed on G.F 0.4 |

Table 4 : FSI

Source: Delhi Bye-laws 2021

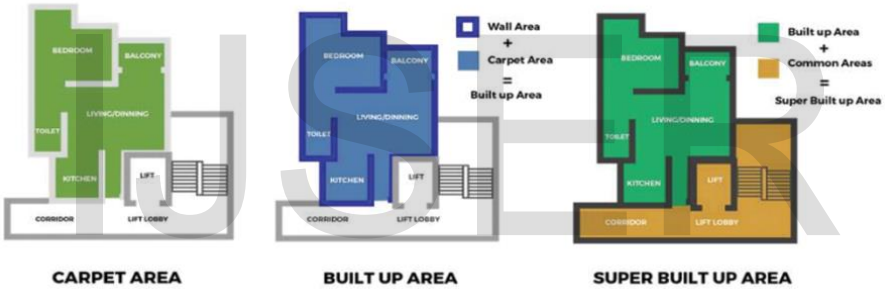



Fig 39 : Area

Source: Delhi Bye-laws 2021

# 6.6 Roof Top Tank

Maximum height allowed is 1.8m

# 6.7 Outer Wall

Minimum of 23cm should be provided

# 6.8 Minimum Width Of Staircase For Different Types Of Buildings (Clear Width Excluding Handrail And Balustrade)

| S. No | TYPE OF BUILDING | | MINIMUM WIDTHS (m) |
|---|---|---|---|
| 1 | Residential Buildings (Group Housing) | | 1.35 |
| 2 | Hotel Buildings | | 1.5 |
| 3 | Assembly Buildings like Auditorium, theatres, cinemas etc | | 2.0 |
| 4 | Educational Buildings | up to 30 in height | 1.5 |
| | | Above 30m height | 2.0 |
| 5 | Institutional buildings like hospitals etc | | 2.0 |
| 6 | All other buildings including commercial | | 1.5 |
| 7 | Industrial Buildings | | 1.5 |



Table 5: Stair Widths

Source: Delhi Bye-laws 2021

Maximum tread = 25cm (without nosing)

Maximum riser = 19cm

Number of riser per flight - 15

Height of handrail = 100cm

# 6.9 Rainwater Harvesting

Rain water shall not be discharged onto the street of a height greater than 1 m from the level of the street.

All buildings above 100 sq.m plot size should have a rainwater harvesting system and reservoir storage facilities.

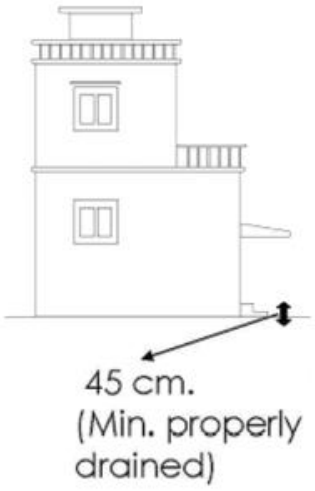



Fig 40: Rainwater Harvesting

Source: Delhi Bye-laws 2021

## 6.10 Setback



THE MINIMUM SETBACK SHALL BE AS GIVEN IN THE FOLLOWING TABLE

| S. No | Plot Size (In sqm) | Minimum setbacks (in metre) | | | |
|---|---|---|---|---|---|
| | | Front | Rear | Side (1) | Side (2) |
| 1 | Below 100 | 0 | 0 | 0 | 0 |
| 2 | Above 100 and up to 250 | 3 | 0 | 0 | 0 |
| 3 | Above 250 and up to 500 | 3 | 3 | 3 | 0 |
| 4 | Above 500 and up to 2000 | 6 | 3 | 3 | 3 |
| 5 | Above 2000 and up to 10000 | 9 | 6 | 6 | 6 |
| 6 | Above 1000 | 15 | 9 | 9 | 9 |

Table 6: Setback

Source: Delhi Bye-laws 2021

## 6.11 Building Height and Open Spaces

Open spaces around buildings depend on the building height.

Maximum height is limited according to the street width.

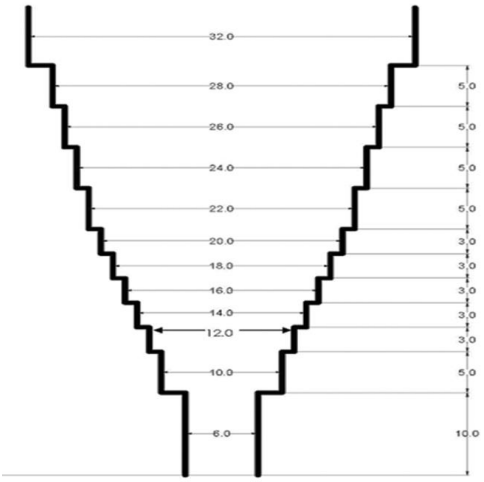



Fig 41: Open Space and Height Relation

Source: Delhi Bye-laws 2021

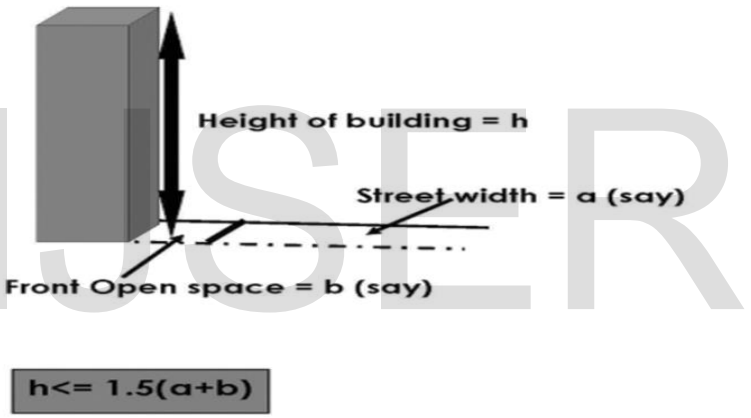





Fig 42: Height and Street Width Relation

Source: Delhi Bye-laws 2021

# 6.12 Canopy

## 6.12.1 Front Setback

- 2.4 m (maximum) deep in case the front setback is 3m deep
- 3 m (maximum) deep in case the front setback is 6 m or more.

## 6.12.2 Side setbacks

- 2.4 m (maximum) deep in case the side setback is 3 m deep.
- 3 m (maximum) deep in case the side setback is 6 m or more.

Note: Minimum 30% of the area of respective setback is to be maintained as open to sky.

## 6.13 Parking

- 2 Equivalent Car Space (ECS) in plots of size 250-300 sq.m.
- 1 ECS for every 100 sq.m. built up area, in plots exceeding 300 sq.m., provided that, if the permissible coverage and FAR is not achieved with the abovementioned parking norms in a plot, the parking norms of the preceding category shall be allowed.

| S.No | Use Premises | Permissible Equivalent Car Spaces (ECS) per 100 sqm. Of floor area |
|---|---|---|
| 1 | Residential | 2.0 |
| 2 | Commercial | 3.0 |
| 3 | Manufacturing | 2.0 |
| 4 | Government | 1.8 |
| 5 | Public and Semi – Public Facilities | 2.0 |



Table 7: Parking Spaces

Source: Delhi Bye-laws 2021

| Sl. No. | Type of Parking | Area in Sq. mt. per ECS |
|---|---|---|
| 1. | Open | 23 |
| 2. | Ground floor covered | 28 |
| 3. | Basement | 32 |
| 4. | Multi level with ramps | 30 |
| 5. | Automated multilevel with lifts | 16 |

Table 8: Car Parking

Source: Delhi Bye-laws 2021

# 6.14 Ground Coverage

| S. No. | Area of the Plot Sq.m. | Max Ground Coverage % | FAR | No. of DUs | No. of DUs Restrained by Supreme Court |
|---|---|---|---|---|---|
| 1. | Below 32 | 90* | 350 | 3 | 3 |
| 2. | Above 32 to 50 | 90* | 350 | 3 | 3 |
| 3. | Above 50 to 100 | 90* | 350 | 4 | 4 |
| 4. | Above 100 to 250 | 75** | 300* | 4 | 4 |
| 5. | Above 250 to 750 | 75 | 225 | 6 | 5 |
| 6. | Above 750 to 1000 | 50 | 200 | 9 | 7 |
| 7. | Above 1000 to 1500 | 50 | 200 | 9 | 7 |
| 8. | Above 1500 to 2250 | 50 | 200 | 12 | 10 |
| 9. | Above 2250 to 3000 | 50 | 200 | 15 | 10 |
| 10. | Above 3000 to 3750 | 50 | 200 | 18 | 10 |
| 11. | Above 3750 | 50 | 200 | 21 | 10 |



Table 9 : Ground Coverage

Source: Delhi Bye-laws 2021

# CHAPTER-7

# SITE STUDY AND ANALYSIS

## 7.1 Location and Site Details

The proposed site for the blind school is located in mukherjee nagar, next to the police station in delhi. Site lies in the delhi university area and is allotted for social welfare tasks according to the delhi master plan 2021.

- Site Area : 24,144 Sq.M / 6 Acre
- Permissible Ground Covering :12072 Sq.M
- Ownership : Ministry Of Social Justice and Empowerment
- Location: 28°42'01.2"N 77°12'33.2"E


Fig 43 : Site Context

Source: Google Maps

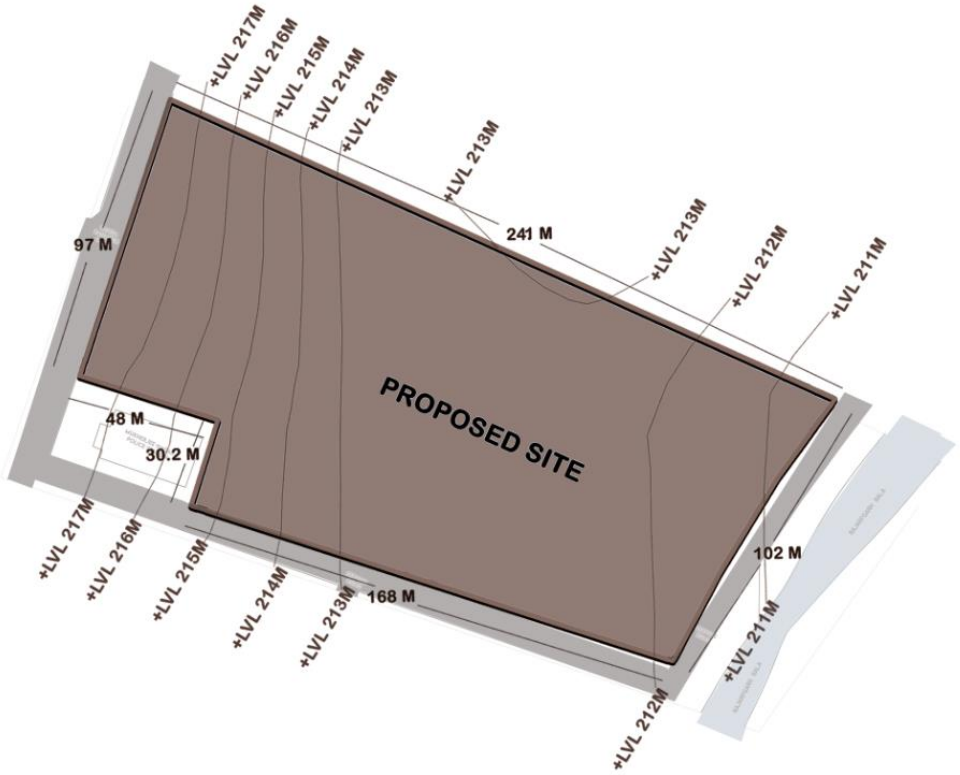



Fig 44 : Proposed Site

Source:Author



# 7.2 Climatic Data

## 7.2.1 Temperature

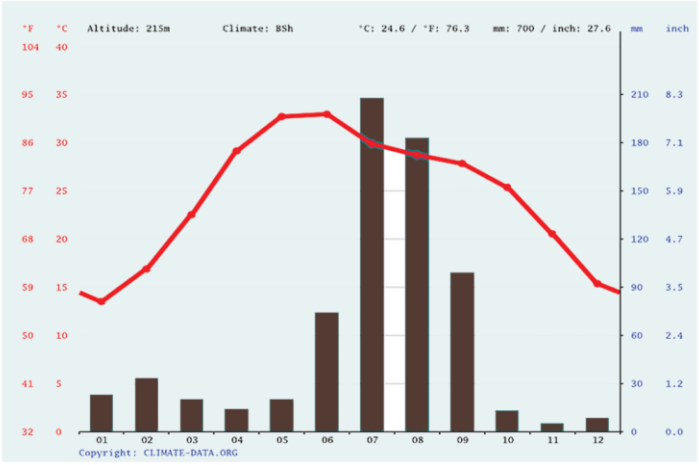



Chart 2 : Temperature Graph

Source:https://en.climate-data.org/asia/india/delhi/new-delhi-30/

- Hottest Month : **June**
- Avg High Temperature : **101 Degree F**
- Coldest Month : **January**

- Avg Low Temperature : **47 Degree F**

## 7.2.2 Humidity

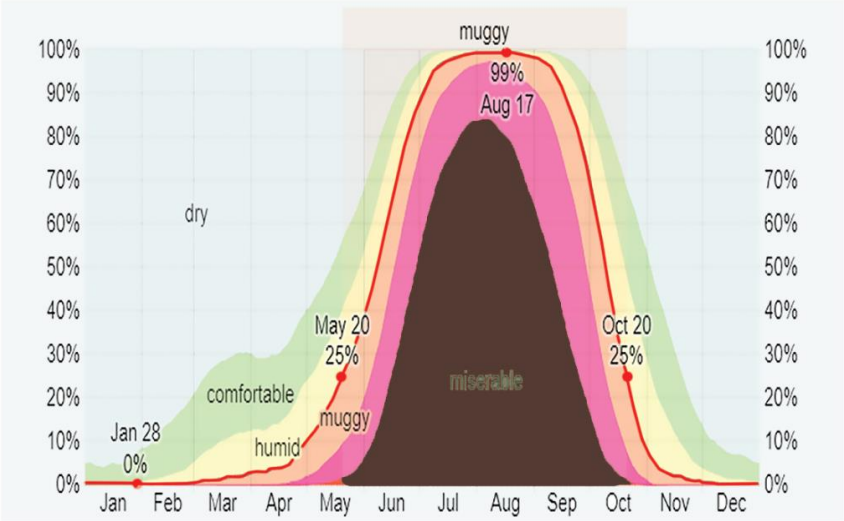



Chart 3 : Humidity Graph

Source:https://en.climate-data.org/asia/india/delhi/new-delhi-30/

Experiences Extreme Seasonal Variation and Variation Between Night And Day

- Most Muggy Month : **August**
- Least Muggy Month : **January**

## 7.2.3 Rainfall

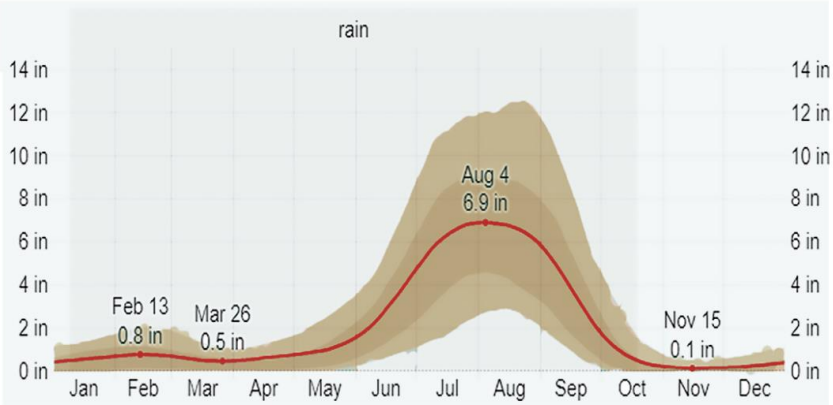



Chart 4 : Rainfall Graph

Source:https://en.climate-data.org/asia/india/delhi/new-delhi-30/

Experiences Extreme Seasonal Variation and Variation Between Night And Day

- Most Rainy Month : **August- 6.7 inches**
- Least Rainy Month: **November-0.1 inches**

## 7.2.4 Cloud Cover

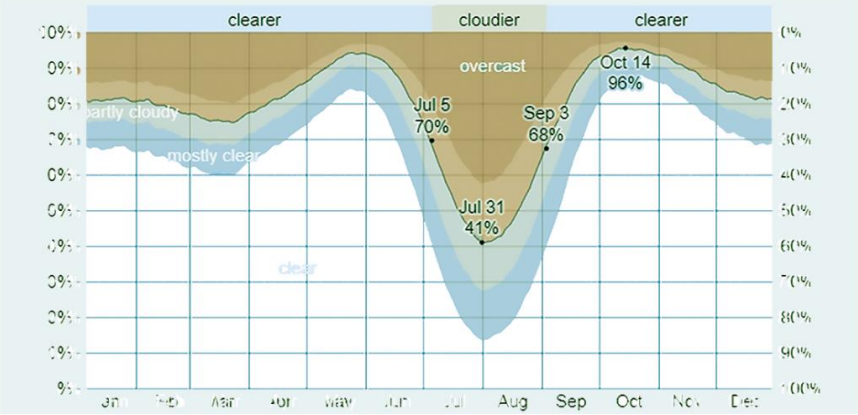



Chart 5 : Cloud Cover Graph

Source:https://en.climate-data.org/asia/india/delhi/new-delhi-30/



Experiences Extreme Seasonal Variation Over The Course Of The Year

- Clearest Month : **October - 95%**
- Cloudiest Month : **August - 50%**

## 7.3 Prevailing Wind

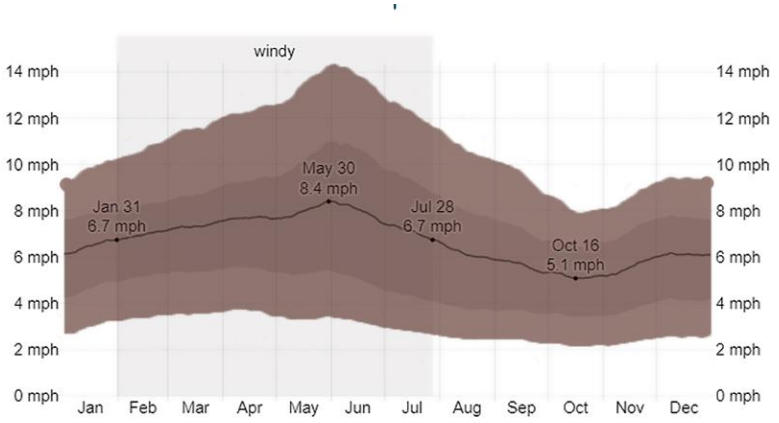


Chart 6 : Wind Speed Graph

Source:https://en.climate-data.org/asia/india/delhi/new-delhi-30/

- Windiest Month : **May- 8.0miles/Hour**
- Calmer Month: **October-5.2miles/Hour**

Direction

- From West : **Aug- Sep ,Nov-july**
- From North : **Sep-nov**
- From East : **Jul- Aug**

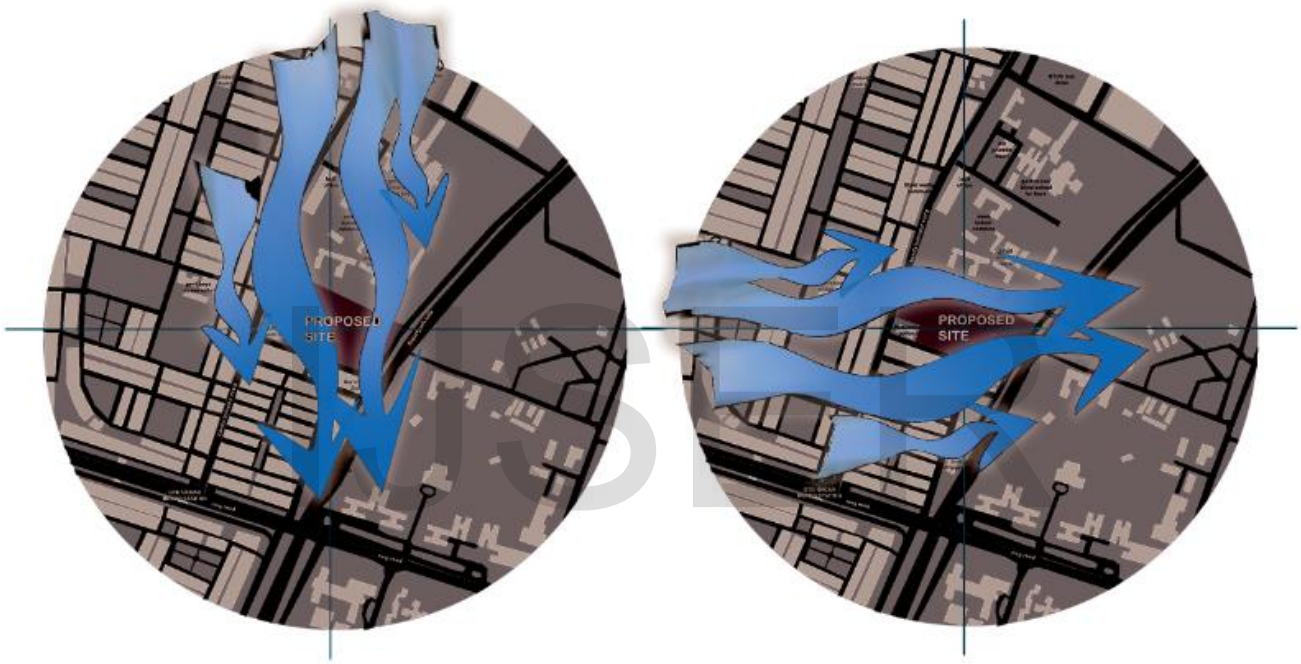



Fig 45,46: Wind Direction

Source:Author

# 7.4 Sun Path Diagram

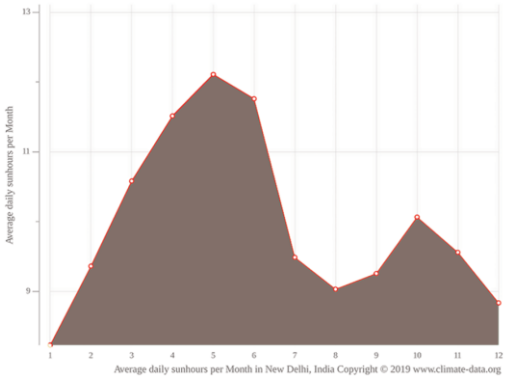



Chart 7 : Average Daily Sunshine

Source:https://en.climate-data.org/asia/india/delhi/new-delhi-30/

The Length Of The Day Varies

- Shortest Day : **In December-10 Hrs**
- Longest Day : **In June - 13 Hrs**

Average Sunshine

- Most Sunshine On : **May**
- Least Sunshine On : **August**

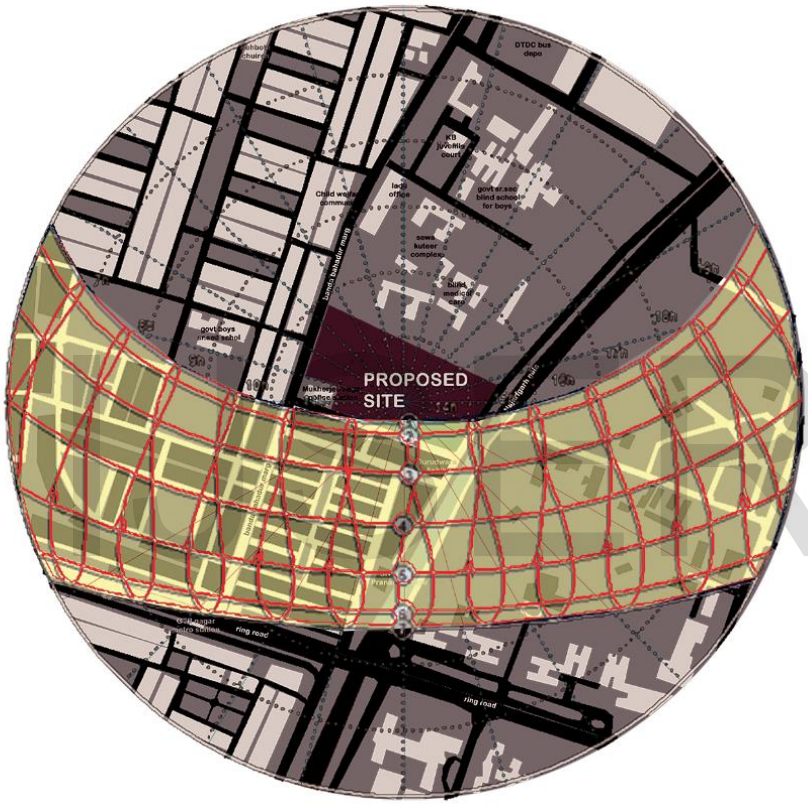



Fig 47 : Sun Path Diagram

Source: Author

# 7.5 Shadow Analysis

Site is not affected much by the shadows of the surrounding buildings. During the winter season , police stations cast some shadow into the site between afternoon and evening.

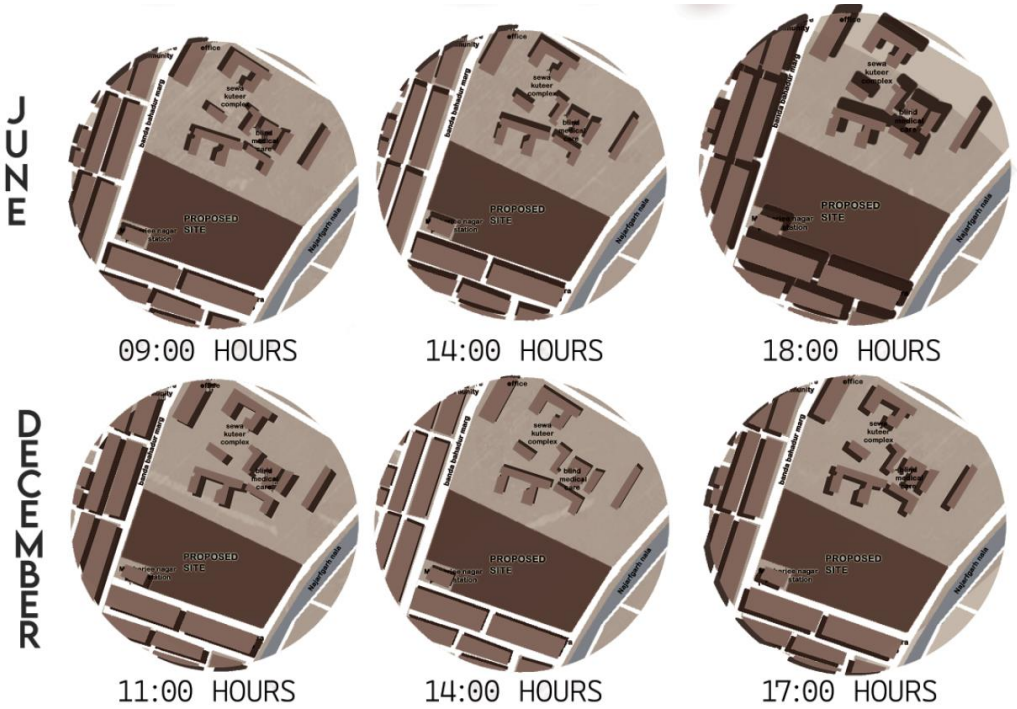



Fig 48 : Shadow Analysis

Source: Author



## 7.6 Figure Ground Map


Fig 49 : Figure Ground Map

Source: Author

The area near the main road has high density of residential, institutional, commercial and government buildings while the other side near the water channel, less number of buildings are seen, this might be due to the foul smell it emits.

## 7.7 Open / Green Space

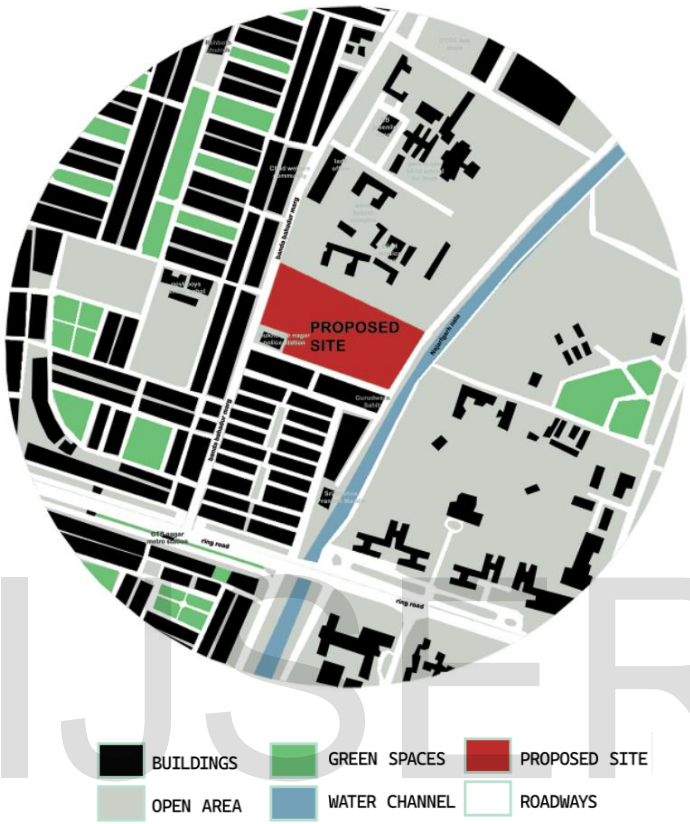



Fig 50 : Open / Green Area

Source: Author

Compared with other densely populated residential areas, here it has many green spaces , gardens and parks nearby . The backside of the site has much more open area than the other.

## 7.8 Neighbourhood Context

Site has a combination of different typology of buildings , this primarily includes residential and institutional buildings. Residential buildings normally have 2-3 floors, institutional buildings have 3-4 floors. Along the road, most buildings serve mixed use purposes of residential and commercial use.

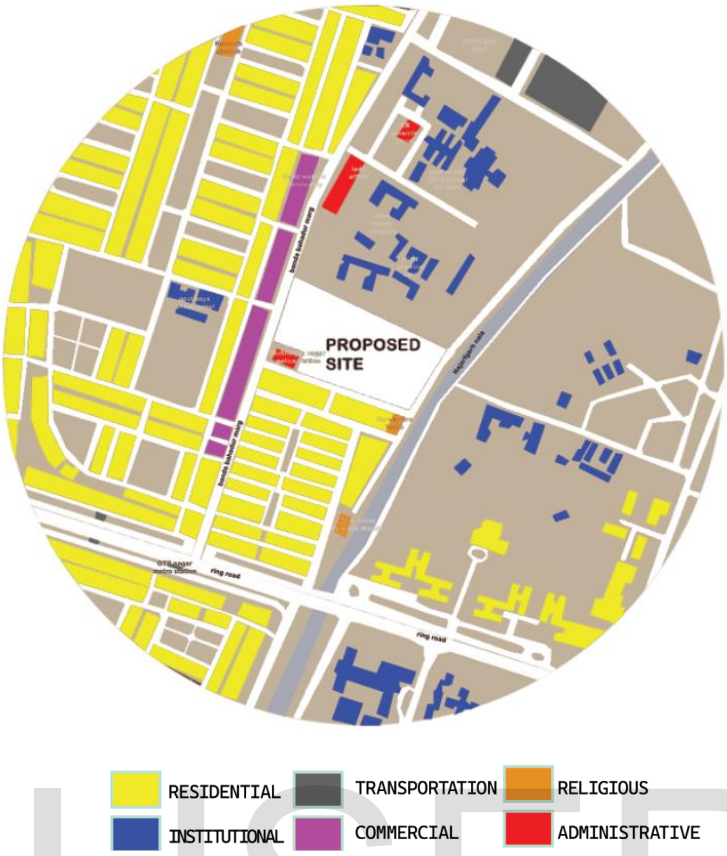





Fig 51 : Context

Source: Author

## 7.9 Access to Site

Site is easily accessible by the Banda Bahadur roadway, and a service road runs along the water channel. Site is only 500m away from the GTB metro station. DTC bus depo is also close-by and public transportation is also available.

