CENTER FOR BLIND CHILDREN
DHAKA

By

Syeda Anika Humaira

ID: 10308008

Supervised By

Mohammad Faruk
Assistant Proffessor
&
Nandini Awal
Assistant Proffessor
Brac University

Seminar II

Department of Architecture

BRAC University

66, Mohakhali

August 2015

A Design Dissertation submitted to the Department of Architecture in partial fulfillment of the requirement for the degree of Bachelor of Architecture (B. Arch) in the Faculty of BRAC University, Dhaka. Information given within this Design Dissertation is true to the best knowledge of the student mentioned below. All possible efforts have been made by the author to acknowledge the secondary sources information. Right to further modification and/or publication of this Design Dissertation in any form belongs to its author. Contents within this Design Dissertation can be reproduced with due acknowledgment for academic purposes only without written consent from the author.

Syeda Anika Humaira
ID-10308008
Dept. of Architecture
BRAC University
Dhaka,2015

Acknowledgement :

I would extend my gratitude towards every person who has been a part of my education of five years and architecture life but before that I would like to thank my Almighty Allah for bringing me to where I am and blessing me with the people around for support and imparting me with patience throughout. I will be forever indebted to my parents; Ammu for her endless and mental support despite the many obstacles that came my way. I owe my gratitude to the people who have inspired me throughout these five years and enhanced my learning experience with their advice and encouragement-

Professor Fuad H. Mallick, PhD (pro-vice chancellor, BRAC University)

Prof. Zainab F. Ali

Ar. Mohammad Faruk Sir

Ar. Shakil Ahmed Shimul Sir

Ar. Mohammad Habib Reza Sir

Ar. Abul Fazal Mahmudun Nabi Sir

I would also like to thank Ar.Mujibur Rahman Sir for being my advisor and advising me throughout these 5 years of journey and all my teachers at BRAC University who have taught me and illuminated my life.

I also owe my gratitude to the following persons-

Umme Hani whose constant support throughout the 5 years of my architecture life has made things easier and for being a constant companion throughout. Anika Mahjabin, Faheem Huq, Ashique and Kazi Mithila for constantly believing in me, encouraging me and helping me whenever needed.

My deepest gratitude to Tithi Chowdhury and Sharmeen Mostafa who has been a constant companion during my thesis days and for boosting me whenever I was on the verge on giving up. This project could not have been completed without them

Special thanks to Pronnoy Das, Sadia Tarannum, Trisha, Fahad Shamsuddoha, Pauroma Taan, Fariha Rashid and Fahim Rubby.

ABSTRACT

The disabled children-blindness and visual impairment being one of them are the most deprived of education right in Bangladesh. When quality education is a critical component of child development and a means of self empowerment, independence and social integration—disabled children are disentitled of this component as well This paper is mainly focused on the importance of a space for blind children. This paper also highlights the universal accessibility consideration both interior and exterior of the buildings or any space. The design process consider the suitability of site, necessary functions and the main aim of the project is to make the people conscious about universal accessibility and make the blind children a part of our social and cultural activity which will in turn make these children more strong, honest and self confident. In Bangladesh there is about a population of 40000 blind children and most of them live in the rural areas where they receive minimum attention. There are many organizations working in order to educate them and many eye hospitals working in close collaboration. Some are treated and receive therapy. But those who remain untreated are mostly deserted from the society because they cannot adapt to a normal life like others. A blind child not only needs education but also is in dire need of a center which will guide him to lead his life and prepare him to live in a 'society' .So, there should be no doubt about the necessity of this project as it benefits that part of the society which has been neglected for so long. Architecture has the power to empower them and change their lives. So this center will be aimed at the betterment of the lives of these blind children who are greatly ignored.

Table of Contents

CHAPTER 01: Introduction

1.1 Background of the project

The Center for the Blind and Visually Impaired is to provide services to one of the most disadvantaged and highly-populated areas of the city; the district with the largest visually impaired population of children in the country. Statistical data show that more than 39 million in the world are bereft of vision. Blindness is one the major health care problems in Bangladesh and it very prevalent among children which is a 0.75 per 1000 children (WHO) according to global estimates. So there stands a whole population 40,000 of blind children in Bangladesh.

Among these 12,000 (UNICEF, 2005) are suffering due to an un-operated cataract and in need of surgical care from well-developed eye-care facilities. Community based preventive measures will be needed to prevent 25% of all childhood blindness, which is related to vitamin A, deficiency disorders, diarrheal diseases, malnutrition and measles. Refractive error in children aged 5 to 15 is an important health problem. Population based refractive errors have shown that nearly half of the visual impairment related with corrected refractive error of this age group is not receiving attention, especially those living in disadvantaged social and economic conditions. As these remains uncorrected, visual impairment persists. Among these approximately 80% of these children live in rural areas and 90% of the ophthalmologists live in the urban areas. Hence they remain unattended and their parents unaware and uneducated about blindness. Socio-economic conditions plays a significant role. They are still considered as a burden for the society and very much ignored.

Many vision programs, non -governmental and governmental sources and NGOs have been working in all districts as a collaboration to educate these blind children but clearly they remain unsuccessful at a certain point. It is only boundless to the basic education. The ways to deal with the many hassles that they come across are not taught at these schools. They are not taught to live like a normal child doing normal activities. This project is aimed at making a difference to the lives of the children who are much ignored in the society for their disability and cornered .These kind of projects are not very scarce in the western world but in Bangladesh this seems to be an ancient idea thus far. With this, a certain population of Bangladesh will revive themselves, will be empowered and also benefit to the socio-economic conditions of the country by becoming active members of the society.

1.2 Project Brief

In later years, a blind child appears to have ambivalent emotional involvement and appears disinterested, non- communicative, and uninformed about the rudiments of play with his/her peers. Consequently, he/she may be avoided by his peers and rejected or overprotected by strangers and relatives. Not only by his/her peers but by the society at a certain point in life. They become helpless and ineffective. Architecture has the power to empower them, change their lives. It has tremendous power to help individuals with blindness, and other disabilities for that matter, gain independence. In as much as it hinders their independence, appropriate architecture can help regain it. If the primary problem of blindness being understanding, coping with and responding to the sensory environment, one can grasp the power of architecture in their everyday lives. The built environment in this project can provide the large majority of sensory input- light, acoustics, textures, colors, spatial configurations, ventilation etc. By manipulating the design of the environment we can manipulate that all-so-important sensory input to instill certain ideas of the environment so as to trigger recognition in the child which will help him adapt to the surrounding around him thus in later life. He/she will be able to act and play an active role like other normal kids in the society and not feel the core of blindness or being a blind child. This centre is aimed to be located at the most disadvantageous districts of the country with the highest number of blind children population at the moment and enrich them with its facilities.

1.3 Aims and objectives of the project

A centre for the blind children is dedicated to the idea that these visually impaired children can become productive and independent members of the society. It will be an initiative to take blindness to a whole different perspective and not only educate them but make them socially active and adaptable to environments and different settings of life. It will nurture their skills and enhance them through different activities. Their parents will be educated and imparted with knowledge and understanding about how to deal with blind children and understand them and their conditions. It will help them become active members in their household chores and socialize normally like other children which in turn help to make them independent. The main objectives of the project to be stated more clearly are:

- services provided to blind or visually impaired students by qualified personnel to enable those students to attain systematic orientation to and safe movement within their environments in school, home, and community;
- Spatial and environmental concepts and use of information received by the senses (such as sound, temperature, and vibrations) to establish, maintain, or regain orientation and line of travel (e.g., using sound at a traffic light to cross the street)
- To use the long cane to supplement visual travel skills or as a tool for safely negotiating the environment for students with no available travel vision;
- To understand and use remaining vision and distance low vision aids; and
- Other concepts, techniques, and tools
- Develop an awareness of the environment in which they live; and
- Learn the skills necessary to move effectively and safely from place to place within that environment (e.g., in school, in the home, at work, and in the community)
- enhance their other skills and help nurture them
- provide with workshops to enlighten their parents

1.4 Specified Programmes

The project or the centre will provide them with spaces and programmes that can create stimulating environments that encourage children with disabilities. This project will will use environment friendly materials since it will contain of spaces that will accomodate children. Spaces will be needed to be designed very sensitively. Spaces will be designed such that it is identifiable by the user by varying size, light intensity and weight of materials. Programmes specified for this project are illustrated below:

- Training rooms
- Library
- Practical learning areas
- sound and touch gallery
- creative art areas-art, dance, music
- study classrooms
- Entertainment areas

- Cognitive indoor play space
- auditorium
- workshop areas
- consultation centre
- community education/volunteering
- cafeteria and utility area
- Administrative areas

CHAPTER 02: Site Appraisal

2.1 Location of the site:

Location: Agargaon, Sher-e-banglanagar, Dhaka, Bangladesh

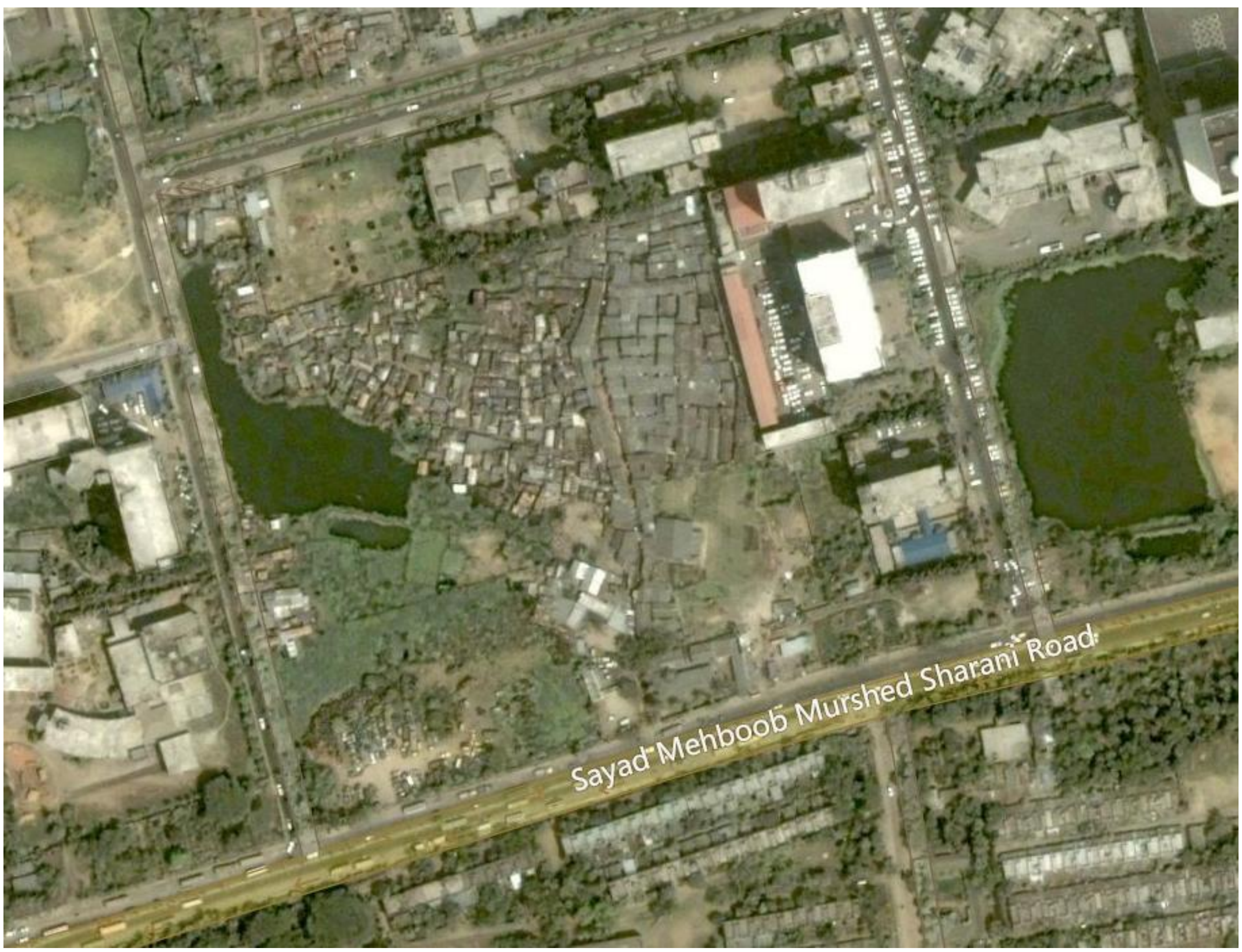
Site area: 522720 sq. ft. , 12 acre (approx)

Plot no.- D-30

Altitude:9m from sea level

Latitude: 23"46' N

Longitude: 90"22' E



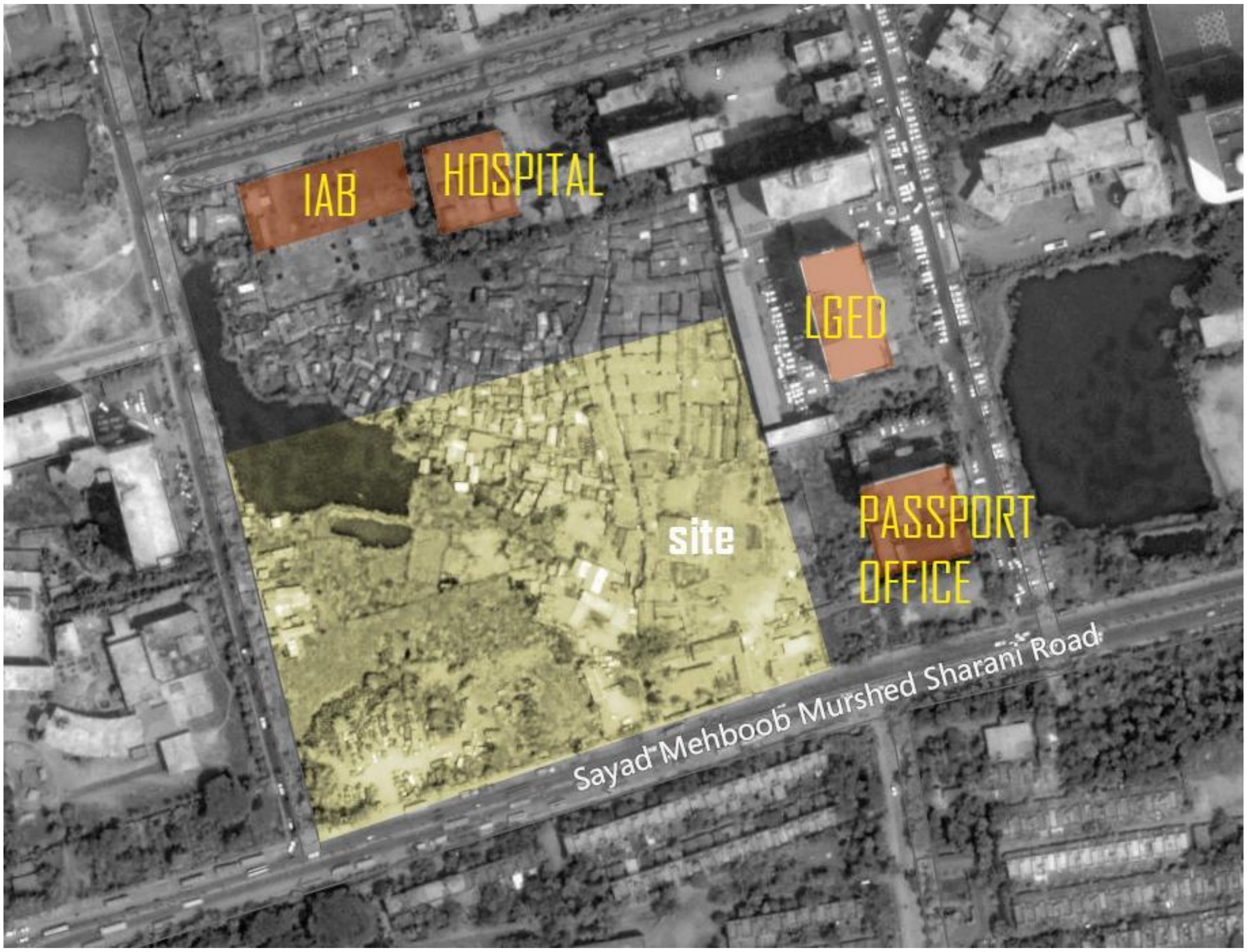


fig. 2.1.1 : location of the site(source: google earth)

2.2 Site Surroundings:

Currently occupied with illegal build slums, tea stalls, temporary Bus stand, and a portion of it used by the police. Maximum land area is now marshy low lying vacant land.

fig. 2.2 : panaromic view at the entry of the site at present

2.3 Environment considerations:

2.3.1. Green and important places:

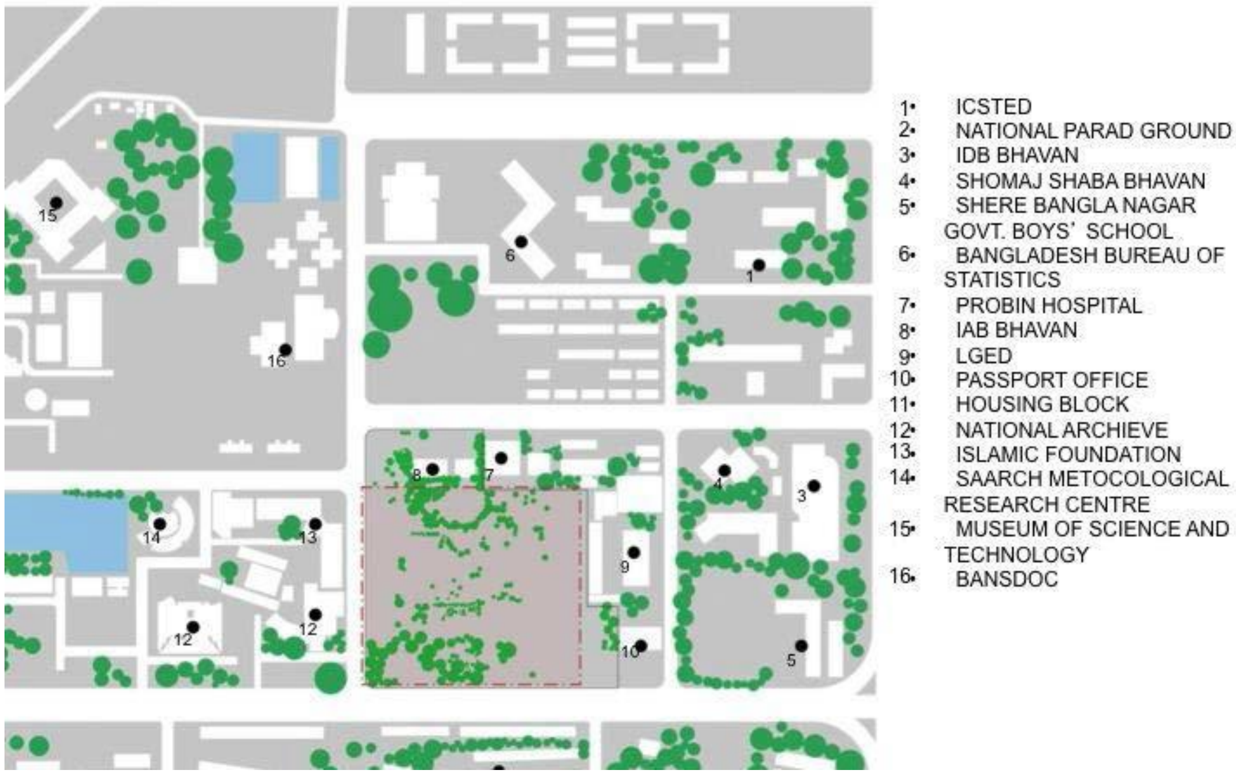


fig 2.3.1: Green and important places (source: Mahmudul Islam Chowdhury)

2.3.2. Existing traffic condition:

fig 2.3.2: Traffic map (source: Mahmudul Islam Chowdhury)

2.3.3. Wind analysis:

fig 2.3.3: Wind analysis (source: Mahmudul Islam Chowdhury)

The site receives constant southern breeze as the building heights of southern side is not more than two storied. West side is blocked with buildings;do not need any Shading implementations. It also receives ample amount of north light.

2.3.4. Permeable green:

fig 2.3.4: Permeable Green

2.3.5 Zoning:

fig 2.3.5: Zoning (source: Mahmudul Islam Chowdhury)

The site is located in a mix land use of Agargaon to Kahn's master plan. To the south and north , land is used for housing. To west and east is used for civic sectors. The site is surrounded mostly by schools, different offices, conference hall and museum.

2.3.6 Temperature:

Season	Month	Maximum (Degree C)	Minimum (Degree C)
Dry-Summer	March- June	40	35
Monsoon	July- October	30	32
Winter	Nov- Feb	26	28

fig 2.3.6: Temperature chart of Agargaon

(source: http://weather.mirbig.net/en/BD/81/1349452_Agargaon])

fig 2.3.6: Temparature chart of Agargaon

(source: http://weather.mirbig.net/en/BD/81/1349452_Agargaon])

2.3.7 Rainfall:

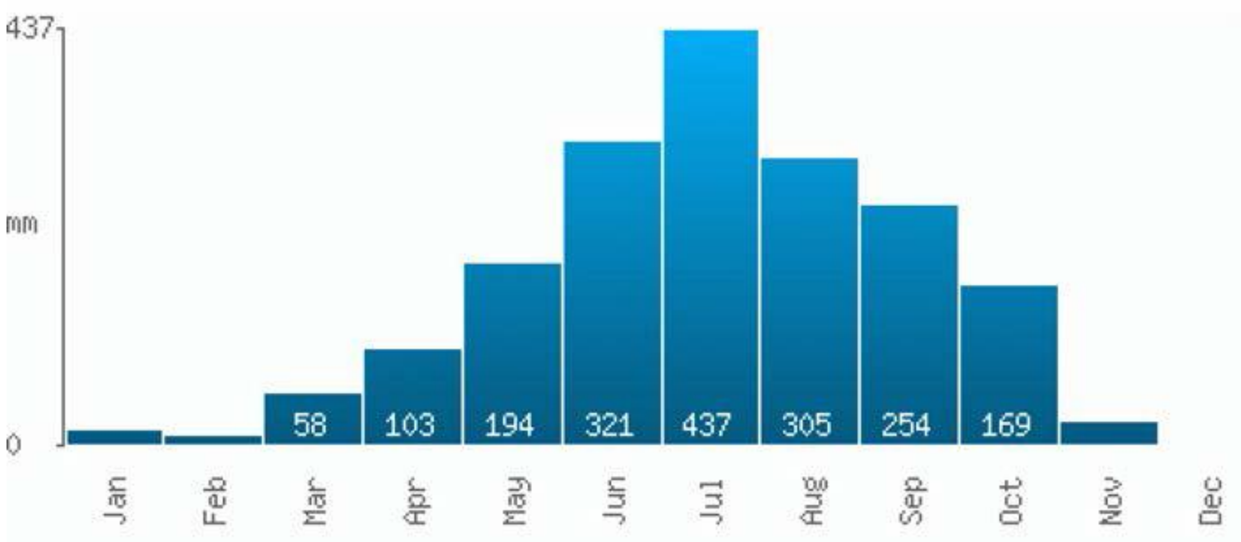


fig 2.3.7: Rainfall chart of Agargaon

(source: http://weather.mirbig.net/en/BD/81/1349452_Agargaon])

2.3.8 Views of the site


প্রবীণ নিবাস ও

fig 2.3.8: Views of the site condition at present (From top to bottom)

2.4 SWOT Analysis:

Strength:

- Lots of trees in the site.
- The front side of the site is open with main road .