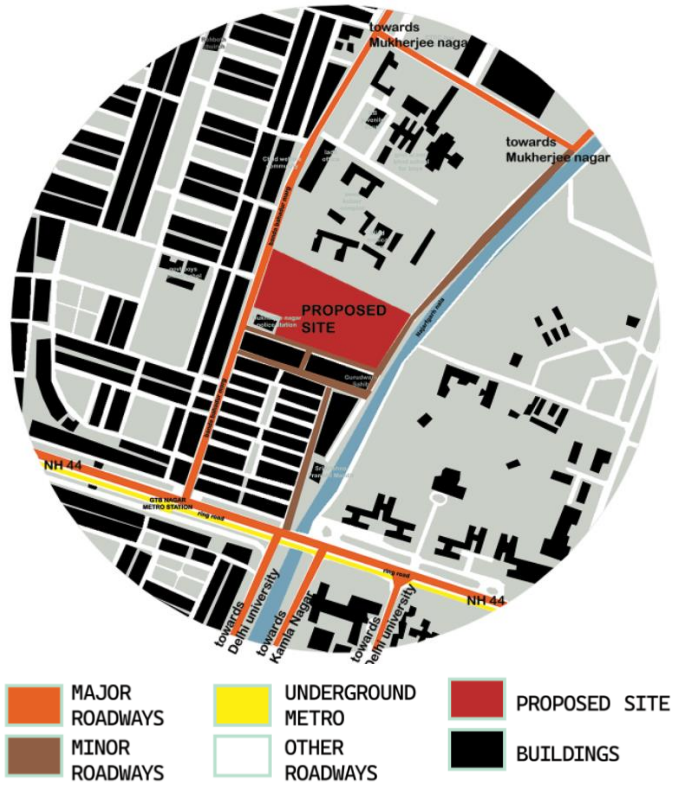



Fig 52: Access

Source: Author

## 7.10 Noise




Fig 53: Noise

Source: Author

Site has noise from commercial and institutional buildings, while the back side of the site is less affected by the sound.

# 7.11 Vegetation

The site is covered in vegetation like shrubs and wild grass. There are a few banyan trees on the site.

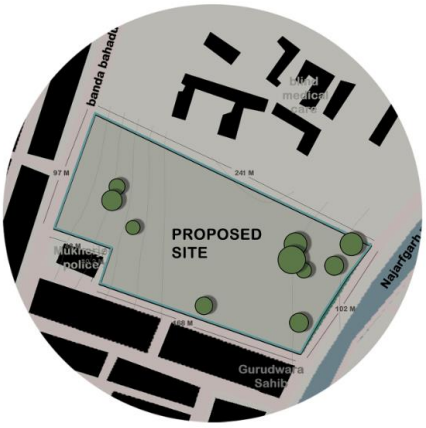



Fig 54: Vegetation

Source: Author

# 7.12 Entrances

The site is connected by 2 roads. The one near the water channel can be considered as a service entry.



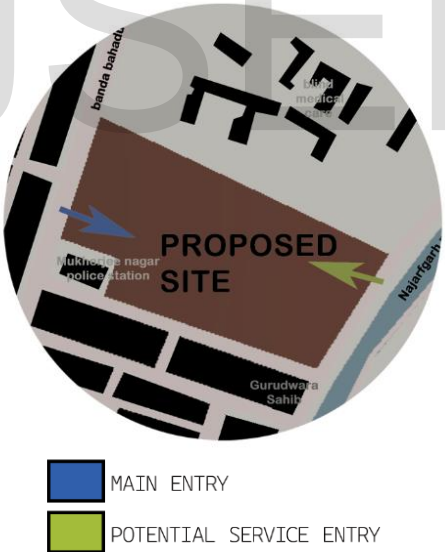



Fig 55 : Entrances

Source: Author

# 7.13 Restrictions

The restriction to the site is foul smell coming from the water channel, which is presently used as a dump yard. Treating the nala is important for activating olfactory sense. Smog pollution is also evident.


Fig 56 : Restrictions

Source: Author

## 7.14 Social and Physical Infrastructure

The site is surrounded by different buildings providing different services and facilities. Blind hostel, medical care facilities are also around the site. Child welfare societies and their offices run NGO is also around. It also provides basic metro, public and road transportation.


Fig 57: Infrastructures

Source: Author

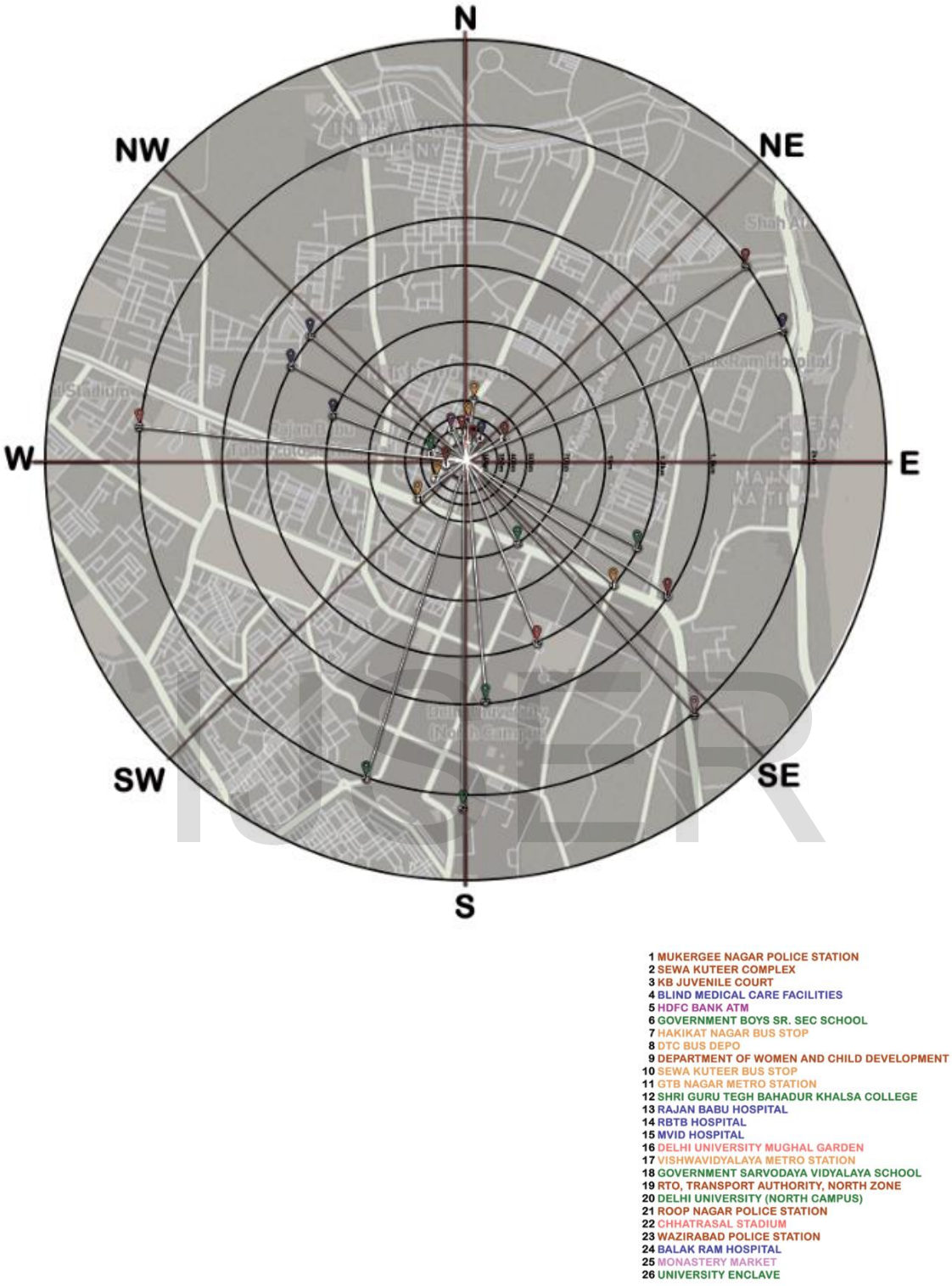



Fig 58: Proximity Diagram

Source: Author

# 7.15 Slope Analysis

The site has a very low slope that is in between 0.04% - 0.32%. The distance between slopes is wide. Hence the construction would not affected by the terrain of the proposed site.

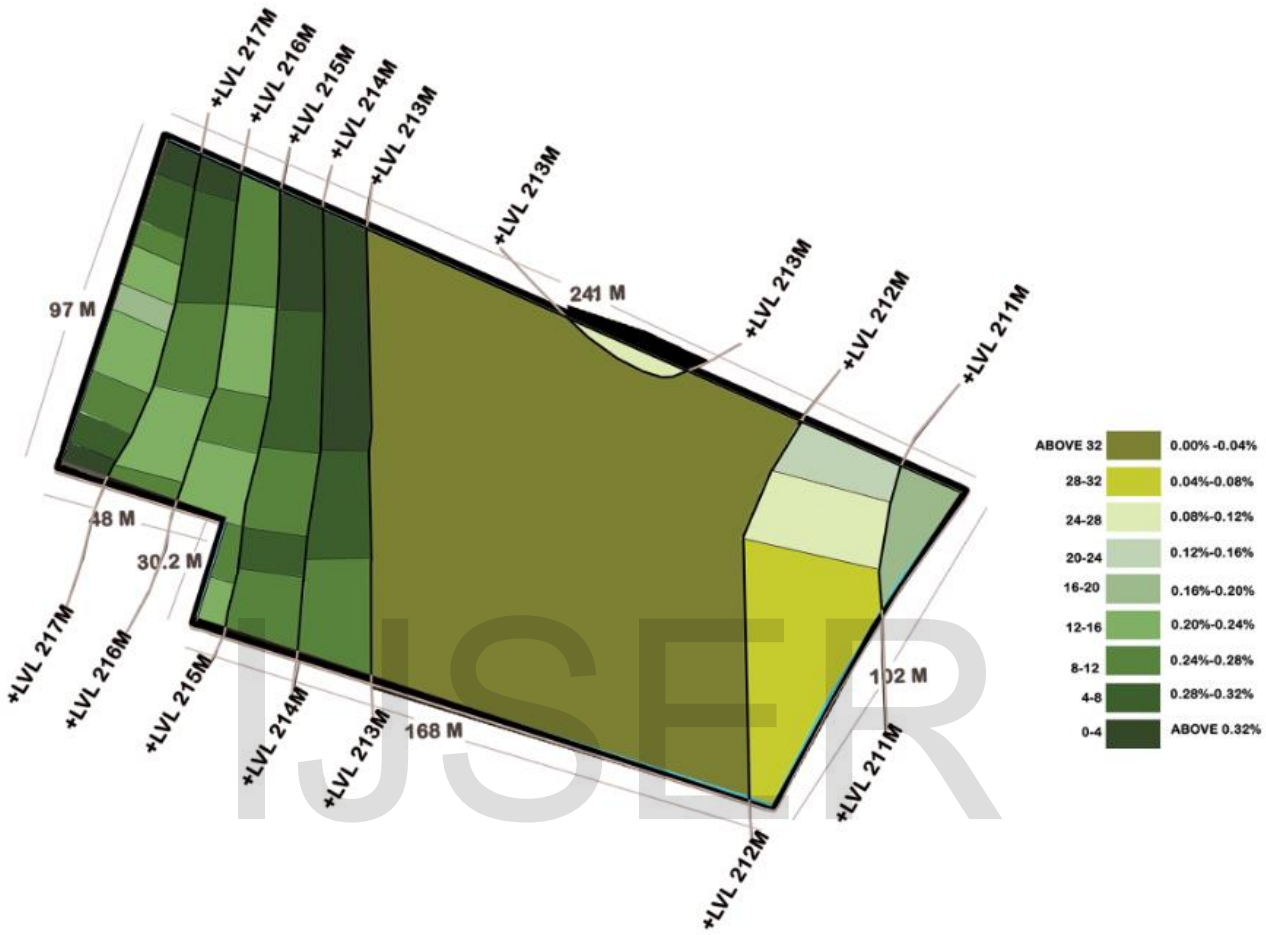



Fig 59: Relief Map

Source: Author

# 7.16 Drainage map

The main drainage pattern is towards the nala or water channel on the backside of the site. Water drainage takes place slowly as the site has a low slope. Site has medium textured loamy alluvial soil.

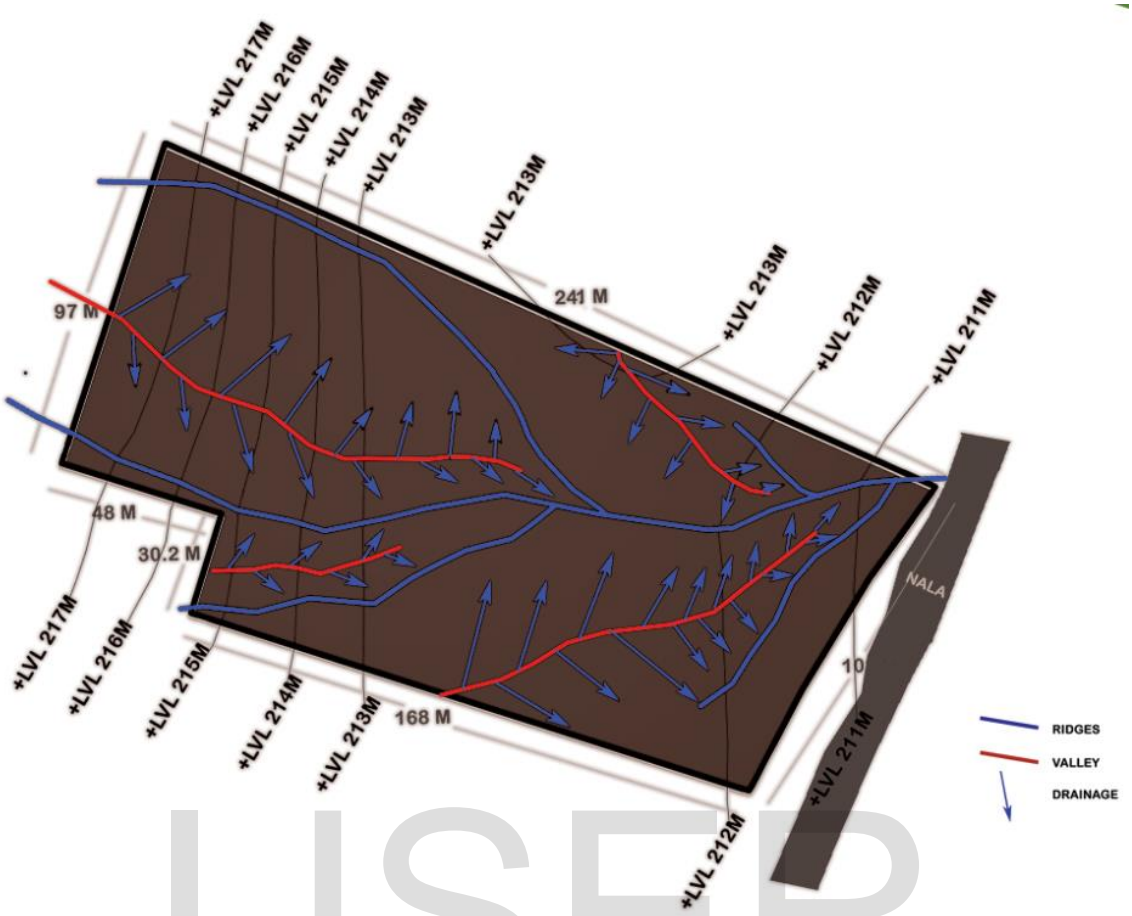



Fig 60: Ridges and Valleys

Source: Author



# 7.17 Site Section

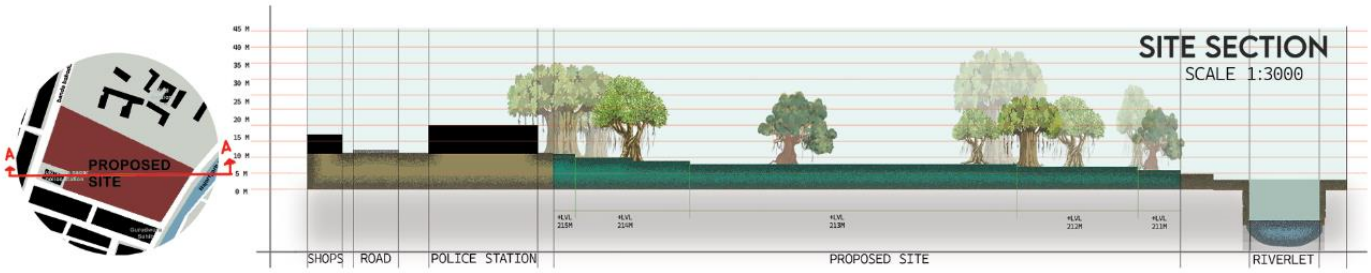



Fig 61: Site Section

Source: Author

# 7.18 Swot Analysis

## 7.18.1 Strength

- Strong transportation network
- Large number of medical facilities
- Strong site security
- Institutional buildings nearby
- Site has no negative edges or corners
- Proper natural drainage

## 7.18.2 Weakness

- Foul smell from Najafgarh Nala
- No proper waste management
- Heavy traffic in morning and evenings
- Vegetation might cause a hindrance hence need to be eliminated
- Public sewage not connected to site's lowest point

## 7.18.3 Opportunity



- Has ngo for children
- Has blind medical facilities
- Easily accessible
- Low slope and terrain
- Few trees  can be maintained for shade
- Nala can be used for storm water drainage

## 7.19.4 Threat

- Noise from the roadways  and  the neighboring buildings
- Densely populated area
- The backside of site is left abandoned that needs high security
- Heavy traffic

# Chapter - 8

# CASE STUDIES

## 8.1 Live Case Studies

### 8.1.1 JPM school for the Blind, Delhi

#### 8.1.1.1 Location

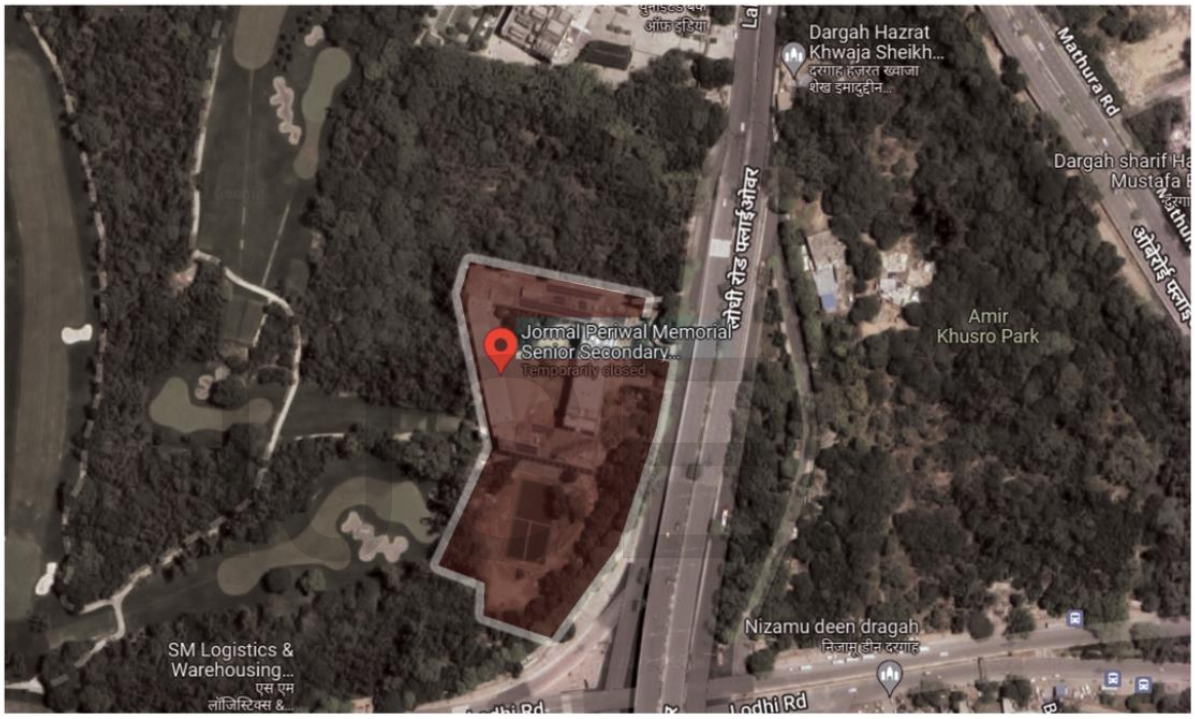



Fig 62: Site Location

Source: Google Maps

#### 8.1.1.2 Overview

- Project Name: Jormal Periwal Memorial Senior Secondary School For The Blind
- Ownership: Blind Relief Association
- Location: Lal Bahadur Shastri Marg, Delhi
- Climate: Hot And Dry Climate
- Year Of Completion :1967
- Site Area: 9890 Sq.M
- Ground Coverage: 3120 Sq.M 31%
- Built-up Area: 4580 Sq.M
- Far Achieved: 0.46
- Age Group: 7-22
- Number Of Students: 300

- Number Of Teachers: 45
- Number Of Staffs: 20
- Number Of Caretaker: 10
- Type Of Education: Exclusive
- Syllabus Followed: Hindi State Syllabus
- Boarding Student: 294

### 8.1.1.3 Planning

The school was a single building into which new blocks attached to the main block was added.It building can be divided into 2 that is residential and academic area. It is directly connected to the residential zone. New block is being added to accommodate more classrooms and it is also connected to the present block. Tactile materials are provided to enhance movement guidance. Different classrooms are provided but not properly planned. Spatial arrangement is given importance and interior details for blind are also provided.

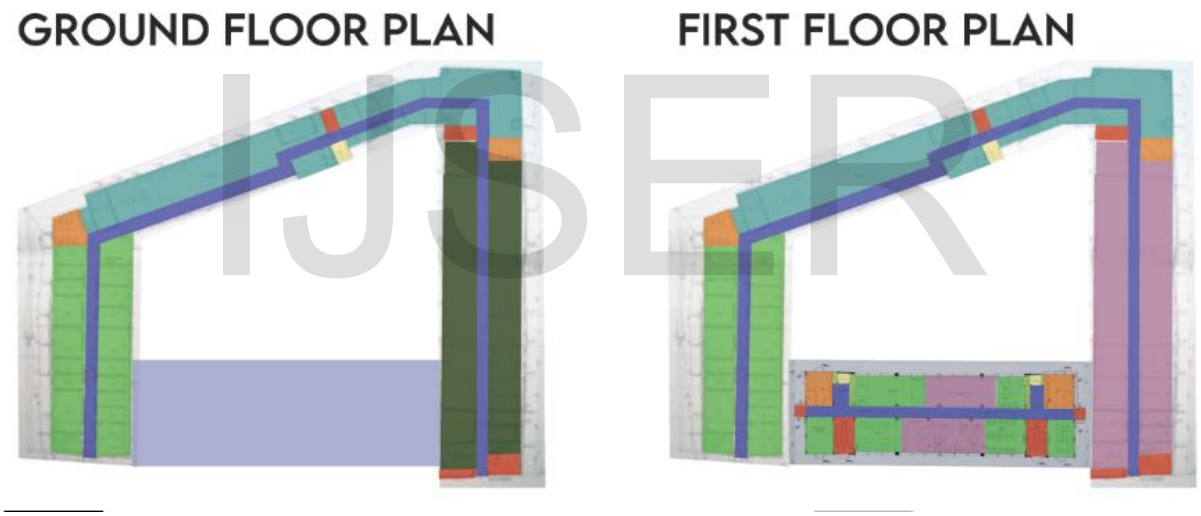



Fig 63: Floor Plans

Source: Author


Fig 64: Photos of School

Source: Author

### 8.1.1.4 Inference

- **Poor structural quality.**
- **No hindrances**
- **Easy moment across the corridors**
- **Lack of texture usage**
- **Difficult for new students**
- **Needs braille signage or other mode of signage for blind children.**
- **No sensory landscape**
- **No shadow and lighting method used**
- **Safety is ensured**
- **No sense or orientation elements provided**

# 8.1.2 National Association for the Blind, Delhi

## 8.1.2.1 Location

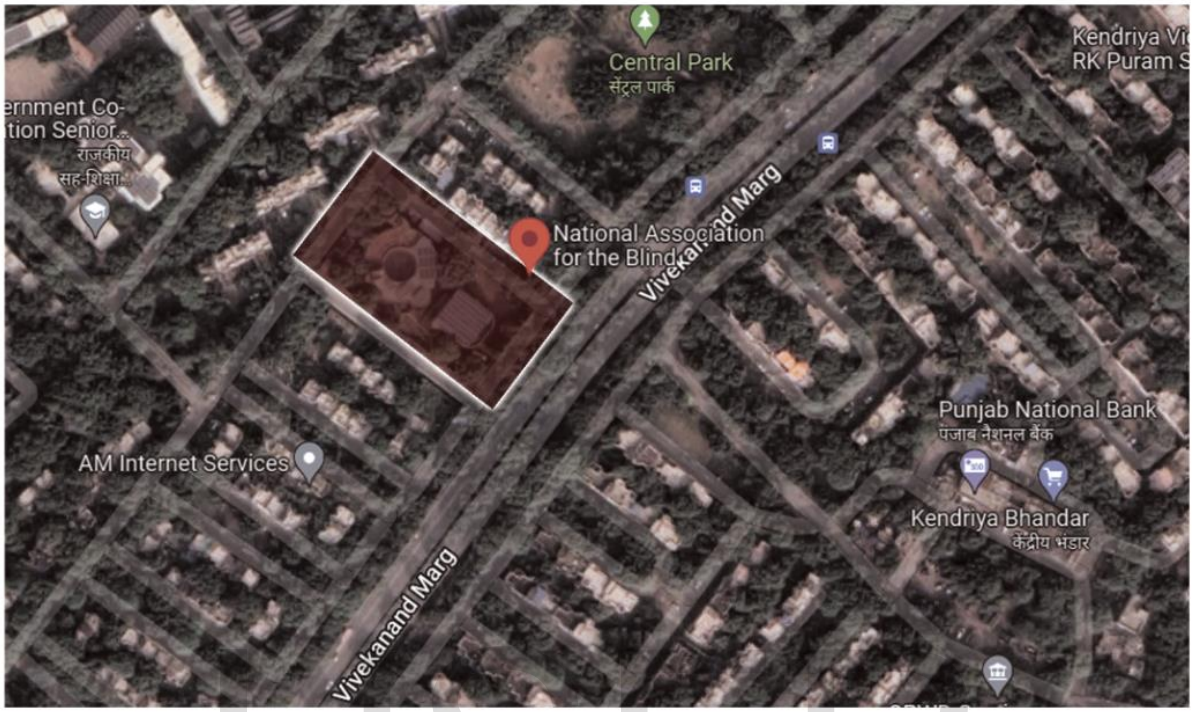



Fig 65: Site Location

Source: Google Maps



## 8.1.2.2 Overview

- Project Name: National Association For The Blind
- Location: Sector 5, R K Puram, Delhi
- Climate: Hot And Dry
- Year Of Completion: 1986
- Site Area: 3456 Sq.M
- Ground Coverage: 1053 Sq.M 30%
- Built-up Area: 1912 Sq.M
- Far Achieved: 0.55
- Age Group: 4-14
- Number Of Students: 230
- Number Of Teachers: 30
- Number Of Staffs: 10
- Number Of Caretaker: 5
- Type Of Education: Exclusive
- Syllabus Followed: Hindi Board
- Boarding Student: 200

### 8.1.2.3 About

NAB, Delhi works on a semi-integrated model of education for visually impaired. It provides education to kindergarten students in the school whereas senior secondary students are sent to various regular schools. There are extra or doubt clearing classes in the afternoon. Apart from a school it also functions as a computer training center.

### 8.1.2.4 Planning

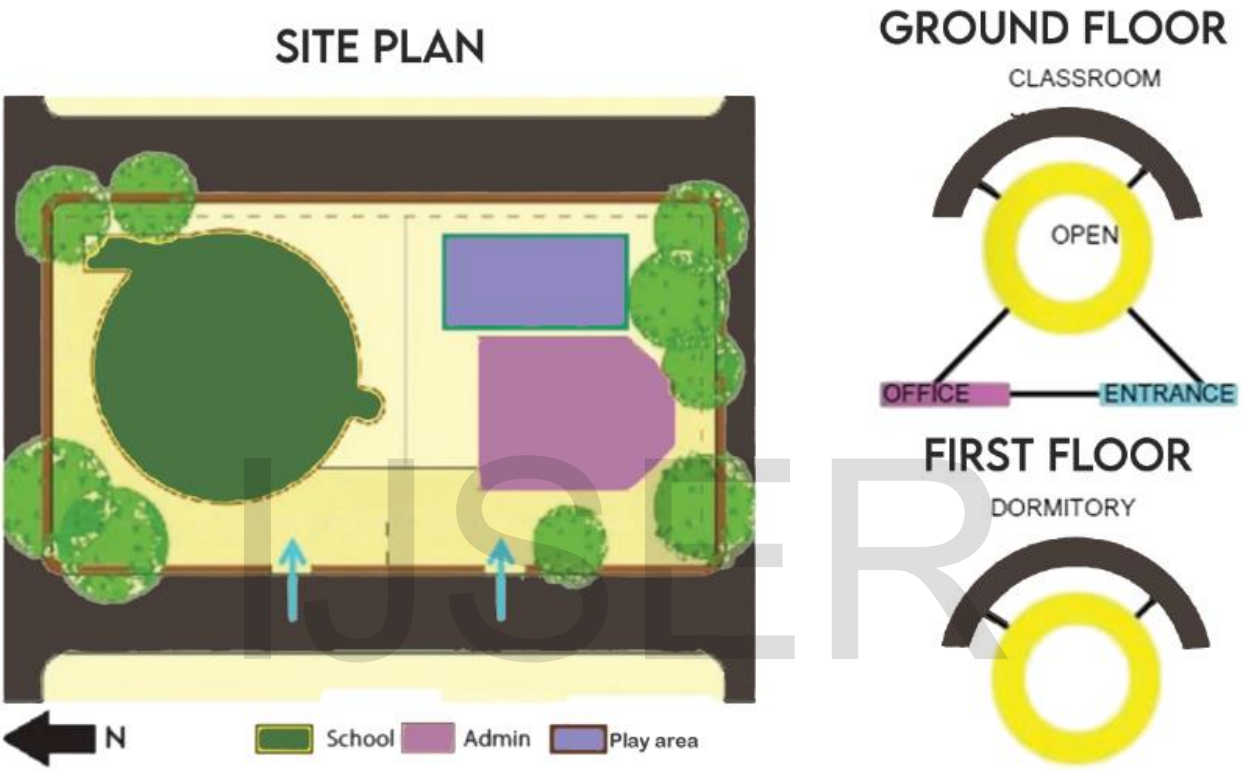



Fig 66: Site Plan and Zoning

Source: https://www.slideshare.net/mayurkarodia/centre-for-blinds-and-visually-impaired

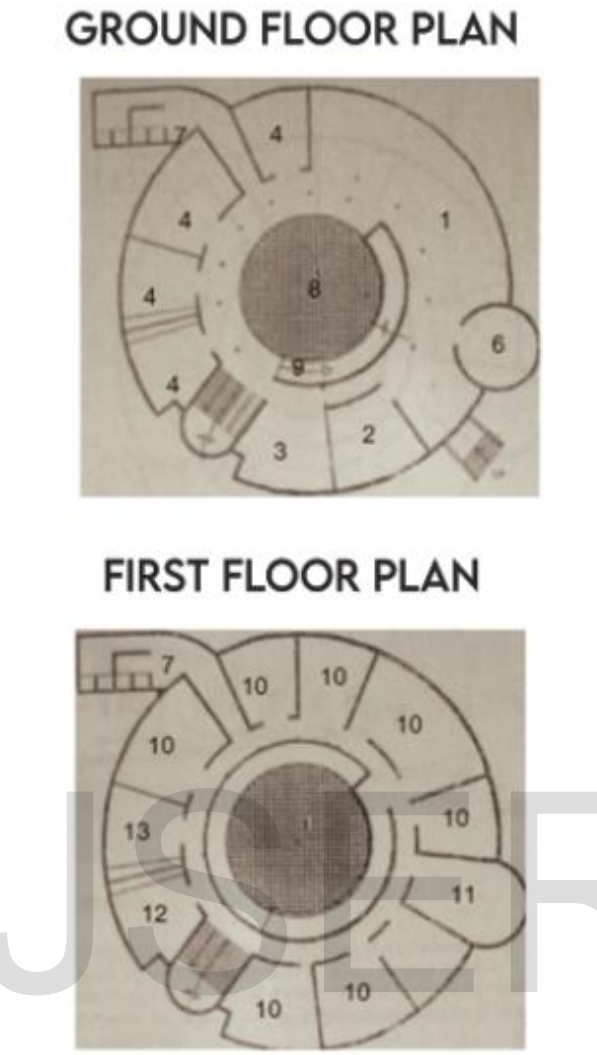



Fig 67:Floor Plans

Source: https://issuu.com/syedhamdanhussainmaqbool/docs/architecture_thesis_2014_-_report

1- LOBBY
2- PRINCIPALS OFFICE
3- OFFICE
4- CLASSROOMS
5- PLAY AREA
6- LIBRARY
7- TOILETS
8-COURTYARD
9- RAMP
10- DORMITORY
11- ENTERTAINMENT ROOM
12-KITCHEN
13-DINING


Fig 68: Photos of the School

Source: Internet



### 8.1.2.5 Inference

- **The school has good resources**
- **Space identification is an issue**
- **Lot of hindrances**
- **Smooth navigation yet not easy to memorize**
- **Lack of tactile flooring and textures**
- **Play area not sufficient**
- **Need more recreational spaces and workshops**
- **Many services for blind are not available**

# 8.2 Literature Case Studies

## 8.2.1 Mathru School for the Blind, Bangalore

### 8.2.1.1 Location

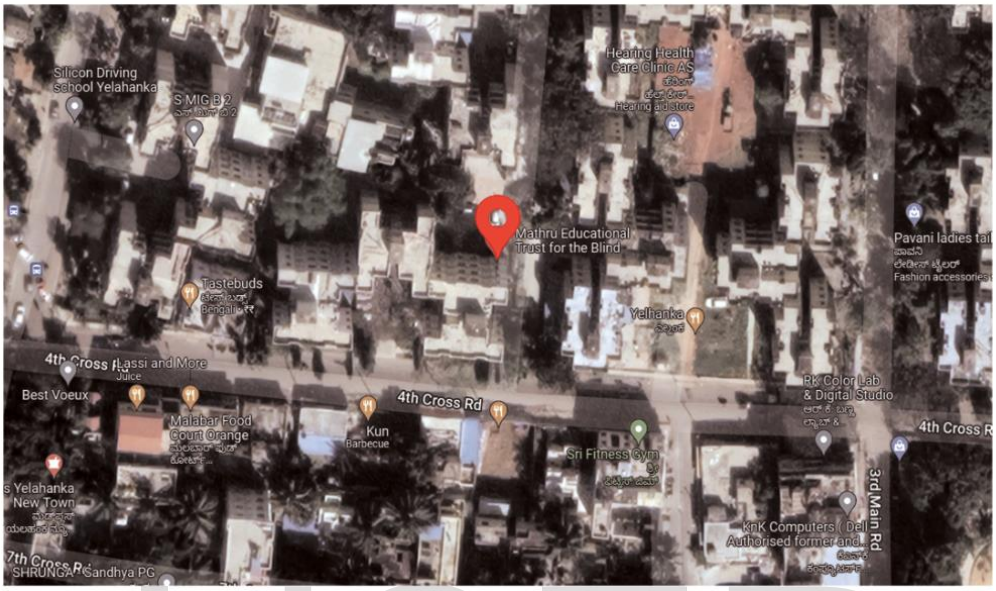



Fig 69: Site Location

Source: Google Maps



### 8.2.2.2 Overview

- Project Name: Mathru School For The Blind
- Ownership: Mathru educational Trust For Blind
- Location: Newtown, Yelahanka, Bangalore
- Climate: Temperate
- Material Used: Mud-micr, Compressed Earth Blocks
- Year Of Completion: 2006
- Architects: Biome
- Site Area:10,000 Sq.M
- Built-up Area: 8850 Sq.M
- Class: Till Tenth Grade
- Number Of Students: 90
- Number Of Staffs: 20
- Number Of Caretaker: 4
- Type Of Education: Exclusive
- Boarding Student: 90

### 8.2.2.3 About

Mathru school is an NGO working specifically in the area of providing education and life skills to visually challenged children from poor families of rural areas. The school was set up by a

practicing lawyer mseukta. She started this school in 2001 _ in 2004 she was given land by the city. The school at its present premises became operational in 2006. The main theme of the school is that the students should be strong to face the uncertainties of an indian urban setup which gives rarely any credence to the needs of disabled.

Fig 70: Floor Plans


Source:https://issuu.com/bhargavi.leela12207/docs/report


Fig 71: Photos of School

Source:Internet

## 8.2.2.4 Inference

- **Using new materials and surfaces. This helps but new to a blind student**
- **No hindrances during circulation**
- **Recreational spaces are provided**
- **Usage of shadow using jaalis is done efficiently**
- **Does not have access to vehicles this might be difficult during emergency.**
- **Efficient planning and layout gives a sense of orientation and guidance**

# 8.2.3 Institute of Blind, Mexico

## 8.2.3.1 Location


Fig 72: Site Location

Source:Internet

## 8.2.3.2 Overview

- Project Name: The Center For The Blind And Visually Impaired
- Ownership: Mexico City Government
- Location : Iztapalapa, Mexico
- CLIMATE: Tropical
- Material Used: Concrete, Tepetate Bricks, Steel, And Glass
- Year Of Completion: 2001
- Architects : Taller Dearquitectura-mauricio Rocha
- Site Area: 14,000 Sq.M
- Built-up Area: 8500 Sq.M
-

## 8.2.3.3 About

The Centre for the Blind and Visually Impaired was created as part of a program by the Mexico City government to provide services to one of the most disadvantaged and highly-populated areas of the city; Iztapalapa is the district with the largest visually impaired population in the Mexican capital.

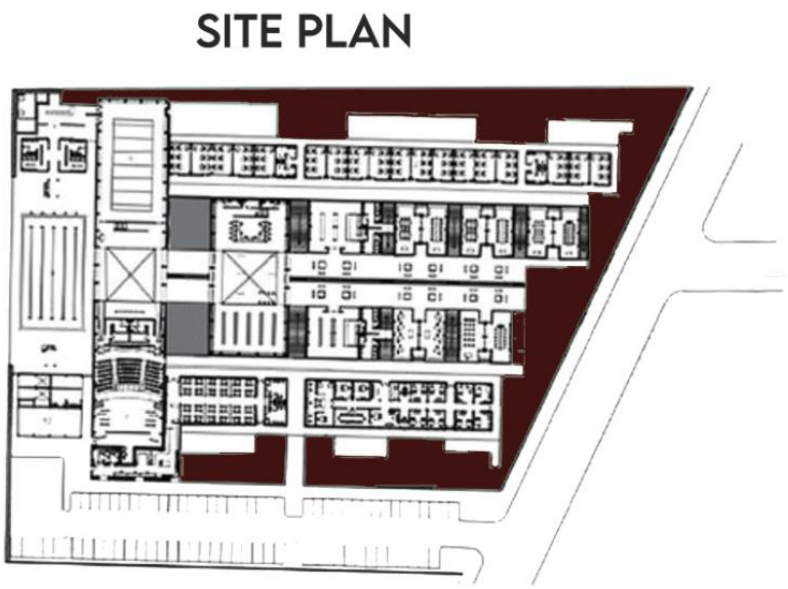



Fig 73: Site Plan

Source:Internet

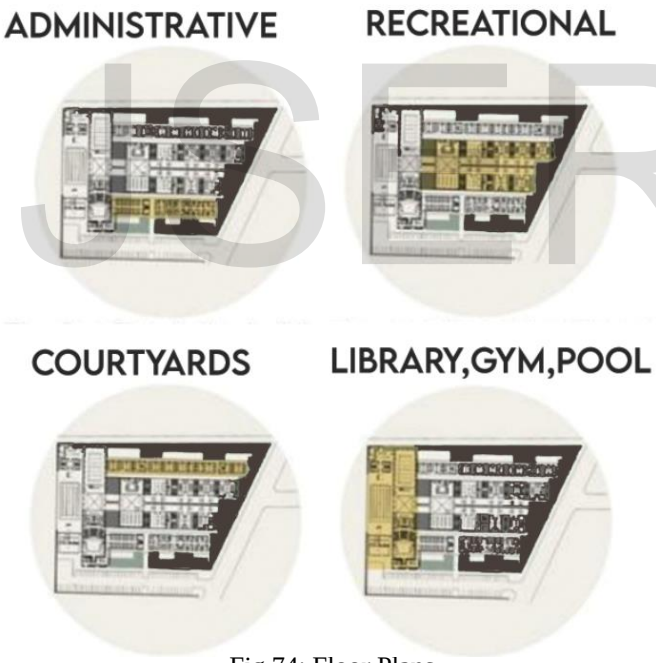



Fig 74: Floor Plans

Source: Internet

## 8.2.3.4 Inference

- **Proper planning and orientation for navigation and gives a sense of orientation.**
- **Building with less level difference even though site has much difference**
- **Best use of shadow, sound and plants .**

- **Echoing is promoted.**

## 8.2.4 Hazelwood School, Scotland

### 8.2.4.1 Location


Fig 75: Site Location

Source: Google Maps

### 8.2.4.2 Overview



- Project Name: Hazelwood School
- Ownership: Glasgow City Council
- Location: Glasgow, Scotland
- Climate : Temperate Oceanic Climate
- Year Of Completion: 2007
- Architects: Gm + Ad Architects
- Built-up Area: 3300 Sq.M
- Age Group: 2-19
- Number Of Students: 54

## 8.2.4.3 About

Hazelwood school is designed for children Who are blind and deaf with cognitive impairment and physical disabilities. The single story built with natural materials creates a series of small garden spaces ideal For small class sizes.

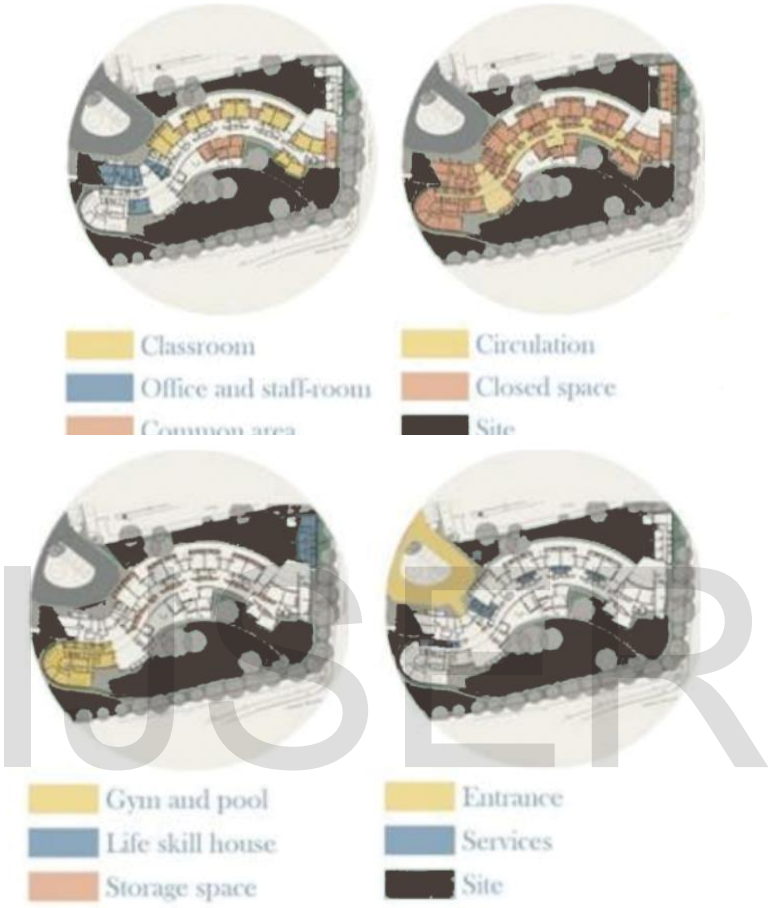


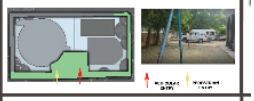
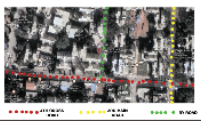
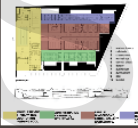

Fig 76: Floor Plans

Source:Internet

## 8.2.4.4 Inference

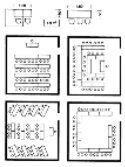
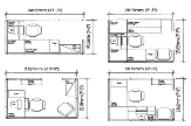
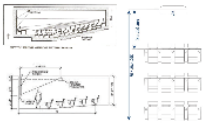
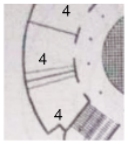
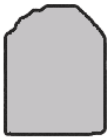
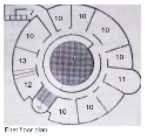
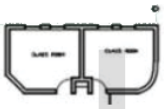
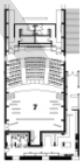
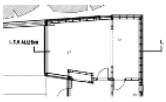
- **Best use of tactile wall surface called trail rail is used**
- **Curved planning allows good guidance**
- **Use of contrasting red in white background in the interiors.**
- **Light and shadow also plays an important role**

# 8.3 Comparative Analysis

| DESIGN PARAMETERS | SITE LOCATION | PLANNING AND LAYOUT | MATERIALS USED | VEHICULAR MOVEMENT |
|---|---|---|---|---|
| JPM SCHOOL . DELHI  | GOOD CONNECTIVITY BY ROAD.<br>NEAREST METRO IS JOR BAGH WHICH IS 3.1 KM AWAY.<br>LOCATION IS GOOD IN TERMS OF ACCESSIBILITY SINCE IT IS IN CORE AREA OF DELHI.  | THE BUILDING CONSIST OF 3 BLOCK EVEN THOUGH IT SEEMS TO BE 1.<br>ZONED TO ACCOMMODATE DIFFERENT FUNCTIONS INTO DIFFERENT ARMS .<br>HAS OPEN INTERACTIVE SPACES WITH 60% UNBUILT OPEN AREA   THIS HELPS STUDENTS TO INTERACT WITH NATURE | CONCRETE STRUCTURES WITH WOODEN FURNITURES AND WOODEN TEXTURES    THIS REDUCES COST OF INTERIOR WORK<br>NEEDS DIFFERENT TEXTURES OF CONCRETE TO SUPPORT BLIND NAVIGATION | VEHICULAR ACCESS INSIDE THE SITE IS RESTRICTED .<br>PARKING IS IN THE GROUND FLOOR OF NEW BLOCK.<br>FOR EMERGENCY VEHICLES ARE ACCESSED TO THE COURTYARD   MAIN ENTRY-PATHS OVERLAP |
| NAB . DELHI  | IT HAS GOOD CONNECTIVITY BY ROAD.<br>NEAREST METRO IS 4.4 KM AWAY FROM THE SITE.<br>IT IS THE HEADQUARTERS OF AL THE NAB CENTRE IN INDIA.  | ZONED INTO 2 NORTH HAS OFFICES AND PLAY AREA WHILE SOUTH HAS THE SCHOOL.<br>OPEN AREAS FOR PLAYGROUND AND PARKING IS PROVIDED.<br>CENTRAL OPEN COURTYARD FOR RECREATIONAL ACTIVITIES  | COARSE SURFACED CONCRETE IS USED IN THE EXTERIOR.<br>INTERIOR DOES NOT HAVE MUCH DIFFERENT SURFACES FOR GUIDANCE.  | VEHICULAR MOVEMENT INSIDE THE SITE IS AROUND THE COMPOUND.<br>VEHICULAR ENTRY IS DIFFERENT FROM PEDESTRIAN ENTRY.<br>VEHICULAR ACCESS IS EXTENDED-TO THE PLAY AREA WHICH IS NOT SAFE FOR THE BLIND.  |
| MATHRU BLIND SCHOOL . BANGLORE  | SITE IS SURROUNDED BY MIDDLE CLASS RESIDENTIAL APARTMENTS .<br>THE SCHOOL IS FOR MIDDLE CLASS AND LOW CLASS PEOPLE.<br>EASY ACCESSIBILITY BY ROADS  |  HAS A COMBINATION OF RESIDENTIAL AND EDUCATIONAL FACILITIES IN ONE BLOCK.<br>HAS RESIDENTIAL AREA IN THE UPPER FLOOR.<br>KITCHEN IN GROUND FLOOR FOR EASY ACCESSIBILITY BUT DINING ABOVE.<br>MORE THAN 80% OF BUILT AREA USED IN THE SITE. | BUILDING USE MUD BRICK, COMPRESSED EARTH BLOCKS AND CONCRETE.STONE WALLS ARE USED.<br>THIS HELPS BLIND FOR ROOM IDENTIFICATION  |  SITE DOES NOT HAVE ACCESS TO VEHICLES.<br>IT IS PEDESTRIAN FRIENDLY.<br>SINCE THE BUILDING IS NOT AWAY FROM ROAD ,IT DOES NOT AFFECT DURING EMERGENCY |
| INSTITUTE OF BLIND . MEXICO  | THE 14,000 SQ M COMPLEX IS ON CORNER PLOT BORDERED BY TWO AVENUES.<br>SITUATED IN A TOWN IN MEXICO WITH THE MAXIMUM NUMBER OF INDIVIDUALS WITH VISUAL IMPAIRMENT,IZTAPALAPA  | BUILDINGS ARE RECTANGULAR PRISMS BASED ON CONCRETE FRAMES AND FLAT ROOFS. EACH GROUP EXPLORES DIFFERENT SPATIAL AND STRUCTURAL RELATIONSHIPS, MAKING EACH SPACE IDENTIFIABLE FOR THE USER.  FLOOR PLAN, MEANWHILE, CAN BE READ AS A SERIES OF FILTERS WHICH STRETCH OUT FROM THE ENTRANCE IN PARALLEL STRIPS. | ENCLOSURE AND FINISHES-TEPETE WALLS ON CONCRETE BASE. HORIZONTAL BANDS OF GLASS BETWEEN WALL AND SLAB .REDUCED COST AND MATERIAL USAGE   | VEHICULAR ENTRY IS RESTRICTED TO THE PARKING AREA INSIDE THE SITE.<br>THIS ENSURES SAFETY FOR THE BLIND STUDENTS AND ENABLES PEDESTRIAN FRIENDLY MOVEMENT.  |
| HAZELWOOD SCHOOL . SCOTLAND  | MAJOR ROADS CLOSELY BORDER THE SITE. SITE SHARED WITH THE DUMBRECK CONSERVATION AREA. RESIDENTIAL VILLAS AND A RESIDENTIAL TOWER AND REFLECT NEIGHBORINGS IN SCALE AND HEIGHT. EXISTING TREES WAS RETAINED AND BUILDING'S ROOF-LINE REMAIN BELOW THE FIRST FLOOR LEVEL OF NEARBY HOMES.  | THE SCHOOL CURVES THROUGH SITE AROUND EXISTING TREES. FORM CREATES A SERIES OF SMALL GARDEN SPACES SUITABLE TO SMALL CLASS SIZES AND OUTDOOR TEACHING AND LEARNING EXPERIENCES.<br>INTROVERT PLANNING  | EXPOSED TIMBER POST AND BEAM STRUCTURE AND NATURALLY WEATHERING LARCH. RECLAIMED SLATE TILES AND ZINC WERE USED EXTERNALLY.<br>THE WALL IS CLAD IN CORK, WHICH HAS WARMTH AND TACTILE QUALITIES  |  VEHICULAR ENTRY IS RESTRICTED TO THE FRONT YARD ALL OTHER CIRCULATION IS PEDESTRIAN ACCESSED  SAFETY FROM VEHICLES ARE ENSURED WITH THIS PLANNING LAYOUT |
| INFERENCE | •SITE NEEDS TO HAVE GOOD TRANSPORTATION CONNECTIVITY ESPECIALLY BY ROAD<br>•BETTER IF SITE HAS CLOSE PROXIMITY TO MEDICAL FACILITIES<br>•VEHICULAR ACCESS IS IMPORTANT DURING EMERGENCY.<br>•LESS DISTURBED NEIGHBORHOOD IS BETTER | •CLASSROOMS NEED TO LOCATED IN THE LOWER LEVEL<br>•LEVEL DIFFERENCE NEEDS TO BE AVOIDED.<br>•SIMPLE LAYOUT WHICH IS LEGIBLE AND EASY TO NAVIGATE<br>•RIGHT ANGLED CORNERS RATHER THAN OBTUSE AND ACUTE<br>•CURVED SPACES RADIUS SHOULD BE LARGE ENOUGH | •MATERIALS HAVING DIFFERENT TEXTURES ARE IDEAL<br>•SHOULD AVOID LOT OF ECHOING. SOME CAN GIVE A SENSE OF SPACE<br>•MATERIALS ALLOWING TACTILE SENSES ARE IMPORTANT<br>•MATERIALS THAT HAVE RANDOM CONTRASTING COLORS SHOULD BE AVOIDED | •VEHICULAR ACCESS TO THE SITE NEEDS TO BE RESTRICTED .<br>•PEDESTRIAN FRIENDLY CAMPUS IS IDEAL AND PROVIDES SAFETY.<br>•IF PEDESTRIAN AND VEHICULAR PATHWAYS OVERLAP, PROPER SIGNAGE OR ALERTING DEVICES ARE NEEDED OR USE TACTILE FLOORING TILES. |

| DESIGN PARAMETERS | SAFETY. SIGNAGES AND WARNINGS | INTERACTIVE PLAY AREAS | LANDSCAPE | QUALITY OF SPACES |
|---|---|---|---|---|
| JPM SCHOOL. DELHI  | SAFETY WARNINGS ARE NOT PROVIDED. NO BRAILLE SIGNAGE ARE INSTALLED.<br>  DOUBLE RAILINGS ARE PROVIDED FOR SAFETY AND GUIDANCE .<br>  PROPER SIGNAGE ARE NECESSARY EVEN IN BLIND SCHOOLS.<br>BRAILLE RAISED SIGNAGE IN LOW HEIGHT HELPS BLIND IDENTIFY SPACES. | NOT GUIDANCE IN PLAY AREAS .<br>TACTILE LEARNING WALLS ARE PROVIDED FOR LEARNING<br>  OUTDOOR PLAYING TRACKS AND SPORTS GROUND IS THERE.<br>   | NO LANDSCAPE IS PROVIDED. FEW TREES ARE GROWN .<br>PLANTS IN THE SITE ARE NON-TOXIC AND NON-HAZARDOUS THUS ENSURING SAFETY IF EATEN BY ACCIDENT .<br>  SENSORY GARDEN AND LANDSCAPING IS IMPORTANT FOR BLIND . IT HELPS IN DEVELOPING THEIR BOND WITH NATURE | NO PROPER STRUCTURAL ELEMENTS IN OLD BLOCK.<br>WORKSHOPS DOES NOT HAVE ENOUGH STORAGE SPACE.<br>GLARE IS TOTALLY AVOIDED IN CLASSROOMS.<br>  NON-FLEXIBLE CLASSROOM LAYOUT<br>FLEXIBLE TEACHING METHODS |
| NAB . DELHI  | NO SAFETY WARNING OR GUIDANCE EXCEPT TACTILE FLOORING.<br>CONTRASTING COLORS ARE USED TO IDENTIFY HINDRANCES , FURNITURES, RAILS AND COLUMNS.<br>NO SENSORY INPUTS.<br>  | NO SPECIAL INTERACTIVE PLAY AREAS AND ZONES OR GARDENS FOR BLIND ARE PROVIDED<br>  PLAY AREAS DOES NOT HAVE SAFETY GUIDANCE TRAIL<br>  NO PROPER FLOORING OR SPECIAL EQUIPMENTS NOT IN THE OUTER PLAY GROUND. | NO LANDSCAPING.<br>FEW POTTED PLANTS PROVIDED.<br>NO SENSORY GARDEN.<br>  | FLEXIBLE TEACHING METHOD<br>FLEXIBLE CLASSROOM LAYOUT.<br>ENOUGH STORING AREA<br>OPEN LOBBY AREA IS USED FOR GROUP DISCUSSIONS AND LECTURES.<br>  FREE STANDING STRUCTURES SHOULD BE AVOIDED.<br>POOR QUALITY OF SPACE |
| MATHRU BLIND SCHOOL. BANGLORE  |  NO BRAILLE SIGNAGE ARE INSTALLED BUT NORMAL SIGN BOARDS DENOTING SPACES ARE USED.<br>THIS HELPS THE EASY WAY FINDING FOR STAFFS BUT DOES NOT HELP STUDENTS WHO ARE BLIND. | INTERACTIVE LEARNING WALLS ARE ON THE CORRIDORS. SPECIAL BRAILLE BOARD GAMES ARE PRESENT.<br>  THE INDOOR PLAY AREA IS IN THE SCALE OF SMALL CHILDREN USING IT.<br>  | NO PROPER LANDSCAPING.<br>SMALL OUTDOOR LAWN AREA ALONG THE PATHWAYS ARE PROVIDED<br>PLANTS SELECTED ARE NON-POISONOUS<br>  | COST EFFECTIVE CONSTRUCTION TECHNOLOGIES ARE USED.<br>PRAYER ROOMS HAVE 5M HEIGHT WHILE CLASSROOMS HAVE 3M HEIGHT.<br>  5 ROOMS ARE ALLOTTED FOR RECREATIONAL AND AS-PLAY ROOMS<br>GOOD QUALITY OF SPACE BUT NO STANDARD DESIGN METHODS FOR BLIND |
| INSTITUTE OF BLIND . MEXICO  | SIGNAGE THAT IS BRAILLE TYPE RAISED IS PROVIDED IN THE HAND RAILS AND AT HAND HEIGHT IN SOME OF THE WALLS.<br>  | IT HAS FIVE ARTS AND CRAFTS WORKSHOPS GARDENS AND THE MOST PRIVATE COURTYARDS.<br>PERPENDICULAR TO THE ENTRANCE, A SERIES OF DOUBLE-HEIGHT VOLUMES HOUSE THE LIBRARY, GYMNASIUM, AUDITORIUM, AND SWIMMING POOL.<br>  | SIX TYPES OF FRAGRANT PLANTS PERIMETER GARDENS ACT AS CONSTANT SENSORS HELP ORIENTATE USERS<br>A WATER CHANNEL RUNS THROUGH CENTER OF PLAZA, SO THE SOUND OF WATER GUIDES USERS ALONG THEIR WAY<br>TALL RETAINING WALL CROWNED BY VEGETATION ACT AS BUFFER.<br>  | THE SPACE HAS CONSIDERED DIFFERENT SENSES OF A BLIND CHILD WHILE DESIGNING EACH SPACE<br>  IN CONTRAST TO THE ABSTRACT EXTERIOR, THE INTERNAL FACADE OF THE BOUNDARY WALL CREATES BANKS THAT CHANGE SHAPE, HEIGHT, AND ORIENTATION, THUS CREATING VARIOUS EFFECTS |
| HAZELWOOD SCHOOL. SCOTLAND  | "TRAIL RAIL" WERE DESIGNED TO ENABLE CHILDREN TO SAFELY AND INDEPENDENTLY NAVIGATE EVERYWHERE IN THE BUILDING<br>  | HAS DIFFERENT PLAY AREAS THAT INCLUDES INDOOR AND OUTDOOR ACTIVITY AREAS.<br>  IT AIMS AT DEVELOPING CHILDREN'S OTHER SENSES AND ABILITIES<br>  | THE EXISTING LIME AND BEECH TREES TO CREATE A SEQUENCE OF SAFE, LANDSCAPED TEACHING GARDENS<br>  <br>ACT AS AN ENVIRONMENT THAT STIMULATES THE IMAGINATION<br>  | THE KEY FEATURES INCLUDED THE INTRODUCTION OF FOCUS ROOMS, CHANGING NATURE OF THE STREET, FLEXIBILITY OF SPACES /RESOURCE AREA AND THE INCLUSION OF FURNITURE ITEMS SUCH AS SEATING WITHIN THE BUILDING FABRIC<br>PROPER PLANNING AND BACKGROUND STUDIES WERE CONDUCTED<br>EXCELLENT DESIGN ASPECTS<br>  |
| INFERENCE | •LOCATION OF SIGN SHOULD BE PART OF THE PROCESS OF PLANNING THE BUILDING<br>•SIGNAGE SHOULD BE AT HAND LEVEL<br>•AUDIO SIGNAGE OR RAISED BRAILLE SIGNAGE NEEDS TO BE INCORPORATED INTO THE DESIGN. | •PLAY AREAS SHOULD BE IDEALLY FOR BLIND<br>•LARGE OPEN PLAYGROUND CREATES CONFUSION AND CAN AFFECT ORIENTATION<br>•INDOOR AND OUTDOOR PLAYGROUNDS ARE NECESSARY<br>•SAFETY GUIDANCES AND TRAILS ARE NEEDED. | •PROPER DESIGN OF PATHWAYS WITHOUT ANY HINDRANCES OR PROTRUDING SURFACES ON THE GROUND .<br>•IN LANDSCAPING SELECTION FOR PLANTS SHOULD BE MADE WHICH ENHANCES OLFACTORY AND AURAL LEGIBILITY<br>•AVOID HARMFUL AND ALLERGIC PLANTS | •QUALITY OF SPACE IS IMPORTANT WHEN IT COMES TO ACTIVATING DIFFERENT SENSES THROUGH THE ARCHITECTURAL ELEMENTS. |

# 8.4 Design Brief

| | CLASSROOM | ADMINISTRATIVE AREA | HOSTEL | AUDITORIUM |
|---|---|---|---|---|
| DATA COLLECTION |  AREA FOR 1 STUDENT = 1.9 SQ.M<br>AREA FOR A CLASROOM OF 10 =25 SQ.M |  AREA FOR ADMINISTRATIVE = 60 SQ.M |  BED SIZE =900MM X 210M<br>BEDROOM SIZE = 60 SQ.M |  AUDITORIUM FOR 300 AREA = 600 SQ.M |
| LIVE CASESTUDY 1- JPM SCHOOL DELHI |  AREA PROVIDED = 10 SQ.M |  AREA FOR ADMINISTRATIVE = 100 SQ.M |  AREA PROVIDED = 20 SQ.M | |
| LIVE CASESTUDY 2- NAB . DELHI |  AREA PROVIDED = 8 SQ.M |  AREA PROVIDED = 40 SQ.M |  AREA PROVIDED = 800 SQ.M | |
| LITERATURE CASESTUDY 1- MATHRU SCHOOL . BANGLORE |  AREA PROVIDED = 9 SQ.M | AREA PROVIDED = 10 SQ.M |  AREA PROVIDED = 40 SQ.M | |
| LITERATURE CASESTUDY 2- INSTITUTE FOR BLIND . MEXICO |  AREA PROVIDED = 8.4 SQ.M |  AREA PROVIDED = 10 SQ.M | |  AREA PROVIDED = 100 SQ.M |
| LITERATURE CASESTUDY 3- HAZELWOOD SCHOOL . SCOTLAND |  AREA PROVIDED = 8.4 SQ.M |  AREA PROVIDED = 17 SQ.M |  AREA PROVIDED = 25 SQ.M | |
| OPTIMUM AREA | OPTIMUM AREA = 45 SQ.M | OPTIMUM AREA = 380 SQ.M | OPTIMUM AREA = 3000 SQ.M | OPTIMUM AREA = 380 SQ.M |

# 8.5 Area Statement

| SPACES | NUMBER OF USERS PER UNIT | NUMBER OF UNITS | AREA PER UNIT IN SQ.M | TOTAL AREA IN SQ.M |
|---|---|---|---|---|
| **ADMINISTRATION** | | | | |
| OFFICE | 7 | 1 | 80 | 80 |
| PRINCIPAL'S ROOM | 1 | 1 | 30 | 30 |
| MANAGER'S ROOM | 1 | 1 | 25 | 25 |
| DIRECTOR'S ROOM | 1 | 1 | 25 | 25 |
| CONFERENCE ROOM | 16 | 1 | 100 | 100 |
| RECEPTION AND LOBBY | 7 | 1 | 70 | 70 |
| TOILETS | 1 | 2 | 5 | 10 |
| TOTAL AREA | | | | 315 |
| **KINDERGARTEN** | | | | |
| CLASSROOM KG | 20 | 1 | 65 | 65 |
| LKG/UKG CLASSROOMS | 10 | 4 | 45 | 180 |
| STAFFROOM | 10 | 1 | 85 | 85 |
| CARETAKER'S ROOM | 8 | 1 | 45 | 45 |
| TOILETS | 5 | 2 | 25 | 50 |
| TOTAL AREA | | | | 425 |
| **MAIN ACADEMIC BLOCK** | | | | |
| CLASSROOMS | 10 | 12 | 40 | 480 |
| STAFF ROOM | 13 | 1 | 75 | 75 |
| CARE-TAKER'S ROOM | 7 | 1 | 50 | 50 |
| STORAGE | 1 | 1 | 10 | 10 |
| MULTI-PURPOSE ROOM | 20 | 1 | 40 | 40 |
| TOILETS | 6 | 2 | 50 | 100 |
| COMPUTER LAB | 20 | 1 | 30 | 30 |
| LIBRARY | 40 | 1 | 90 | 90 |
| BRAILLE PRESS | 2 | 1 | 30 | 30 |
| AUDIO BOOKS | 15 | 1 | 20 | 20 |
| COUNSELLING ROM | 2 | 1 | 30 | 30 |
| TOTAL AREA | | | | 955 |
| **RECREATIONAL BLOCK** | | | | |
| TERRACOTTA WORKSHOP | 10 | 1 | 100 | 100 |
| CANDLE MAKING WORKSHOP | 10 | 1 | 100 | 100 |
| TAILORING WORKSHOP | 10 | 1 | 100 | 100 |
| COOKING WORKSHOP | 10 | 1 | 100 | 100 |
| EXHIBITION AREA | 30 | 1 | 80 | 80 |

# Chapter- 9

# SPECIAL TOPIC- SENSORY TRIGGERS FOR THE BLIND

## 9.1 Topic Introduction

Specially-abled people face problems managing their routine. They may find it a little hard to do particular tasks on their own. They often go through various emotional phases and may turn ultra-sensitive. Thus, these discrepancies, tackled by a sensory garden, keep senses entertained and repressed.

Depending on the type of equipment and seating layouts, sensory gardens can bring learning and educational progress within the specially-abled. The cleverly calculated, diplomatic plan of a sensory garden aids reflex actions, consciousness, awareness, and emotional satisfaction. Sensory gardens are self-sufficient places that trigger the senses, not only individually but also by combining various ways. They prompt both new and familiar experiences and make the visitors respond positively to the surroundings. They allow children and adults to boost their motor abilities and functions while remaining in a limited environment. Thus, they provide educational, therapy-like, and recreational benefits.