- Enough land and space for an institutional project.
- The site has no rush of traffic which is helpful for researcher
- It is located almost centrally in the city and easily accessible
- National ophthalmology right beside it which will support they blind center.
- Low height surrounding structures

Weakness:

- Noisy surrounding might bother the children
- The present access road is very narrow
- The site is larger in the east-west side. So it should be handled sensitively
- The site and surrounding is not properly taken care by authority

Opportunity:

- As the area does not have a proper public place, this site will give a chance to flourish the idea of public place in the city
- The other public building around the site would act as positive forces for the centre.
- It will initiate a new kind of development in this area

Threat:

- If the site is not handled appropriately, It might make a bad effect in community
- The environment would be affected if the ratio of build area and green is not properly balanced

CHAPTER 03: Literature review

3.1 Understanding and blindness and visual impairment

As provided in the federal and state regulations, a “visual impairment including blindness” means an “impairment in vision that, even with correction, adversely affects a child’s educational performance.. The term “blind and visually impaired” is used to acknowledge that all individuals who are blind are visually impaired, but that all individuals with visual impairments are not blind. People rely on visual, audible and tactile and other sensory information from the surrounding environment for their orientation. Most vision-impaired people are able to see in color, though color discrimination may be impaired. Some sources report that yellow colors are more salient as vision is lost. Only a small percentage can see nothing at all, but even that group will generally have some sensitivity to light and shade. Contrast between the walking surface and surrounding environment is critical for vision-impaired people for orientation, distinguishing the limits of the footpath, recognizing hazards and gathering information. A loss of sight is not accompanied by an increase in the effectiveness of other non-visual senses. However, blind and vision-impaired people generally place more emphasis on information received via other senses, for example the sense of touch. The currently used WHO standard terminology makes a distinction between impairment (physiological), disability (personal) and handicap (social).

• an impairment is any loss or abnormality of psychological, physiological or anatomical structure or function;

• a disability is any restriction or lack of ability (resulting from an impairment) to perform an activity in the manner or within the range considered normal for a human being. The terms Visually handicapped', visually impaired', 'blind1 or 'partially sighted1 ranges from those who do not see at all to those who may see, but are confused by what they see because of changes or distortions brought about by their visual mechanisms. If a person has some sight, he is "visually impaired" and not "blind", regardless of what and how a child sees, he is much like other children in terms of basic needs and feelings and in general responses to growth processes. He is an 'individual' child, whose visual impairment is one additional difference, one further distinguishing feature that makes him himself. Children who do not see or who see partially, have a different view of their environment from those who are visually oriented and who see well.

Blindness is the inability to see anything, even light. If a person is partially blind, he/she will have limited vision. Complete blindness means that one cannot see at all and is in total darkness. Legal blindness refers to vision that is highly compromised: What a person with healthy eyes can see from 200 feet away, a legally blind person can see only from 20 feet away. A child's visual system begins to develop in the womb, but will not be fully formed until about 2 years of age. By 6 to 8 weeks of age, a baby should be able to fix his or her gaze on an object and follow its movement. By 4 months of age, the child's eyes should be properly aligned (not turned inward or outward).

The following conditions can cause vision impairment or blindness in infants:

- infections, such as pink eye
- blocked tear ducts
- cataracts
- strabismus (crossed eyes)
- amblyopia (a lazy eye)
- ptosis (a droopy eyelid)
- congenital glaucoma
- retinopathy of prematurity (when the blood vessels that supply the retina are not fully developed in premature babies)
- visual inattention (delayed development of the child's visual system)

A person with a visual acuity of 6/24 means that a person has to be as close as 6m to see what a normal sighted person can see at 24m i.e., 4 times closer. A person with a visual acuity of 3/60 means that a person has to be as close as 3m to see what a normal sighted person can see at 60m i.e. 20 times closer. As blind and vision-impaired people are unable to drive a motor vehicle, their independent mobility depends on walking. An alternative functional definition is loss of vision sufficient to prevent an individual from supporting himself in an occupation, making him dependent on other persons, agencies, or devices in order to live. The term, "color blindness" is a misnomer since this genetically transmitted disorder is not "blindness" as the term is generally understood and is a minor handicap to only a few people. Visually impaired children are normally considered to be those who show by their actions and general functioning that they learn more efficiently by ways other than visual or who must implement, supplement, or substitute for their visual learning through touching and listening. From the educational point of view, the blind child is now considered to be the child who learns educationally through Braille and related media with little or no residual vision employed. The partially sighted child is felt to have useful vision for educational purposes, but is limited to the extent that some special educational provisions are necessary.

The mother who is told her child is "blind" (a term often used when the child possesses a substantial amount of vision) may very well not realize those objects the child could see and should be encouraged to look at visually. Relatively, few children have total blindness that is the absolute inability visually to distinguish from day from night. Those wilt event the slightest vision can be helped to develop that degree through use and in that way can learn to; use what vision they possess with increasing effectiveness. They may evidence poor eye-hand coordination, low ability to pick out and organize details, weak figure-ground discrimination, and faculty visual target-following. The major need of these children is education for effective visual use. If such youngsters receive no visual stimulation and fail to be helped in putting to use what vision they have, their visual ability will deteriorate. The evaluation of visual behavior is strongly affected by factors such as the child's ability to sit still, to attend, to follow directions, to understand and to use words. There are legally blind children capable of reading print of various sizes. A pediatrician will screen the baby for eye problems shortly after birth. At 6 months of age, a child should have an eye doctor or pediatrician check the child again for visual acuity, focus, and eye alignment. The doctor will look at the baby's eye structures and see whether the baby can follow a light or colorful object with his or her eyes.That is how blindness or visual impairment can be diagnosed in a child.

3.2 Visual impairment & Blindness

Visual impairment is when; a person has sight loss that cannot be fully corrected using glasses or contact lenses. On the other hand, a complete loss of eye sight is called blindness.

The number of visually disabled in our country is increasing at an alarming rate. It is estimated that nearly 4% of all children in Bangladesh develop corneal damage before reaching 6 years. At least 50% of the children with vision impairment die within one year of becoming blind. The total number of cataract patients in Bangladesh is more than 400,000 and about another 60,000 are added each year. The total number of blind persons is 3.3 million (UNICEF, 2005). Bangladesh has almost 800,000 blind people (out of a population of 90 million), of whom 40,000 are children under the age of 15.

3.2.1 How vision is tested and measured:

Two main areas are assessed while vision is tested:

- visual acuity – central vision used to look at objects in detail, such as reading a book or watching television
- visual field – ability to see around the edge of vision while looking straight ahead

The main tests used to assess visual acuity and field are described below.

a. Visual acuity testing

A test called the Snellen test is often used to measure visual acuity. It involves reading letters off a chart on which the letters become progressively smaller. This chart is used during a routine eye test.

After the test patients are given a score for visual acuity. A Snellen score consists of two numbers. The first number represents how far away from the chart patient was able to successfully read the letters on the chart. The second number represents how far away a person with healthy vision should be able to read the chart. So if the patient was given a visual acuity score of 6/60, it means he or she can only read at 6 metres away what a person with healthy eyesight can read at 60 metres away.

b. Visual field testing

There are a number of different tests that can be used to assess visual field. One test involves looking straight ahead at a device while lights are flashed on and off at the edges of patient's vision. Patient be asked to press a button every time he/she sees a light. This shows any gaps in the field of vision.

Alternatively, patient might be asked to follow an object (or the tester's hand) with their eyes as it is moved across the field of vision. He/she will be asked to say when he first sees the object and when he can no longer see it.

3.2.2 Types of visual impairment:

Visual impairment is usually classified as either 'sight impaired' or 'severely sight impaired'. These classifications are based on the results of the tests described above.

a. Sight impaired

Sight impairment, previously called 'partial sight', is usually defined as:

- having poor visual acuity (3/60 to 6/60) but having a full field of vision, or
- having a combination of slightly reduced visual acuity (up to 6/24) and a reduced field of vision or having blurriness or cloudiness in your central vision,
- having relatively good visual acuity (up to 6/18) but a significantly reduced field of vision

b. Severely sight impaired

The legal definition of severe sight impairment (which was previously called 'blindness') is when 'a person is so blind that they cannot do any work for which eyesight is essential'.

This usually falls into one of three categories:

- having very poor visual acuity (less than 3/60), but having a full field of vision

- having poor visual acuity (between 3/60 and 6/60) and a severe reduction in your field of vision
- having slightly reduced visual acuity (6/60 or better) and a significantly reduced field of vision

3.2.3 Causes of visual impairment

Types of impairment are different for different causes of visual impairment. In total vision loss for example there may be total darkness of the visual fields. Other types include visual impairment in glaucoma, age-related macular degeneration and so forth.

a. Visual impairment in glaucoma

This condition is due to the rise of normal fluid pressure inside the eyes. The type of vision impairment causes a tunnel effect.

The intact vision remains in the centre while progressively the peripheries start decreasing. The centre of the tunnel reduces in size progressively till total vision is lost if left uncorrected.

b. Age-Related Macular Degeneration

A central area of woolly or cottony opacity obscures the central part of the vision. The peripheries may be normally seen. AMD usually blurs the sharp, central vision that is needed for closely viewed activities like reading, sewing, and driving. This is a painless condition.

c. Cataract

There is general clouding of the vision. As the whole eye lens is affected the blurring of vision may be diffuse until it is totally lost. There may be other symptoms like photophobia – inability to see the light; diplopia – double vision etc. Cataracts are very common in older people.

d. Diabetic Retinopathy

Diabetes leads to damage of the smaller arteries and blood vessels at the back of the eyes over the retina. Diabetic retinopathy is the most common diabetic eye disease and a leading cause of blindness in adults. Usually vision impairment in diabetics begins as black spots or floating shapes that appear in the field of vision. Slowly complete vision may be lost if left unchecked.

e. Near sightedness

Myopia or near sightedness or short sightedness means a person can see nearby objects clearly but distant objects appear blurred. High myopia may lead to vision impairment.

f. Retinitis Pigmentosa

This is a genetic or inherited condition. Initially it manifests as night blindness. As the disease progresses there may be a tunnelling of vision with loss of peripheral vision followed by complete blindness.

3.3 Blindness, low-vision and the built environment

Vision plays a crucial role in the acquisition and development of spatial knowledge. It allows for the quick and accurate coordination of action and movement in relation to what is being directly perceived or what is mentally stored. It is for this reason that Golledge (1993) notes that the congenitally blind can only know "impoverished environments." Impoverished relates to the incompleteness or the distorted experiences of these individuals. This is not about the blind being socialized into an inferior category of society (Imrie, 1996) but the undeniable fact that the total or partial absence of vision can impose several restrictions to activity and movement patterns. Sensory limitation affects the decision making process during navigation as more time is required for the absorption, comprehension, storage and retrieval of environmental information.

The blind move about in routes. Anyone who has worked with the blind can attest for this, as it comprises part of the basic teaching of orientation and mobility. Movement is limited as navigation is highly dependent on prior experience and practice. In this manner, disability can be said to shrink the space/time prisms of individuals as a disabled person's experience, awareness and overall knowledge of the built environment is more constrained (Jacobson, 1999; Golledge, 1993). The ability to build accurate mental representations of space, and more important the ability to operate based on these representations will depend on the spatial abilities of the individual but also on quality and form of the environment in question. Shortcutting for example something that is often regarded as challenging for the blind as it requires a configurational knowledge of the environment, is a factor of both the accuracy of mental representation (and the ability to perform mental operations) and the fact that shortcutting requires navigating through unknown and potentially unfriendly environments.

One of the major problems associated with mobility in the total or partial absence of vision are the difficulties that blind and visually impaired individuals have previewing and pre-processing spatial information (Golledge, 1993). Vision allows for previewing which facilitates the development and implementation of a variety of heuristics for navigation such as choosing the appropriate path and avoiding obstacles. The urban environment is filled with obstacles and barriers that can limit movement and impoverish the knowledge of disabled individuals. Curves, and in particular slight angled curves, can be hard to detect and seriously disorienting. Hutchinson (1998) notes that the blind and visually impaired may have an easier time negotiating environments that is angular rather than curved. Yet, the downtown of most European cities is characterized by a no grid complex set of pathways and dead-ends. Navigation in such environments will for the most part depend on prior experience, training and the help of others. A gridded pattern or a repetitious design style can also be disorienting. This is the case in hospitals or large offices where the design of each ward or area is similar. Long corridors, high ceilings, carpets and other situations where sounds or echoes cannot bounce back can also be problematic.

fig 3.3.1 **-** *Table showing Barriers faced when navigating the urban environment*

Physical barriers	**Human/socio interaction barriers**
Urban furniture (i.e., benches, water fountains, telephone booths, mailboxes, benches, signposts)	Unprotected natural/man-made hazards (i.e., bodies of water, street construction, cliffs)
Lack of railing	Traffic
Badly Placed Ramps	Travel Access
Non-standard Fixtures	Lack of signs or badly placed signs
Gradient	Crowding
Large Irregular open areas	Lack of communication
Unprotected construction/repair	
Bollards	
Transparent surfaces(glass doors)	

The blind and visually impaired are also disadvantaged regarding their access to information (Passini & Proulx, 1988). Typical urban signage is often unavailable in a medium that caters to their needs. Considerable work is being conducted on the development of clear, functional and informative tactile maps but their implementation is yet to become common practice. Any form of tactile aid, whether is Braille on a wall or toilet door or a tactile map of a shopping centre, must also be strategically positioned for quick and easy detection. It makes no sense in putting up a state of the art tactile map at a shopping centre if the actual map cannot be found by blind and visually impaired patrons. To this, we must add that issue of sensitivity threshold for the discrimination of audio and tactile information. Audio and tactile cues must be provided in a format that can be easily discriminated from other environmental cacophony and must cater to widest range of visual impairments and conditions. Figure 1 illustrates some of these barriers and the dangers they can impose. Table 1 presents a list of physical and human/socio interaction barriers that are found in most urban areas.

Architects, planners and designer have come up with several intelligent solutions to aid navigation in open urban environment and buildings. Below is a short list of these easily to administer interventions. Figure 2 provides a few concrete examples of how these have been implemented:

a. **Colour contrast:** Colour contrast is a simple and effective way to increase the responsiveness of an environment. Contrasting facilitates recognition and can help individuals find and avoid objects as well as their general navigation.

b. **Tactile maps:** Maps are excellent tools for communicating information regarding the overall relationship between different objects in space. Unfortunately, the majority of maps have been designed for the sighted. The conventional graphic map rather difficult to interpret by someone who has low-vision and of absolute no use for someone who is blind. Tactual maps have been shown to be considerable aids to navigation. It is up to planners, designers, architects, real estate developers and owners to include them in public spaces along with those designed for the sighted.

c. **Lighting:** Lighting is the essence of vision and appropriate lighting levels can be a powerful aid to mobility. This however, can be difficult to implement as different individuals have varying lighting needs. Designers should aim at creating spaces where lighting levels can easily be adjusted to suit the individual. In general, environments should be evenly lit without any abrupt light changes. Designers should also take into consideration the reflective characteristic of surfaces as these can also be highly disorienting. This is usually the case with glass, bright steel and other glossy surfaces. In some situations surfaces that are not necessarily reflective can become disorienting because of a change in weather i.e., asphalt after rain.

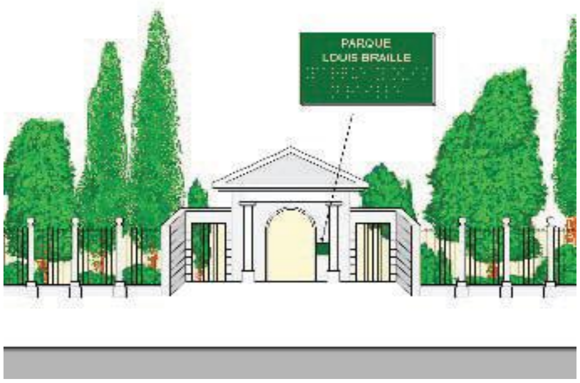
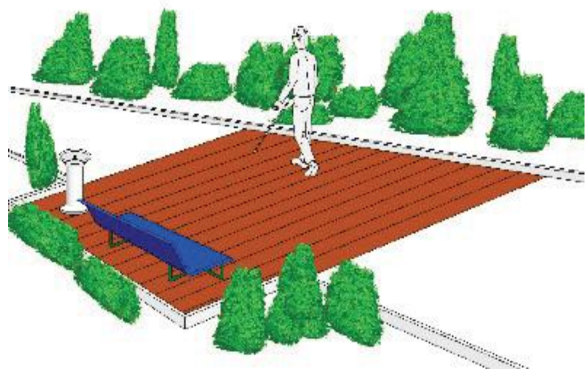
fig 3.3.2 - Urban barriers

(a) Protruding façade	(b) Unattended construction	(c) Unprotected scaffolding
		
(d) Poorly placed containers	(e) Street cafe	(f) Diagonal crossing

		
(g) Crossing barrier	(h) Driving obstacles	
		

d. **Surfaces & pathways:** Contrasting surfaces can act as useful navigation guides and indicate particular features in the environment. Surfaces should be non-slip and even. A distinct surface can be used as a pathway to a particular place (see figure 2). Individuals can follow the path by keeping track of the surface in the bottom of their shoes or with their cane. Navigation seems to be easier in flat surfaces. When the environment is not flat, level changes such as steps and ramps should be clearly marked (different surface can be used to identify the approach) and complemented by handrails. There are many examples of tactile surfaces. A modified blister pattern (figure 2) is used to indicate the limit in sidewalks, the edge of stairs, ramps or escalators. In some cases, surfaces are raised (figure 2) to indicate a street crossing.

fig 3.3.3 - Environment based navigation aids

(a) Well placed signage	(b) Different textures
	
(c) Limit guide	(d) Textured pathway
	

e. **Technical aids**: A variety of technical aids has been developed with the purpose of helping navigation by providing spatial information to senses other than vision. The *Sonic Guide* (Kay, 1973) and the *Nottingham Obstacle Avoider* (Dodds et al., 1981) use ultrasound to provide information about objects in the environment and serve as hazard identifiers. Other technological aids such as the laser cane or *Mowat* sensor use the intensity of sound vibrations to provide distance information to nearby objects. Since the late sixties, Paul Bach y Rita has worked on a series of sensory substitution devices, the most famous known as the *Tongue Display Unit* (TDU) where environmental information is captured through a camera and reproduced to a device that is placed on the tongue. The device consists of gold-platted copper electrodes that are organized a 10 X 10 pixel matrix that reacts to contrast picked up by the camera identifying the location objects in space (Bach-y-Rita, 1972; 1967). These devices however, only provide useful information in terms of obstacle location and avoidance. They do not provide a frame of reference or contextual information.

3.4 Special Education for Visually Impaired Children

ADL: It is a program to teach blind children daily activities, where they practice motor development, ear-hand coordination, along with how to move about and do the basic activities. When, the children are very small, their activities involve their whole bodies- Gradually they become able to use one, then several body parts. A good example is ball play. This at first involves a scramble of total body activity; later the body movements become more specialized. Children first learn to use large muscles which allow them to reach for and grasp at objects. Eventually they are able to pick up things by means of the whole hand, then fingers, thus using increasingly refined muscle activity. In case of blind children, this becomes more difficult. Children are taught to move around, pick up things, react to sounds.

Education courses: The courses are normal like any other school, including Brail system for reading and Abacus for mathematics.

Vocational training: Cane handicrafts, handloom, music, art & sculpture, plaster of pairs making, white cane making etc.

Architecture & Physical Environment Orientation

Orientation in the modern community is becoming more and more difficult for people who are blind or with impaired vision. It is important to remember that many things that do not normally create big problems can be difficult and sometimes even dangerous for people with impaired vision. This applies for example, to the unexpected placing of objects and details in the physical environment and wrong planning solutions.

To eliminate the difficulties for someone with impaired vision as far as orientation is concerned the sitting and planning solutions must be simple and easily understood. One should bear in mind the blind person, when choosing furnishings and fitments. For example, one can use contrasting materials and place furniture and fitments so that they do not get in the way. Sufficient information regarding the environment in which one will be moving about is a basic requirement for orientation. Light, used in the right way (for visually impaired persons), simplifies orientation. Color can be a decisive importance in distinguishing different parts of the environments. Finally, sound can make orientation both easier and more difficult.

3.5 Guidelines for design of a blind center

3.5.1 Sitting

The larger the area one has to move over, the more difficult orientation becomes.

Orientation is also more difficult if one frequently has to change direction. One can as early as at the sitting stage in planning process, simplify orientation for visually impaired or blind people. Important and frequently used functions will be easier to find if they are placed centrally to, or in the near vicinity of the areas (room units) which they are intended to serve. To avoid possible confusion, one can also SEPARATE DIFFERENT UNCTIONS (for example, goods-entrance and staff-entrance).

3.5.2 Planning and Design

A "good planning should be SIMPLE. It should be easily understood also by people with impaired vision. Orientation is easier at plan, pavements, roads and paths keep to a

right-angled system. It is important that intermediate objectives such as lifts, stairs and reception desks should be particularly easy to find.
Orientation across open areas is difficult; it is therefore advisable that large areas should be broken down into smaller areas, preferably rectangular ones. Areas which are too small, such as narrow corridors and passages, can of course make orientation more difficult since it is easy to collide with other people or objects.
There should no obstacles on pedestrian circulation routes. Information desks, signs etc. should not be placed in positions where they become obstacles themselves.