## 9.2 Case studies

### 9.2.1 Pattaya Redemptorist School for the Blind, Thailand

Architects: Creative Crews

Area : 48 m²

The main aim for this  is to equip all students with fundamental skills for future livelihoods beyond the school's gate. The school enrols pupils with varying degrees of visual impairment, and abilities thus the facility needs to be flexible.

#### 9.2.1.1 Planning

- Children moves through the four walls
- Touch begins with the most basic shapes, then sizes relationships, texture and weight, to more complex shapes such as animals.
- Scented capsules are designed to teach pupils about the smell of potential harm such as fire, smoke, gas leakage etc.

- Binaural recordings of various environments to stimulate students' perception of the world.
- The lighting is designed to exercise and stimulate visibility in low vision children.
- The floor is embedded with braille tactile letters, thai, english, and numbers for basic braille introduction.

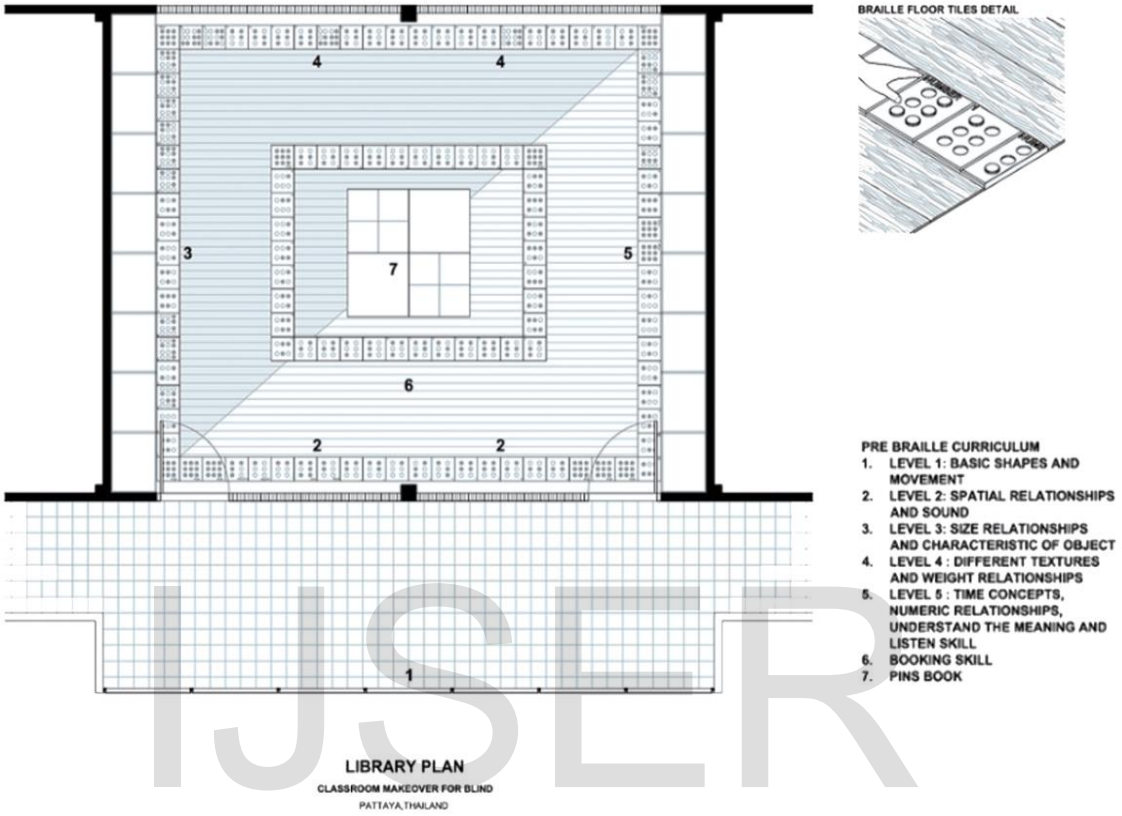



Fig 77: Library Plan

Source:https://www.archdaily.com/918942/classroom-makeover-for-the-blind-creative-crews

Fig 78: Photos of Surfaces

Source:https://www.archdaily.com/918942/classroom-makeover-for-the-blind-creative-crews

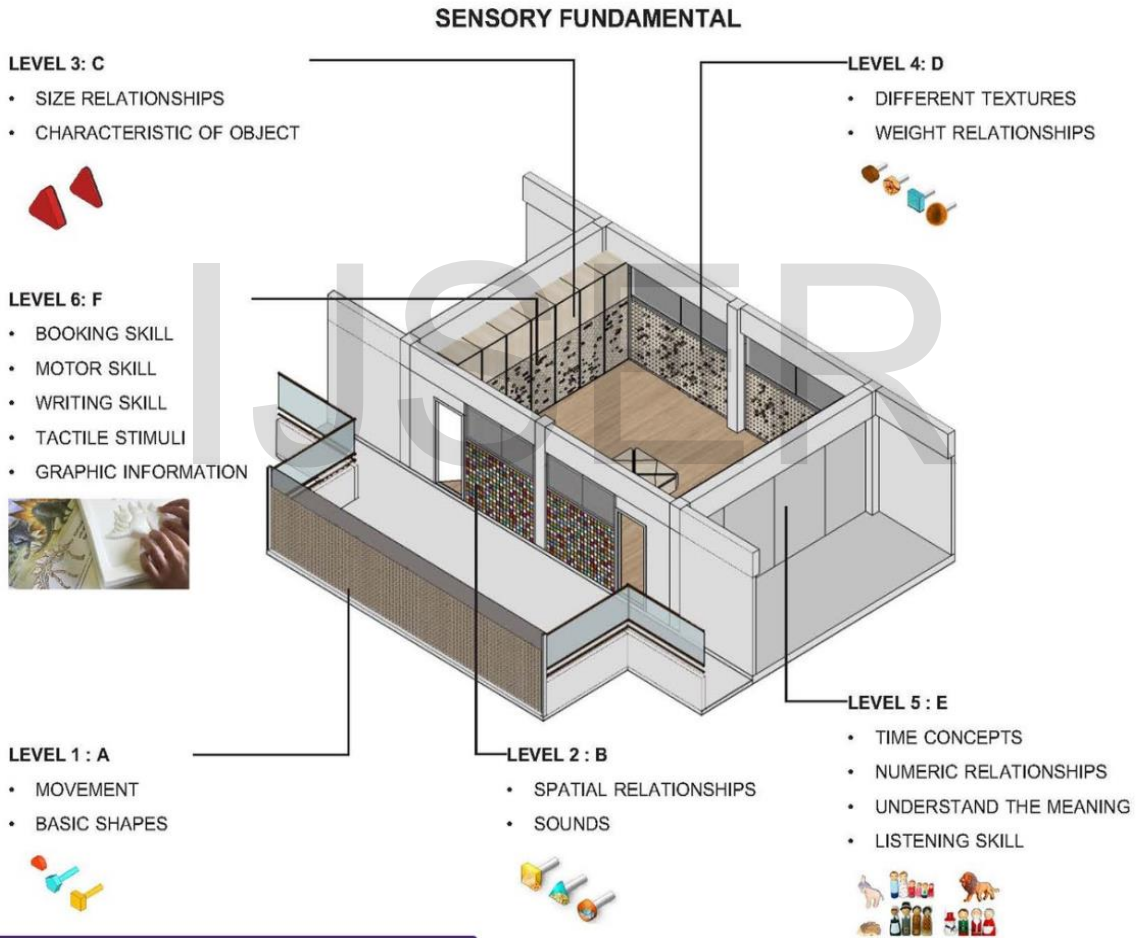



Fig 79: Analysis of Space

Source:https://www.archdaily.com/918942/classroom-makeover-for-the-blind-creative-crews

Fig 80: Perforated wall

Source:https://www.archdaily.com/918942/classroom-makeover-for-the-blind-creative-crews

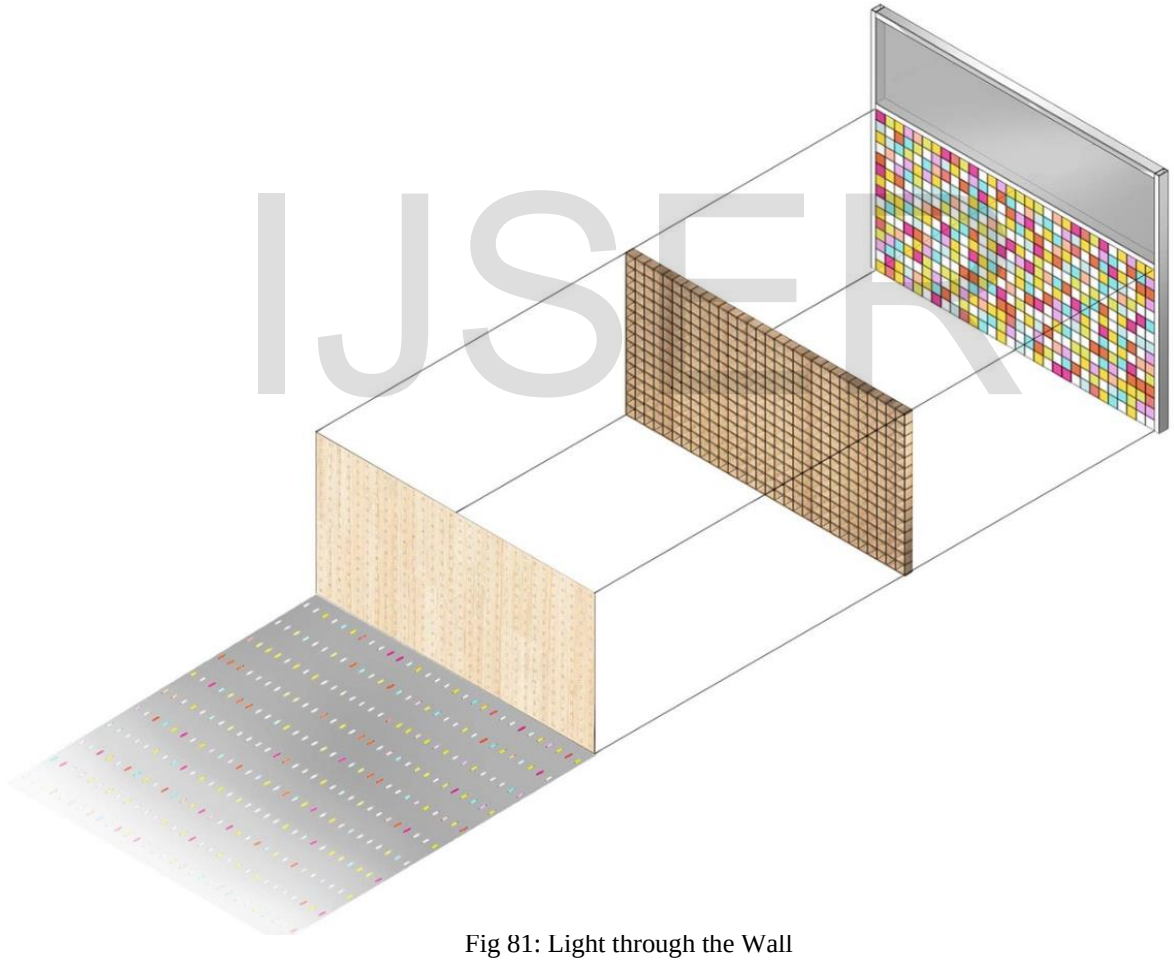


Fig 81: Light through the Wall

Source:https://www.archdaily.com/918942/classroom-makeover-for-the-blind-creative-crews

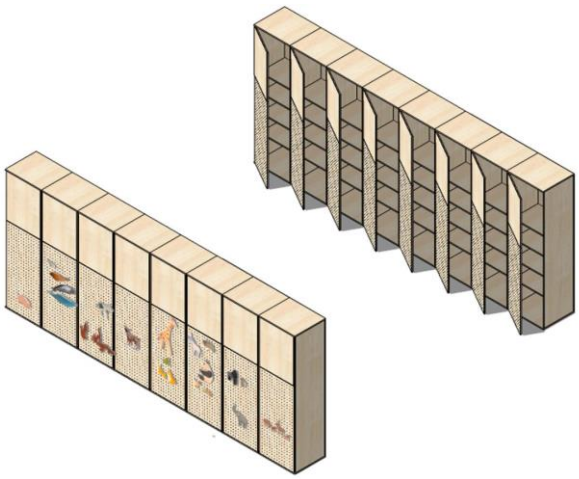


Fig 82: Shelf

Source:https://www.archdaily.com/918942/classroom-makeover-for-the-blind-creative-crews



## 9.2.2 Other Case Studies


Fig 83: Sensory Elements

Source:Internet

# 9.2 Inference

- **Color, texture, massing, light and shadow effects, and contrast all prompt the sense of vision and sensory experiences.**
- **Accessibility should be the main point in sensory gardens**

- **Various path designs, widths, directional changes all influence orientation and mystery within an area.**
- **Consider the changes in material appearance during wet and dry conditions**
- **For softscapes, contrasting colored leaves like white and red flowers can benefit the visually impaired and facilitate sensing**

# Chapter- 10

# MATERIAL STUDY

## 10.1 Flooring

Using neutral and earthly tones to blend with the overall colour of the structure and switching flooring types based on texture in different spaces for easy identification and navigation.


Fig 84: Flooring Materials

Source:Internet



## 10.2 Walls

Use Different textures and materials to aid right movement.


Fig 85: Wall Materials

Source:Internet

# 10.3 Roofings

Using light and shadow to improvise spatial experience.


Fig 86: Roofing Materials

Source:Internet

# 10.4 Doors


Fig 87 : Doors

Source:Internet

# 10.5 Furnishings

Using alterable Furniture


Fig 88 : Furnishes

Source: Internet

# 10.6 Signages

Embossed braille script on signages at hand level and audio signages help the blind identify spaces. Metal surfaces in outdoor and wooden or metal indoor are ideal.


Fig 89 : Signages

Source: Internet

# 10.7 Tactile Surfaces

Tactile surfaces are standardized guidance trails for the blind on the walls or on the floor or either .


Fig 90: Tactile Surfaces

Source : Internet

# 10.8 Facade

Vital to create texture with natural lighting and ventilation.


Fig 91 : Facade

Source: Internet

# 10.9 Road

Special materials on the vehicular paths.


Fig 92 : Road

Source: Internet

# 10.10 Pathways

Different materials for pedestrian pathways to distinguish between primary secondary and tertiary pathways.

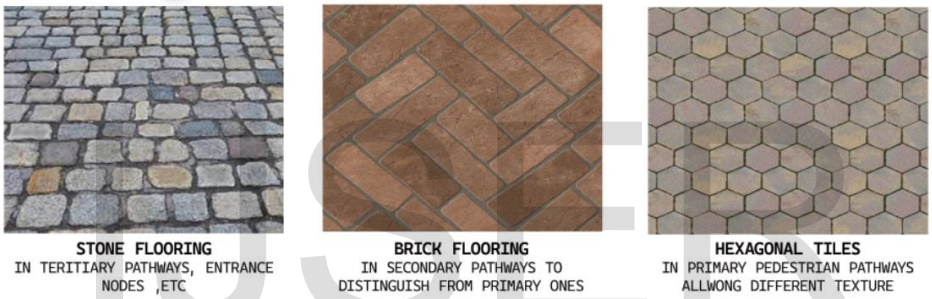



Fig 93 : Pedestrian Pathways

Source: Internet

# 10.11 Other Elements

Other elements are also important for creating a smooth navigation path and guidance for the blind

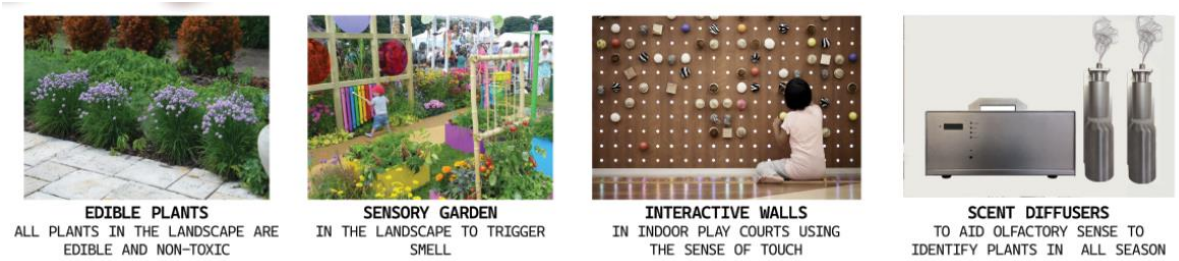



Fig 94 : Other Elements

Source : Internet

# Chapter- 11

# CONCEPT- COMPOS MENTIS

## 11.1 Introduction

Architectural experience of the blind can be enhanced through different design elements that achieves different states of consciousness. The built environment can control one's mind and action in relation to the way it is perceived.

Through this concept a guidance trail for the blind is designed called conscious trail which aids navigation with one's consciousness.Their actions and the behavior is triggered through the architecture design elements and the way it is perceived.

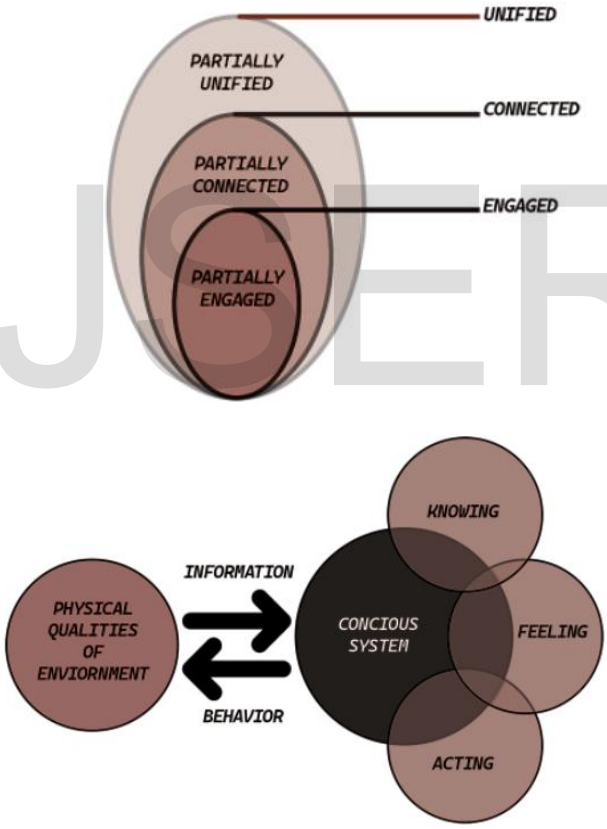



Fig 95: Different Levels of Consciousness and its Relations

Source:https://www.researchgate.net/figure/Schematic-illustration-of-3-levels-of-consciousness-successively-engaged-connected_fig1_325762631

## 11.2 Theory Supporting the Concept- Blind Sight

**Blindsight is the phenomenon in which blind people can interact with their environments even though they can't see it.**

It could be navigating obstacles or even saying what is in front of them with over 90% accuracy. The information is processed by other areas of the visual system that are intact, enabling people to carry out the kind of tasks. They show awareness of single visual features, such as edges and motion, but cannot gain a holistic visual perception.

Fig 96: Sense of Orientation

Source: Author

## 11.3 Concept based Architectural Design Elements



- Using sensory landmarks like gardens in between to identify spaces with different scents from plants.

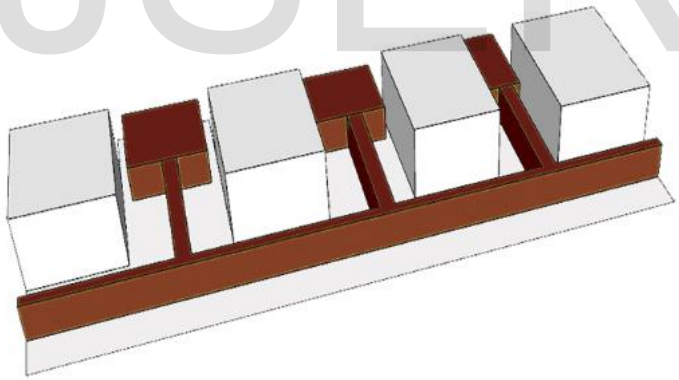


Fig 97:Courtyards

Source: Author

- Using different roofing - closed, semi-open and open to cast shadow and light to distinguish pathways

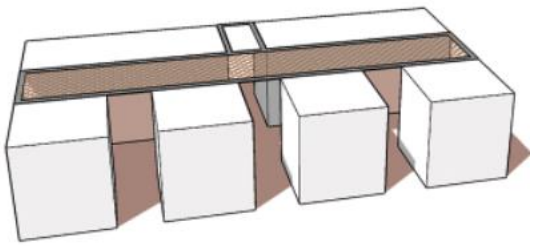


Fig 98: Shadow

Source: Author

- Segregating the corridors as primary , secondary and tertiary with the help of different dimensions or volume.

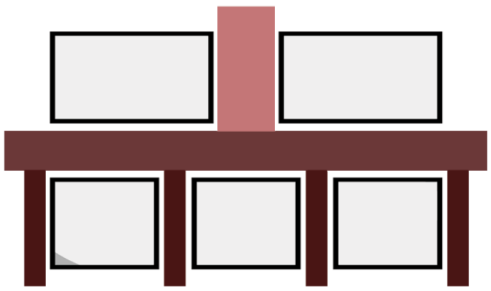


Fig 99: Paths

Source: Author

- Creating a trail in the flooring for guided movement and leading to different spaces easily.



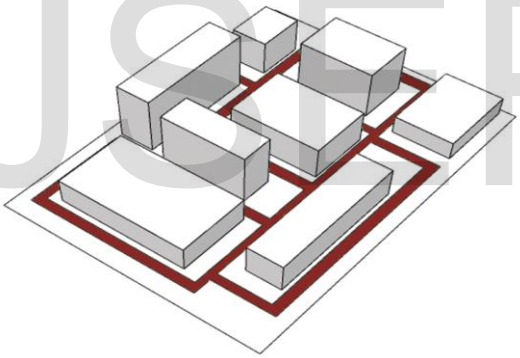


Fig 100 : Trail

Source: Author

- Using trails in the walls and flooring using different textures. different textures in each space can also help.

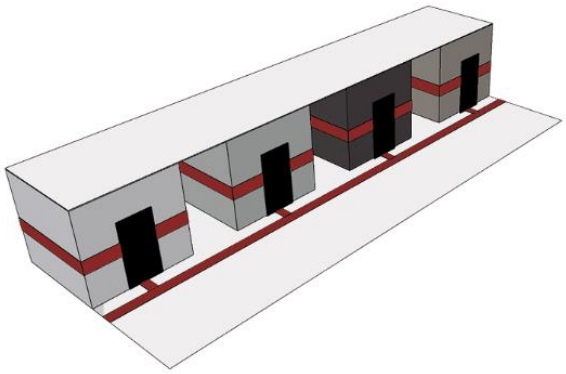


Fig 101 : Guidance

Source: Author

- Using landmarks at different areas in the building for space identification and easy navigation.