3.5.3 Materials, furnishing, fitments

To break down larger areas into preferably rectangular ones can be done by the placing of furniture, making sure at the same time, however, that the furniture will not obstruct passage. Large areas can be broken to make orientation easier. It can be broken down also by marking the circulation routes in a different color from the rest of the flooring, or by using materials which give different sound impressions. The softness (spring) of the floor can be for example give directional guidance. Wall-to-wall carpeting eliminates nearly all echoes. Circulation routes can for example be carried out in patterns which clearly separate them from the surrounding floor surfaces. The texture of the walls can also consciously be made to vary. All areas as including staircases should be equipped with handrails to give directional guidance. But an element of a building, if correctly placed will not for example; afterwards require a fatty rail added to it. FREE HEAD ROOM should never be less than 220 cm. or 7 ft. Signs: awnings, light-fitting etc. must therefore be above this height. For Visually Impaired Persons (People with Poor Eyesight), location of completely GLAZED AREAS—glass doors and large windows-should be carefully considered. In order to prevent people from walking into glazed areas, one should mark them with a colored and which can clearly be seen against the background. The band should be placed between.-140 to 160 cm, (4'-6" to 5') above floor or ground level. The choice of furnishing materials and color should be made with knowledge of their characteristics regarding the REFLECTION FACTOR and MIRRORING EFFECTS. A high mirroring factor in a material often gives negative effects. As an example, a floor can give irritating reflections from lights in the ceiling and cause dazzling, which in turn may impair the vision; a high reflection factor and the use of light colors influence the mean luminance and give light interiors. One should choose a source of light so that colors are reproduced naturally. Materials and colors must be chosen in light .from the source of light which will be used.

The ACOUSTIC CONDITIONS should be good. One must choose a suitable reverberation time. Sounds should not be too little dampened, as in often the case in public-swimming baths and entrance halls. They should on the other hand, not be dampened too much as in many conference rooms.

Various CONTROLS, TAPS AND LIGHT SWITCHES should be recognizable to touch and to people with poor eyesight. By using taps which are standardized in design and color, and which are placed in a standard fashion, it will be easier both to find and use them. DOORS and GATES should be hung so that, they open from a busy area into a less busy one. When open, a door should be against a wall (90° or 180°). Mark off door-handles and the 'push' or 'pull' side of the door by using different colors and materials. Sliding doors are preferable.

Obstacles

For a blind person or a person with impaired or poor vision, an obstacle can be-

• Immobile, such as bicycle stands, flower-boxes, pillars, posts, signs, awnings, balconies and vegetation.

• Mobile, such as doors and windows.

• Temporary, such as vehicles, wiring-off of for example road-works, scaffolding, heaps of snow sand and building materials.

• Obstacles should be placed at the side of pedestrian ways and areas, and they should be so designed that parts of them do not stick out.

• Free head room above pedestrian ways and areas shouted at no point is under 220 c. or 7 ft. Above floor or ground level.

One should warn or protect against unavoidable obstacles by using varying floor or surfacing materials, or by safety arrangements such as fences or rails.

Deigned obstacles (time-table signs) should be placed in such place so that they will not cause injury to anyone who bombs into them.

Any temporary arrangement to close off pavements etc. should be placed at a safe distance from the obstacle. The actual arrangement should consist of two horizontal wooden spars, which of the upper one should be approx. 90 cm. above the ground. They should be in position both during and after working hours abroad, snow is a particular problem. It can cause slipping and stumbling and it makes it difficult to recognize normal "guiding features", such as curbs. Snow also dampens sound.

Information

Information can be given in many ways. Verbal information can be imparted directly — at an information desk or indirectly — over a loudspeaker. It is the best alternative for people with impaired vision and should therefore be used as widely as possible. At an information desk, the distance between the mouth of the speaker and the ear of the listener should not be too great.

SOUND SIGNALS (acoustic indication) can also give information such as at lifts, at pedestrian crossings etc. ordinary forms of information should be complemented by sound signals.

Signs should be placed and designed as to allow one to get close up to them and READ BY TOUCH or by people with impaired vision. RELIEF MAPS of buildings, areas or of any information are most helpful and should be placed at central points, and should also be available on a more reduced scale to hand of people. The call-buttons for door-telephones should have at least the numbers in relief.

Light

In many situations, one requires better and stronger light than is normal today. People with. Impaired vision and with some remnants of vision are dependent upon a better quality of light. This applies also too many elderly people. The lighting environment is influenced at an early stage in the planning, among other things by the choice between daylight and artificial lighting. Daylight, when low, must be complemented by artificial light. Daylight makes can also causes undesirable mirroring effects. If one uses daylight, the lighting in adjoining areas must also be strong, otherwise the difference in lightness may be so great, that one gets dazzled. The difference in lightness between two surfaces should not be so great as to tire and irritate the eyes. It is important that light-fittings are correctly placed so as to avoid dazzling effects, direct or by reflection within the field of vision. One-should choose well-shielded fittings which does not take away the desired color contrast.

Color

For people with poor eyesight and people with varying remnants of vision, color is not only important from an emotional or aesthetic point of view, but above all is important in order to make orientation easier. Properly chosen and placed colors make it easier to move around over all areas. The eye is sensitive to color experiences and increases with lightness;

Experience of color is at its maximum with orange, yellow and light green colors and decreases towards the red and violet. In order to make orientation safe, one should separate different surfaces by using contrasting colors in color schemes. Choose colors and interior materials with a knowledge of their reflecting and mirroring factors. High reflection factors and light color scheme influence the mean luminance (lightness) and create light interior.

Sound

Sound can have both positive and negative effects on blind people. Sound can make orientation easier, such as, certain continuous sounds from an escalator or a Sound fountain. As an echo from a footstep or a stick, sound has a positive effect and acts as a to other signals (acoustic signals).

Sound has a negative effective when as noise. It distorts or blocks desirable sound."Noise is mist to the blind". Blind". Wind has both a dampening and a distorting effect. Sources from noise mist screened so that they do not disturb sounds which give directional guidance. If one Harm Pen me sound °f an underground train in a station, then it becomes easier for a n with, bad eyesight to orientate himself by the sound of an escalator, or by using stick-person technique unsuitable acoustics — too much or too little dampening — can make communication between are more difficult or even impossible, particularly for those who can only reify on their sense of hearing.

MATERIALS of pedestrian circulation routes can give a certain amount of information since different materials have different sound characteristics when one walks on them and particularly so when one uses a stick. Certain floor surfaces, such as wall-to-wall carpeting, remove nearly all echoes, thus making orientation more difficult. Optical signals should be complimented by acoustic signals. A loudspeaker, if placed, should give the correct "SOUND PICTURE" and indicate the direction of the person speaking.

Understanding the "blind child"

The children who do not see have a different perspective of their environment from those who are visually oriented and see well by usual standards. Children who are blind or visually impaired:

- Must be systematically introduced to their world- the people and things around them, even to themselves. Things learned relatively casually through visual means must be consciously taught when vision is limited.

- Must have opportunity to know, understand, and develop their bodies through physical movement and exercise.
- Must be encouraged to use whatever vision they have.
- Must get ideas about other people, how they are reacting, how they are feeling and what they are doing through their voices, rather than from facial expressions, gestures or from eye-to-eye contact.
- Must develop an understanding that there are certain things that may not be touched (clouds, snowflakes, fire).Must be with other people often (adults as well as children) to know them and be known by them and in order to expand their experiences and their personal/social lives
- Must learn at appropriate times in their development to do things for themselves, just as all children must learn these things.
- Must be taught through the growing, expressed understanding of those around them chat they are learning to know the world correctly despite their visual impairments**.**

Parents and others must develop the abilities: to observe the child, to recognize how he earns, to evaluate how and what he sees, to note what he does well, and to discover where he needs special aid. The growing knowledge and understanding of the child should be combined with an enriched knowledge of technical and other available aids. Periodical general medical check-ups are a must, along with regular and through ophthalmological attention.

Intelligence is not simple inherited, but is developed through the child's living within his environment. It is extremely important for him to be loved in a constructive way, from the time of birth on, and to learn to return love. It is vital that he be given guidance and discipline which allows him just enough choice, but does not leave him on his own when he is not ready for this. He must have many opportunities to move around and exercise and to use all of his 'working senses' in getting to know his world. There is a certain sequence of learning through infancy and childhood which, if followed, enable a child to learn much more than he would otherwise learn. Most importantly, the realization that how a child is received, accepted stimulated and appreciated in his home and how he learns to feel about himself have great influence on how he lives and grows into adulthood. As a child grows older, there are certain activities: he can be expected to do best in terms of his muscle and bone development, his neurological maturation, his experience, and his emotional and intellectual growth. Children, from infancy, must be encouraged to hear, smell, taste, feel, see and use their muscles in order for them to become increasingly capable in all of these areas. They must move about, be with people and learn to do things

Talking with children so they learn that words make sense, that words cause and describe actions and reactions and that word help them know themselves and other people is the most important ways of enabling a child to learn and become open to learning more. Most importantly, how quickly a child grows, matures and develops (emotionally, physically, intellectually and tally) is how he continues to feel about himself and his worth as a person. These again d needs on how they think those who are close to them feel about them. This makes it Operative that a child be known in the fullness of his person rather than simply as a child who is visually impaired or blind.

There is a story of a 12 year old boy with no vision who when camping with a group of sighted 12 year olds delighted his huddle by going out in late night in a downpour to let down canvas flaps over windows. They reasoned that he did not have to hold a flashlight in order to see what he was doing. Thus both his hands were free for the necessary work. Children should learn in directions which allow and encourage them to become independent. If the child is to grow into a healthy and productive human being, he must be helped to gain the tools (skills, knowledge, attitudes) which make this possible, make him feel self-confident and capable of managing his world. It is essential that the child who is visually impaired learn to care for himself personally and to share in household responsibilities even though it takes much effort on his part and on the parts of those around him. If he does not learn to be independent, he will be less of a person because of it and remain a burden on his family from lack of experience.

Visual loss does not necessarily set the limit for an individual's life goals. Although the visual impairment may at first cloud the picture, focusing on the individualities of the child will enable parents and others to set up appropriate expectations for him.

Children need encouragement and increasing challenge to learn, but they must not be overwhelmed. Children should have opportunities for hearing, touching, seeing, smelling, tasting and feeling through use of their muscles and joints. In this way, the begin to know their world and begin to feel safe in their expectations of that world.

Through play, children learn to try new materials to create and construct, to pretend, to act out some of the important things on their minds and to get along with others.

3.6 Analysis of the physical growth and development

Children need to be "shown" and to "learn" the areas where they will spend most of their lime. It is important that the child move explore and be curious. More refined "orientation and mobility" can be learned later. The visually impaired child coordinates the gross motor process by hearing. As EAR-HAND COORDINATION (ability to reach or react toward the source of a sound) ripens later than eye-hand coordination, the visually impaired child will experience a different rate of development in certain areas.

- The child must be shown specifically how to move about, to crawl or walk and make use of his muscles. Visually impaired children should be encouraged through numerous and diverse way to lie on front, on back, lift head when lying, on stomach, balance head when sitting, roll over etc. Little noise making objects should be hung above where he will hit them and cause them to sound. Ear-Hand Co-Ordination: The child must learn to follow sound. Giving encouragement, reason and help to sit, move or react towards a sound. Visually impaired child needs the kind or motivation to reach and grasp, that makes sense to him. Objects should sound and feel worthy of investigating. The ear-hand coordination seldom develops until near the end of the 1s' year.
- As the child moves about, he needs help in becoming aware of hazards: what they what they cause, how to deal with them. He can be taught that some areas are for play and others are not; that the "gate" marks the stairs at which point he must reach for the railing He will learn, but may need to be shown such things a number of times in order to do so.
- Sometimes visually impaired children spend periods of time rocking their bodies back and forth or making certain motions over the over. These "mannerisms" are sometimes mistakenly called "blindisms". But, such mannerisms can be witnessed in any children, resulting from a child's not knowing what else to do.

3.7 Analysis of the personal/Social Growth & Development

Emotionally a blind child is like any other normal child. In thinking of the child's development into a personal/social being, first consideration must be given to his own interest and awareness of himself and secondly, his relationships within his family and his neighborhood or community.

- General interaction of the child is to be done through voice and mannerisms. Holding, embracing, touching wit help him feel wanted, enjoyed, needed and loved. Most importantly, talking will increasingly help him to understand and feel a part of the world around him.
- He needs 'active involvement' with the work around him, which he will like doing. He must be told what is happening around him, 'shown' and given time to really "look". He must be given simple tasks to do—to get his own toys, putting them away, set the table, help with the yard work, his own toys, putting them away, set the table, help with the yard work, get around the neighborhood by himself (may need watching crossing streets), go alone or with friend to school or stores.
- Regarding playing, the visually impaired child should be given those toys which are interesting to touch, to muscular feel, to hearing and to smell, as much as to whatever remaining vision he may have. Toys of different texture are more appropriate. He likes to play with sand, mud, water; likes to pour them and later creates with them. A reasonable amount of noise, dirt and messiness must be expected, even desired with the visually impaired child. The child becomes acquainted with toys and certain materials chiefly through e noises they make, how they feel and smell. He plays on solitary level first and does not want to play with other children at first. Through playing, he increasingly interacts with others and become acquainted with their world. The young child like any other normal child singly prefers playing in a group may have special friends, likes to sing, dance or act plays. He likes even to engage in rough and tumble play, like stunts, gymnastics, and physical activities.

3.8 Analysis of the Intellectual Growth & Development

Generally, children began to develop a sense of purpose during earliest infancy. This sense of Purpose is akin to the simplest kind of thinking; responding to stimulus as sound, sight, smell, touch, taste, movement. As they become older, the stimulus and response become directed toward abstract as well as concrete experiences. The intellectual growth of children happens through using all their senses, by doing (by watching others), through language,

- through play (giving chance to act as adults, solving problems, becoming more social through asking questions and investigating), through doing increasingly complicated things in terms of muscle use, emotional involvement, thought processes and with help.
- Language is more important to visually impaired children than normal children. Language takes over vision in organizing thought and experiences. It gives the ability to teach and think with words. Attitudes and conditions must be conveyed by words. The .warmth of the expressed language is what the child can feel.
- For children of visual impairment or little sight, books can be made which stimulates interests through color, texture and with real object interesting to touch and understand.
- Games involving touching and naming body parts are excellent. Verbally describing the actions are more helpful to him. Skills having to do with money or telephone can be taught to a child who has good finger control and is aware what these object are and how they are used.
- Blind children may use their mouth to explore objects like most other children. Touching and feeling is a good way to explore things. He can enjoy shapes of objects, the materials they are made of their odor, the sound they make when dropped, whether or not they roll etc.
- Real objects have to have meaning to the blind child over a period of time before the same objects, in replica and miniature, have meaning. He will need many experiences with a Teal car, for example, before the tiny objects held in one hand can be meaningfully called "car".
- Chalk, crayons and paint can be pleasurable and interesting to the blind child too if the emphasis is getting to know the materials and appreciating them through the muscle movement involved, the feel, and the associated smells. Drying paint can be felt. Crayon traces give different feel to the paper and if the drawings are simple enough, it can be recognized by touching.
- The blind children can be learnt to group things and persons in numerous ways, by its use, shapes etc.

The presence of a visual impairment requires that these skills be thoroughly evaluated and systematically taught to students by teachers with specialized expertise. Without specialized instruction, children with vision loss may not be aware of the activities of their peers or acquire other critical information about their surroundings

Compensatory skills are needed to access the general curriculum. m Access to literacy through Braille and/or print, handwriting skills and auditory skills is required by the. Many students with low vision use regular print with magnification devices. Some students need both print and Braille. Communication needs will vary depending on degree of functional vision, effects of additional disabilities and the task to be done. Students with deaf-blindness and others may use alternative communication systems such as tactile sign language, symbol or object communication, or calendar boxes. m Specialized instruction in concept development may be of significant importance when visual observation is limited. It is essential to offer specific and sequential hands-on, sensory-based lessons to build a broad base of experiences. In higher grades, there are many mathematical, geographical and scientific concepts that must be taught with adapted materials and strategies for students unable to learn from pictures and visual diagrams. A child with little or no vision may have fragmented understandings of the world without systematic tactile exploration and clear, verbal explanations. Some concepts are totally visual, such as colors, rainbows, clouds, and sky. Some are too large to experience completely, such as a building, mountain ranges, and oceans. Other items are too tiny or delicate to understand through touch, including small insects, a snowflake, or an item under a microscope. Some items are inappropriate to explore through touch such as wild animals or toxic substances. Fragmented concepts can impede social, academic, and vocational development. Sensory efficiency, including visual, tactual and auditory skills. Students who are blind and students with low vision need systematic instruction to learn efficient use of their senses. Instruction in visual efficiency must be individually designed and may include using visual gaze to make choices, tracking car movements when crossing the street, responding to visual cues in the environment, and/or using optical devices such as magnifiers and telescopes. For most students with visual impairments, an increased reliance on tactual skills is essential to learning. It takes more detailed “hands-on” interaction and repetition to tactually understand a concept, such as relative size, that may be readily captured with a glance by sighted individuals. Systematic instruction in auditory skills may be needed for successful mobility and learning. Students must learn to effectively use their hearing to respond appropriately to social cues, travel safely in schools and across streets, learn from recorded media, and use echolocation for orientation.

Orientation and Mobility

Safe and efficient travel throughout the environment is a critical component in the education of students with visual impairments. Instruction should begin in infancy with basic spatial concepts and purposeful and exploratory movement. Instruction should then progress through more independent, age appropriate motor and travel skills in increasingly complex environments. Vision provides the primary motivation for infants to begin to move their bodies, to raise their heads to see people, to reach toward objects, to move through the environment, and to begin to play. Significant delays and differences in meeting motor milestones can impact overall development. A child who is blind needs to know how classrooms or other environments are arranged in order to independently move with confidence. Systematic orientation to a space may be needed before placement and function of furniture and objects are familiar. More advanced age-appropriate travel skills, such as orientation to all school facilities, street crossings, bus travel, and community experiences, are needed as the student gets older.Technology permits students with visual impairments to access the general curriculum, to increase literacy options, and to enhance communication. There are a variety of high- and low-tech assistive technology tools designed specifically for students with visual impairments that require specialized instruction. These devices include, but are not limited to, electronic Braille note takers, colored transparencies, tactile symbols, calendar systems, video magnifiers, screen reader software, screen enlarging software, Braille displays, auditory access to printed materials, and magnification devices.

3.9 Design Principles

There are certain key design principles which, when applied, make it easier and safer for blind and vision-impaired pedestrians to move around.

Simple, logical and consistent layouts enable people to memorise environments that they use regularly and predict and interpret environments that they are encountering for the first time. Non-visual features (e.g. audible and tactile devices) convey important information about the environment to blind and vision-impaired users. Visual contrast is important to accentuate the presence of certain key features. This will enable many people to use their residual vision to obtain information. Any design for the blind supports the seven universal design principles:

- Equitable use
- Flexibility in use

- Simple and intuitive
- Perceptible information
- Tolerance for error
- Low physical effort
- Size and space for approach and use

3.9.1 Tactile ground surface indicators (TGSI)

TGSI provide pedestrians with visual and sensory information. The two types of TGSI are warning indicators and directional indicators. Warning indicators alert pedestrians to hazards in the continuous accessible path of travel indicating that they should stop to determine the nature of the hazard before proceeding further. They do not indicate what the hazard will be. Directional indicators give directional orientation to blind and vision-impaired people and designate the continuous accessible path of travel when other tactile or environmental cues are insufficient. When combined with other environmental information, TGSI assist blind and vision-impaired people with their orientation and awareness of impending obstacles, hazards and changes in the direction of the continuous accessible path of travel.

a. Warning indicators

A warning indicator is a textured surface feature consisting of truncated domes built into or applied to walking surfaces to warn blind and vision-impaired people of a nearby hazard. Warning indicators are intended to function much like a stop sign. They alert pedestrians who are blind or vision-impaired to hazards in their line of travel, indicating that they should stop to determine the nature of the hazard before proceeding further. They do not indicate what the hazard will be.

fig. 3.9.1 - View of warning indicators.

Note how the domes have been located to maintain equal spacing between domes across the entire warning indicator surface.

b. Directional indicators

A directional indicator is a textured surface feature consisting of directional grooves built into or applied to walking surfaces to give directional orientation to blind and vision-impaired people. Directional indicators are used where other tactile and environmental cues, such as the property line or kerb edge are absent or give insufficient guidance. They:

- give directional orientation in open spaces
- designate the continuous accessible route to be taken to avoid hazards
- give directional orientation to a person who must deviate from the continuous accessible path to gain access to a crossing point, public transport access point, or point of entry to a significant public facility eg, public toilet, information centre.

fig. 3.9.2 - Typical arrangement of directional indicators.

3.9.1.1 TGSI Material

When selecting a material, consideration should be given to the performance characteristics of the material, such as:

- Visual contrast
- Slip resistance in wet and dry conditions
- Resistance to impact, i.e., chipping or cracking
- Adhesion/bond strength - particularly if immersed in water

3.9.2 Protruding Objects

Objects with leading edges more than 27 inches (685 mm) and not more than 80 inches (2030 mm) above the finish floor or ground shall protrude 4 inches (100 mm) maximum horizontally into the circulation path.

EXCEPTION: Handrails shall be permitted to protrude 4½ inches (115 mm) maximum.

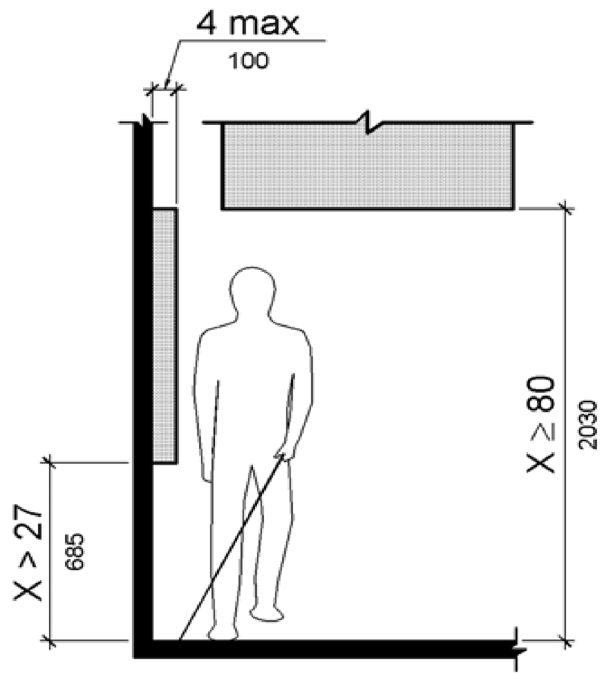


fig. 3.9.2 - Limits of Protruding Objects

3.9.3 Vertical Clearance

Vertical clearance shall be 80 inches (2030 mm) high minimum. Guardrails or other barriers shall be provided where the vertical clearance is less than 80 inches (2030 mm) high. The leading edge of such guardrail or barrier shall be located 27 inches (685 mm) maximum above the finish floor or ground.

EXCEPTION: Door closers and door stops shall be permitted to be 78 inches (1980 mm) minimum above the finish floor or ground.

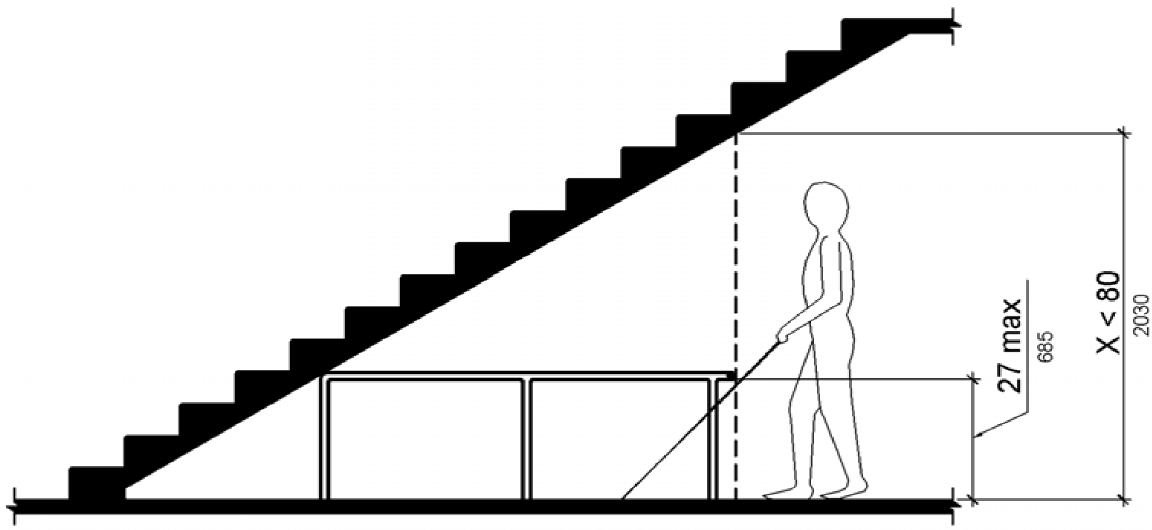


fig. 3.9.3 - Vertical Clearance

3.9.4 Children's Reach Ranges

The following table provides guidance on reach ranges for children according to age where building elements such as coat hooks, lockers, or operable parts are designed for use primarily by children. These dimensions apply to either forward or side reaches. Accessible elements and operable parts designed for adult use or children over age 12 can be located outside these ranges but must be within the adult reach ranges.

fig.3.9.4 - Table showing Children's Reach Ranges

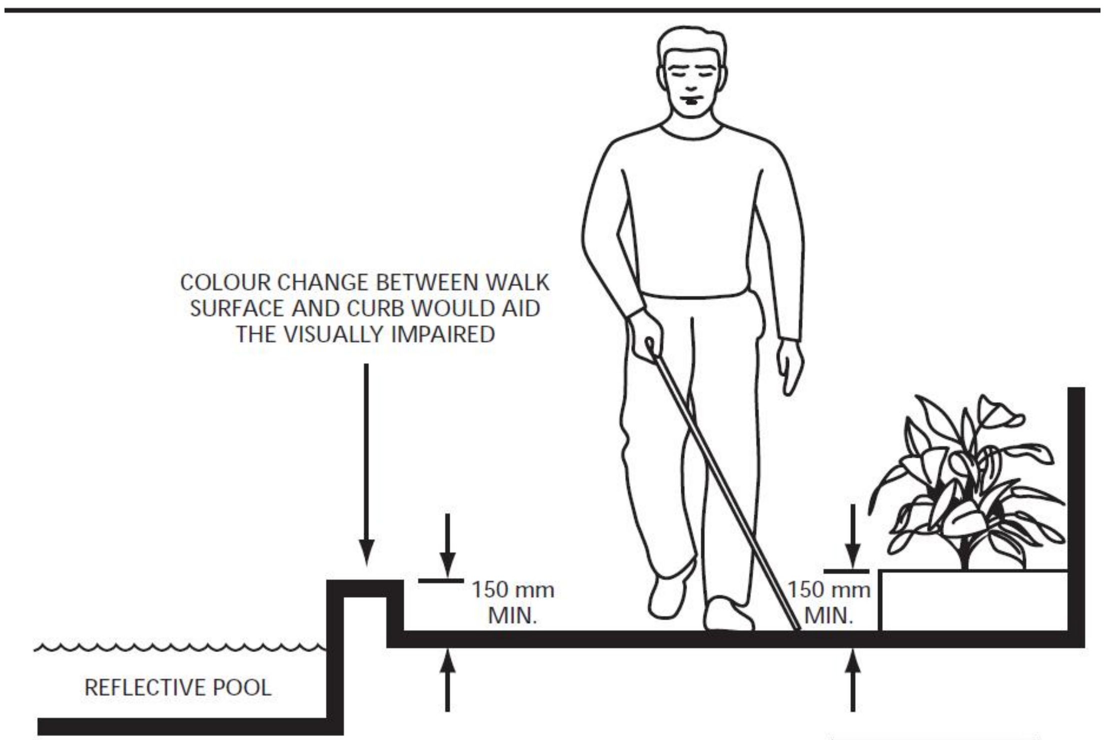
Children's Reach Ranges			
Forward or Side Reach	Ages 3 & 4	Ages 5 through 8	Ages 9 through 12
Vertical (maximum)	36 in (915 mm)	40 in (1015 mm)	44 in (1120 mm)
Horizontal (maximum)	20 in (510 mm)	18 in (455 mm)	16 in (405 mm)

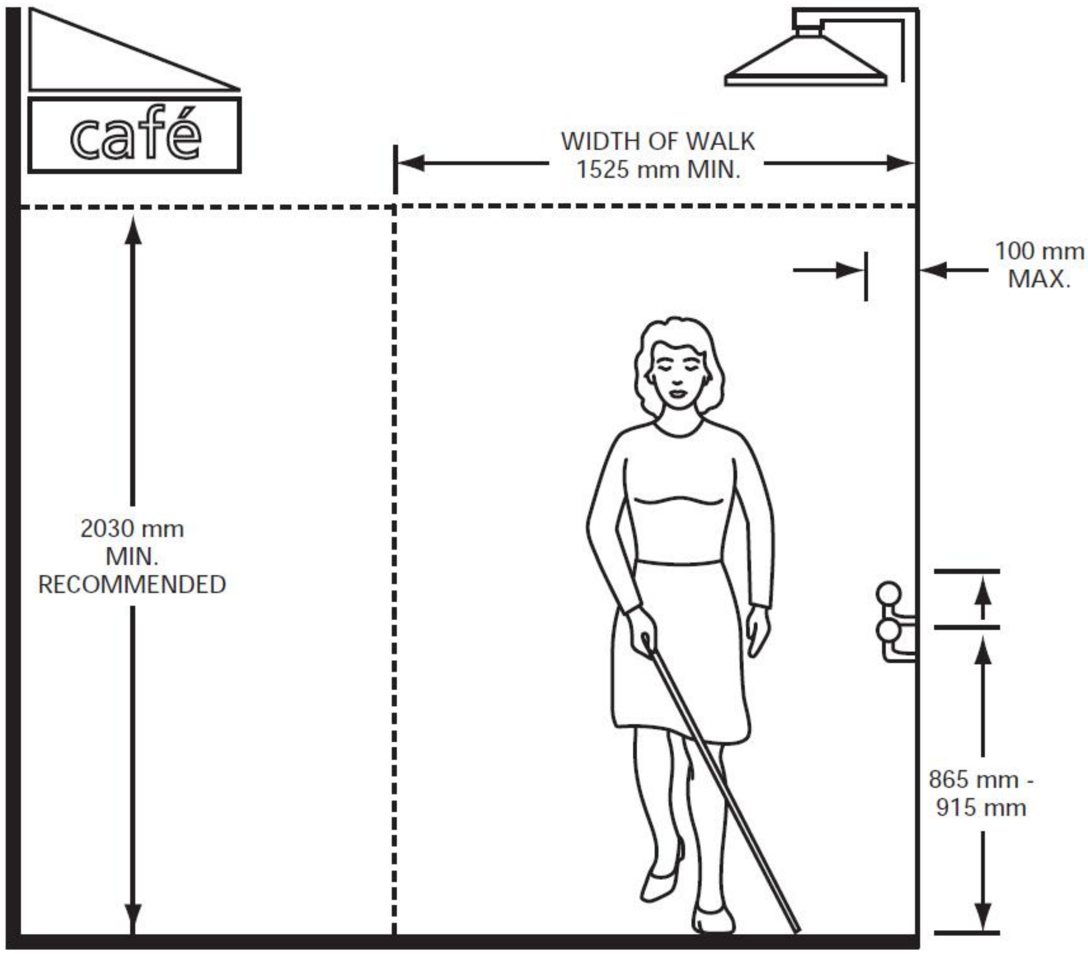
3.9.5 Pedestrian routes

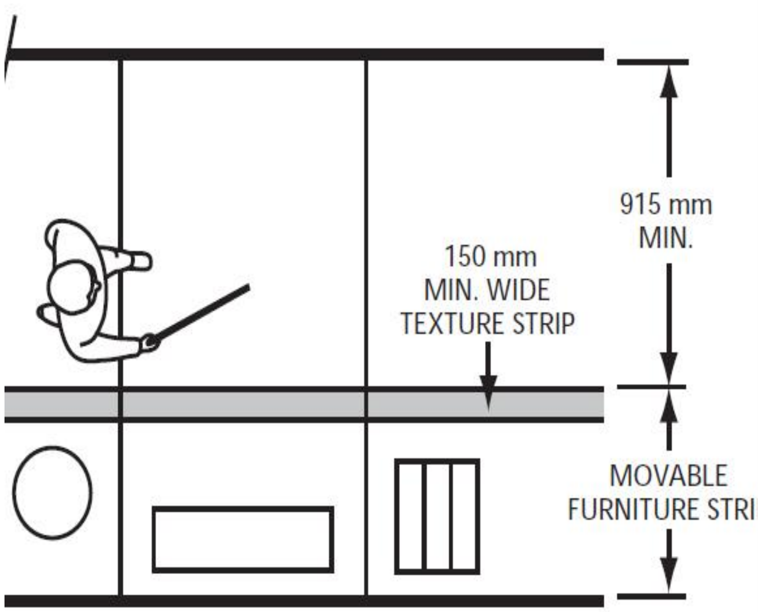
Pedestrian routes should be designed to ensure the comfort and safety of all persons regardless of age or ability.

- All active routes required to accommodate persons using mobility aids, walkers, or persons accompanied by guide dogs, should be a minimum of 1500 mm wide; 1675 mm is preferred.

- All routes should be free of protruding obstacles, overhanging signs, branches etc., in the walking area, to aid persons with visual limitations.
- The maximum allowable protrusion of objects into any pedestrian route from grade to a recommended height of 2030 mm is 100 mm.




café
WIDTH OF WALK
1525 mm MIN.
100 mm
MAX.
2030 mm
MIN.
RECOMMENDED
865 mm -
915 mm


915 mm
MIN.
150 mm
MIN. WIDE
TEXTURE STRIP
MOVABLE
FURNITURE STRI

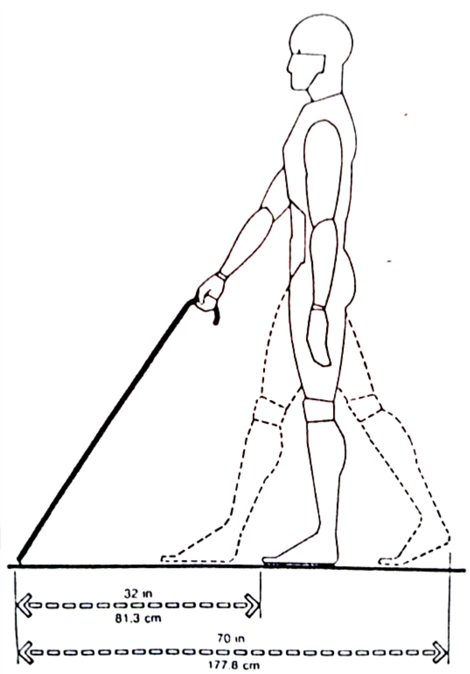

32 in
81.3 cm
70 in
177.8 cm

fig.3.9.5 - Pedestrian routes for the V.I

3.9.6 Other relevant elements

Braille mark on the railing

No forward inclined facade or element

fig.3.9.6 : Figure showing some indicators.

3.9.7 Participatory Training & Research centre for the V.I.

Method of Participatory Research and Training:

- Training or conferences in participatory methods are held in 5 to 6 groups
- Each group contains 6 participants and 1 facilitator
- For a group containing 5 participants doesn't need a separate facilitator
- A facilitator is needed to observe the overall process
- A large hall is required for all groups to gather at one place
- Separate meeting places are required for each group
- The facilitators shall be provided separate rooms at the dorm

Social skills

A visual impairment can socially isolate a student, impede typical social interactions, or limit social skill development. A student with a visual impairment who is not able to see facial expressions and subtle body language to participate in conversations and activities may experience awkward and confusing interactions. Social skills that sighted children are able to observe and imitate may need to be taught to a child with a visual impairment.

Independent living skills

Home living, self-determination, vocational goals, community access skills, and appropriate interpersonal/social skills are critical for successful transition from school to independent living and employment. Young children begin learning basic skills in independent living from visual observation and imitation. Most students with visual impairments, however, will need systematic instruction and adaptations to standard equipment, such as modifications to read oven markings and to cook independently and safely. Depending on the level of vision, intellectual ability, and other unique characteristics of a student, adaptations may range from minor highlighting to tactile clues for matching clothing. Students can learn to apply make-up and perform other grooming activities with magnifying lenses, specially marked containers, and highlighted dials on electric shavers. These skills are not typically evaluated or taught in a sequential and systematic basis in general education settings. Family members may require assistance and guidance to implement the proper adaptations that will permit practice and mastery of new independence skills within the home.

Recreation and leisure skills

Students with visual impairments need to be taught recreation and leisure activities that they can enjoy as children and throughout their lives. They are often not aware of the options or the possible adaptations that would allow them to participate in these activities. Such skills include both individual and organized group activities for students at all ages and levels.

CHAPTER 04: Contextual Analysis

4.1 Economical and social impact of a center for the blind children

“The physical and emotional toll impacts not just the individual and family but the social and economic fabric of communities and everyone’s existence. Sudden blindness of one individual in a family can become the tipping point for survival when they are impoverished to begin with"

It is approximated that 45 million people are blind in the world and that 87% of visually impaired people live in developing countries (UNICEF, 2005). Thus, “poverty and blindness are believed to be intimately linked, with poverty predisposing to blindness, and blindness exacerbating poverty by limiting employment opportunities, or by incurring treatment cost.” People who are poor are more likely to become blind due to lack of access and ability to pay for health services, an increased susceptibility to eye infections and diseases, and lack of awareness about eye health. For example, a study conducted in Pakistan found that the prevalence of total blindness was more than three times higher in poor clusters of the population than in affluent clusters. In addition, “clear evidence shows that some blinding eye diseases are a direct consequence of poverty (for example, trachoma).” However, it is important to realize that blindness may also cause people to become poor. For instance, a review on poverty and its consequences found that “although some individuals become disabled because of low income, a staggering 64% of those with disabilities were not in poverty prior to onset of the disability. Households affected by disability, and which were not initially impoverished, had three times the probability of entering into poverty within one year of onset of disability compared with unaffected households. Households affected by disability also had a lower probability of leaving poverty because of the increased costs and reduced earnings associated with disability.” Thus, it is evident that disabilities such as blindness may not only be a result of living in poverty, but also may lead an individual or family to become impoverished. “Sadly, disability is both caused by poverty and causes poverty.

Over the years, studies in child development, sociology, and special education have led enlightened educators to the conclusion that blind children grow, flourish, and achieve greater self and social fulfillment by being nurtured in the least restrictive environment. Through local education, supported by well prepared specialists in education of the blind, these children may enjoy everyday common experiences essential to the development of a keen awareness of the realities of the world around them. With proper technical assistance, consultation given to regular classroom teachers, and a broad educational environment, blind children are able to show their true worth; they are then more readily accepted socially by their sighted counterparts. Statistics reveal that not even 10% of blind children in most of the developing countries are receiving any kind of education, and therefore, integrated education is considered to be the only practical approach. It is the economically viable, psychologically superior, and socially acceptable model to bring all those unreached blind children into the mainstream of education.

WHO has estimated that up to three-quarters of all blindness worldwide is avoidable. In children, about one-half of the causes can be prevented or treated.

Blindness has profound human and socioeconomic consequences in all societies. The costs of lost productivity and of rehabilitation and education of the blind constitute a significant economic burden for the individual, the family and society. The economic effects of visual impairment can be divided into direct and indirect costs. The direct costs are those of the treatment of eye diseases, including the relevant proportions of costs for running medical and allied health services, pharmaceuticals, research and administration. The indirect costs include lost earnings of visually impaired people and their caregivers and costs for visual aids, equipment, home modifications, rehabilitation, welfare payments, lost taxation revenue and the pain, suffering and premature death that can result from visual impairment.

In Bangladesh a great number of disabled persons are children. Their number is relatively higher in the rural areas where they are deprived of many health facilities which are available in the cities. As for education this is the same. Due to the city centered policy of the government, the disabled persons of the rural areas remain ever deprived of their right to education (Islam, 1994).

The disabled persons are the ignored community in each and every sector of the society. They also long for love and care from their surroundings. But when the disabled people are deprived of receiving education with the normal children from the early childhood, they feel segregated and stranded aloof. Gradually they become deviated from the mainstream society. Adding to the misery their relatives also feel stigmatized due to their disabled family members. More often they are ridiculed and humiliated by the majority of the normal people. Considering all these miseries they become introvert and self cornered day by day. They become to feel that they are the burdens of their society and family. Due to the lack of proper education and training they become helpless for themselves, let alone the society and the state. The state in turn denies them their rights. The society holds them in contempt and irritation due to the reigning superstitions and stereotyped ways of thought.

A centre for blind children will provide this particular population of disabled children in Bangladesh where they will get an opportunity to not only educate themselves but also empower themselves in many sectors. While many nongovernmental NGOs are working with foreign forces and services in Bangladesh in all districts to provide educational facilities they are lacking behind in some sectors still. These blind children are getting educated but they are not being taught properly the many ways of leading life, adapting to surroundings. They continue to becoming a significant burden for the family, society. This percentage being more for girls. They are ill treated in the rural areas, ignored and looked down upon. Blind children from all over the country will have an opportunity to come and empower themselves, nurture their skills where they will not be differently treated but be treated as "normal" amongst all. They can enjoy everyday common experiences and also be taught how to experience it. Through this initiative a blind child will be prepared to face the world and challenges as it comes. They will play an active role and participate in economic fulfillment of their families which will in turn affect the economical situation of their families. They will be able to mingle in the society as themselves and will not be stranded in a corner of a room. They will be taught leisure activities so that they can enjoy throughout their lives.

CHAPTER 05 : Case studies

5.1 Case study 01

Project Title: National Center for Special Education (NCSE)

Site: Mirpur , Dhaka

Architect / Consultant: The Designers Collaborative Ltd.

Area: 6.3 acre

This campus has:

■ 3 schools for the handicapped

■ 3 hostels for the handicapped

■ Teachers' training and resource department

■ Staff quarters

■ Residence for Head Sir Special provisions in school:

■ Ramp: for wheelchairs (only for ground floor).

■ Handrail running along corridor: for protection for window openings and convenience in movement of physically and visually impaired students.

■ Contrast in wall paintings

■ Acoustical treatment

■ Change of material at stairways: for the visually impaired children

■ Toilet specially designed for multiple handicapped

5.2 Case Study 02

Project Title : W. Ross Macdonald School for the Blind

Site: Ontario,United States,2005

Architects: G. Bruce Stratton Architects

Concept

The W. Ross Macdonald School for the Blind comprises several buildings dedicated to the education of over 200 visually impaired children. The concept employed involved the use of the single-spine plan where all functions branch off one single circulation route. This layout is simple to follow and easily memorised by visually impaired users. The architects explored navigation through touch where guiding textures feature both on the walls and underfoot to aid orientation.

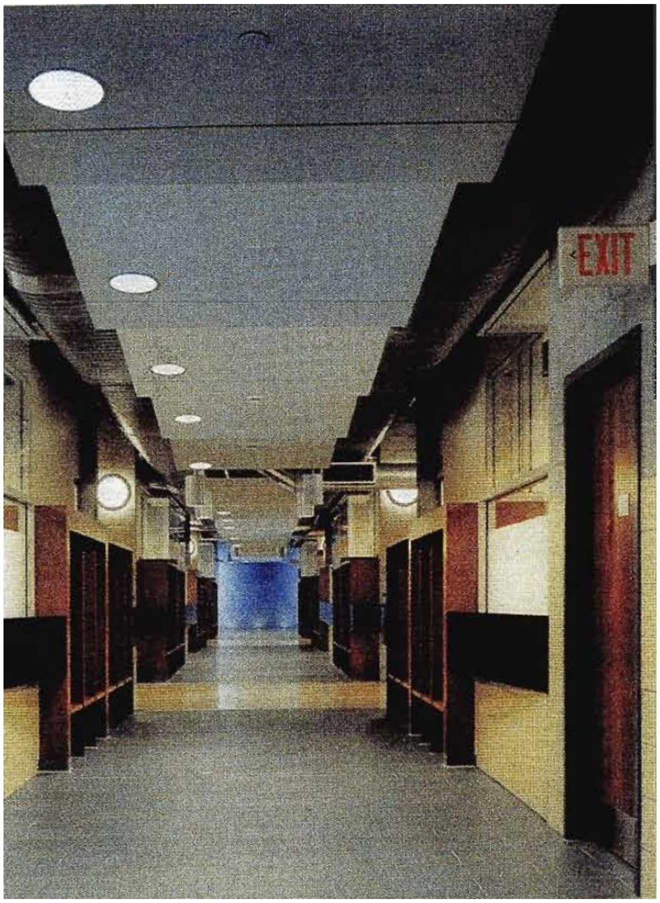


fig. 5.2.1 - Central spine for circulation

Spatial Organization

The single-spine plan, with a bend at the entrance, features extra wide corridors of approximately 3 metres as opposed to the common 1.6 metres and oversized doorways relative to the corridors width to accommodate increased circulation requirements of the children in their way finding process (figure 11). In plan, the two wings form a junction at the centre, which creates a focal point adjacent to the main entry foyer (figure 12).