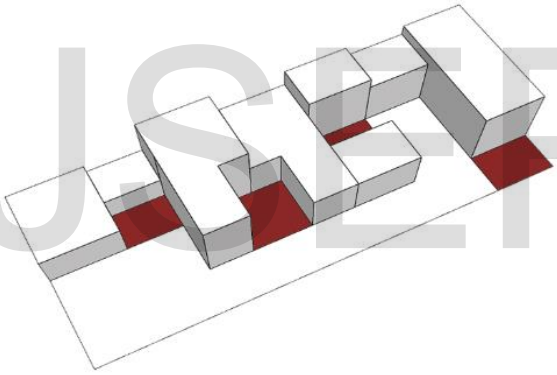




Fig 102 : Landmarks

Source: Author

# Chapter - 12

# ZONING AND DESIGN DEVELOPMENT

# 12.1 Bubble Diagrams

## 12.1.1 Kindergarten

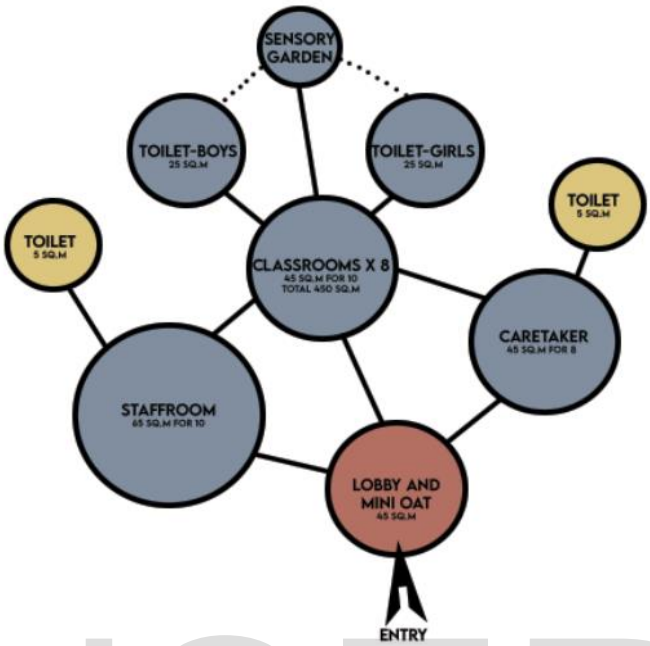





Fig 103 : KG Bubble Diagram

Source: Author

## 12.1.2 Main Academic Block

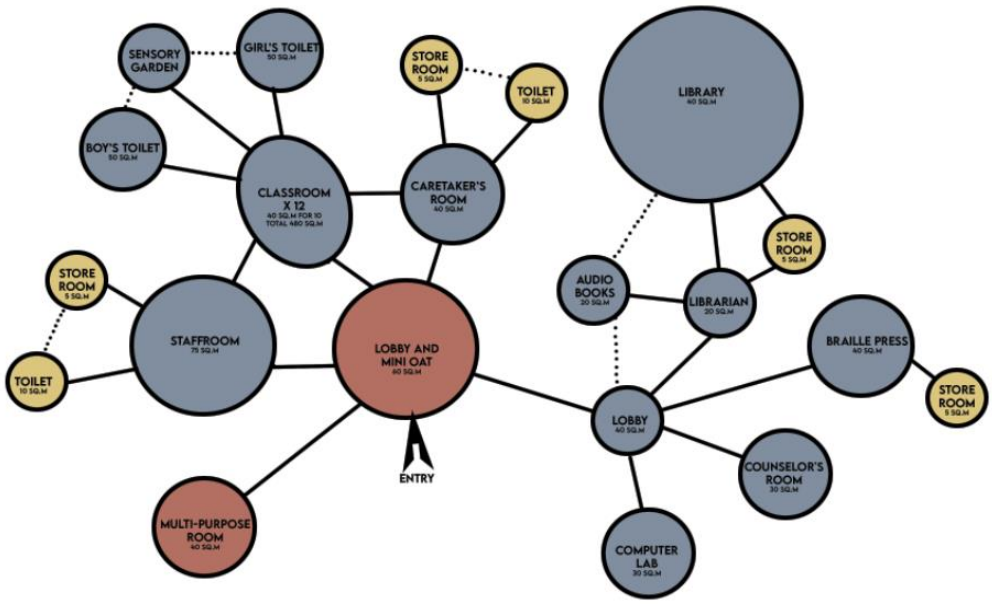



Fig 104 :Main Block Bubble Diagram

Source: Author



## 12.1.3 Recreational Block

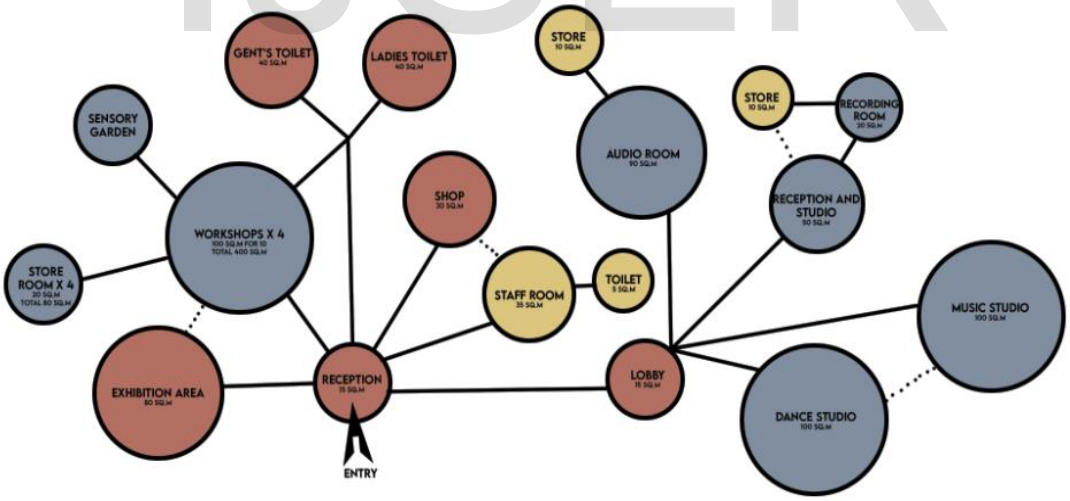



Fig 105 : Recreational Bubble Diagram

Source: Author

## 12.1.4 Admin Block

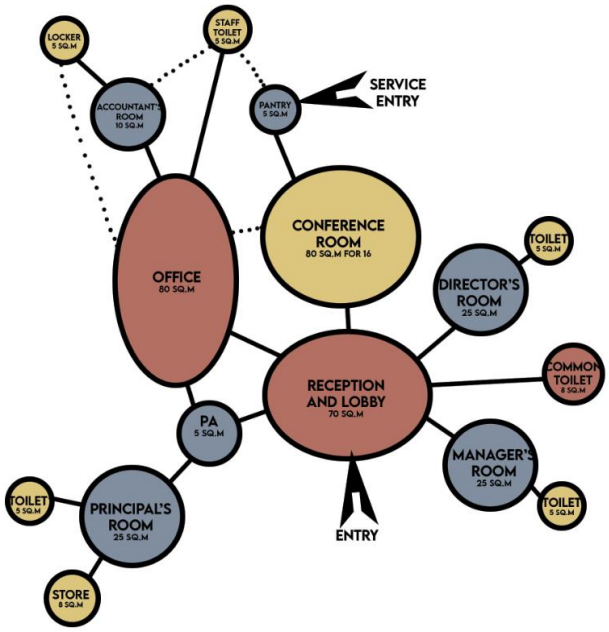



Fig 106 : Admin Bubble Diagram

Source: Author

## 12.1.5 Medical Block

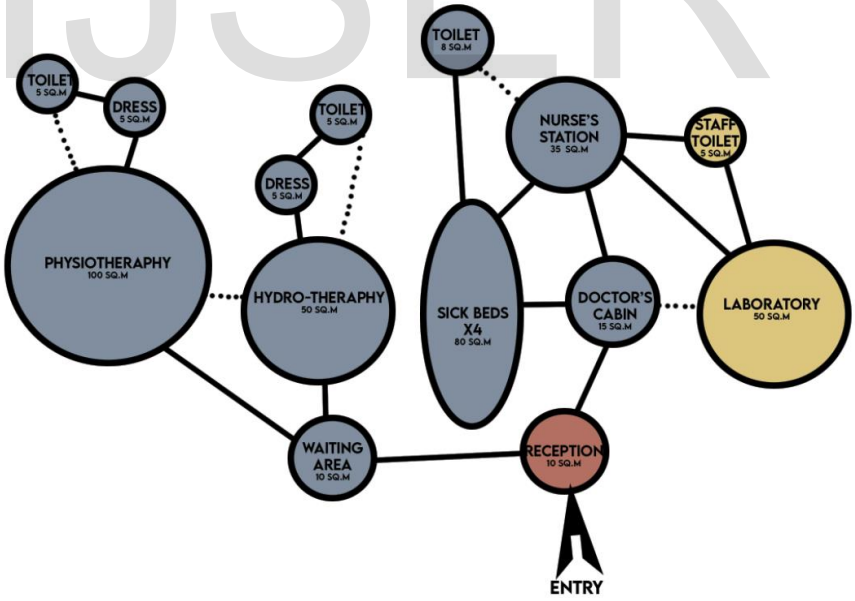



Fig 107 : Medical Block Bubble Diagram

Source: Author

## 12.1.5 Student's Hostel

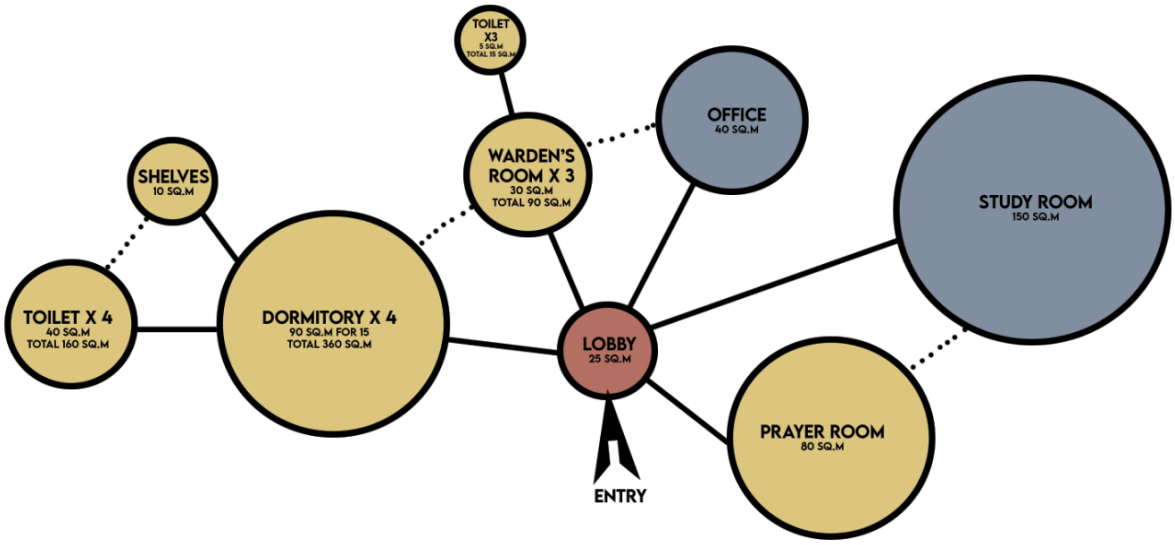



Fig 108 : Hostel Bubble Diagram

Source: Author



## 12.1.6 Staff Quarters

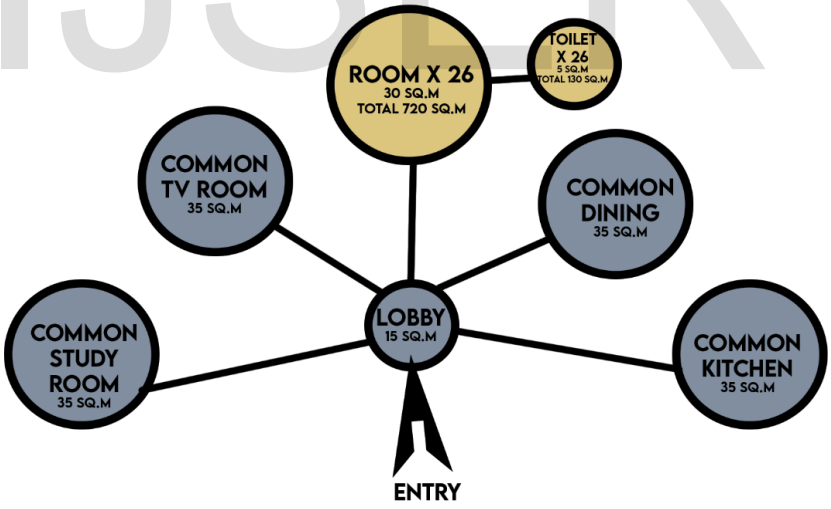



Fig 109 : Staff Quarters Bubble Diagram

Source: Author

## 12.1.7 Dining and Kitchen

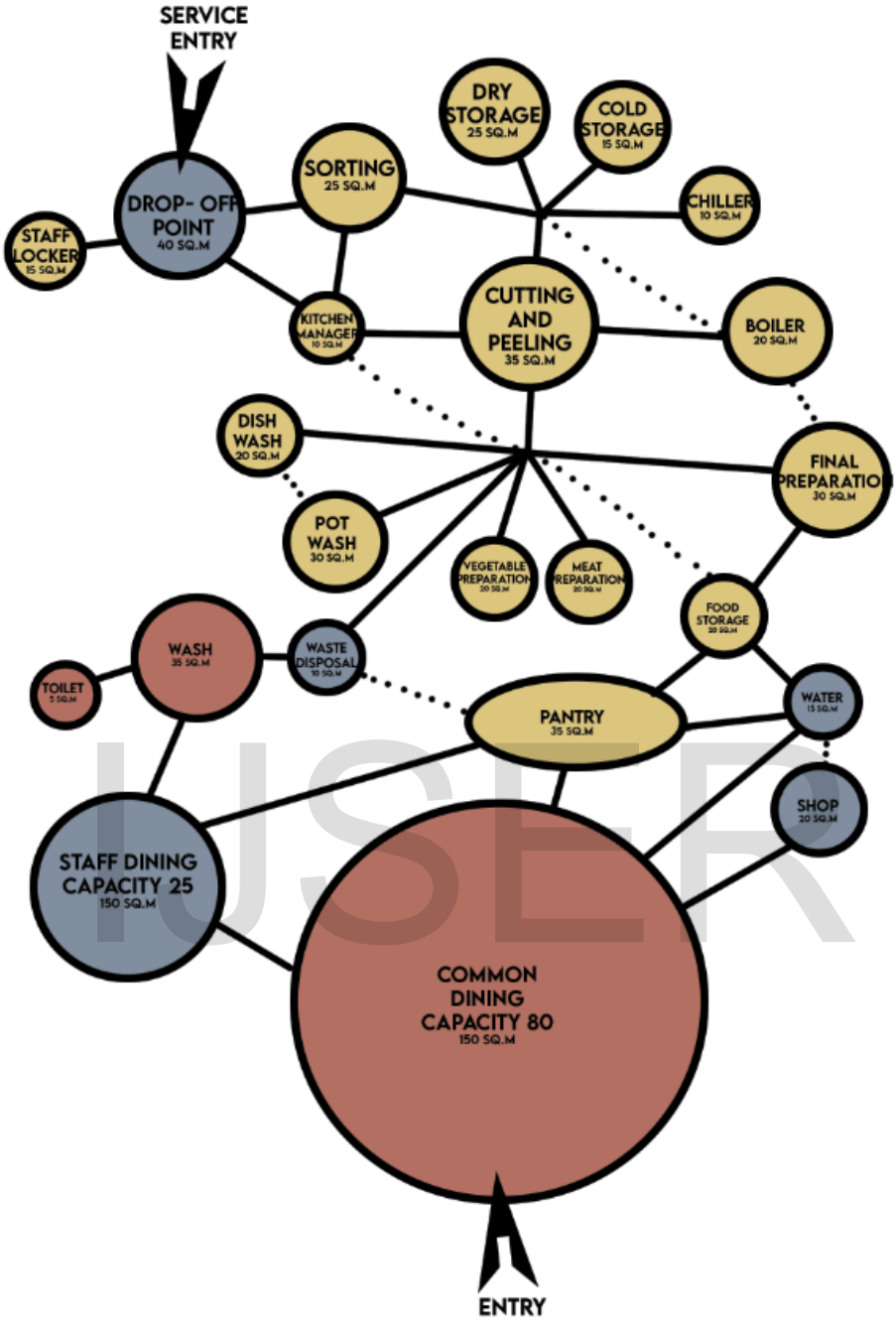



Fig 110 : Dining and Kitchen Bubble Diagram

Source: Author

## 12.1.8 Academic

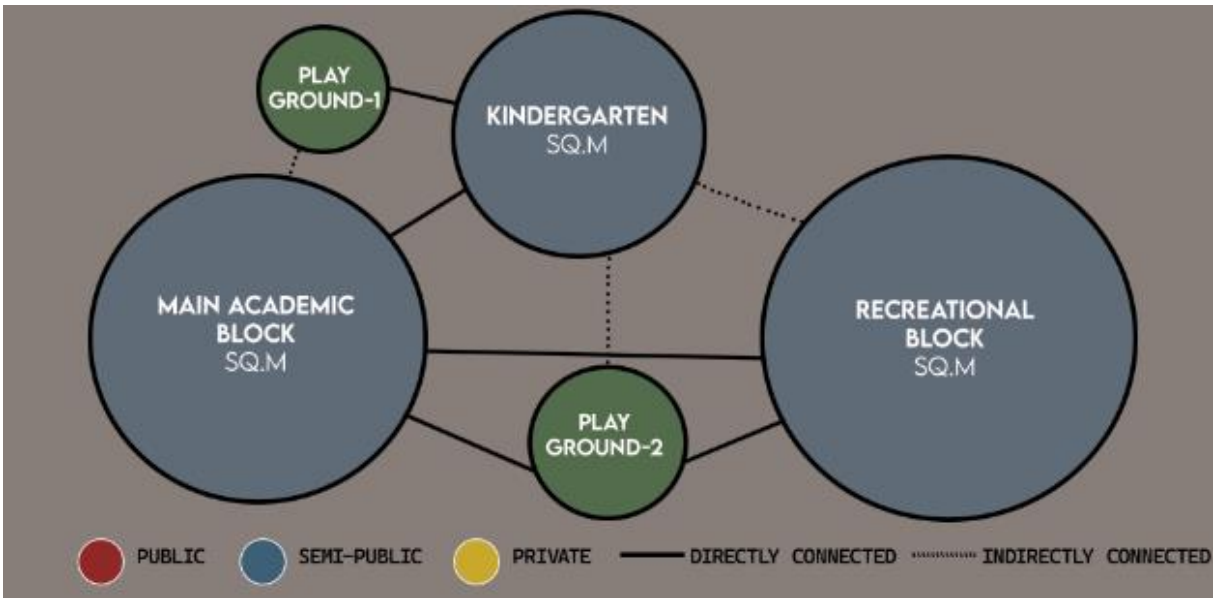



Fig 111 : Academic Bubble Diagram

Source: Author

## 12.1.9 Overall



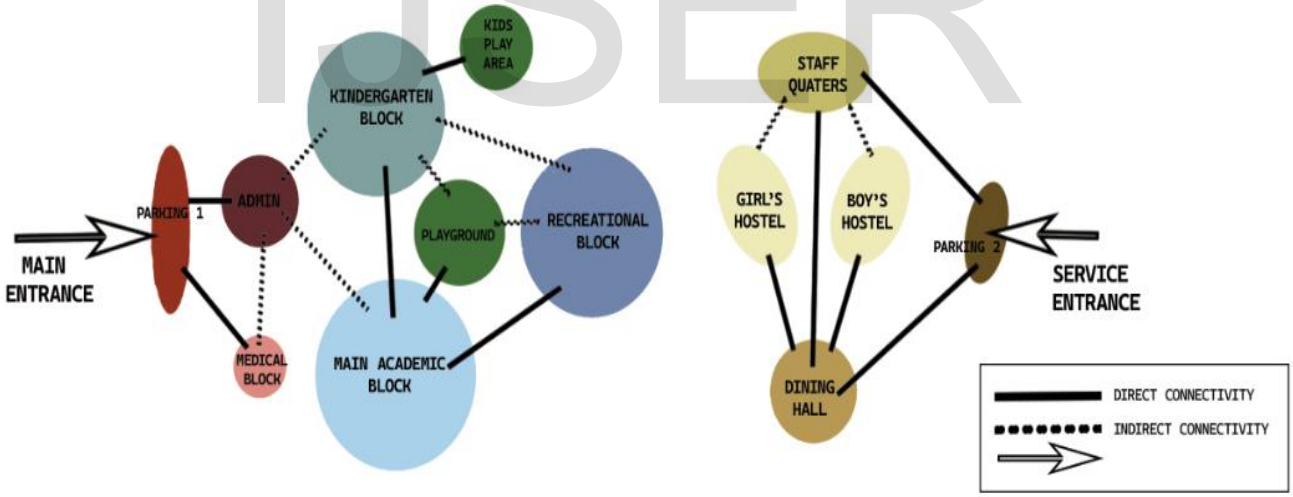



Fig 112: Overall Bubble Diagram

Source: Author

# 12.2 Proximity Chart

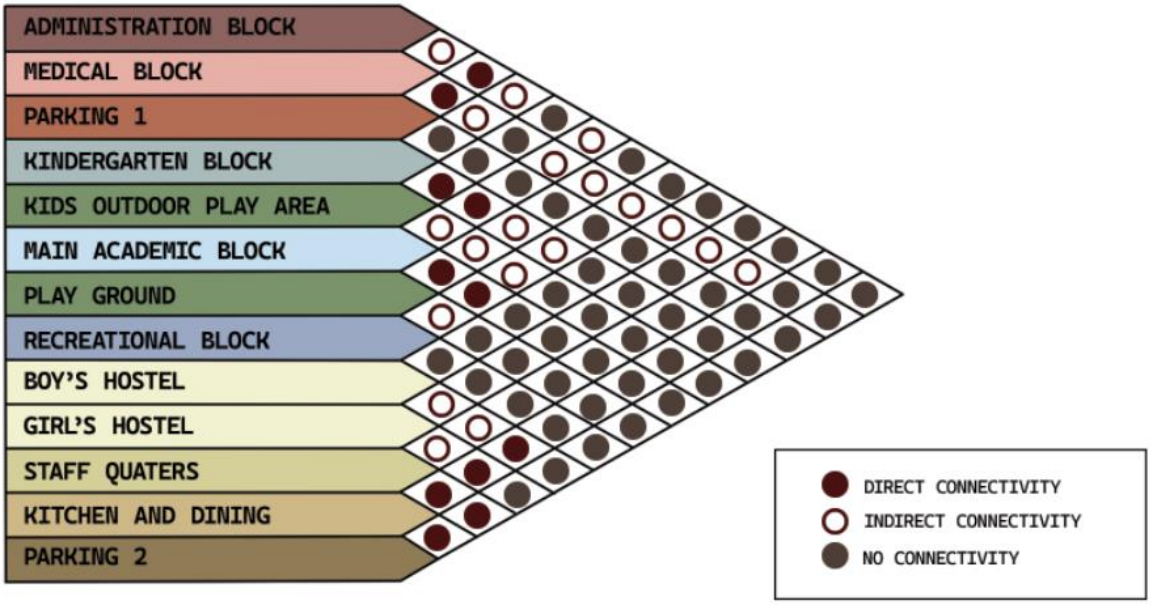



Fig 113: Proximity Chart

Source: Author



# 12.3 Site Zoning

- Total Area Of The Site = 24,144 Sq.M
- Total Built Area =10,350 Sq.M
- Total Unbuilt Area =13,794 Sq.M
- Total Permissible Fsi =4
- Fsi Achieved = 0.42
- Permissible Ground Coverage =50%
- Permissible Ground Area =12,072 Sq.M
- Minimum Required Open Space =7243.2 Sq.M
- Maximum Permissible Height =30 M
- Permissible Number Of Dwelling Units = 21
- Minimum Number Of Parking
- 4-wheeler = 25 (23 Sq.M)
- 2-wheeler = 15
- Wheelchair = 3
- Ambulance = 1

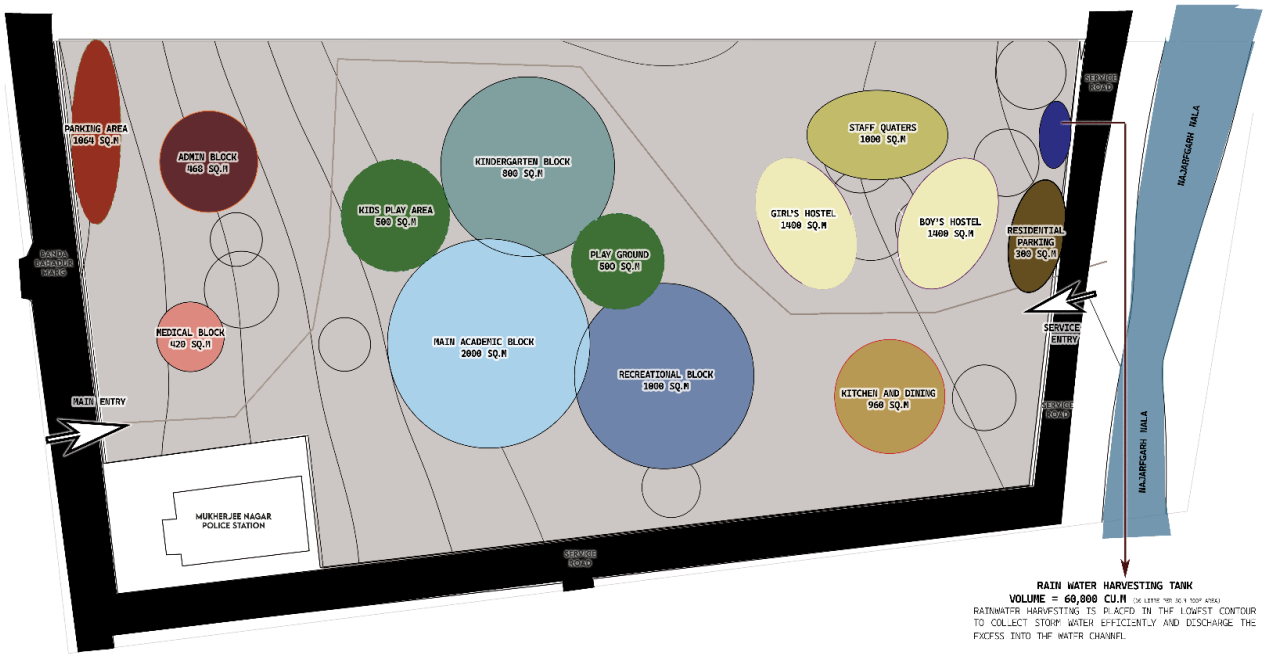



Fig 114: Site Zoning

Source: Author

## 12.5 Form Development

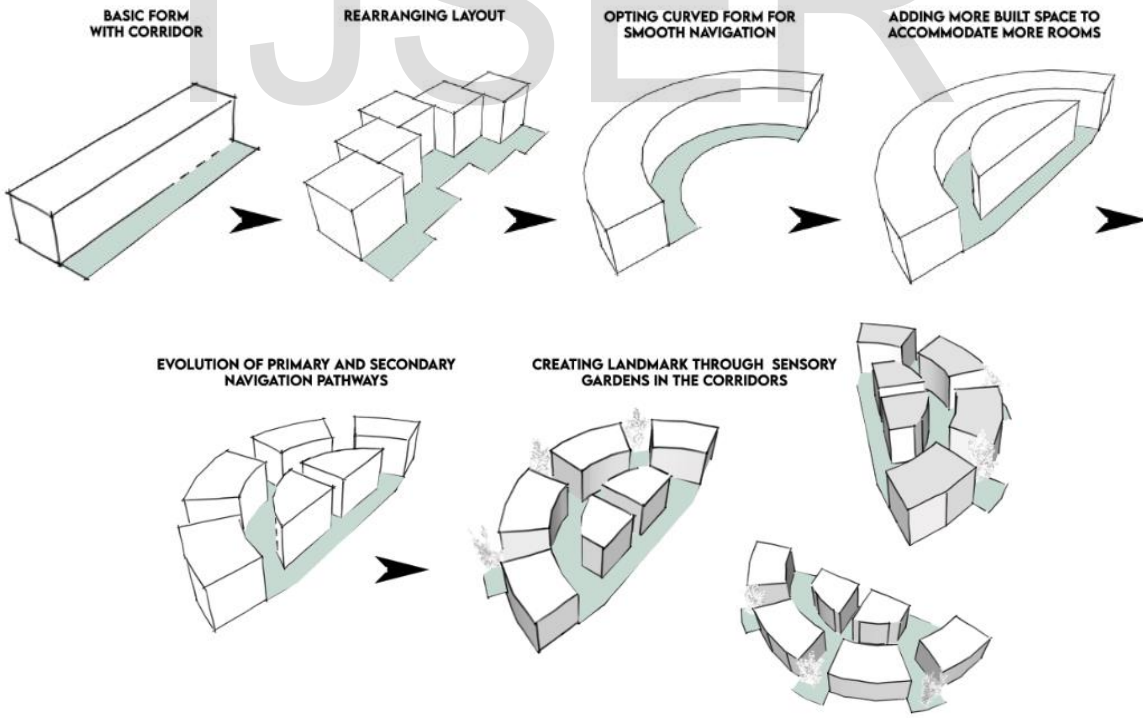



Fig 115: Form Development

Source: Author

# Chapter- 13

# MASTER PLAN

## 13.1 Master Plan Development



- Zoning Based on Privacy

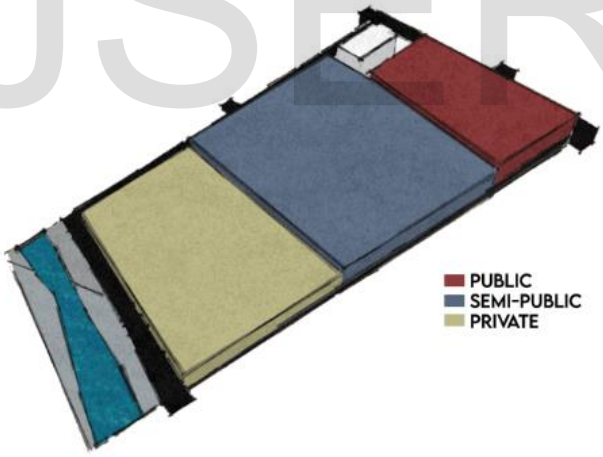



Fig 116: Development Stage 1

Source: Author

- Subtracting setback

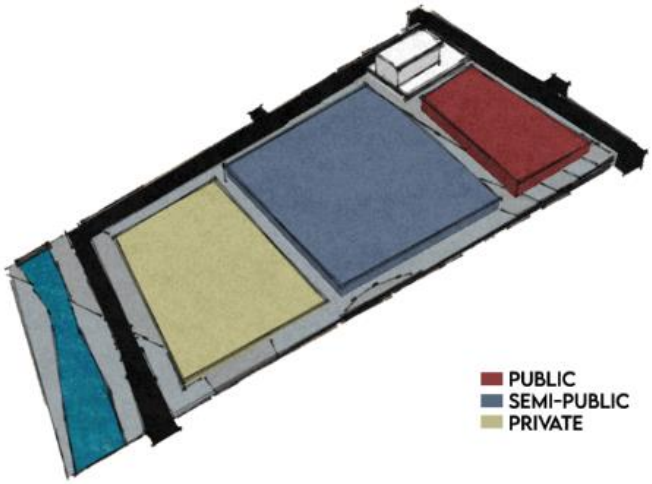



Fig 117: Development Stage 2

Source: Author

- Adding Main Circulation Path

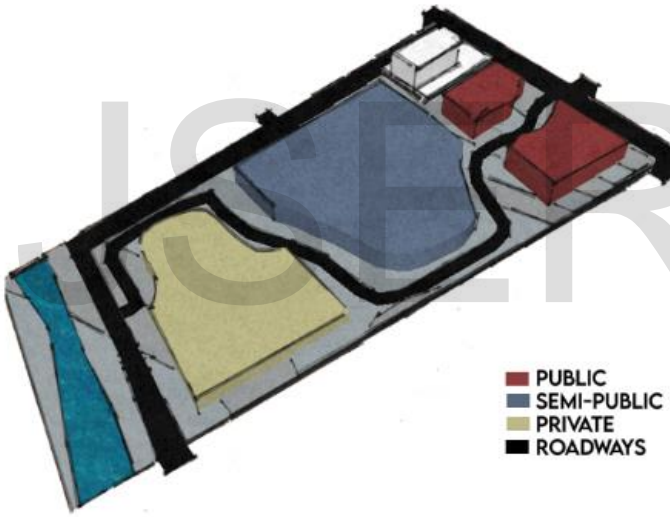



Fig 118 : Development Stage 3

Source: Author

- Evolving Concept Based Form

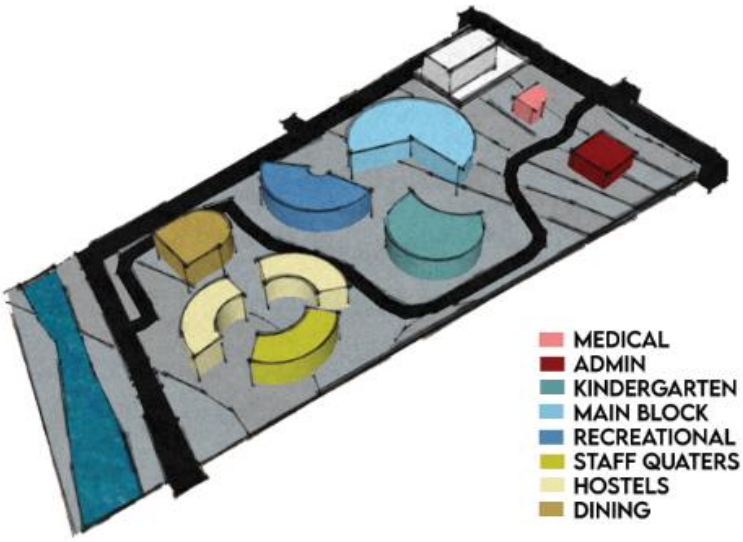



Fig 119 : Development Stage 4

Source: Author

- Adding Mass to The Form



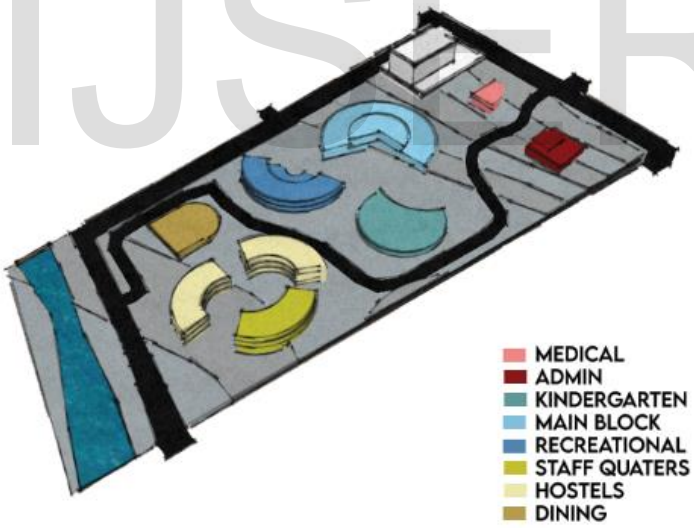



Fig 120 : Development Stage 5

Source: Author

# 13.2 Massing

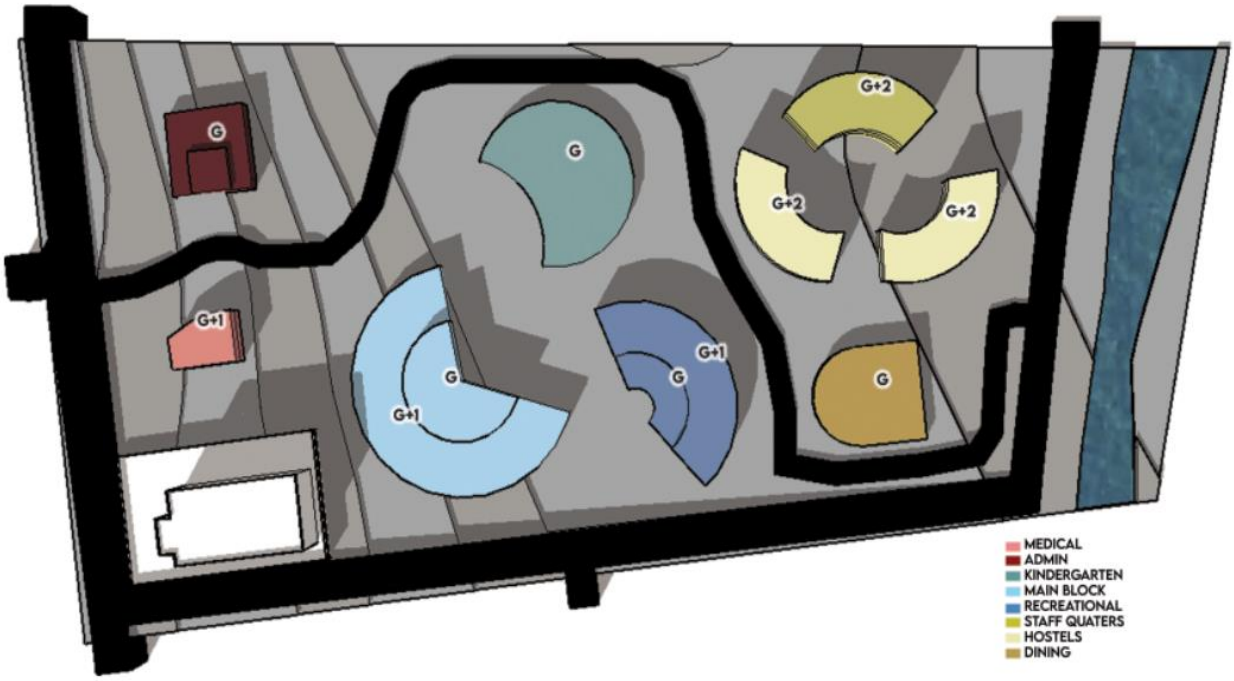



Fig 121 : Massing

Source: Author



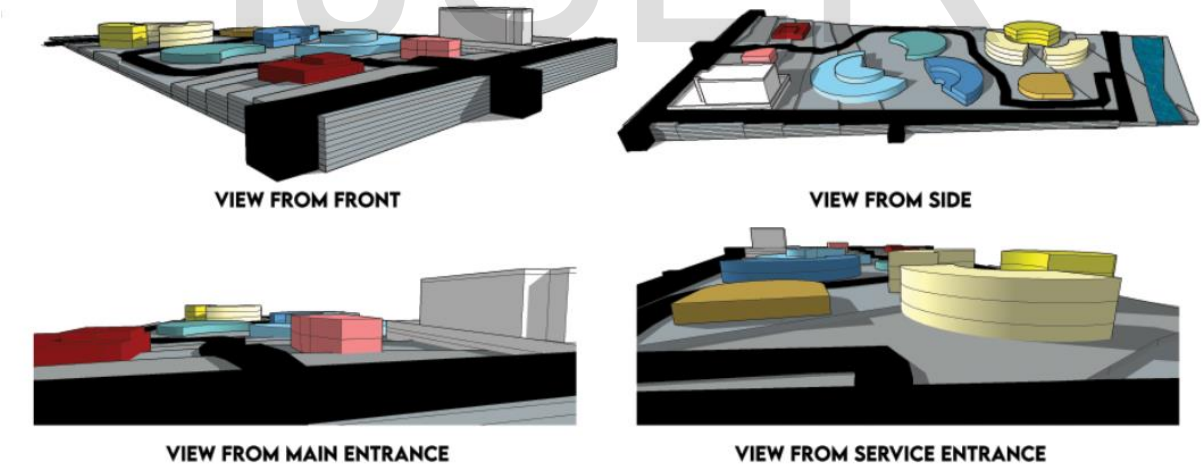



Fig 122 : Massing Views

Source: Author

# 13.3 Master Plan


1 MAIN SECURITY CABIN
2 SERVICE ROOM
3 UNDERGROUND WATER TANK
4 OUTDOOR SEATING
5 ADMIN BLOCK
6 MEDICAL BLOCK
7 DROP OFF POINT
8 AMBULANCE PARKING
9 COMMON PARKING
10 NODE
11 PLAYGROUND -1
12 PLAYGROUND- 2
13 KINDERGARTEN BLOCK
14 MAIN ACADEMIC BLOCK
15 RECREATIONAL BLOCK
16 PLAY COURT
17 STAFF QUATERS
18 GIRL'S HOSTEL
19 BOY'S HOSTEL
20 OUTDOOR DINING
21 DINING HALL AND KITCHEN
22 RESIDENTIAL PARKING
23 STORM WATER TANK
24 KITCHEN STAFF PARKING
25 SERVICE ENTRY SECURITY CABIN



Fig 123 : Master Plan

Source: Author


Fig 125 : Master Plan Views

Source: Author



- **Total Built Area = 11,200 Sq.M**
- **Total Area Of The Site = 25,900 Sq.M**
- **FAR =0.43**