The eastern wing accommodates student residences, a health services centre, classrooms, music practice studios, and a multi-purpose space. A double volume atrium at the entrance alters the acoustical quality of the space thus defining it. The atrium is spanned with exposed steel beams allowing light in through clerestory windows. The western wing has meeting rooms and offices close to the atrium. Four 'teaching pods' follow on from there, each 'pod' has two classrooms divided by washrooms and a shared activity room. The architect's objective was to promote an enriched living and learning environment with as few barriers as possible. The design caters for the unique needs of the students enabling them to learn in an environment that is hospitable to their needs.

Light

Natural and artificial light were carefully considered. Most students are highly sensitive to glare so direct sunlight is minimized. The fenestration is designed to achieve diffuse day lighting conditions through the implementation of shading devices. Broad concrete beams and a series of exaggerated concrete fins are designed to block late afternoon sun from entering directly. Windows have lower than normal lintels to reduce the amount of direct light that enters the classrooms. Furthermore the use of sand blasted glass to ensure indirect natural light reaches the central corridors from the classrooms. Artificial light sources are indirect and operate with dimmers so that the individual can adjust it to suit his or her need and comfort.

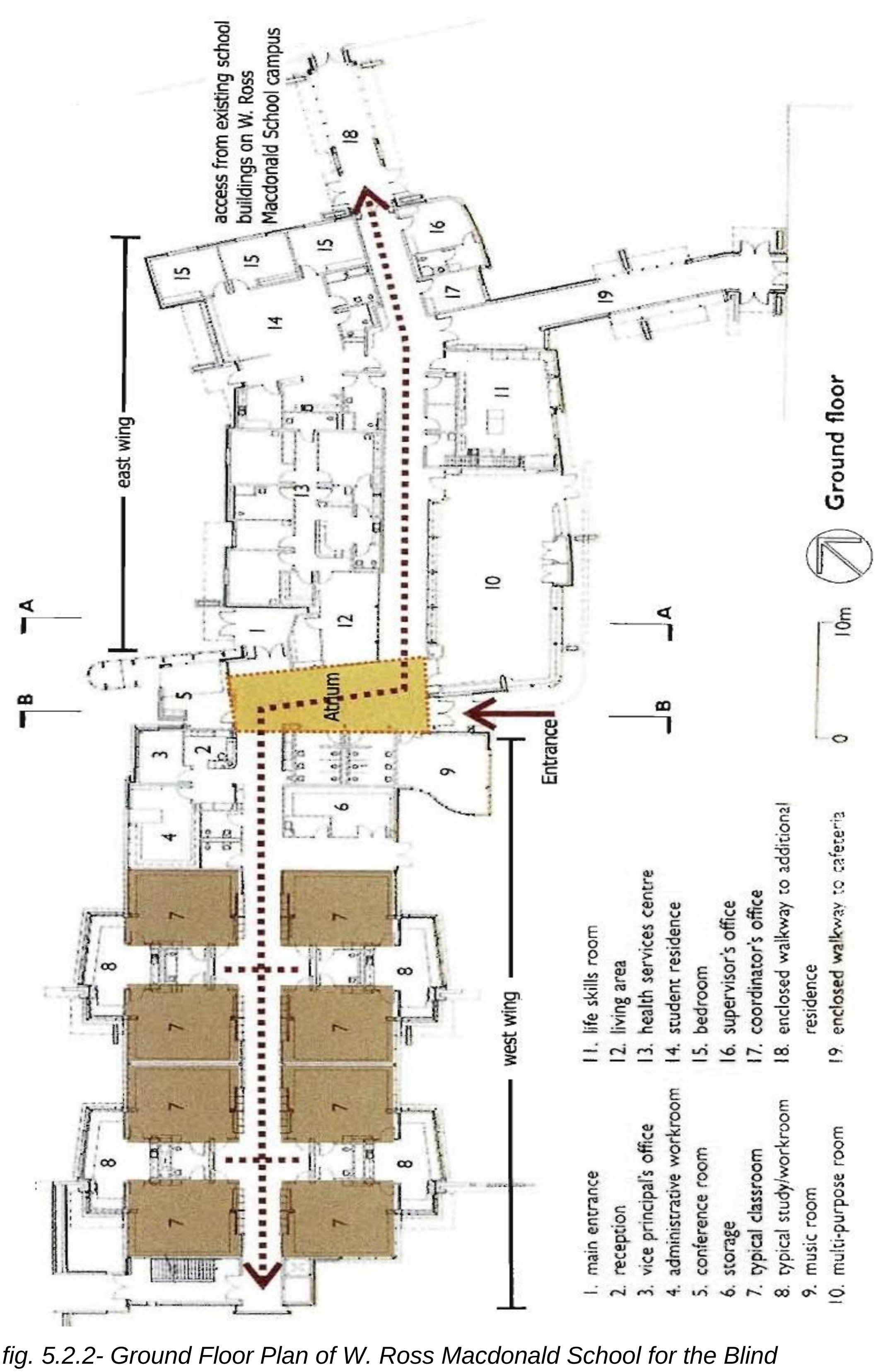
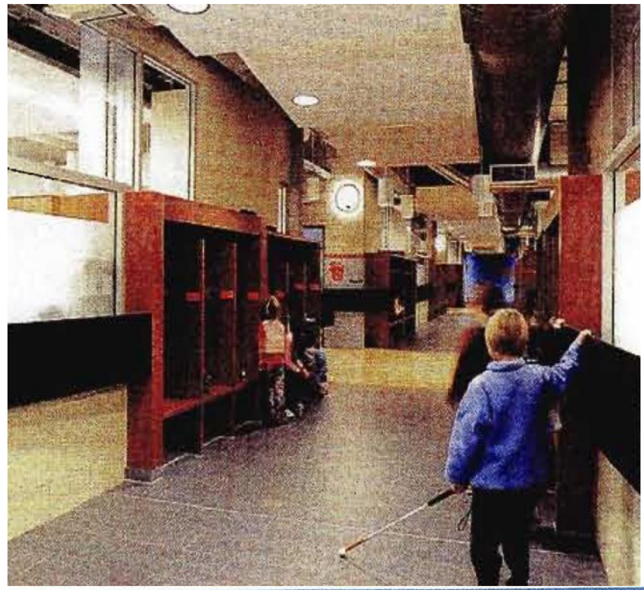


fig. 5.2.2- Ground Floor Plan of W. Ross Macdonald School for the Blind

Navigation through Texture



The design philosophy focuses on 'navigation through texture'. Off-shutter concrete walls detailed with smooth ceramic tiles work with a continuous 360mm wide black 'trail rail' along the walls that children use to guide them along the corridor. (Figure 13) Contrasting tactile floor materials provide audible clues for students aiding them in the creation and navigation of their mental map. At critical junctions the flooring differentiates from dark porcelain laid tiles to blonde maple hardwood flooring, providing a contrast in colour and audible quality. These tactile markers orient the students at every step of their daily route and enable them to differentiate between zones in the process of way finding.

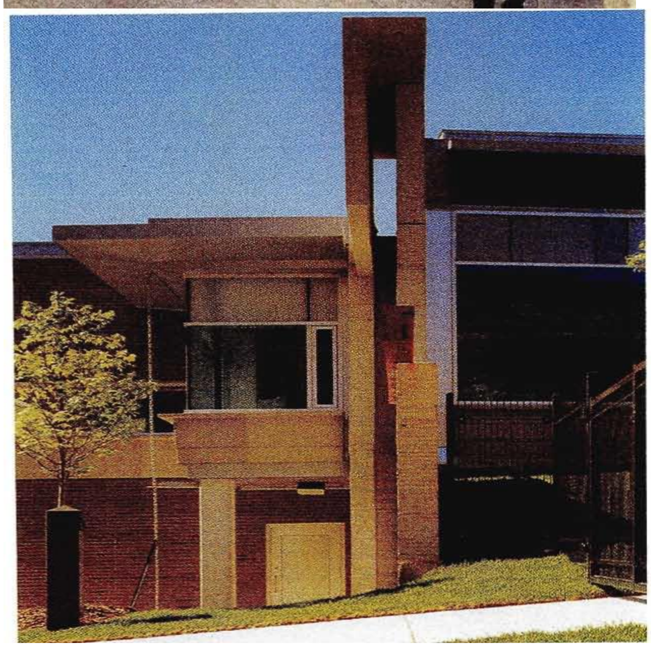


fig. 5.2.3- Textural material on exterior

All students are legally blind however many are partially sighted therefore robust colours and strongly expressed forms become critical to the student's experience of their surroundings. The rich variety of materials designed for the senses on the inside of the building, with great consideration given to detail, appear to be echoed on the exterior. (Figure 14) In situ and pre-cast concrete are combined with rusted steel, horizontally scaled zinc, concrete block and face brick to give this building a distinctive textural quality. Metal chains hang from the soffits channelling water into rusted steel-lined concrete trays filled with pebbles. This mixture of materials provides the children with a stimulating environment to be explored with their sense of touch. Brightly coloured glass is attached to a weathered steel structure that features at the schools entrance. (Figure 15) The glass panels are tinted red, blue, orange and yellow forming a transparent screen, which casts patterns of transparent light onto the ground. This is another means of stimulation for partially sighted children.

Summary

The low profiled building has a sculptural quality that is ironic, as students cannot fully appreciate its visual aesthetics. This precedent study shows that the architect has created a building, which exceeds the visual, and embraces the sensory aspect of the human body, while at the same time including visual qualities. It is uncertain whether the mirroring of sensual materials on the interior and exterior of the building was intentional. However, this is seen to be an appropriate response in design where the visually impaired are specifically designed for, but the sighted are not excluded.

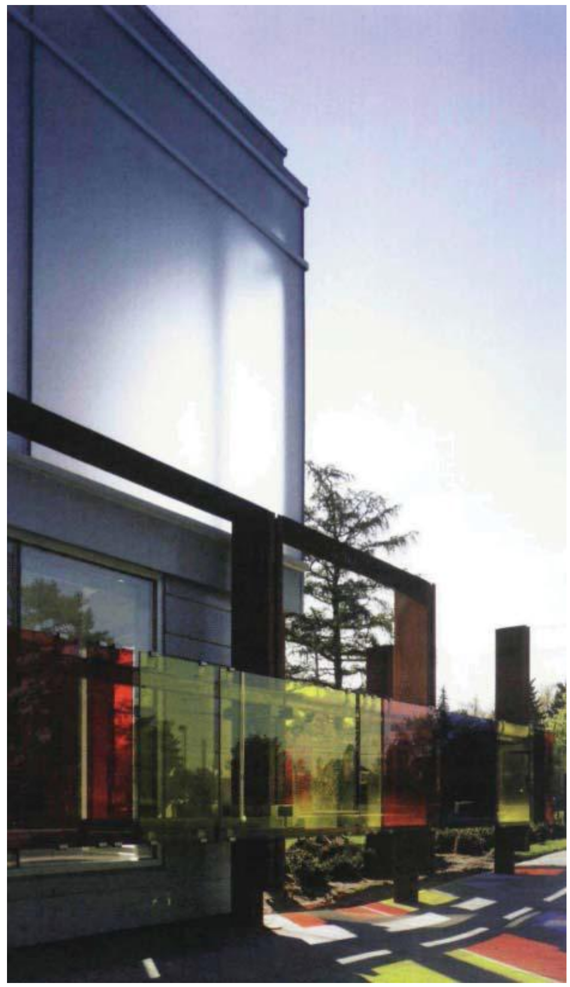


fig. 5.2.4 - Coloured glass at entrance

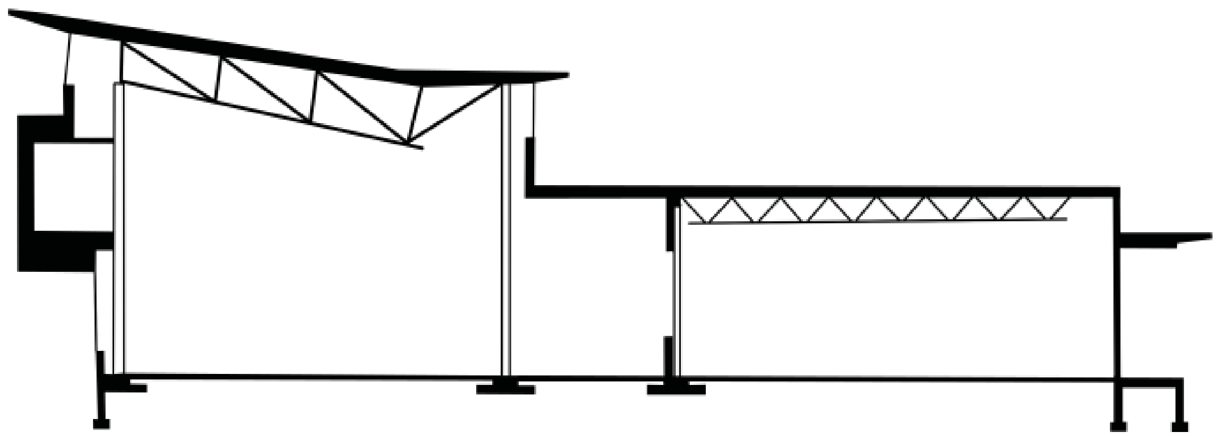


fig. 5.2.5 - Section showing height variation for sound effect

.

5.3 Case study 03:

Project title: Center for the Blind and Visually Impaired

Architect: Tallerde Arquitectura-MauricioRocha

Location: Mexico City**,** Mexico

Project Team: Arturo Mera , Cristobal Pliego, María Elena Reyes, , Ivan Camacho, Iris Sosa, Jose Luis Acevedo, Victor Limón, Vanessa Loya, Juan Manuel Moreno, Francisco Manterola,

Landscape Architect: Jerónimo Hagerman

Project Area**:** 8,500 sqm

Project Year**:** 2001

5.3.1 Project brief

The 14,000 sqm complex is on corner plot bordered by two avenues. A blind wall encircles the complex on its four sides and acts as an acoustic barrier as well as a retaining wall/blank to hold the earth moved from neighboring wasteland areas. In contrast to the abstract exterior, the internal facade of the boundary wall creates banks that change shape, height, and orientation, thus creating various courtyards.

5.3.2 Spatial planning

The floor plan, meanwhile, can be read as a series of filters which stretch out from the entrance in parallel strips. The first filter is the building that houses the administrative offices, cafeteria, and utility area. The second consists of two parallel lines of buildings organized symmetrically along a central plaza. These buildings contain a store, the “tifloteca-sonoteca” (a sound and touch gallery) and five arts and crafts workshops. The third filter has the classrooms facing the gardens and the most private courtyards. Perpendicular to the entrance, a series of double-height volumes house the library, gymnasium-auditorium, and swimming pool.

The 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 and varying size, light intensity and weight of materials: concrete, tepetate bricks, steel, and glass.

The Center aims to enhance spatial perception, activating the five senses as experience and source of information.

Different materials used to direct the users along their way in order to help them identify each building.A water channel runs through the center of the plaza, so that the sound of the water guides users along their way. Horizontal and vertical lines in the concrete at hand height offer tactile clues to identify each building. Six types of fragrant plants and flowers in the perimeter gardens act as constant sensors to help orientate users within the complex.

Figure 5.3.3 - Pictures of different functions within building blocks

5.4 Case study 04:

Project Title: Disabled Children's Rehabilitation Center

Site: Jeddah, Saudi Arabia

Architect: Zuhair Fayez & Associates

Client: Disabled Children's Rehabilitation Center

Area: 7.85 acre

Fig.10.Plan

The center is designed as a village and divided into six main sections: medical, school, rehabilitation, multipurpose, children's housing, worker's housing. These are united by landscape open spaces and series of transitional atria

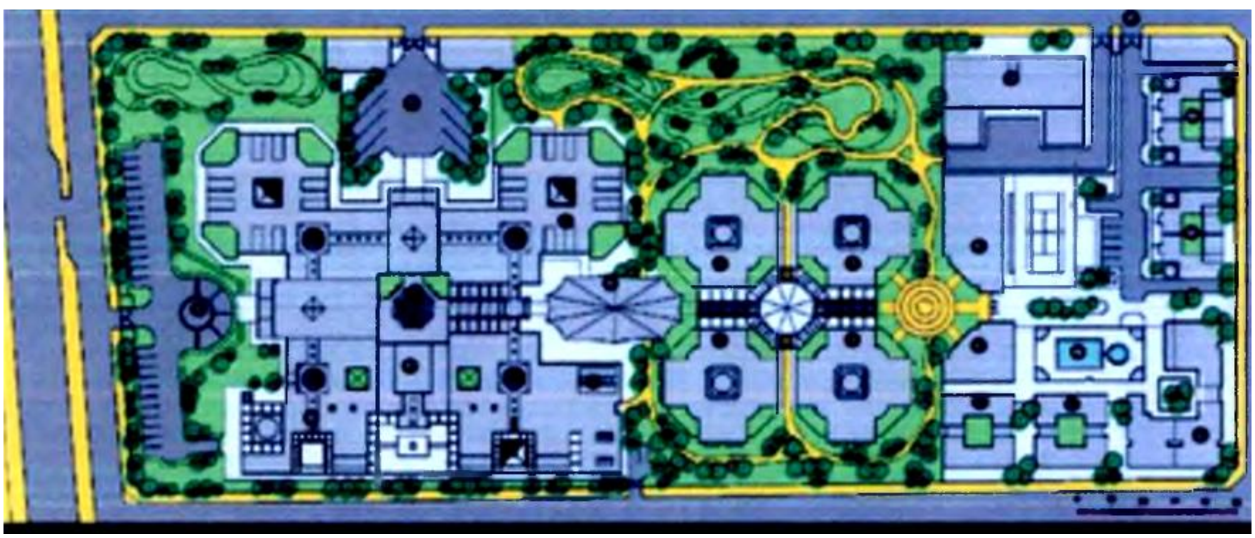


Figure 5.4.1 - masterplan

The center is designed as a village and divided into six main sections: medical, school, rehabilitation, multipurpose, children's housing, worker's housing. These are united by landscape open spaces and series of transitional atria

• The center is designed like a village.
• Related with landscape.
• North south oriented.
• Internal courtyard.
• Sufficient light & air.
• Separated entry for school & hospital.

Figure 5.4.2 - Interior

5.5 Case Study 05

Project Title: Centre for Disability in Development
Site: Ulail, Savar, Dhaka

This NGO provides medical and logistic support to the disabled persons, which includes the visually impaired persons.
Features for the blind:

- Warning indicator tactile paving surface

- Directional tactile paving surface
- Braille map
- Ramp with directional tactile paving

Figure 5.5.1 - Ramp with tactile paving

Figure 5.5.2 - Braille Map

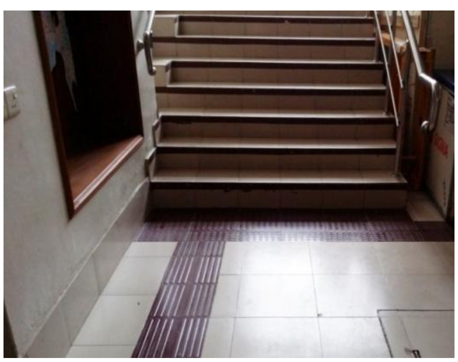


Figure 5.5.3 - Warning and directional indicator

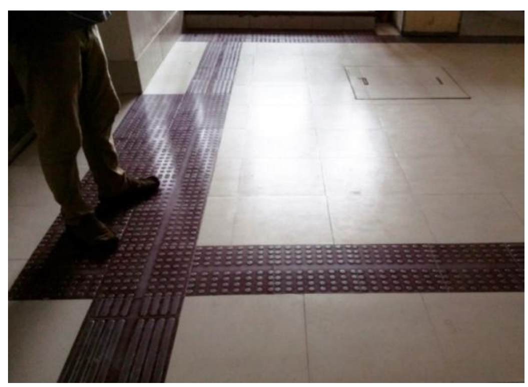


Figure 5.5.4 - Warning and directional indicator

5.6 Analysis and findings

On close speculation the following points were found common in all the case studies which could be implemented in the design process.

5.6.1 Spatial planning

- A common feature in all these projects is that these spaces are all segregated around small or large courtyards. A courtyard in the case of a blind centre plays a vital role in rehabilitating them and providing them a space closer to nature which helps them connect to nature
- In all these projects, the classrooms are located around the courtyard and on the inner side while the administrative areas are located on the outwards surrounding these classrooms.
- Access for ventilation and entry for light have been kept in mind while designing these projects.
- The planning follows a single spine route which is an easy guide for the visually impaired
- At each transition varying elements are used in all these projects to identify a stair,room etc
- A special element like a water channel is used throughout to keep them alert as seen in the Center for the Blind and Visually Impaired.

5.6.2 Materials

- In the third project varying materials have been used. This was an essential observation because the different materials help and guide the users along their way and identify each building.
- Exposed brickwork and concrete used in both the projects.
- Plants and trees of variant scents used in places to act as sensors.
- Materials changes along the way in different spaces to orientate the users

5.6.3 *Environmental considerations*

- All the structures have intelligent solutions to bringing light inside the deepest and darkest corners by means of light holes or segregating masses.
- Interior spaces are gorged with landscaping which serves the function of providing with an environment for cafes and restaurants apart from the aesthetic needs.
- No direct light is brough into the centres which might cause glare and affect the visully impaired.