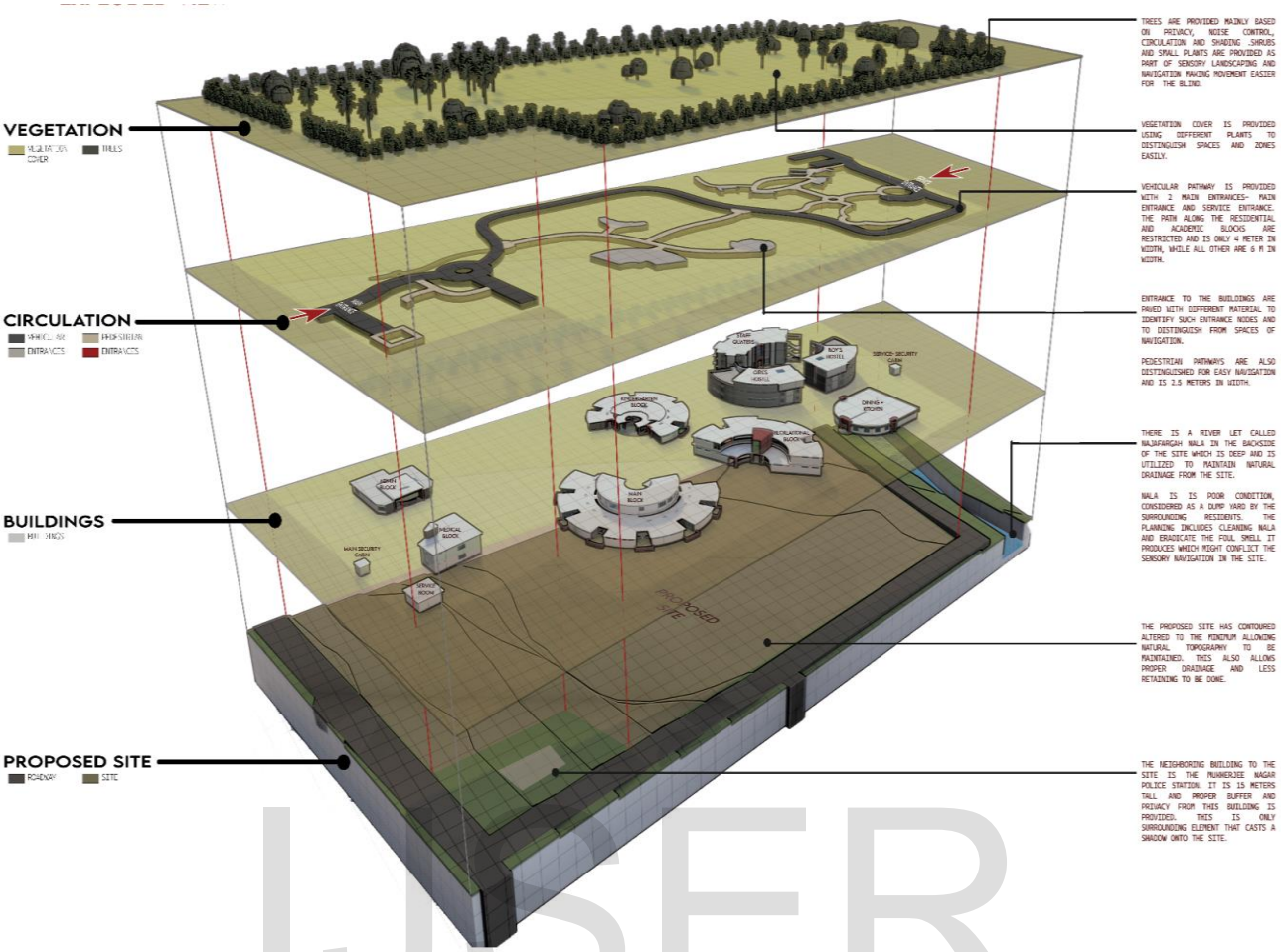



Fig 126 : Exploded View

Source: Author

# 13.4 Circulations

## 13.4.1 Student's Circulation

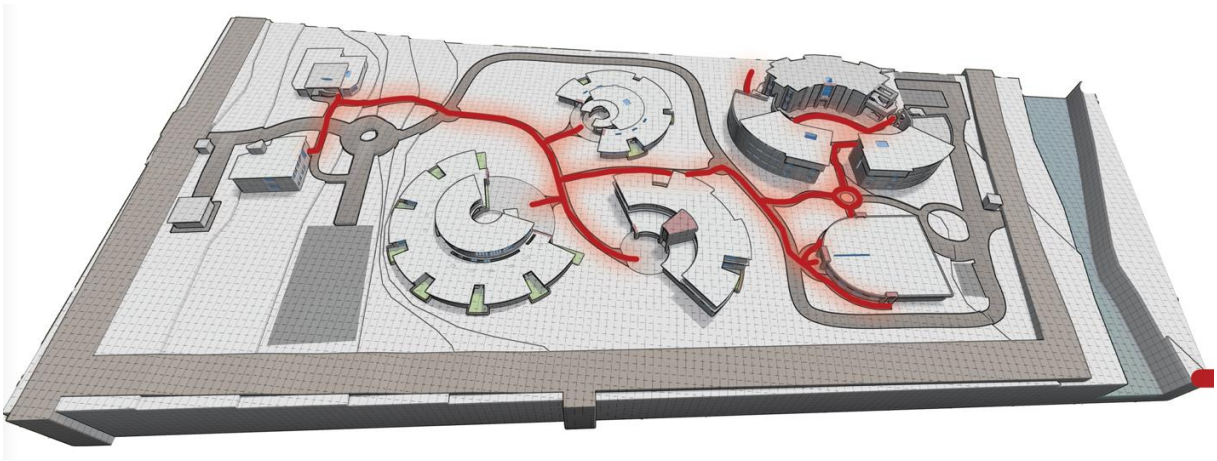


Fig 127: Student's Circulation

Source: Author



## 13.4.2 Public Circulation

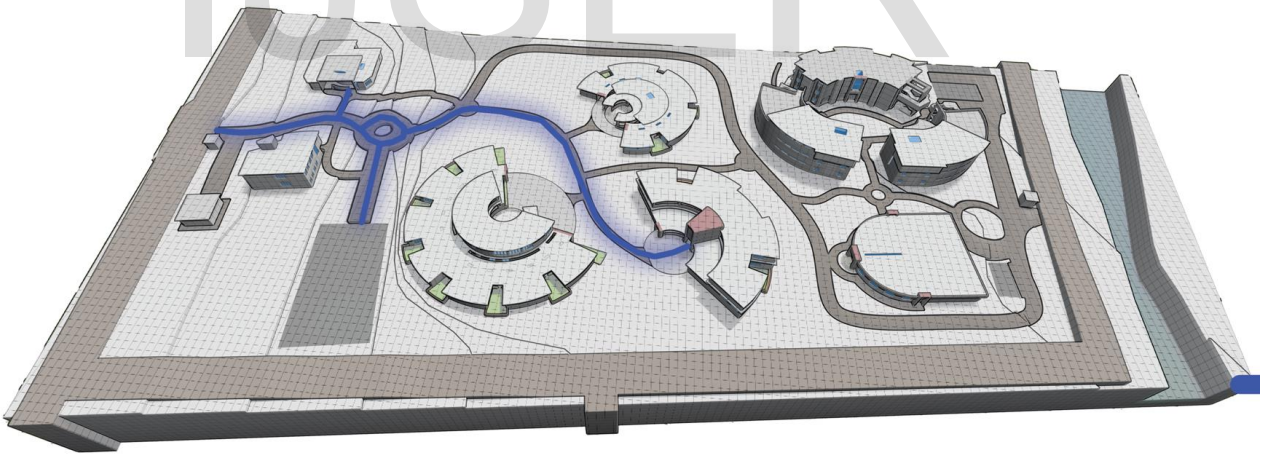


Fig:128 Public Circulation

Source: Author

## 13.4.3 Residential Staff Circulation

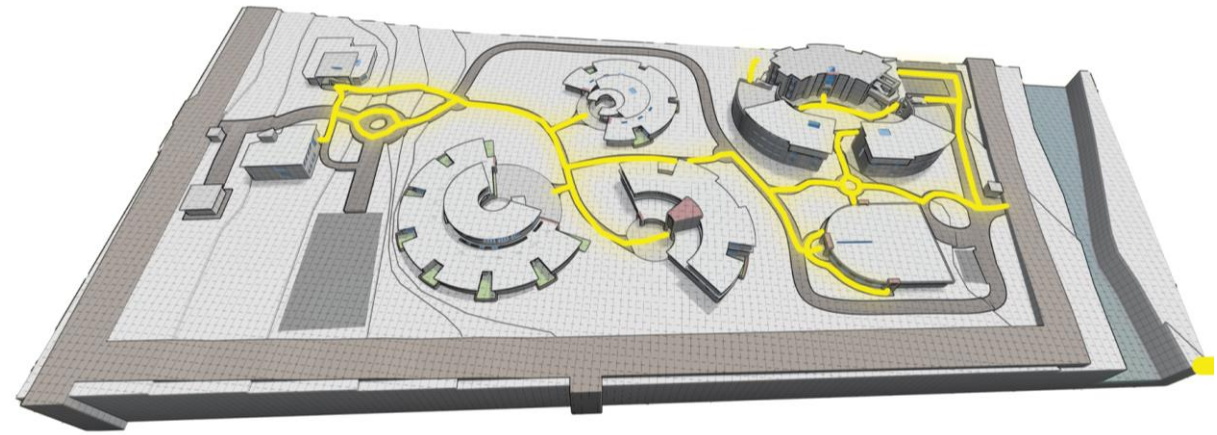


Fig:129: Residential Staff Circulation

Source: Author

## 13.4.4 Non-Residential Staff Circulation

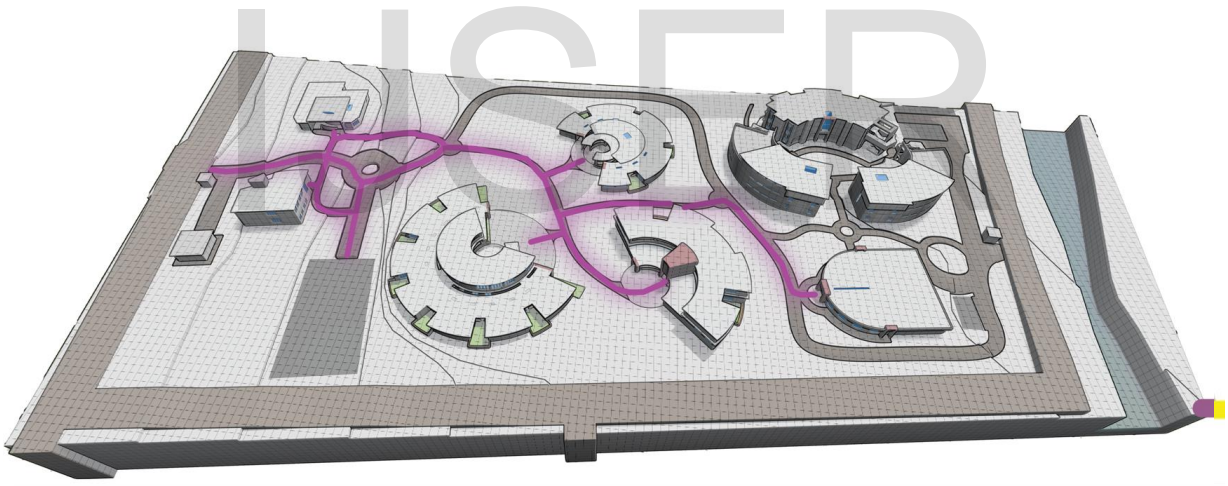


Fig:130: Non-Residential Staff Circulation

Source: Author

## 13.4.5 Service/ Maintenance Circulation

Fig:131: Service/Maintenance Circulation

Source: Author

## 13.4.6 Medical Emergency Circulation

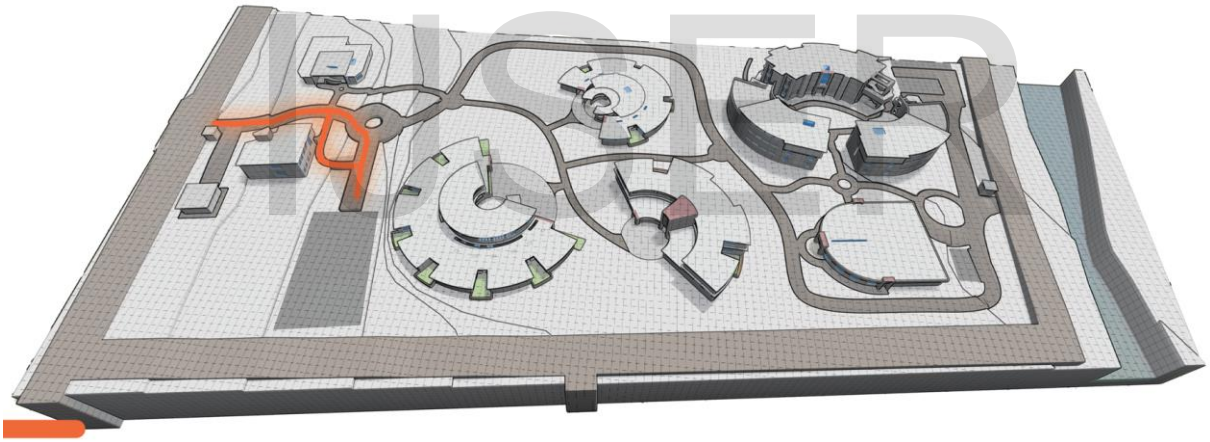


Fig:132: Medical Emergency Circulation

Source: Author

## 13.4.7 Restricted Vehicular Circulation

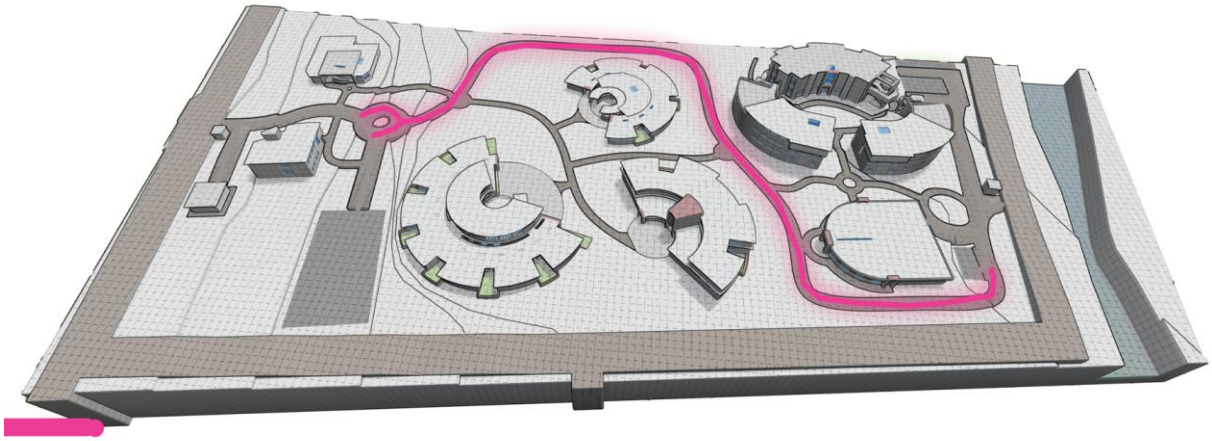


Fig:133:Restricted Vehicular Circulation

Source: Author



# Chapter- 14

# SENSORY PLAN

## 14.1 sensory plan

Fig 134 : Sensory Plan

Source: Author

## 14.2 Sensory Elements

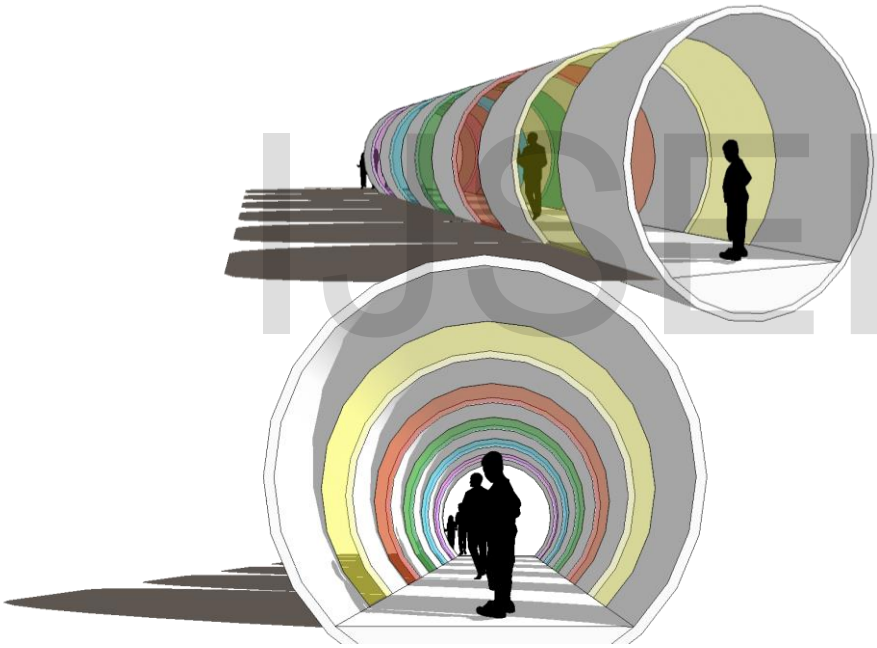


Fig 135 : Coloured Glass Tunnel

Source: Author

Fig 136 : Triangular Tunnel

Source: Author



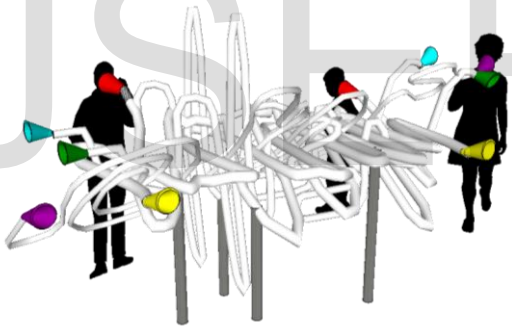


Fig 137 : Sound Pipes

Source: Author

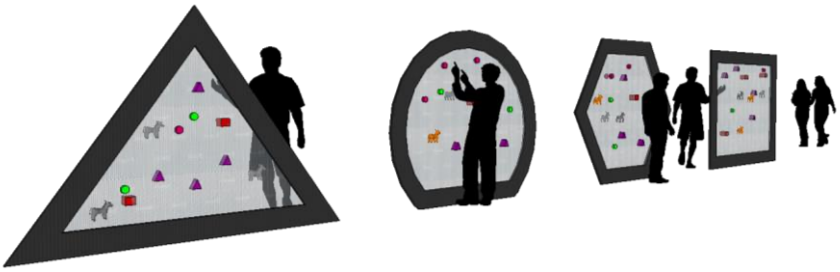


Fig 138 : Perforated Walls

Source: Author

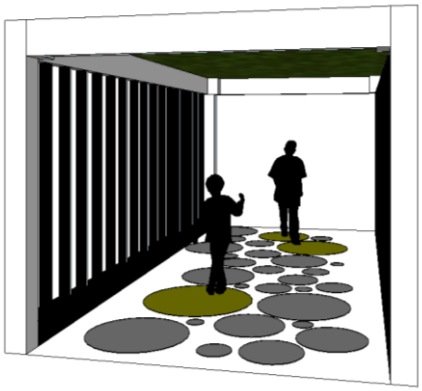


Fig 139 : Glowing Pathways

Source: Author

Fig 140 : Slope Training Tunnels

Source: Author

# Chapter- 15



# ARCHITECTURAL DESIGN

## 15.1 Kindergarten

- **Total Area = 1050 Sq.M**
- **Students In KG = 20**
- **Students In LKG= 20**
- **Students In UKG = 20**
- **Total Students = 60**

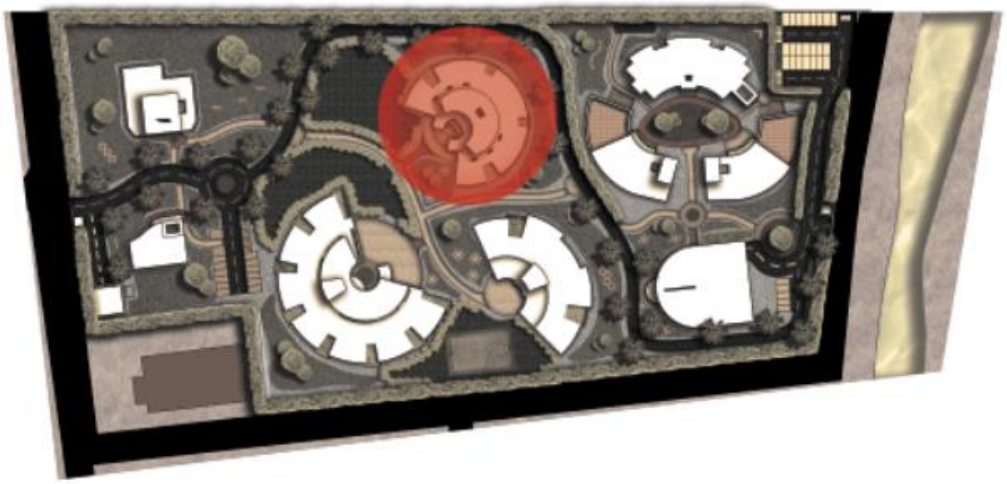


Fig 141 : Key Plan

Source: Author

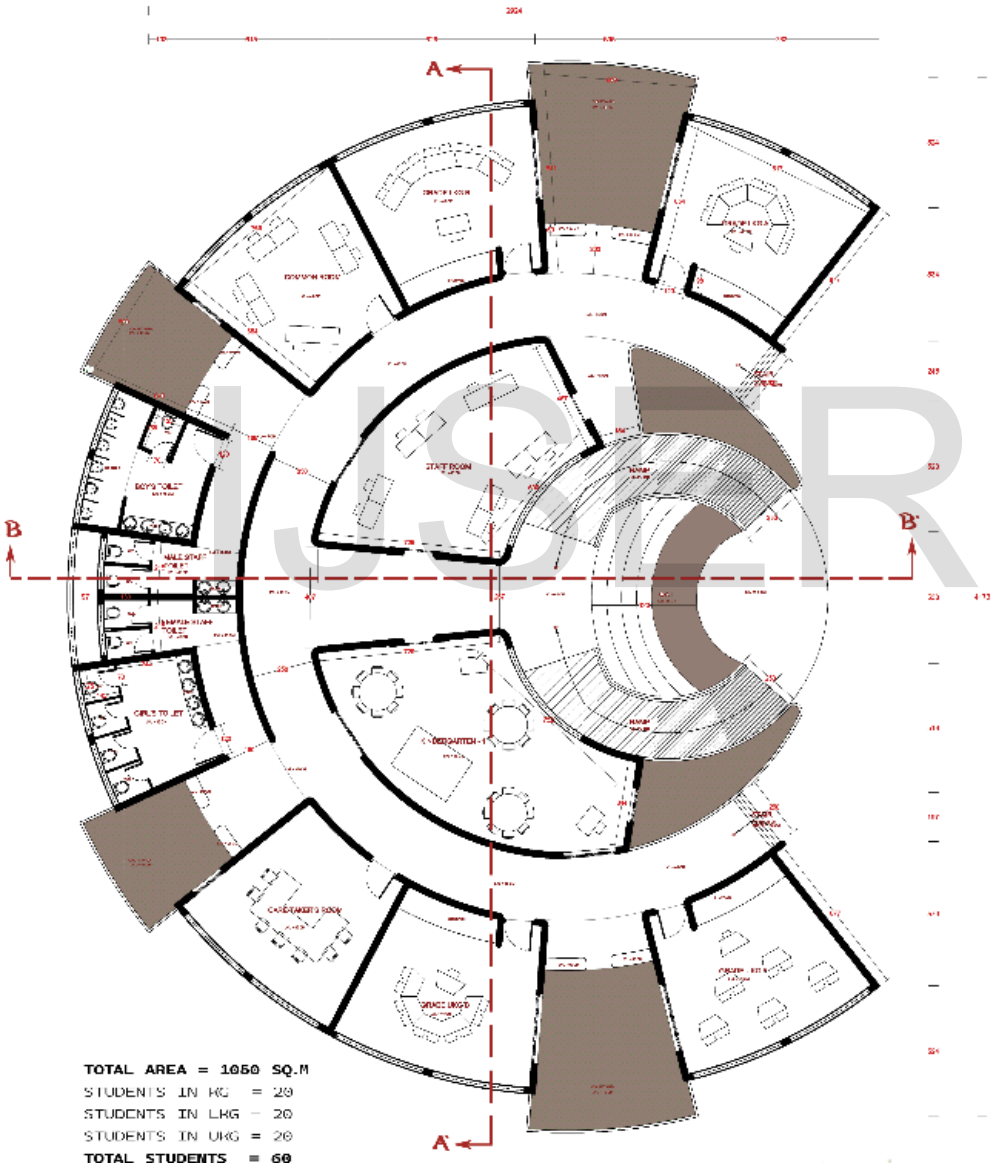



Fig 142 : Ground Floor Plan

Source: Author

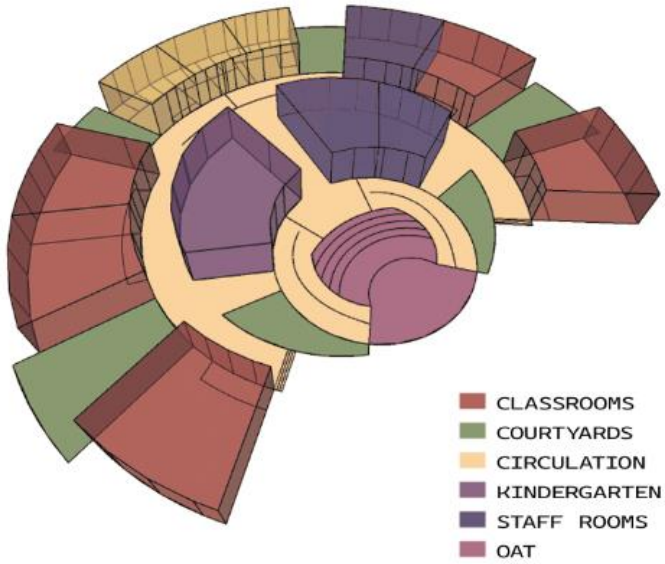





Fig 143 : Spatial Zoning

Source: Author

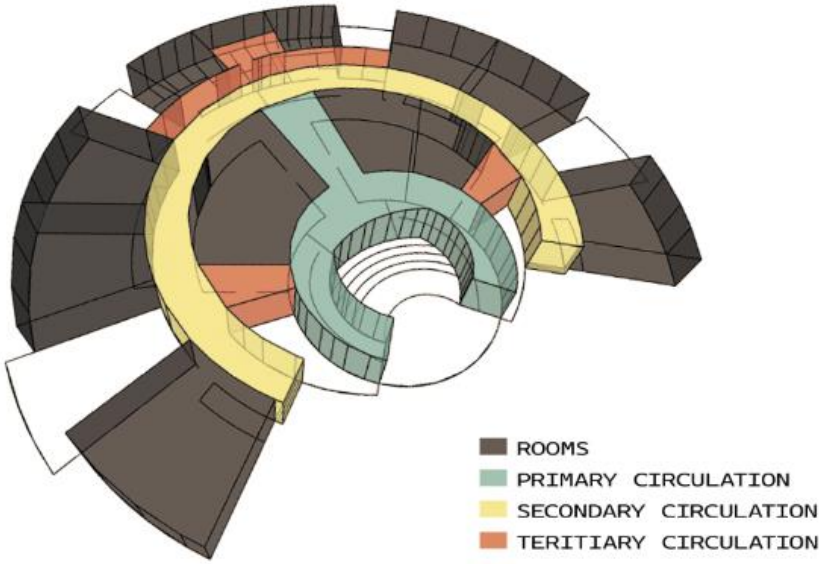



Fig 144 : Circulation Zoning

Source: Author

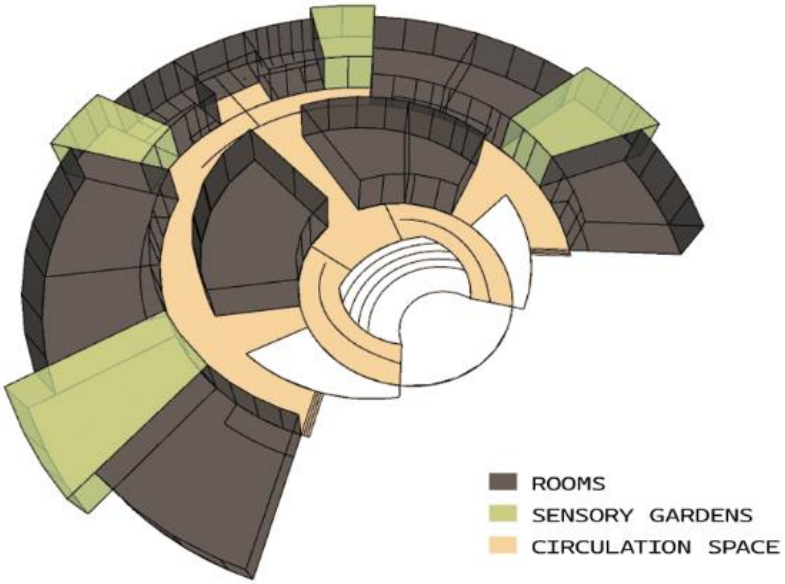



Fig 145 : Sensory Zoning

Source: Author

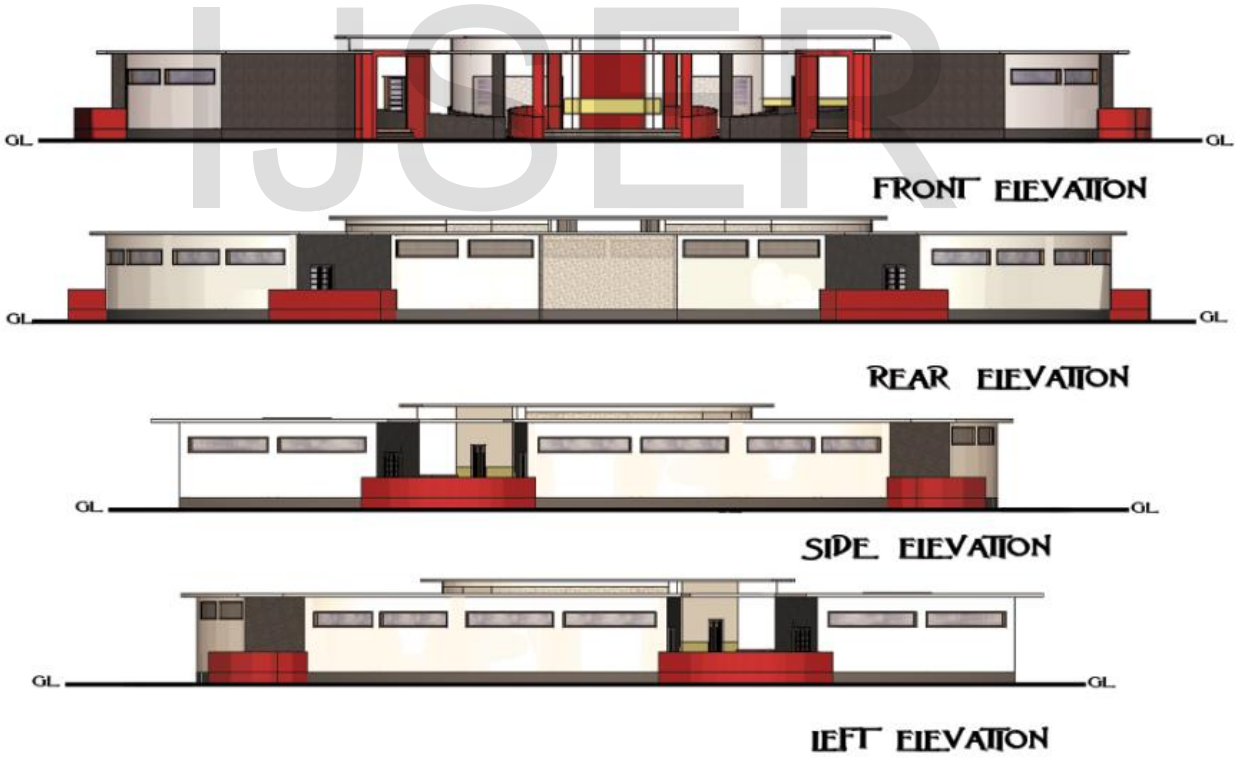



Fig 146 : Elevations

Source: Author


Fig 147 : Front View

Source: Author

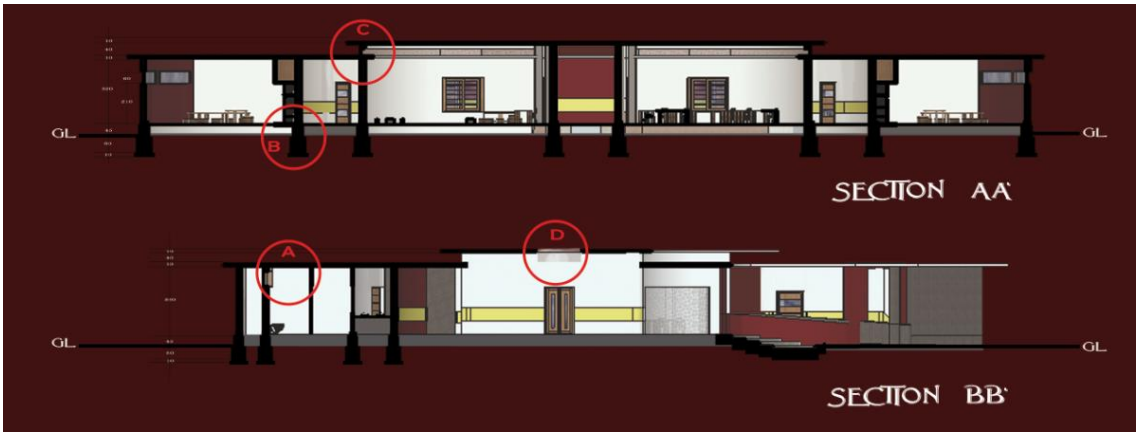



Fig 148 : Sections

Source: Author

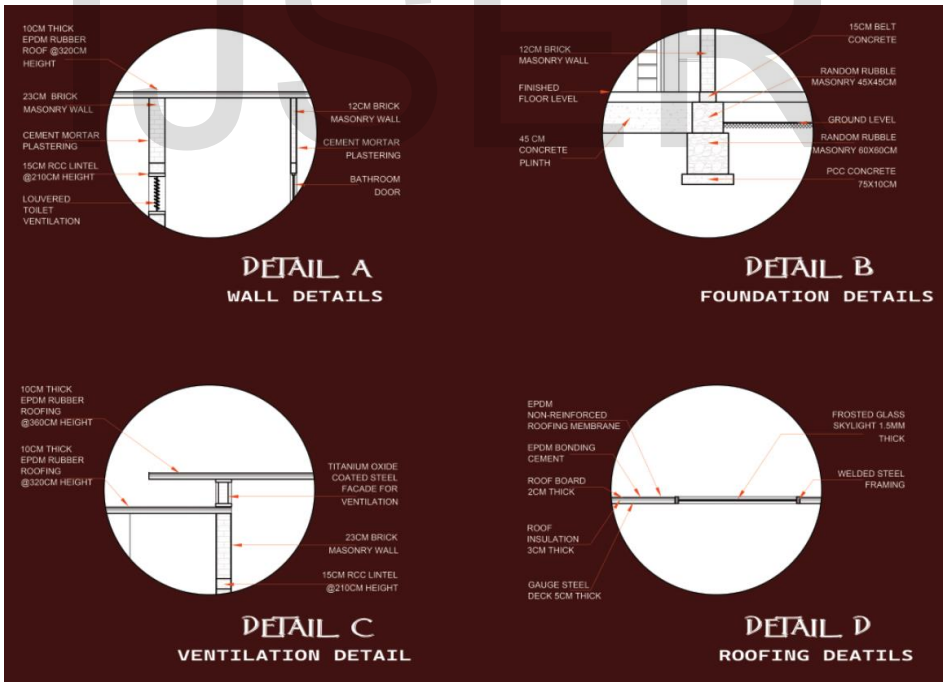



Fig 149 : Details

Source: Author

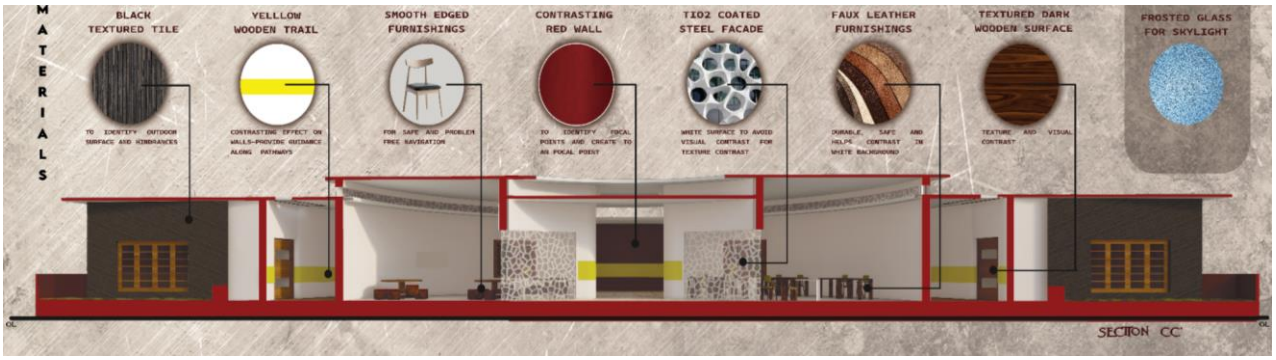



Fig 150 : Materials

Source: Author

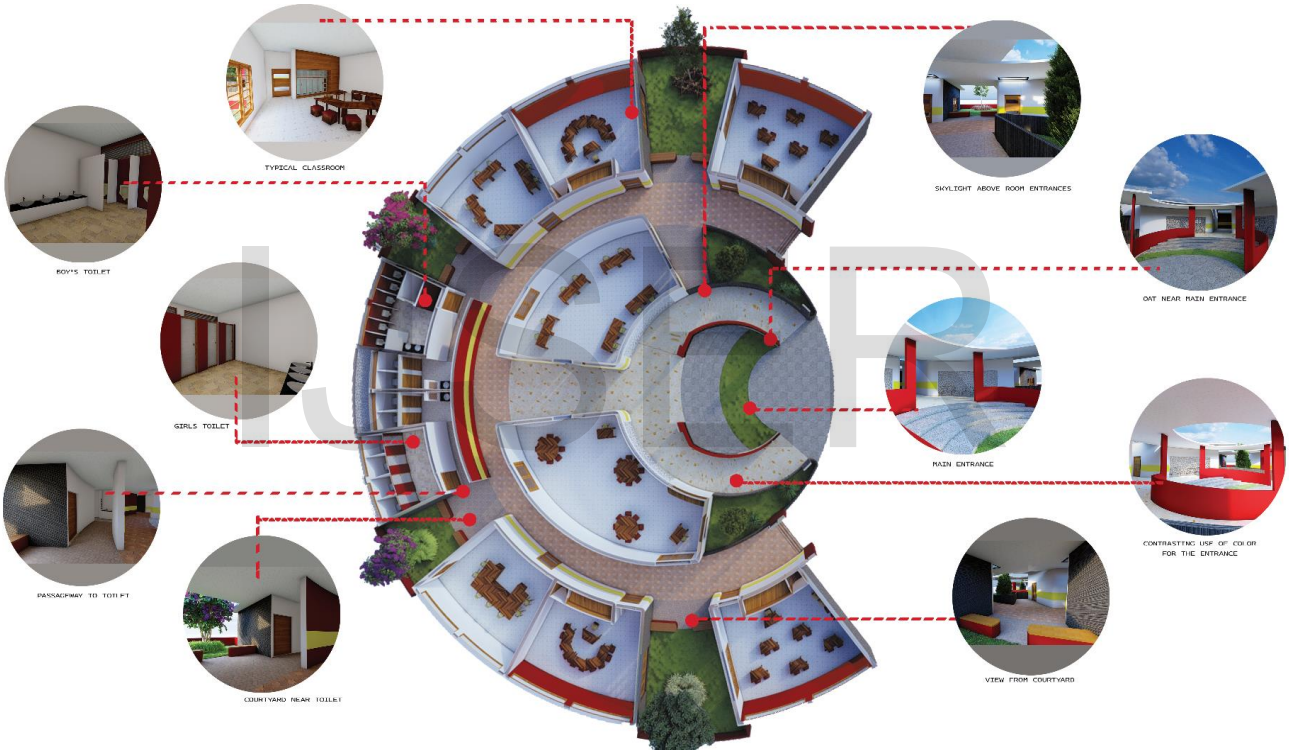



Fig 151 : Views

Source: Author

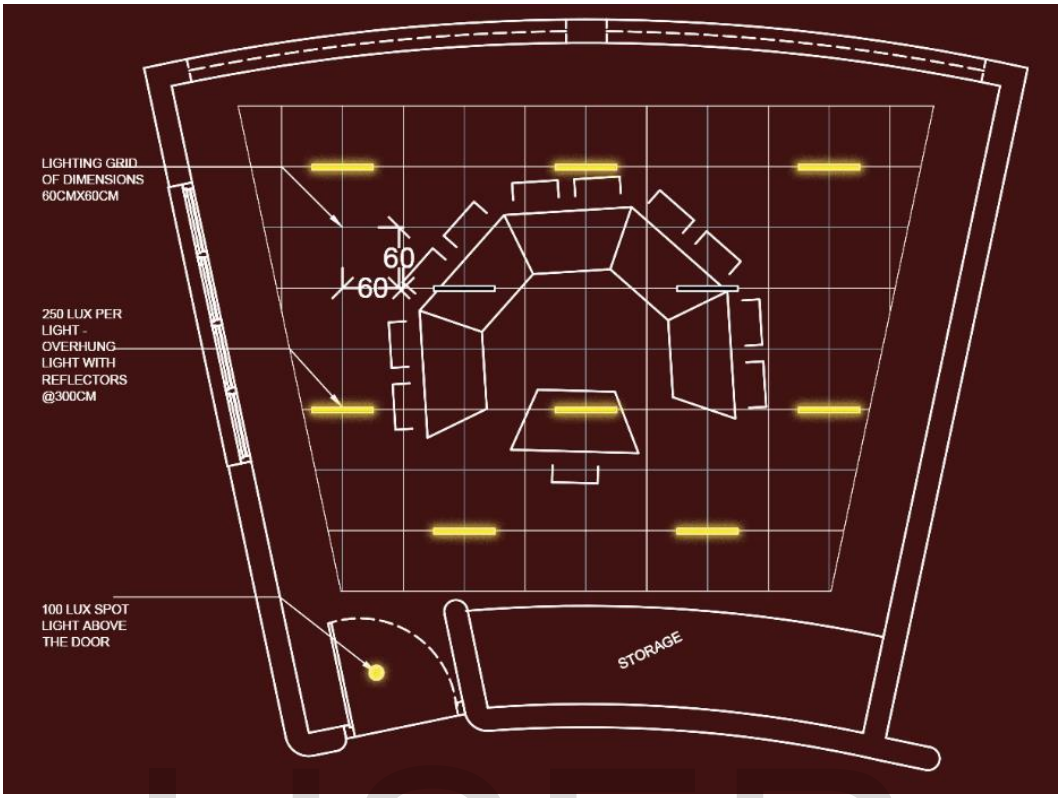



Fig 152 : Lighting Plan

Source: Author

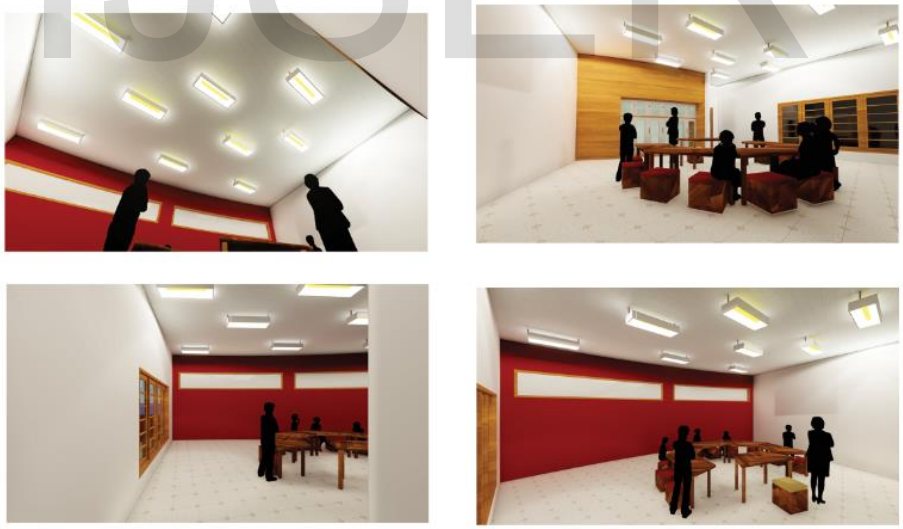


Fig 153 : Lighting Views

Source: Author

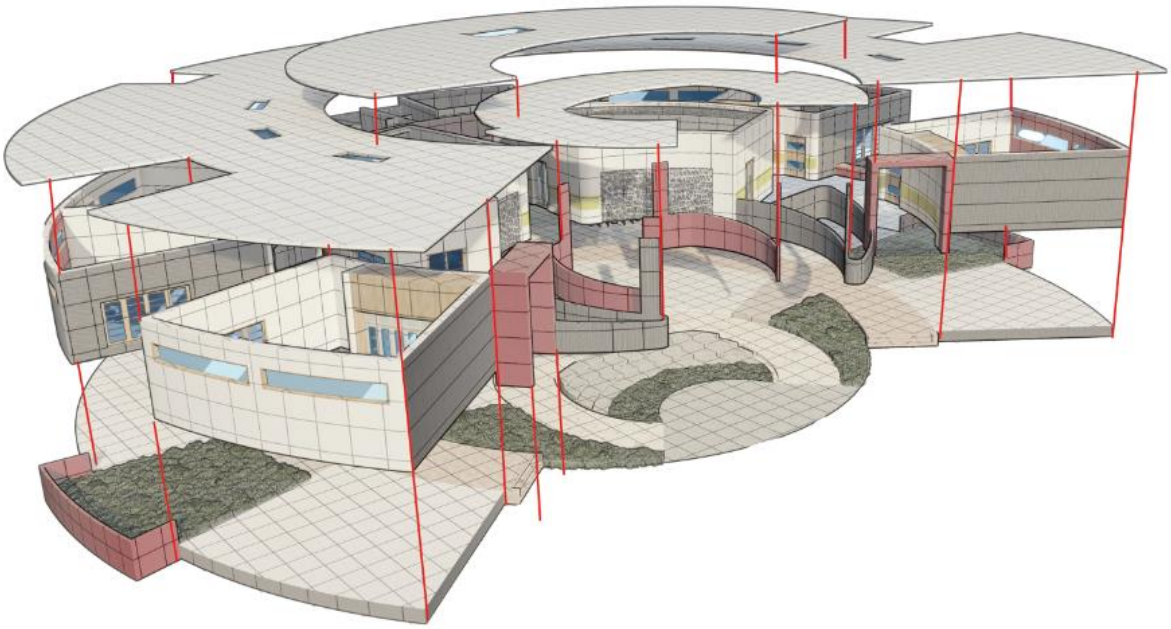


Fig 154 : Exploded View

Source: Author



## 15.2 Main Academic Block

- **Ground Floor Area = 1770 Sq.M**
- **First Floor Area = 450 Sq.M**
- **Total Area = 2220 Sq.M**
- **Students In Each Class = 10**
- **Total Students From 1-12 = 120**

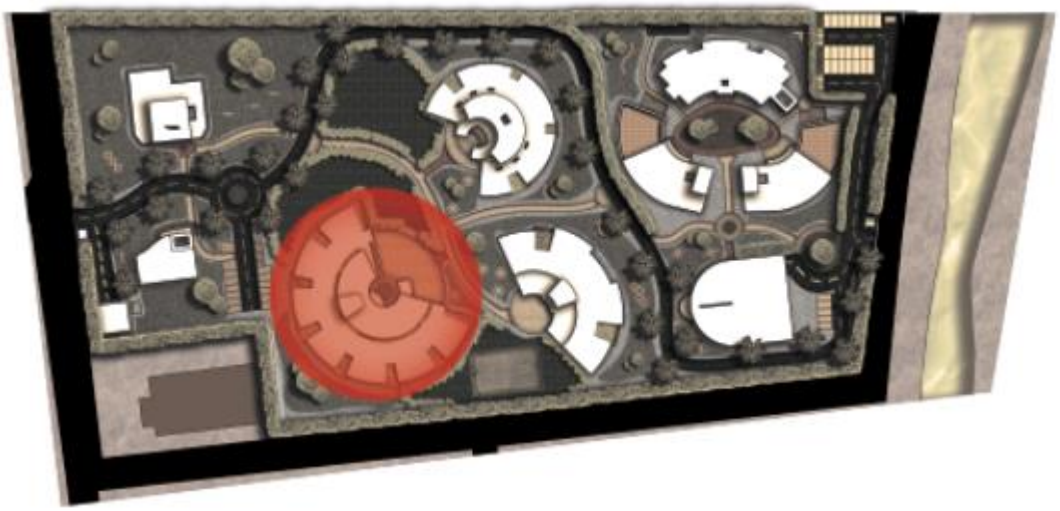


Fig 155 : Key Plan

Source: Author

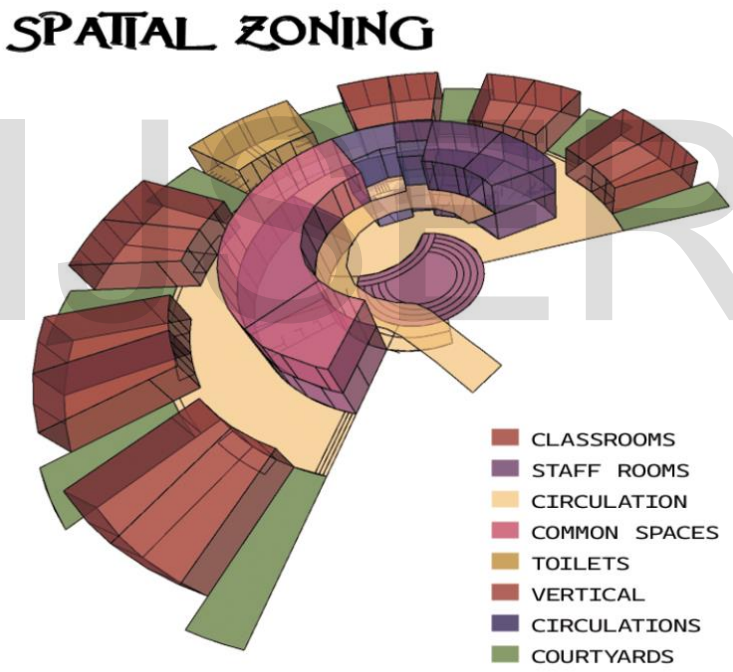



Fig 156 : Spatial Zoning

Source: Author

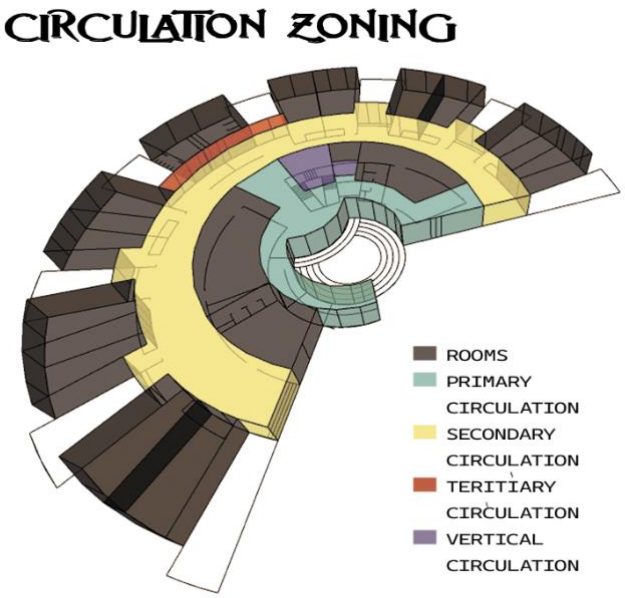



Fig 157 : Circulation Zoning

Source: Author



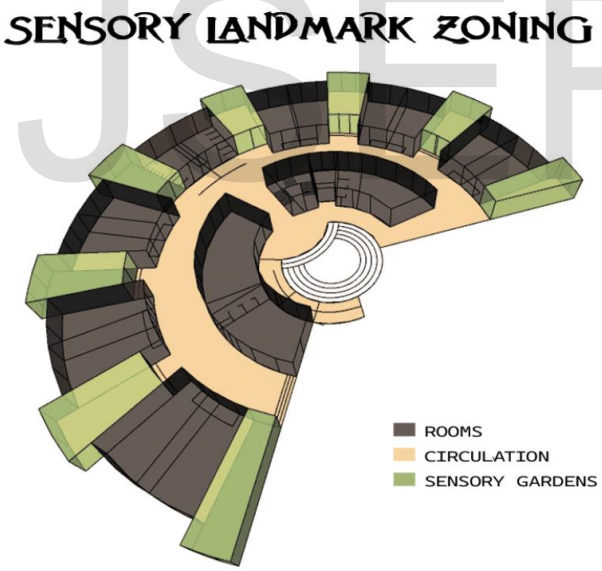



Fig 158 : Sensory Zoning

Source: Author

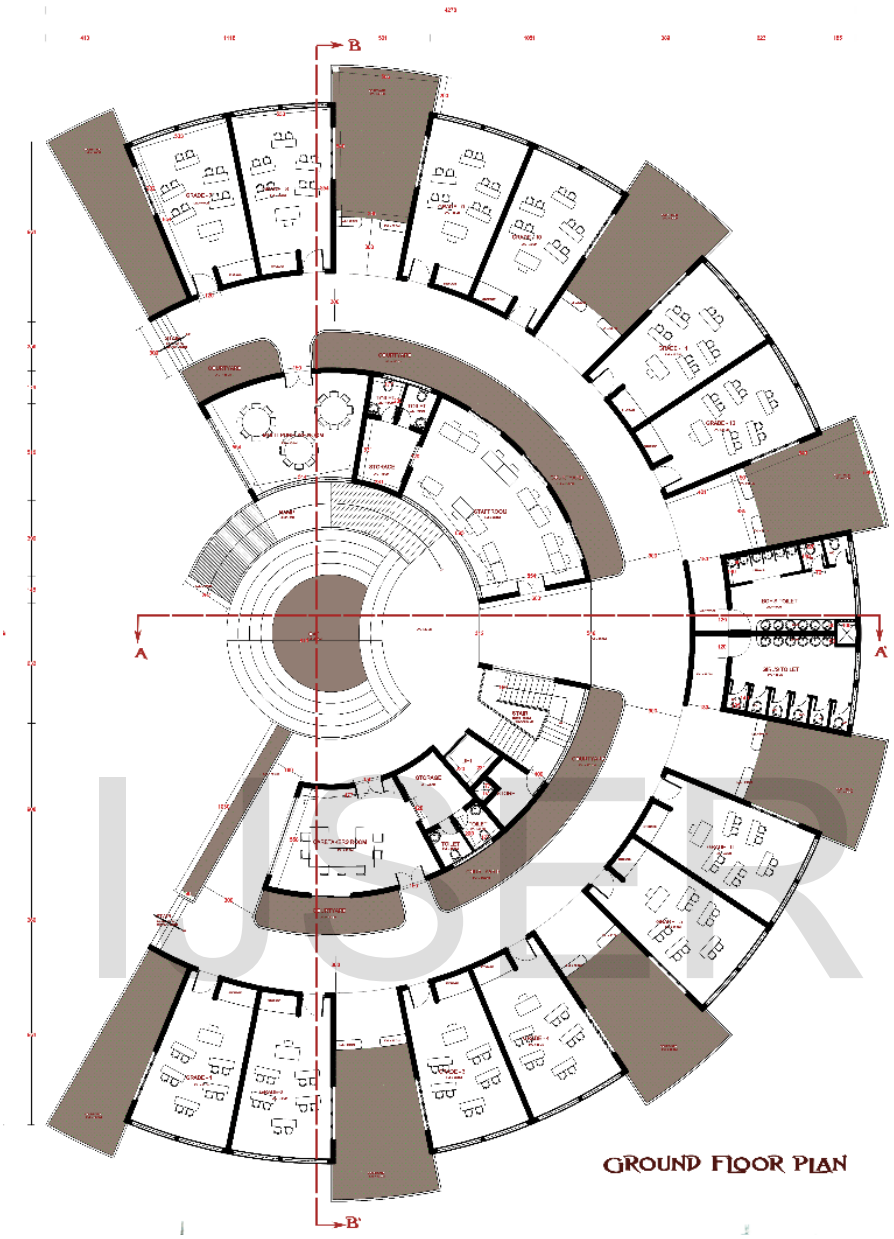



Fig 159 : Ground Floor Plan

Source: Author

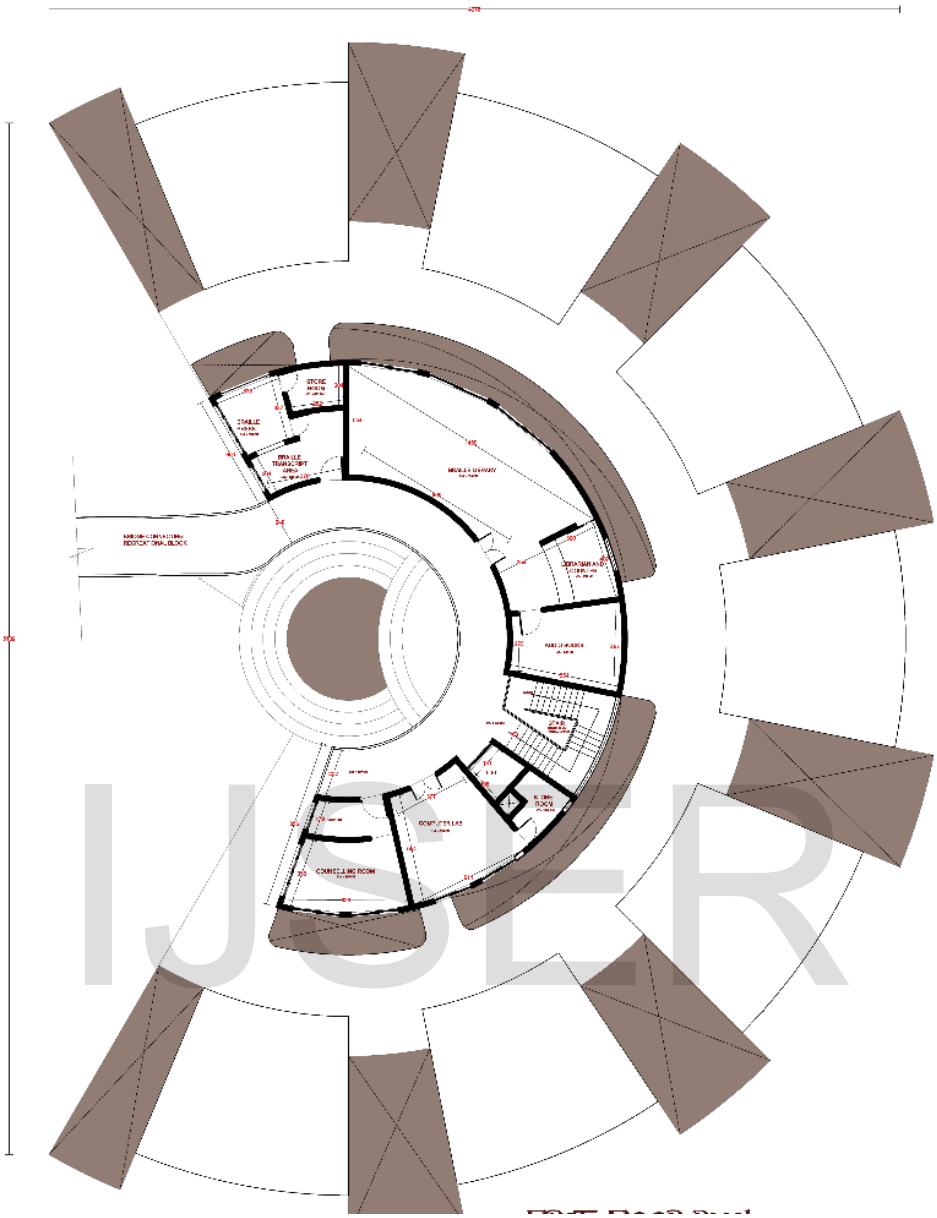


Fig 160 : First Floor Plan

Source: Author

Fig 161 : Front View

Source: Author


Fig 162 : Elevations

Source: Author


Fig 163 :Sections

Source: Author


Fig 164 : Views

Source: Author


Fig 165 : Top View

Source: Author

# 15.3 Administration Block

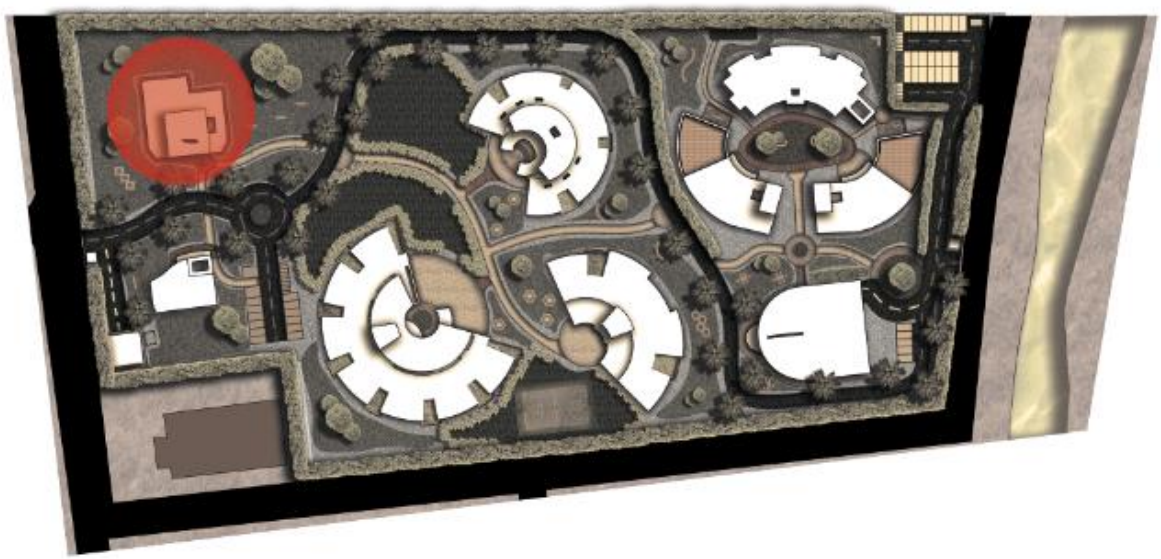


Fig 166 :Key Plan

Source: Author

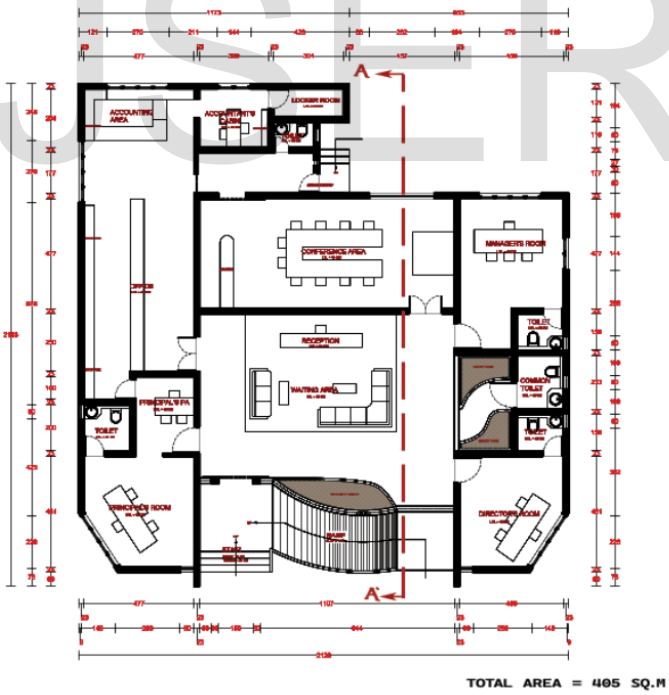



Fig 167 : Ground Floor Plan

Source: Author

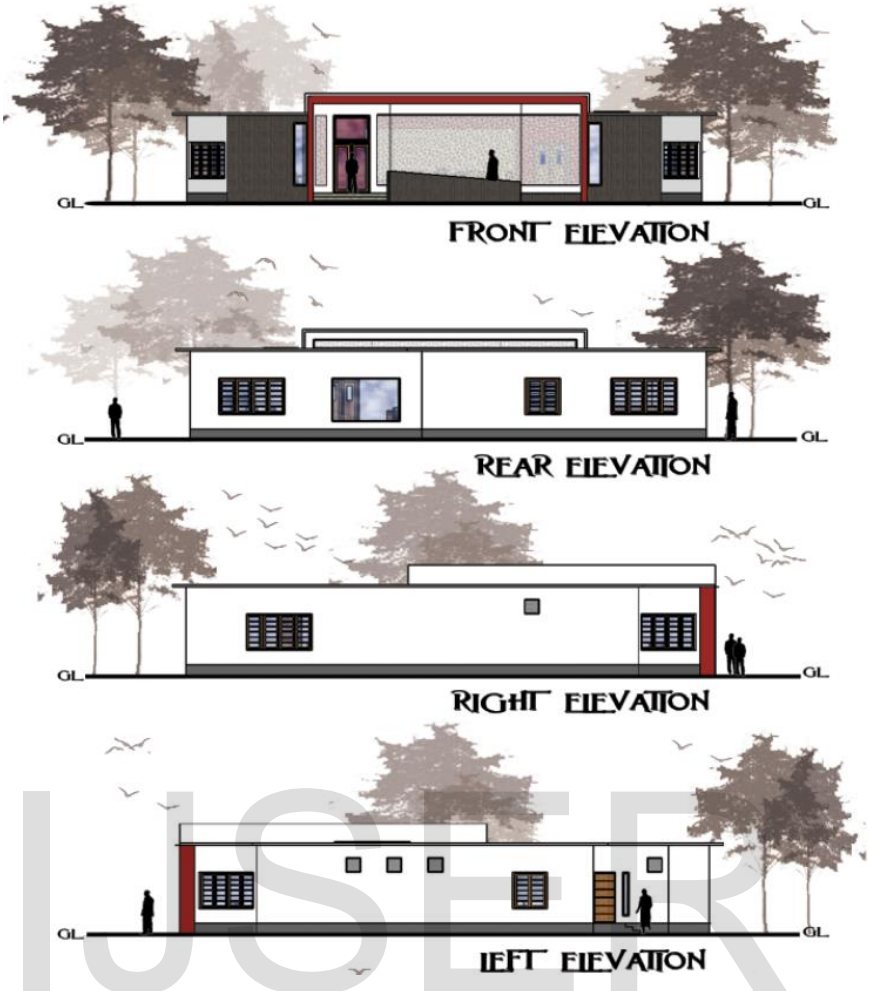



Fig 168 : Elevations

Source: Author

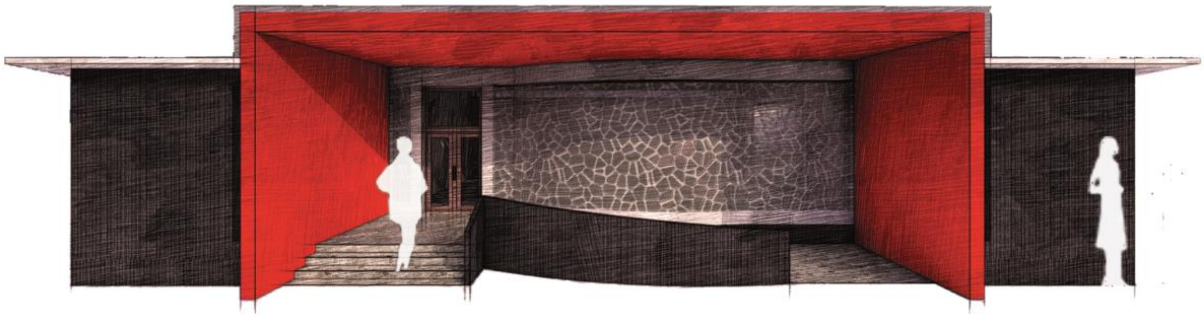


Fig 169 :Front View

Source: Author


Fig 170 : Section AA'