CHAPTER 06: Programme and development

This section encloses the project aim, objectives and the main functions of the project programme.

ITEM
Training for the blind
Study rooms
Admin
Recreational facility
Community education centre

6.1 Programme Brief

Training centre:

Types of training courses: Orientation & Mobility training , Computer training, Spoken English training, Musical instrument training. Rehabilitation and instruction is provided for visually impaired people so that they can cope with the different challenges of the built environment in order to become independent and mobile in their daily lives. Trainings are offered, where life skills such as Braille, computer use, weaving and carpentry are available. These skills serve to empower people giving them an opportunity to earn an "income.This center will also provide information and knowledge to visually impaired people regarding their handicap. Counseling through social services is also available.

Study rooms

They are needed to provide after school assistance with braille and other textbooks

Administration

A central administration with information centre, administrative offices, accounts section etc.

The administration will ensure the smooth operation of the facility and also will maintain the process and promotional responsibilities of the facility.

Recreation and Reception lobby

A recreation hall and a central reception lobby is needed for the facility and for the visually impaired children who are going to visit this center. It will provide them with indoor games facilities and multipurpose rooms where their work of art and other activities can be displayed.

Community education centre

Meeting rooms and conference halls where there will be workshops held to enhance knowledge among the parents of the visually impaired children and the mass community. Community meeting rooms are available in the centre where they will be trained how to deal with visually impaired children.

6.2 Schematic

A very initial programmatic sketch of the functions I did in the early stages of the project.

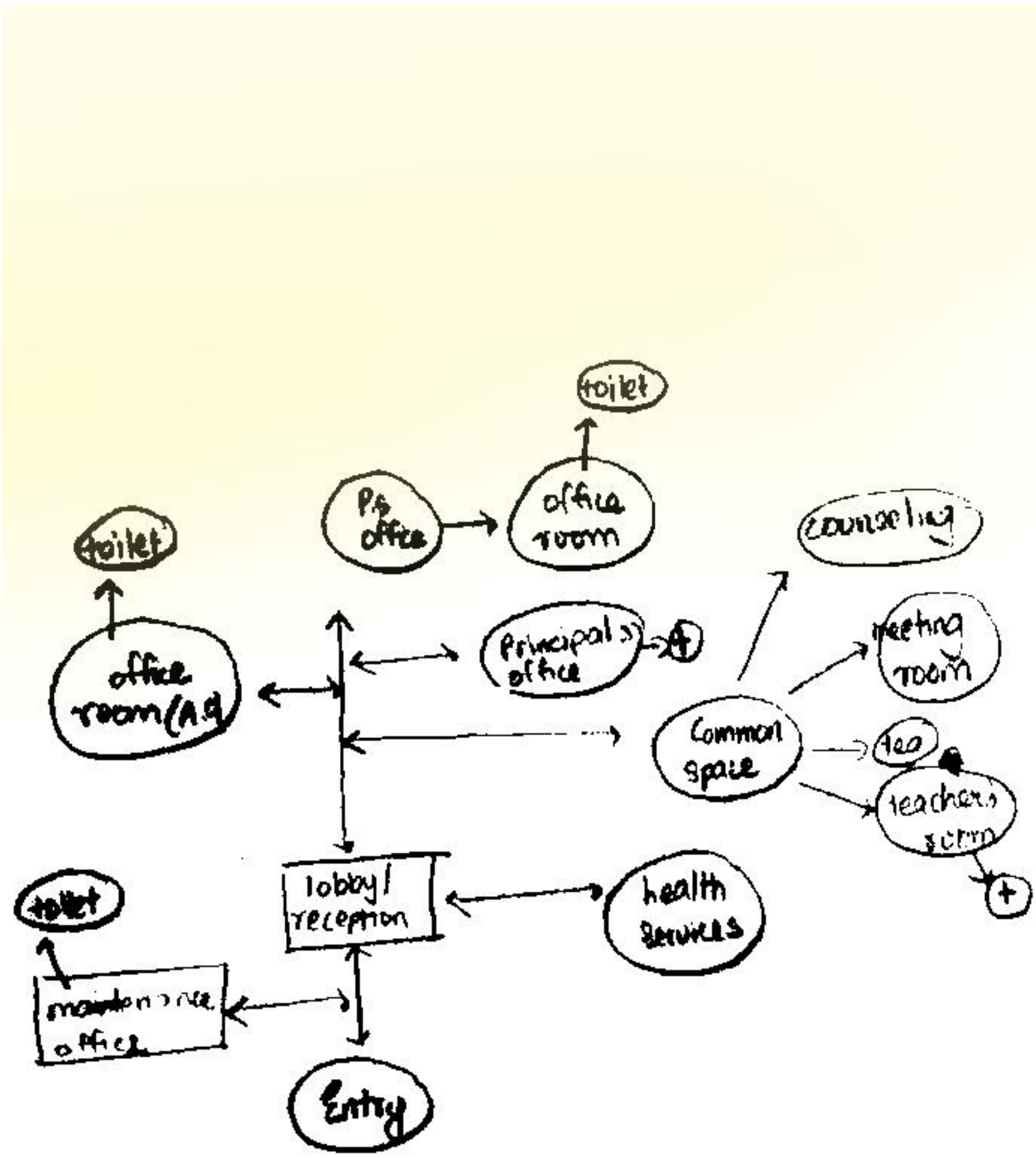


fig.6.2.1 : a sketchy representation of the functional distribution of the admin wing

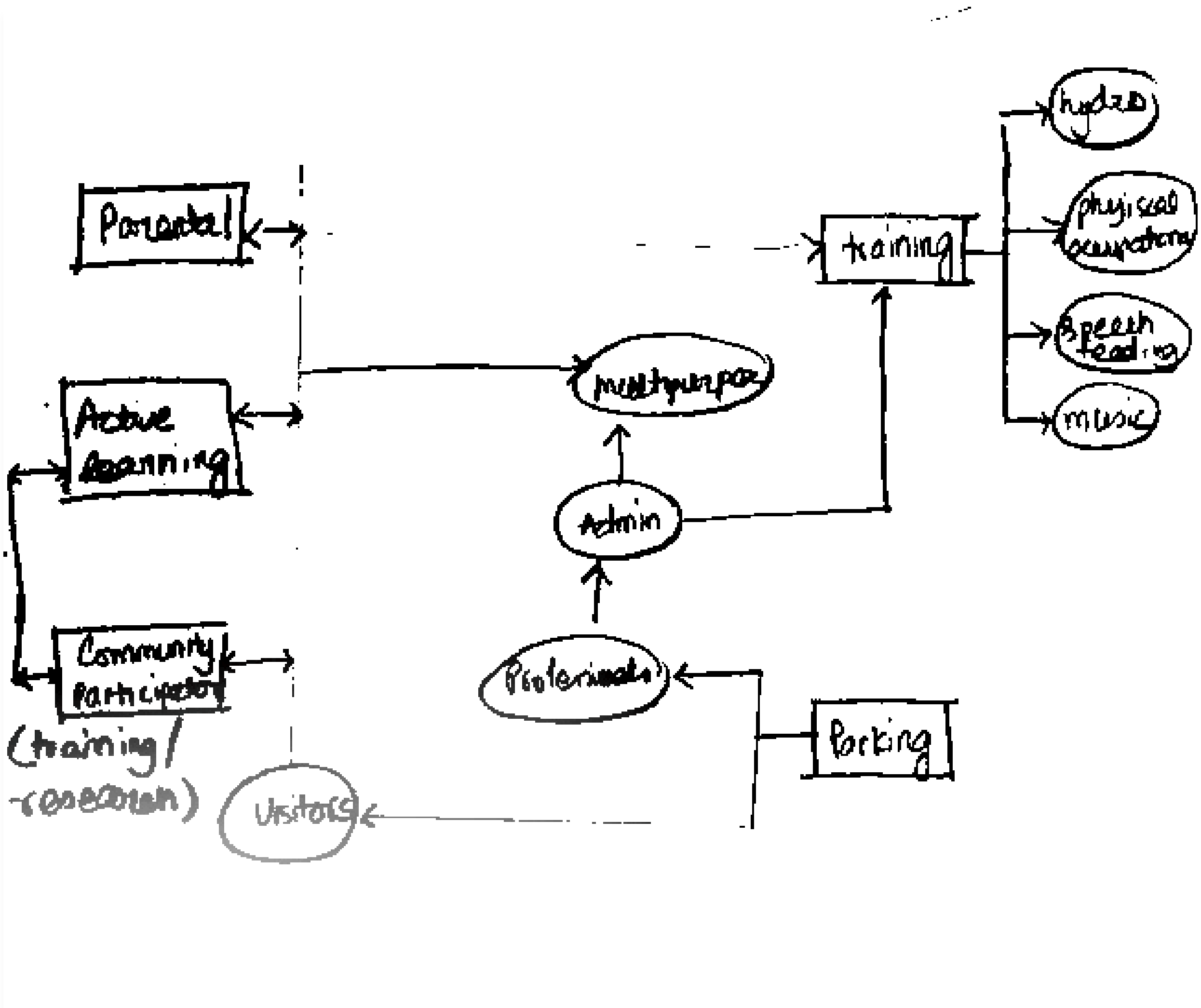


fig.6.2.2 : a sketchy representation of the functional distribution of the centre in general

6.3 DETAILED PROGRAMME

ITEM	AREA (SQM)
Training centre	455
Study rooms	312

Admin	90
Conference centre	4000
Recreational facility	437
Total	**6404**

Training and research centre:

ITEM	UNIT	SQM/UNIT	TOTAL SQM
Orientation & Mobility training	20 person	10	200
Braille training	15 person X 1 unit	1.5/person	23
Computer training & Spoken English	15 person x 1 unit	3/person	45
Musical Instrument (Guitar)	12 person x 1 unit	2/person	24
Musical Instrument (Harmonium)	8 person x 3 unit	2/person	24
Teacher's room	16 person	3/person	48
Service & circulation	25%	-	91
TOTAL			**455**

Study rooms :

ITEM	UNIT	SQM/UNIT	TOTAL SQM
Class rooms	10 person x 10 unit	2.5/person	250
Service & circulation	25%	-	62
TOTAL			**312**

Admin:

ITEM	UNIT	SQM/UNIT	TOTAL SQM
Director's room	1	24	24
Security office	1	24	24
Accounts	1	24	24
	.		

Service & circulation	25%	-	18
TOTAL			90

Community education centre:

ITEM	UNIT	SQM/UNIT	TOTAL SQM
Room	25 X 3	30	2250
Dining & Kitchen	60 person	3	180
Front office	1	20	20
Accounts	1	20	20
Sales centre	1	40	40
Conference Hall	40 person X 3 unit	2/person	240
Meeting rooms	6 person X 15 unit	4	360
Director	1	30	30
Service & circulation	1	60	60
TOTAL	25%	-	800
			4000

Recreational facility :

ITEM	UNIT	SQM/UNIT	TOTAL SQM
Multipurpose hall	50 person	3/person	150
Reception Lobby	1	200	200
Service & circulation	25%	-	87
TOTAL			**437**

Chapter 07: Conceptual stage and design development

7.1 Concept Development:

The eye is truly a magnificent organ and our primary link to the outside world. It is estimated that around 60% of information perceived by humans arrives through the visual channel (Zeevi & Kronauer, 1975). By transforming light waves into visual images, we are able to make almost instantaneous sense of our environment. Without much effort, our eyes allow us to apprehend distant information and anticipate our actions by providing detailed information on the size, shape and colour of elements in the environment (Hollyfield & Foulke, 1983). I tried to sketch rays of light emerging from the eye and how they entered the brain and hit the nerves.Rays of light travelling from a less concentrated to a more concentrated area was the basic idea of the form derived.I studied how rays of light pass through and from the eye and sketched out ideas that would represent the idea on paper to visualize the spaces and the form itself.

Some brainstorms of the initial ideas:

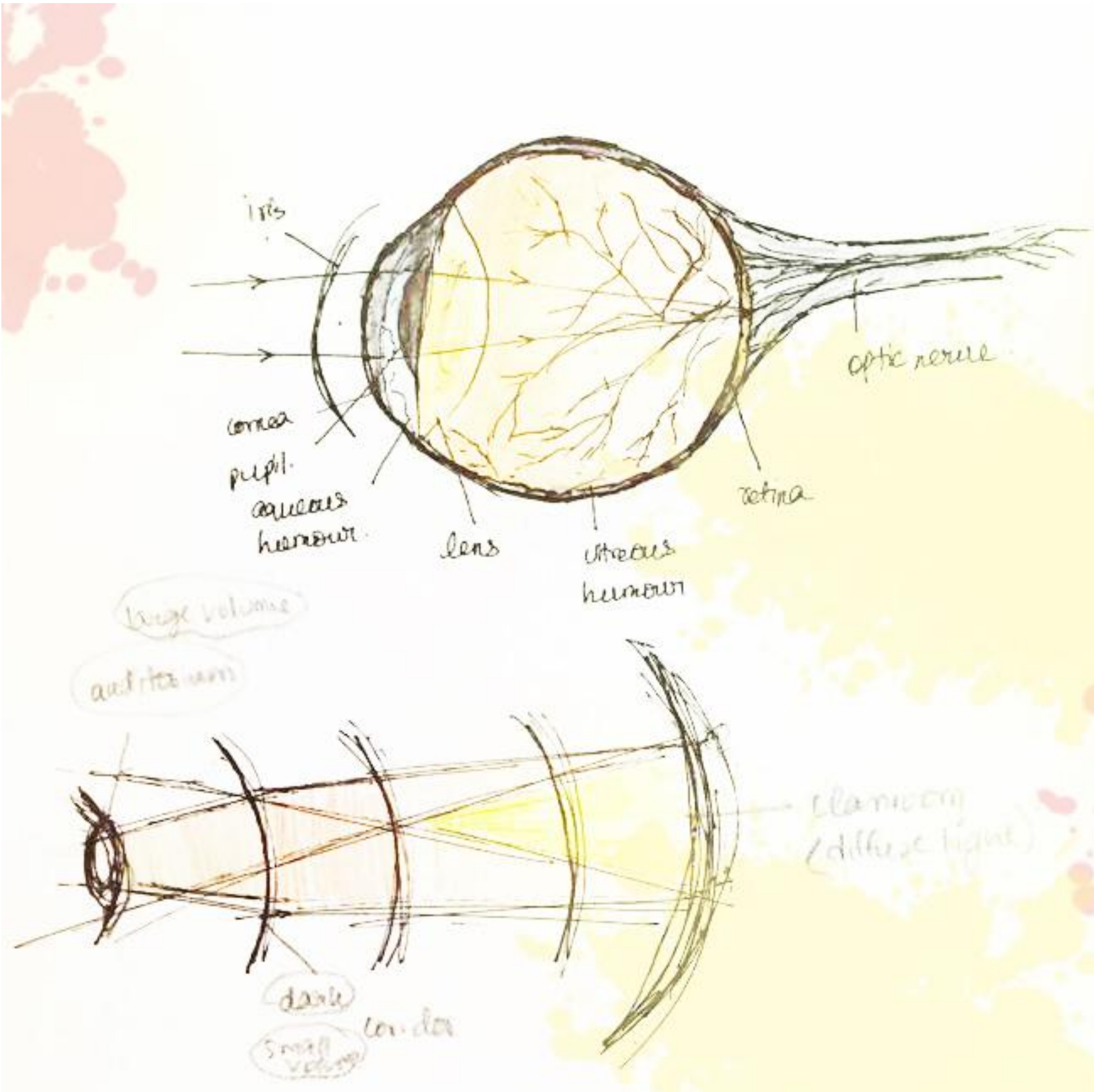
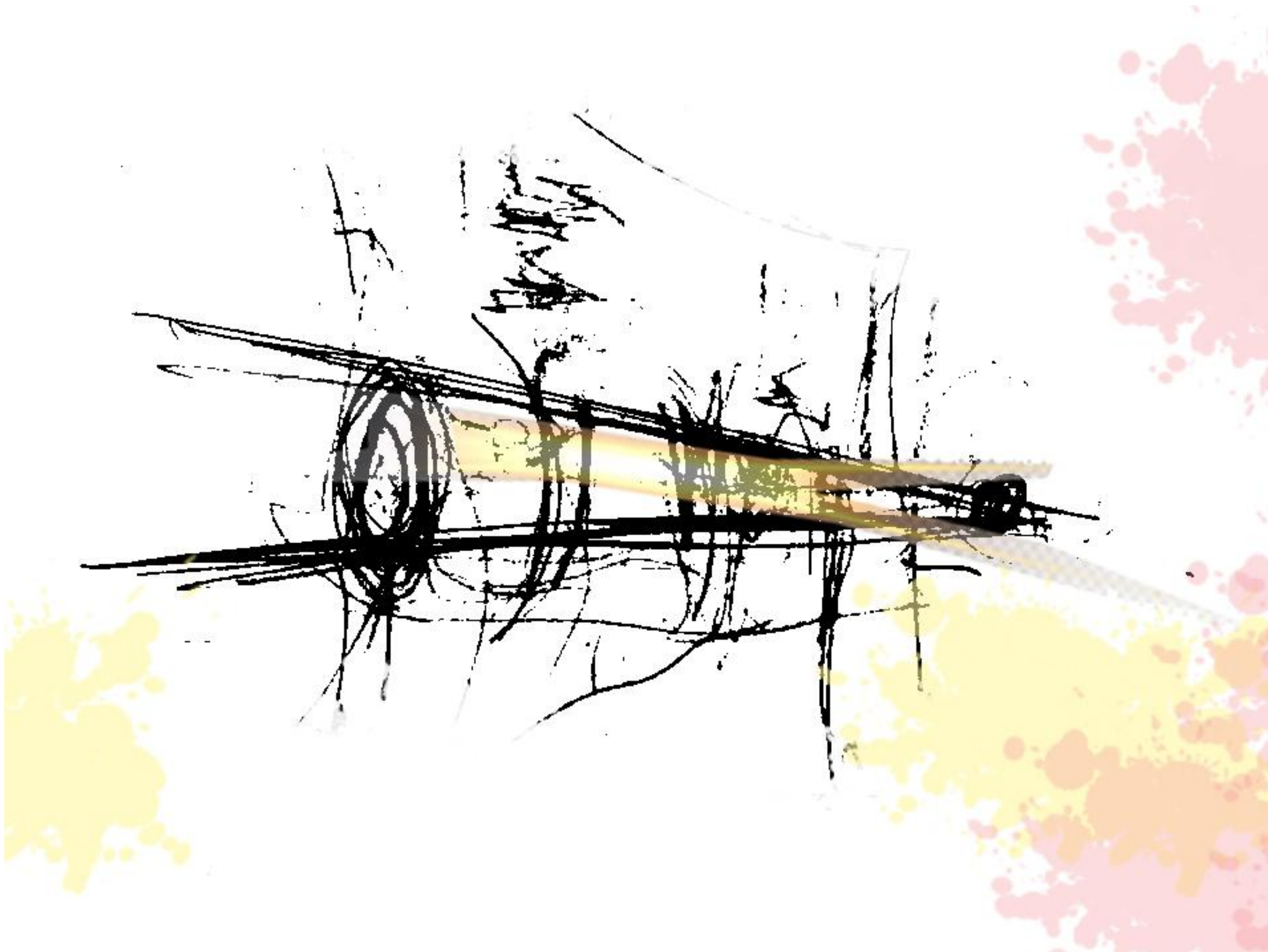