Source: Author

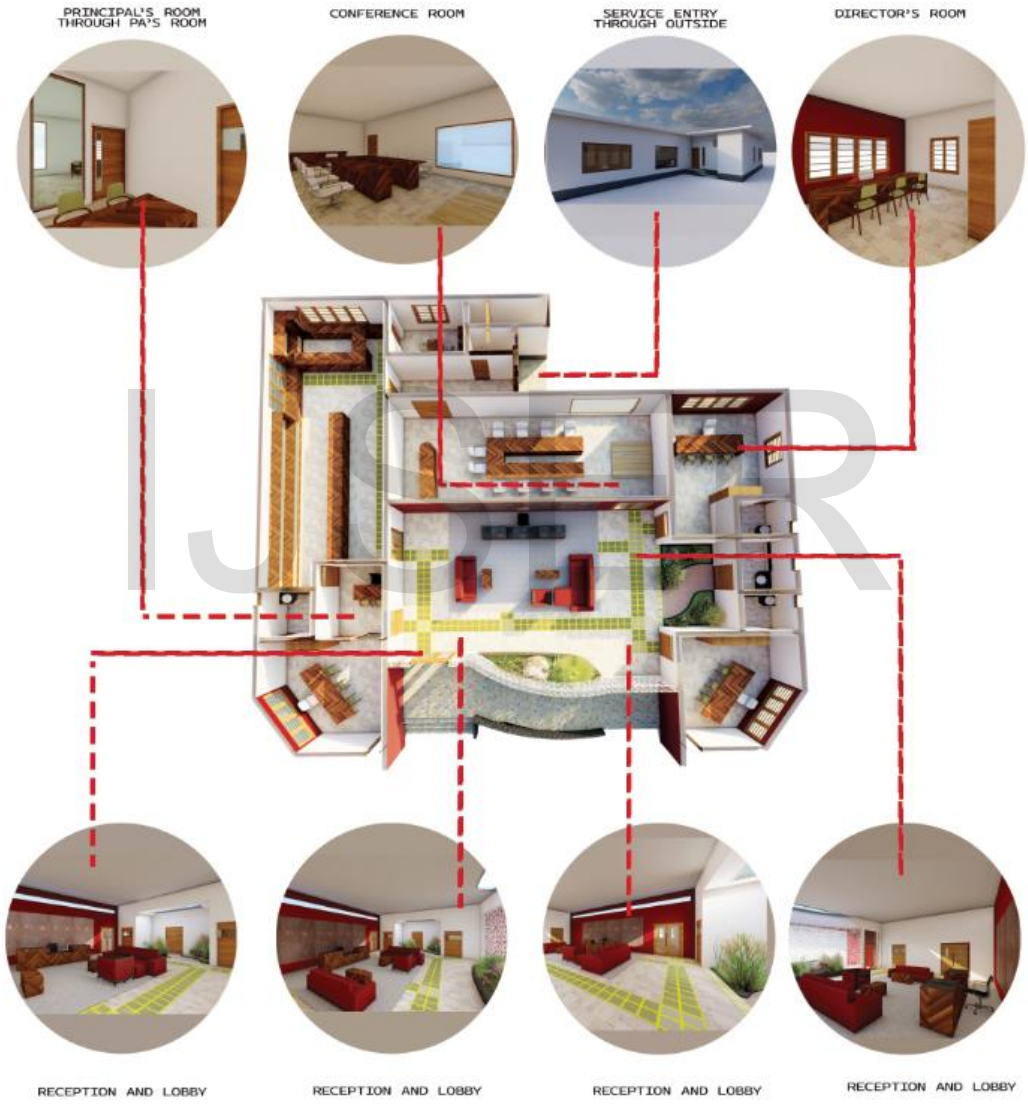



Fig 171 : Views

Source: Author

# 15.4 Hostel

Fig 172 : Key Plan

Source: Author

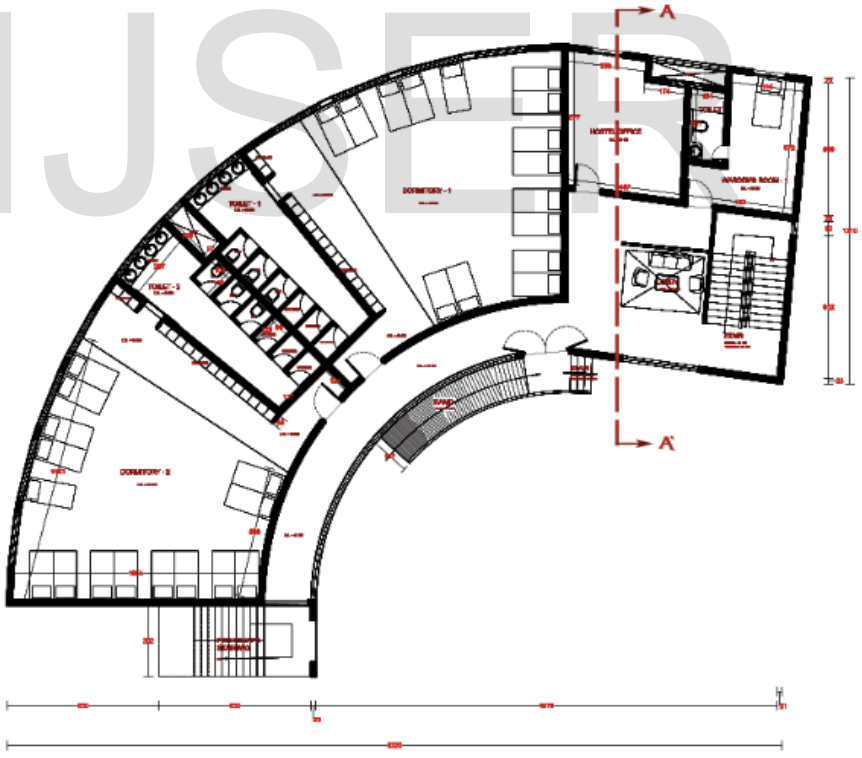


Fig 173 : Ground Floor Plan

Source: Author

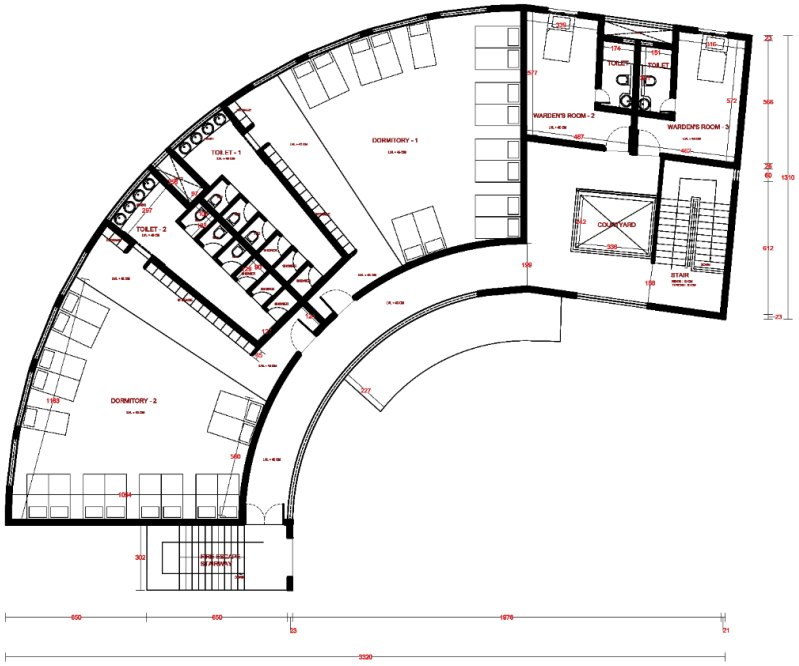



Fig 174 : First Floor Plan

Source: Author



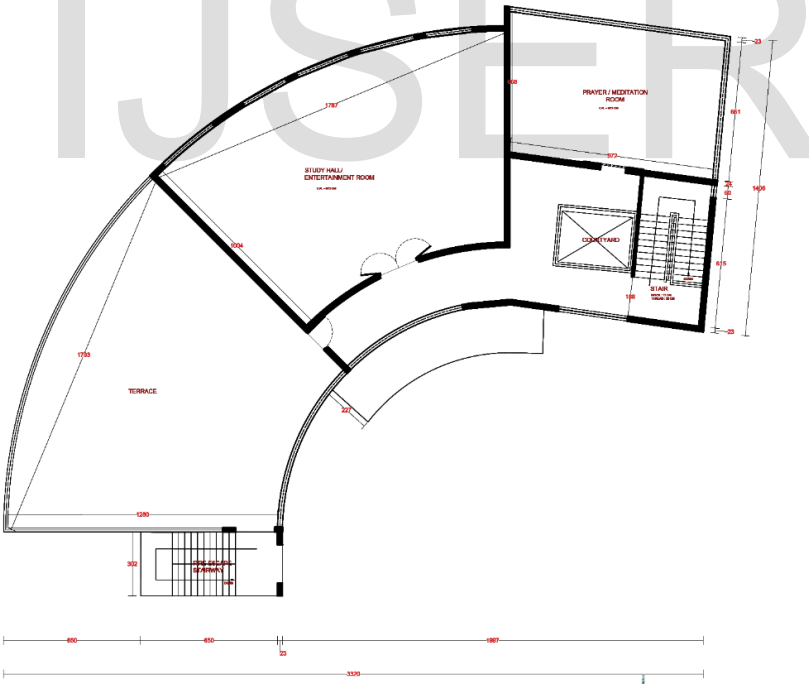



Fig 175 : Second Floor Plan

Source: Author

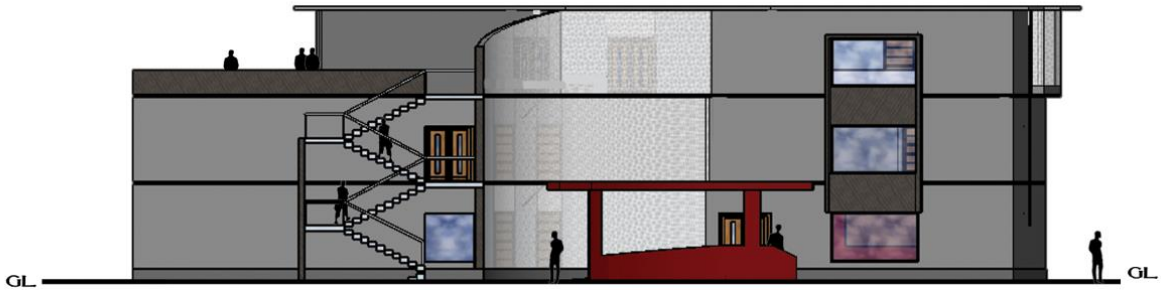



Fig 176 : Side Elevation

Source: Author


Fig 177 : Section AA'

Source: Author


Fig 178 : Views

Source: Author

# 15.5 Staff Quarters

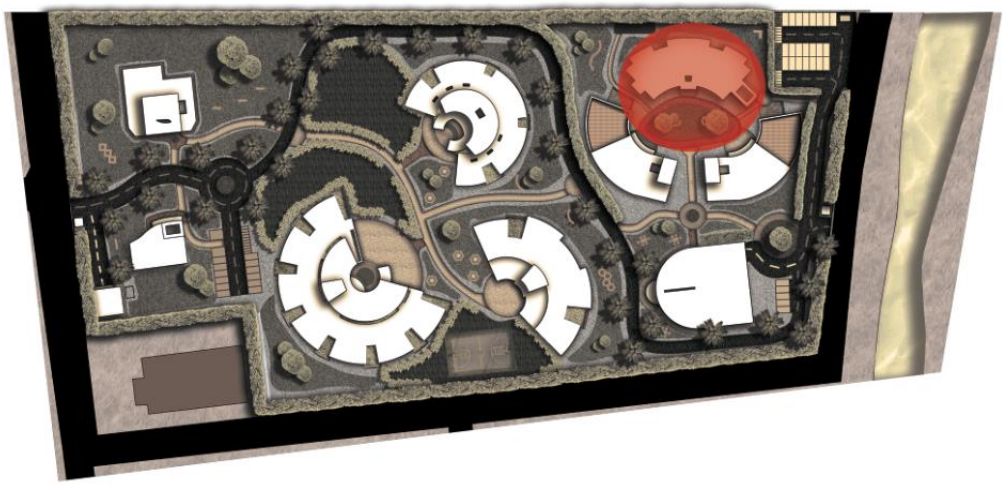


Fig 179 : Key Plan

Source: Author

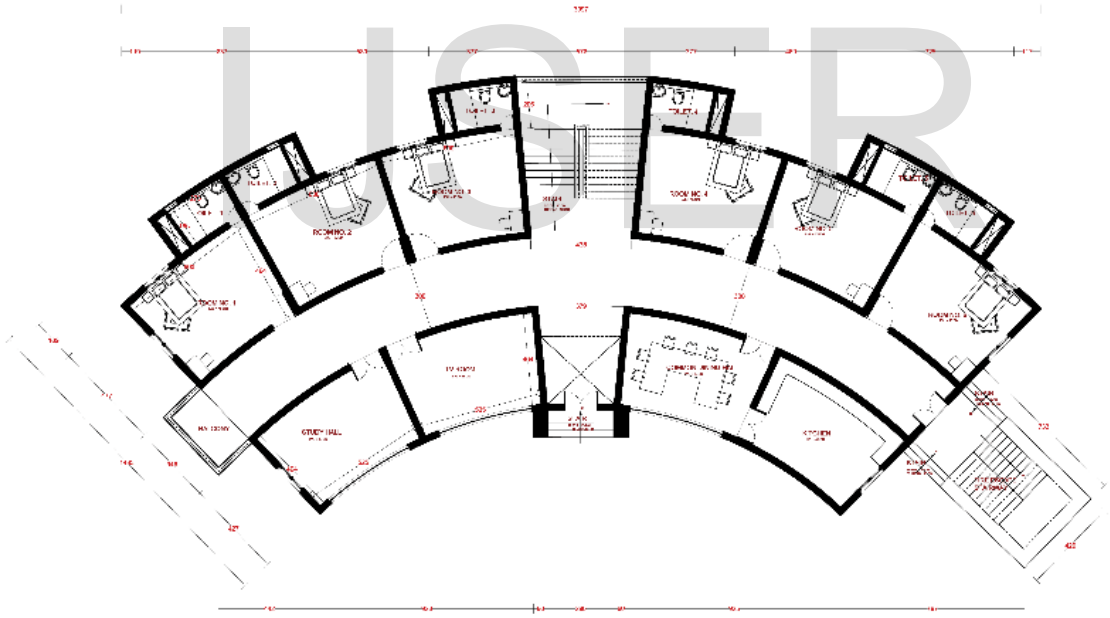


Fig 180 : Ground Floor Plan

Source: Author

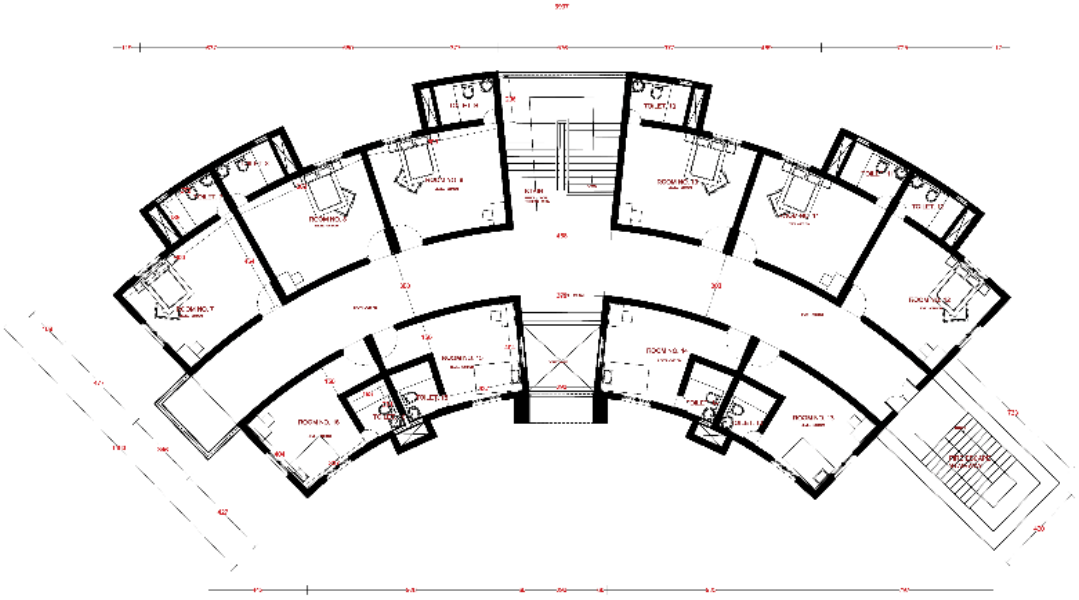


Fig 181 : Typical Floor Plan

Source: Author

Fig 182 : Front View

Source: Author

Fig 183 : Views

Source: Author

# 15.6 Recreational Block

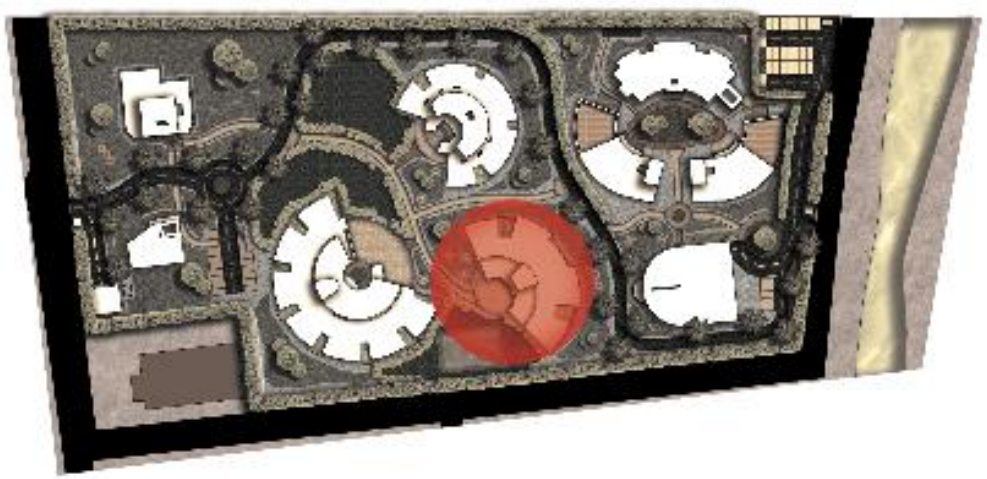


Fig 184: Key Plan

Source: Author

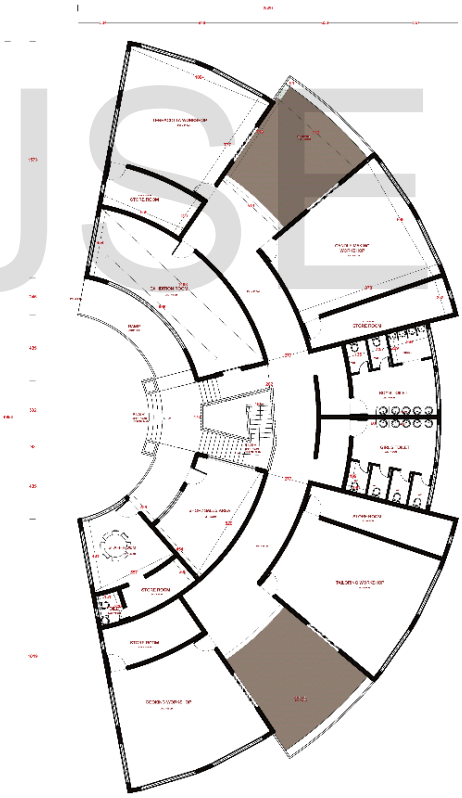


Fig 185 : Ground Floor Plan

Source: Author

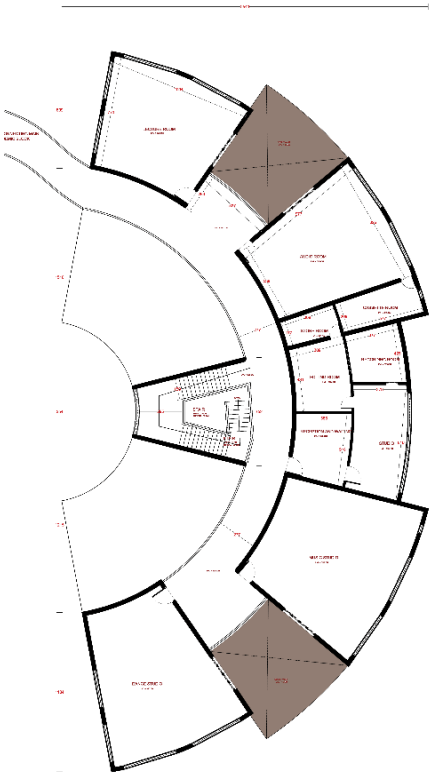


Fig 186 : Second Floor Plan

Source: Author



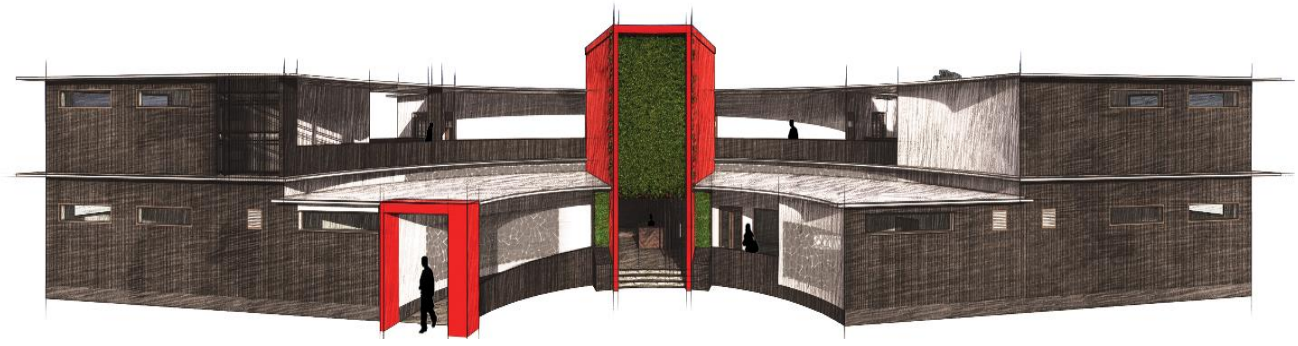


Fig 187 : Front View

Source: Author


Fig 188 : Views

Source: Author

# 15.7 Dining

Fig 189: Key Plan

Source: Author

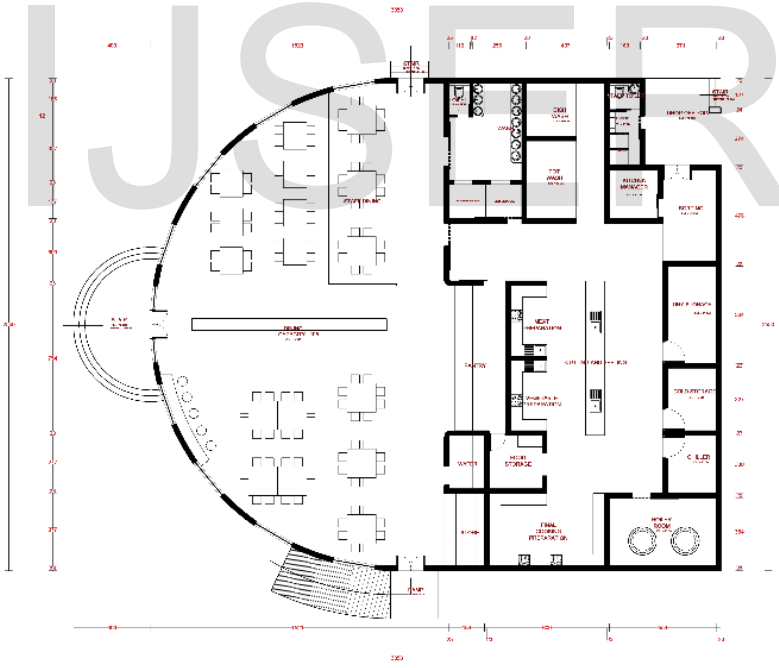


Fig 190:Ground Floor Plan

Source: Author

Fig 191: Front View

Source: Author

# 15.8 Medical Block

Fig 192: Key Plan

Source: Author

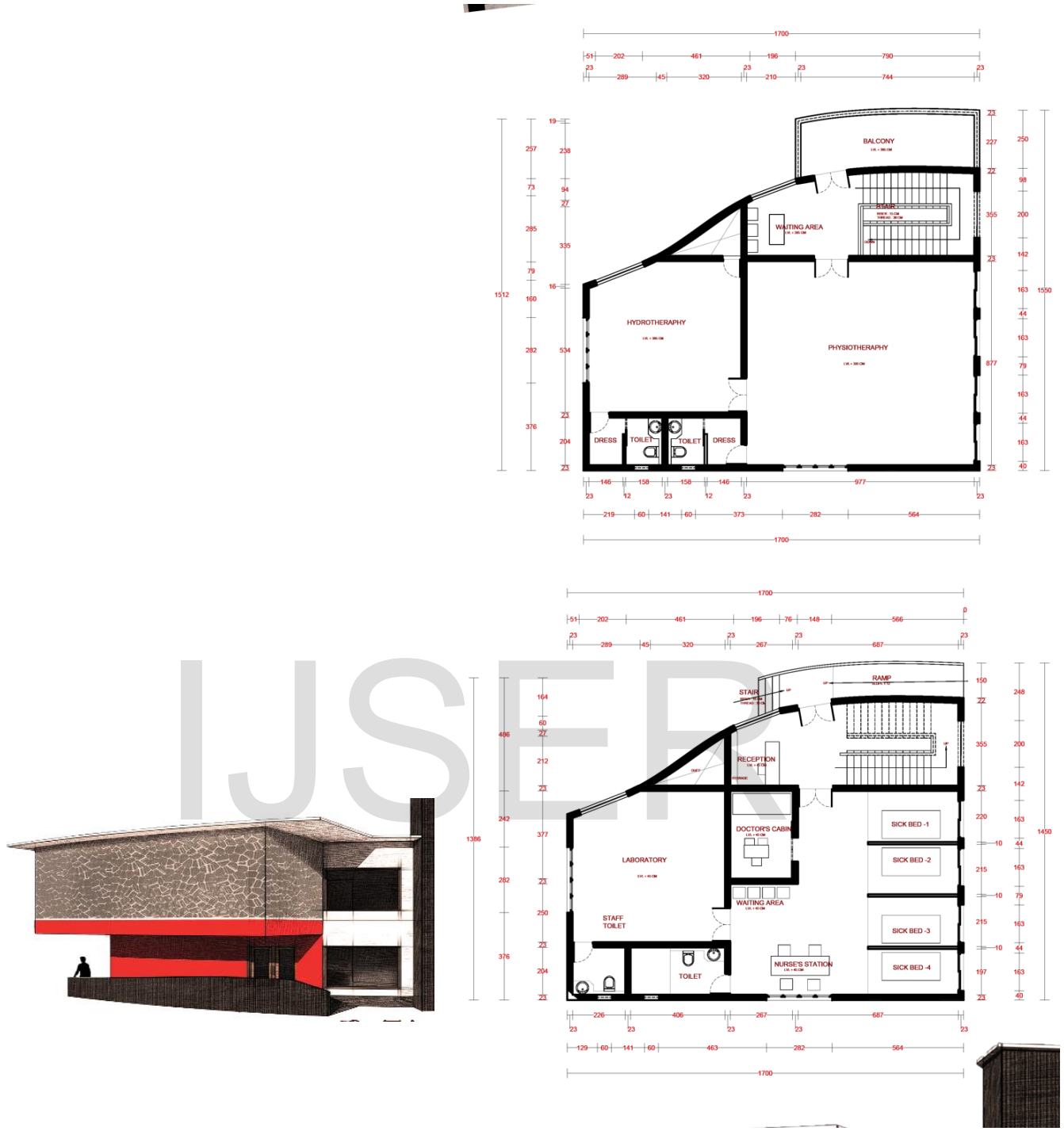



Fig 193: Floor Plans

Source: Author

# 15.4 Service Plan

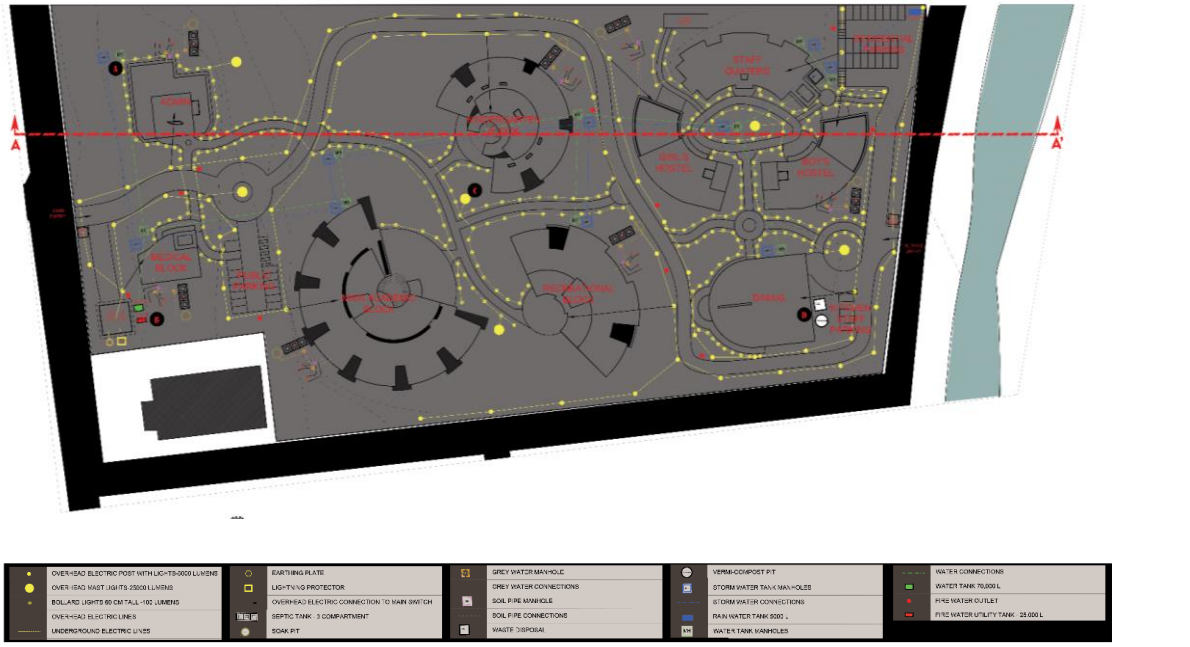
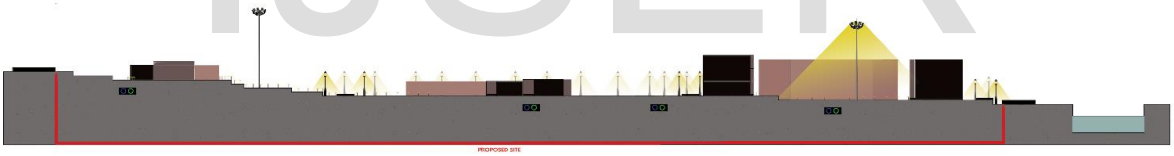



Fig 154 : ServicePlan

Source: Author





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