fig.7.1.1 sketch of the retina



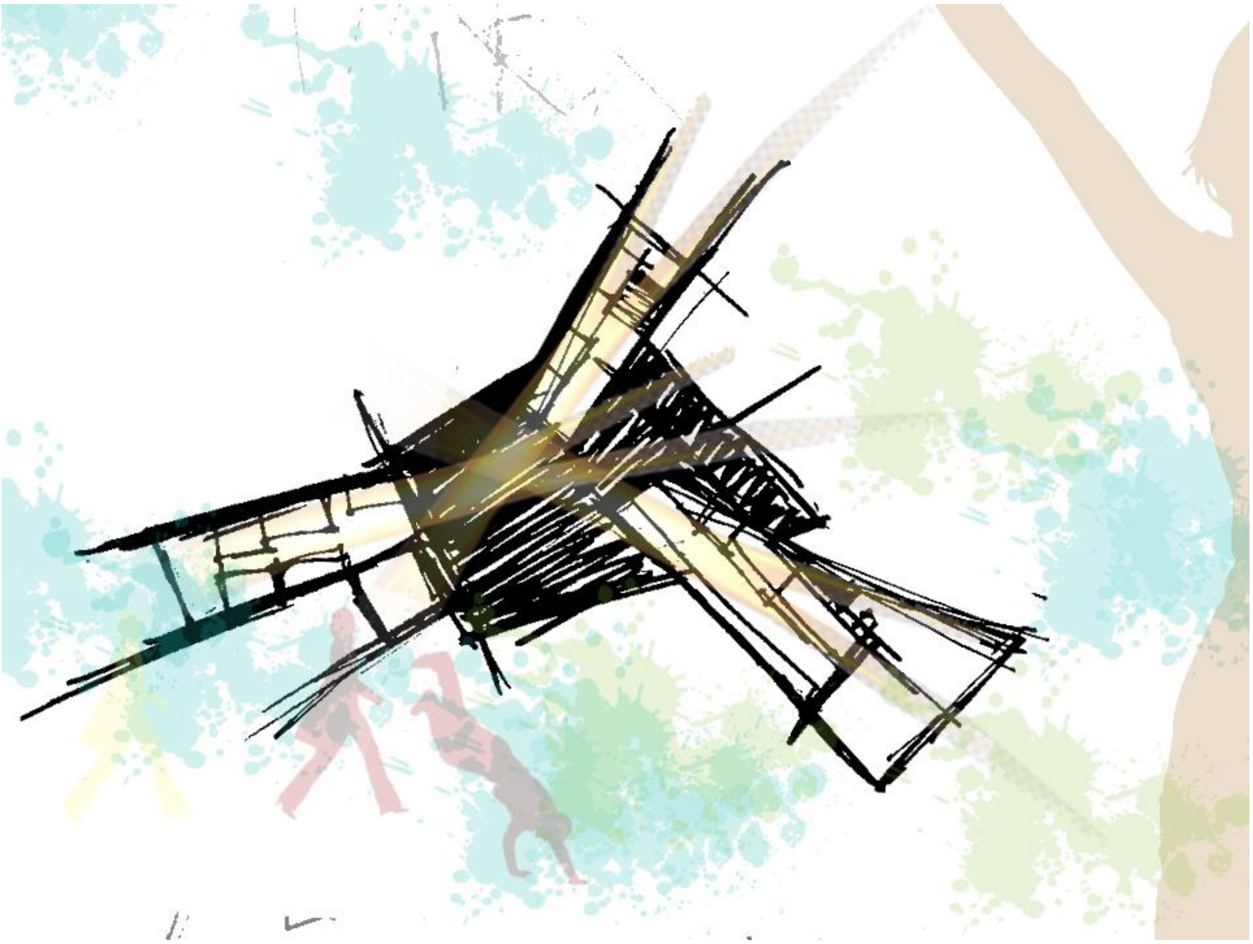
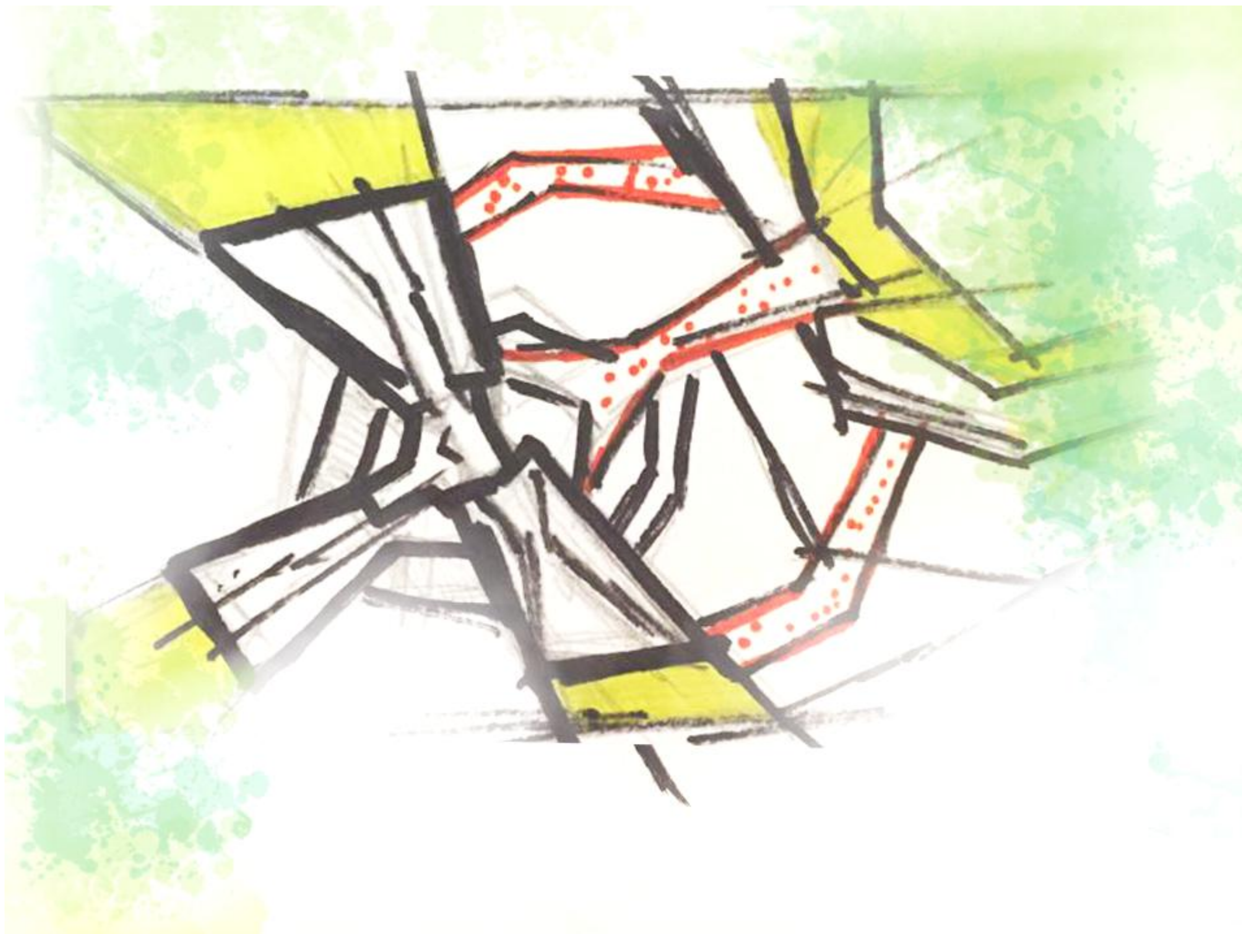
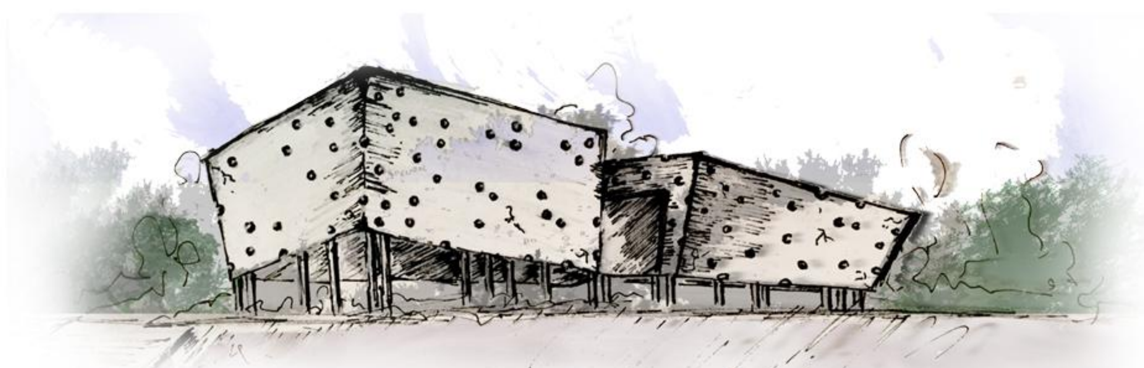


fig.7.1.2 sketch of the form that I visualized initially from the concept of light flow

I then tried sketching my form from my ideas and visualizations





Visualizing the Braille imprints on the facade and the spaces with the people in it.

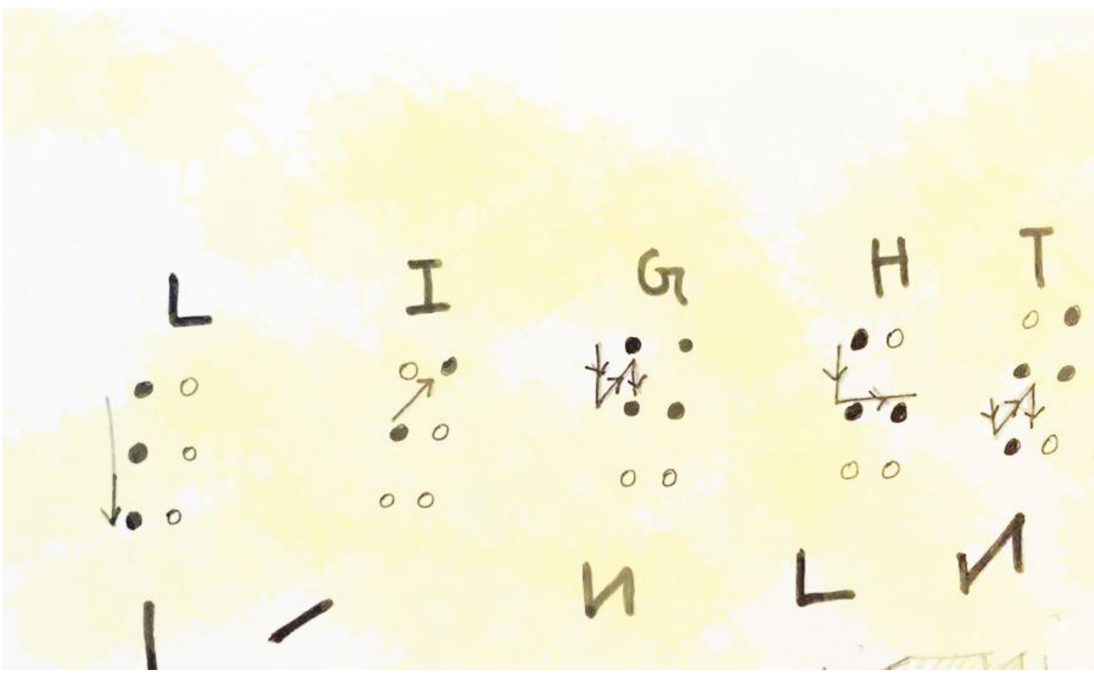


fig.7.1.3 form sketches and how the Facade alphabets were derived from certain words in the braille alphabet.

Visualizing the spaces with model and further sketches

At this stage the orientation and the placement of the masses were not right. Masses were arranged in the next stages. The masses were divided according to that which is entitled for the children and that which is completely entitled to the public and the administration and other community facilities along a central plaza which is the emerging point of all the masses.

Masses are rearranged in orientation with the northern side of the siteline.The educational zone and training centres are arranged perpendicular along the axis and the public zone is placed alongside the two private masses to create the impression of it holding the other two.Also,when the masses are arranged in this manner two vistas are created along the two roads which in turn will create openings for the public.The termination of the third public mass ends visually into the landscape outside which in turn become the braille trail,sensory gardens etc for the visually impaired children visiting here.

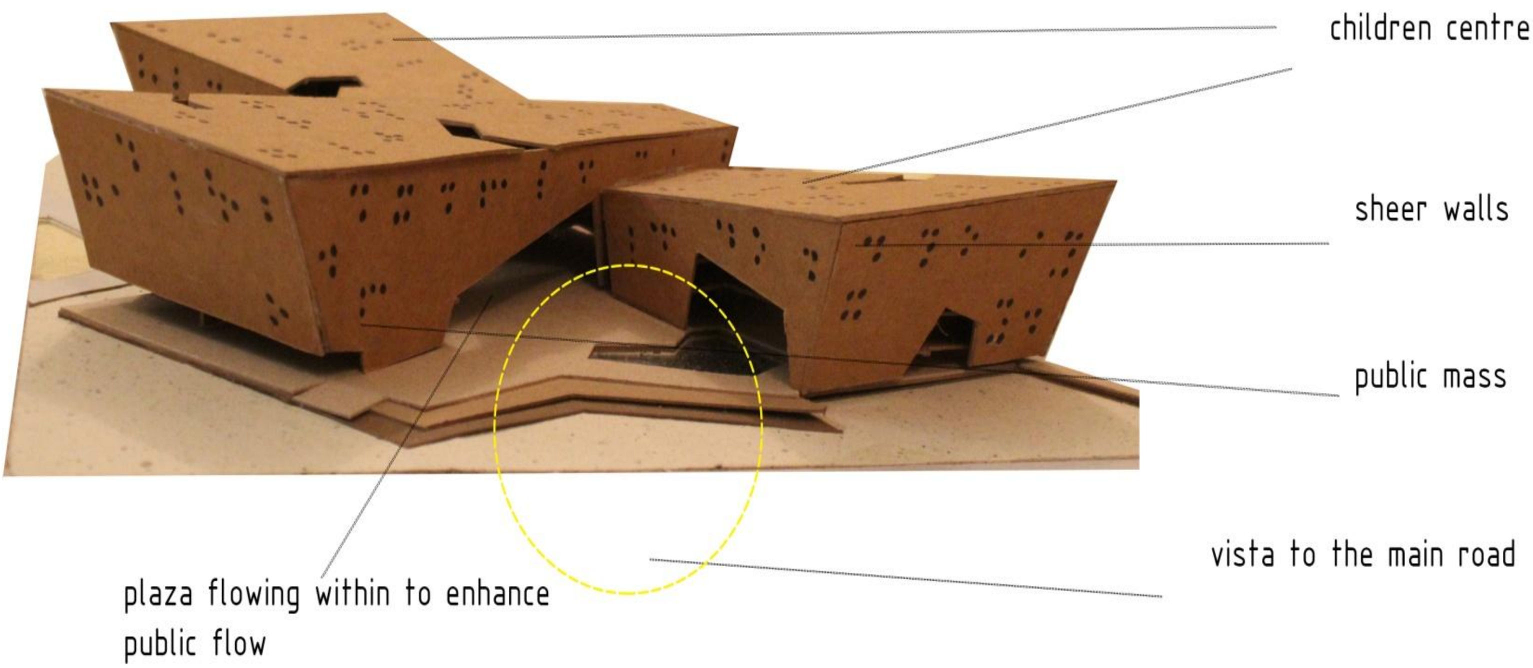


fig.7.1.4 Visualizing through model

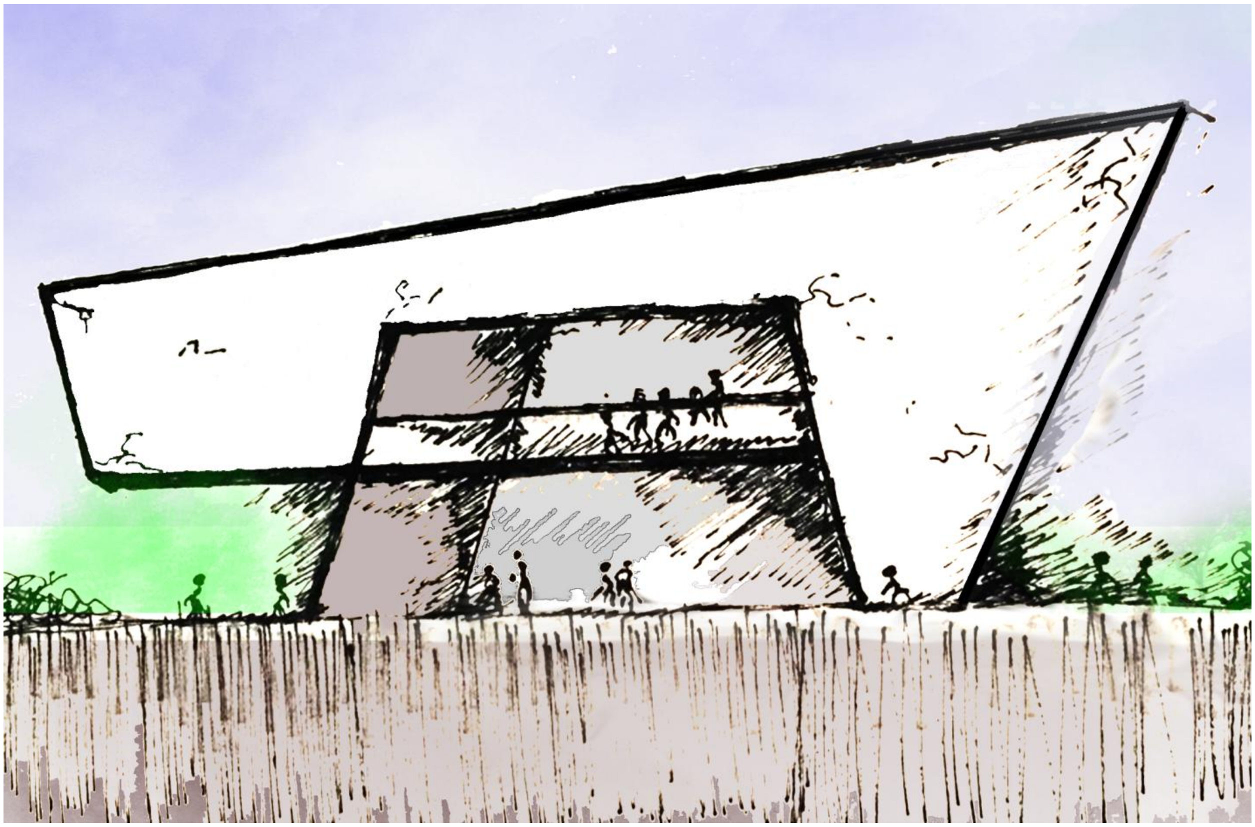


Fig. 7.1.5 Final sketch which is the inspiration and a brain storm for the project

A conceptual section of the form as perceived. Also the idea of a railing emerging from within to outside to the plaza with textures changing at each transition point were conceptualized through sketches.

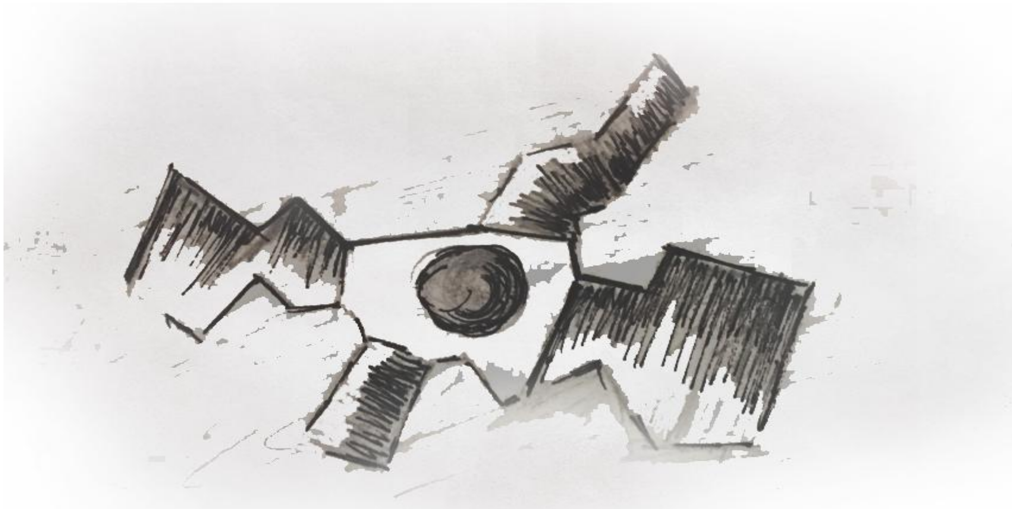


Fig. 7.1.6 Railings incorportated throughout.

Final schematic:

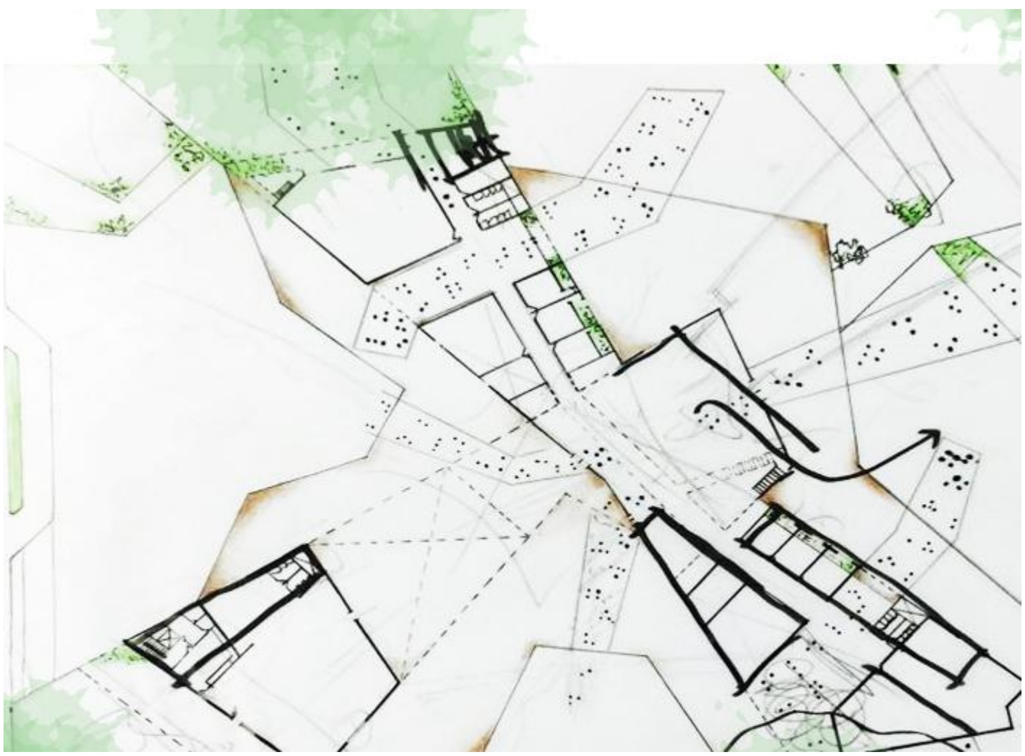
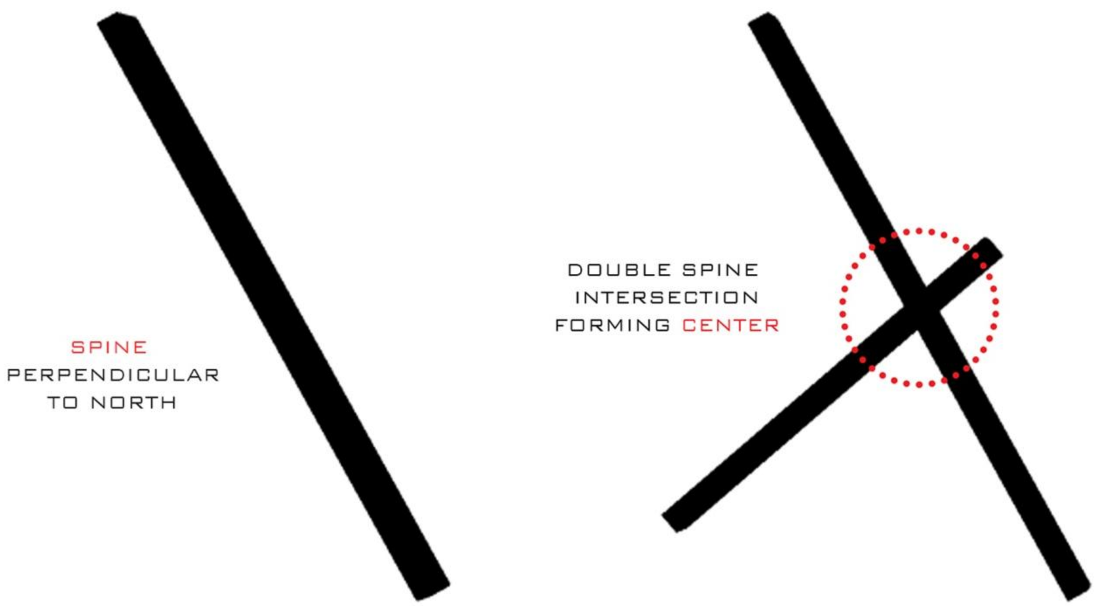
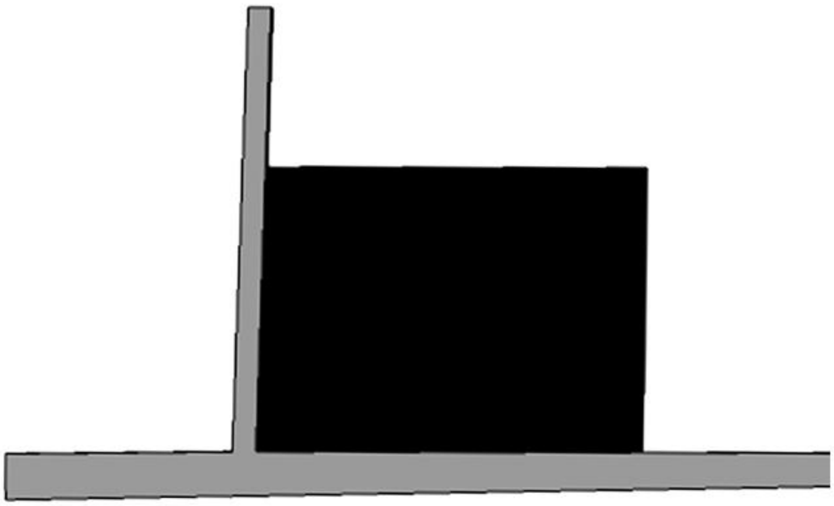


Fig. 7.1.7 Final schematic

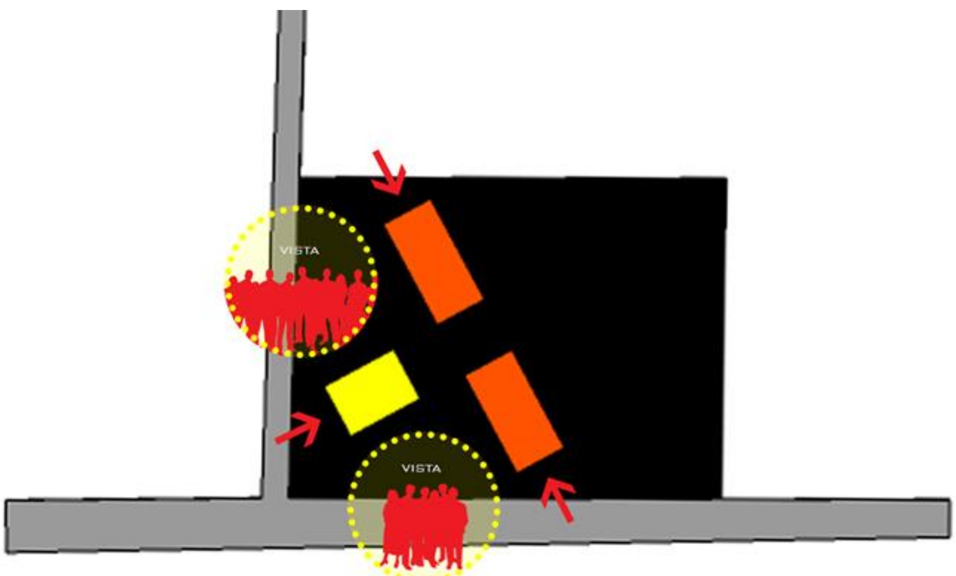
7.2 Design phases

The design phases are explained step by step below through diagram:

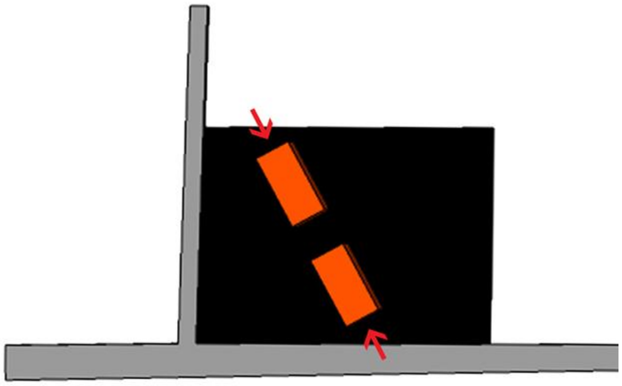




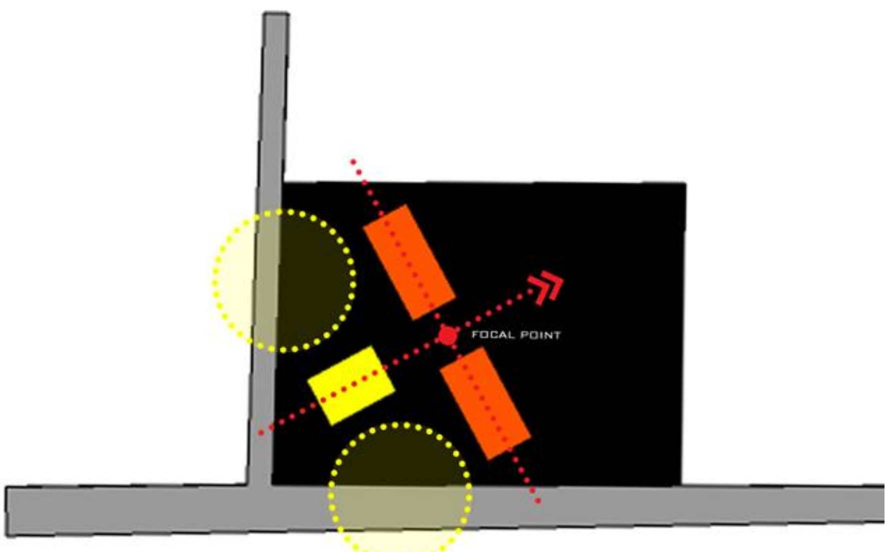
EXISTING SITE



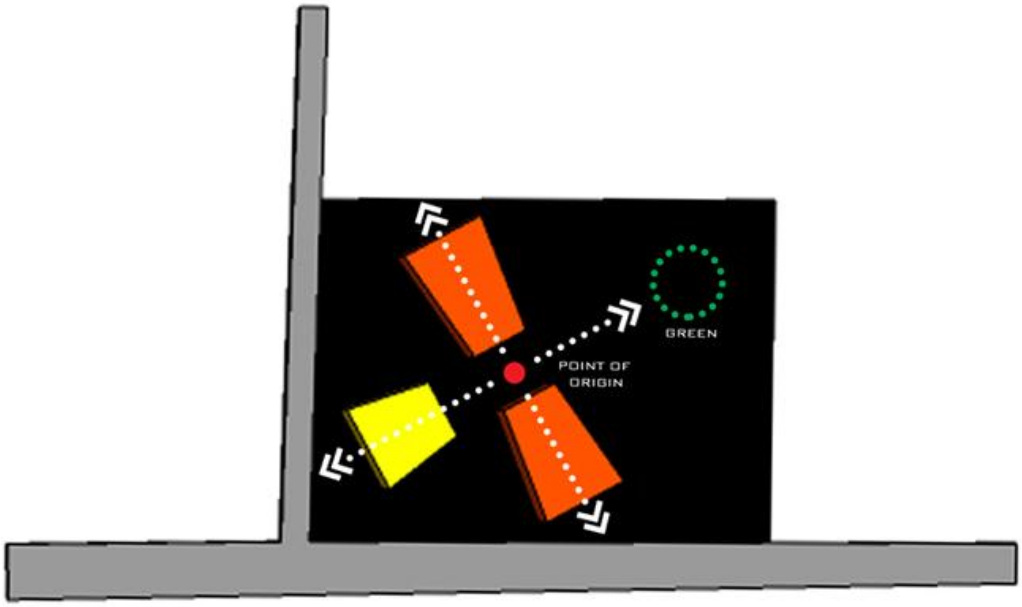
ANOTHER BLOCK PLACED ALONG THE NORTH WITH A PEDESTRIAN ACCESS TO DEFINE THE EDGES, GIVING BIRTH TO TWO NEW VISTAS BETWEEN THE MASSES



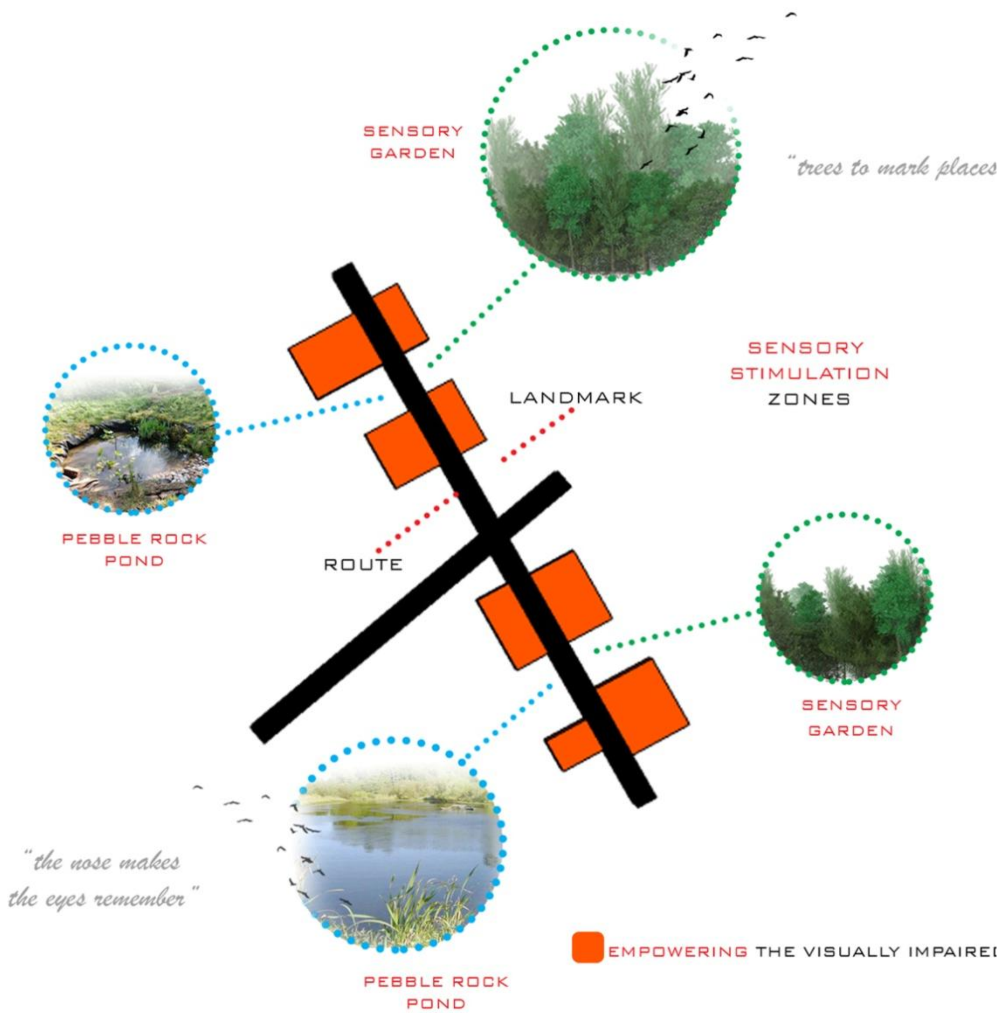
RECTANGULAR BLOCKS PLACED PERPENDICULAR TO THE NORTH WITH RESPECTIVE PEDESTRIAN ACCESS



INTERSECTION BETWEEN THE TWO AXES CREATES A FOCAL POINT



THE FOCAL POINT ACTS AS A POINT OF ORIGIN AS SEEN
IN A BEAM OF LIGHT


SENSORY
GARDEN
"trees to mark places
SENSORY
STIMULATION
ZONES
LANDMARK
PEBBLE ROCK
POND
ROUTE
SENSORY
GARDEN
"the nose makes
the eyes remember"
EMPOWERING THE VISUALLY IMPAIRED
PEBBLE ROCK
POND

"

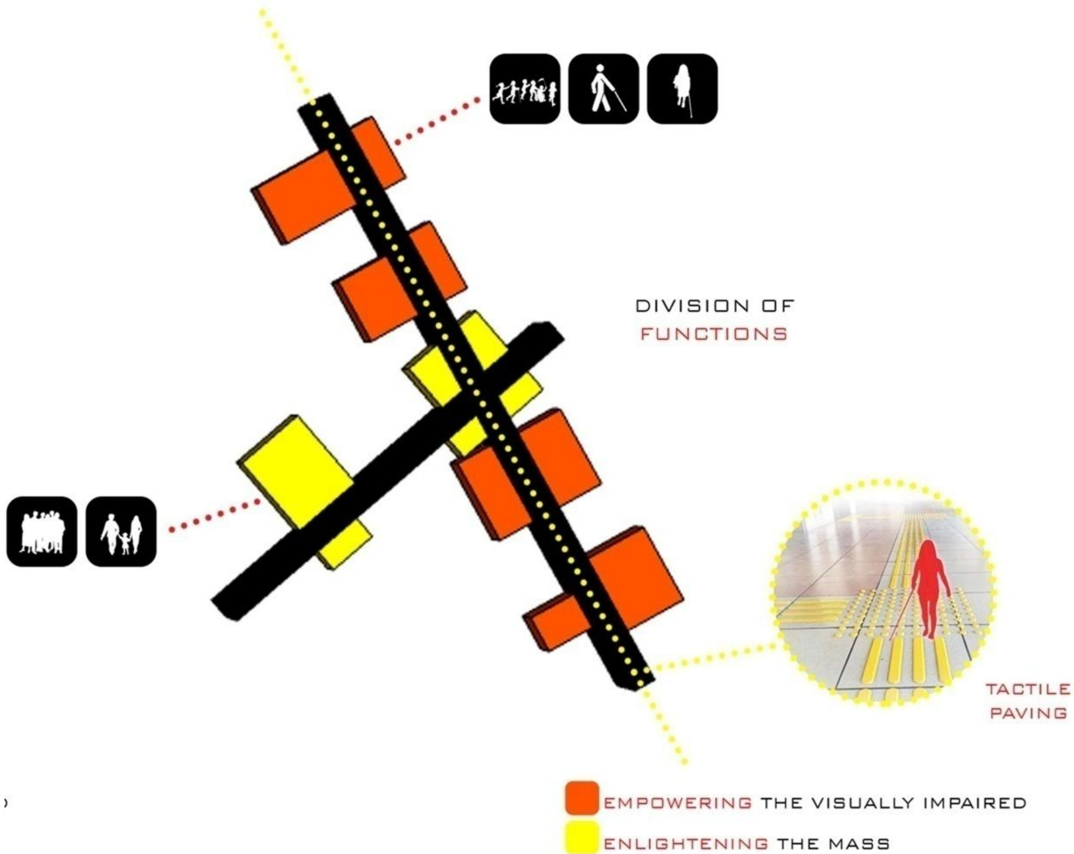


fig.7.2 Design phases

7.3 Final Design

7.3.1 Plans:

Fig. 7.3.1.1 Site Plan:

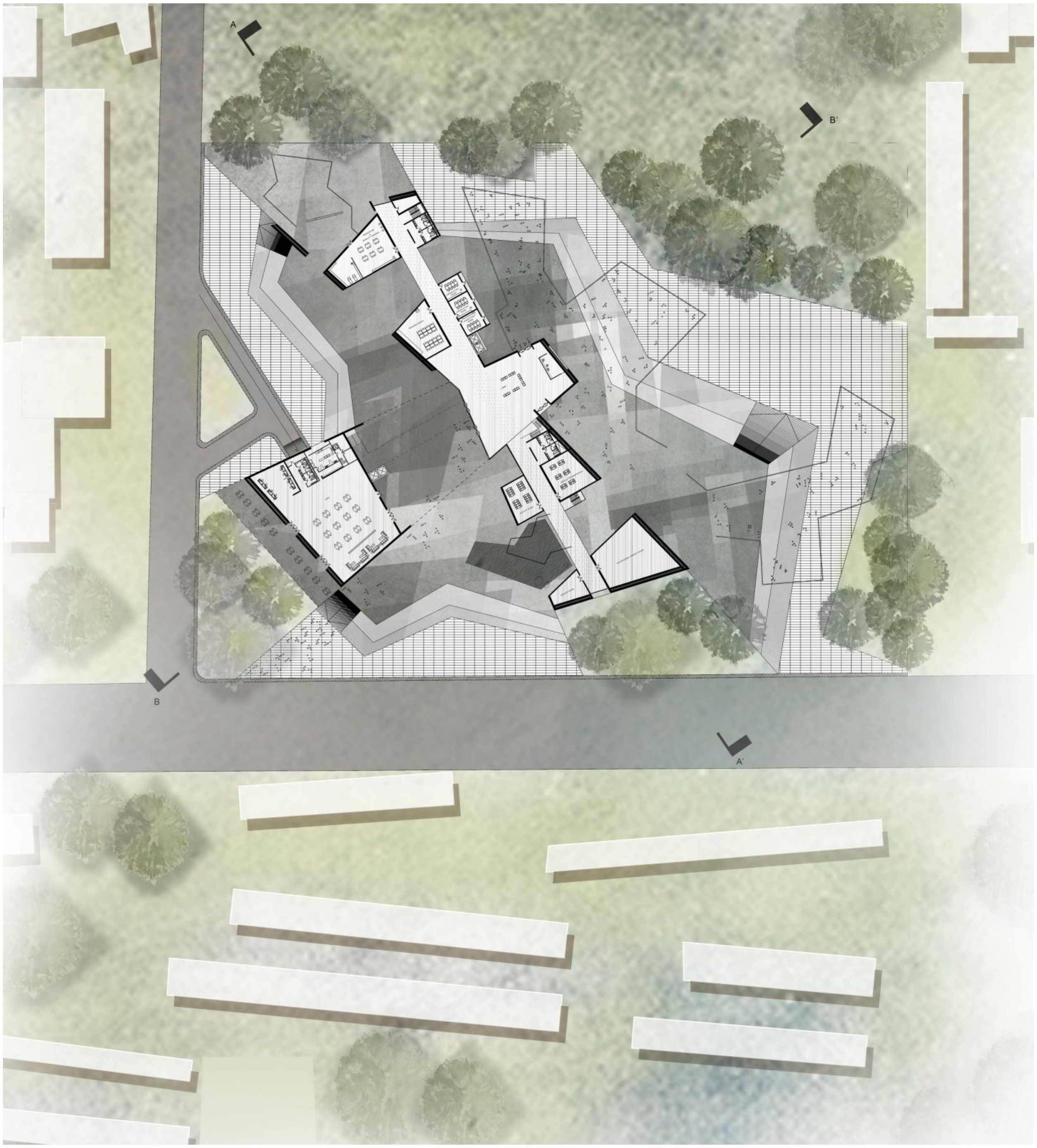


Fig. 7.3.1.2 Plan at +5'

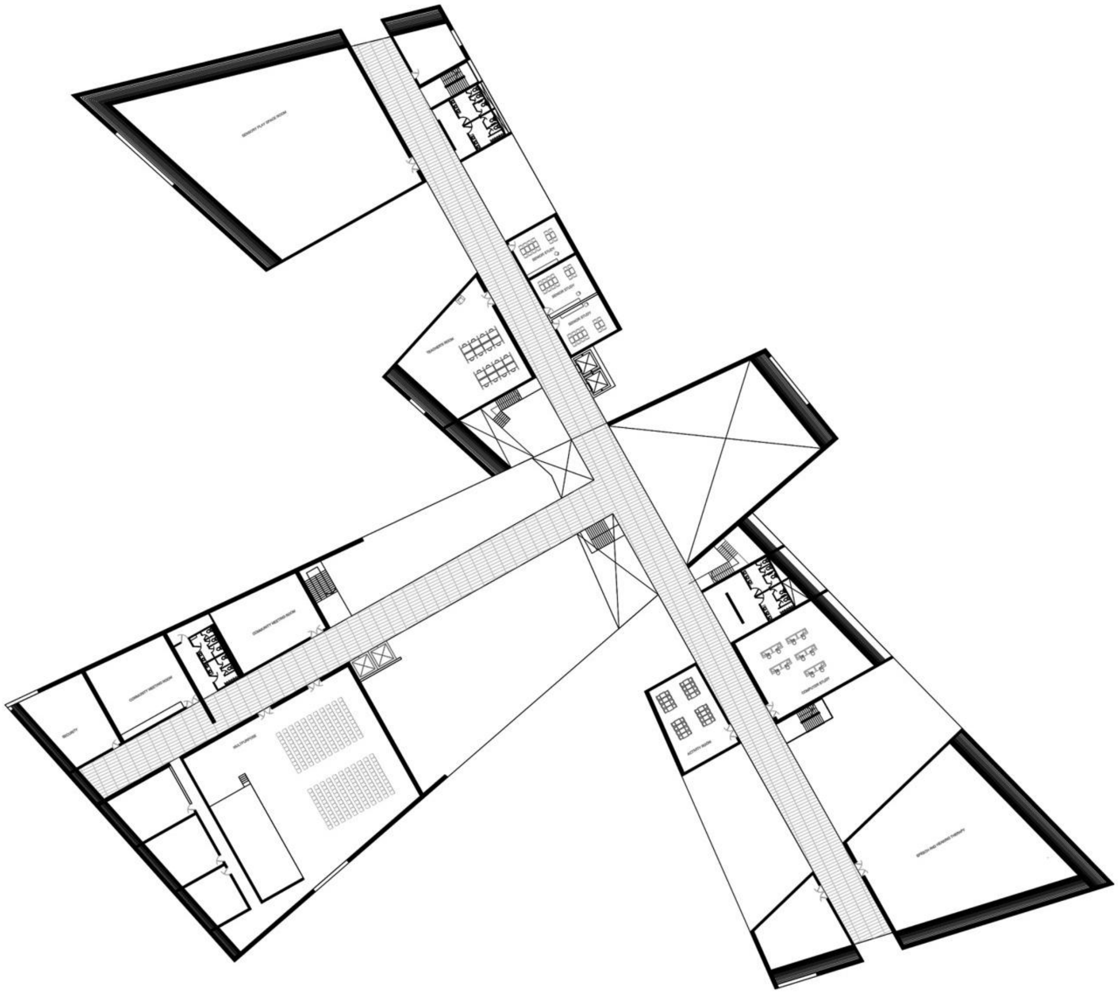


Fig. 7.3.1.3 Plan at +15'

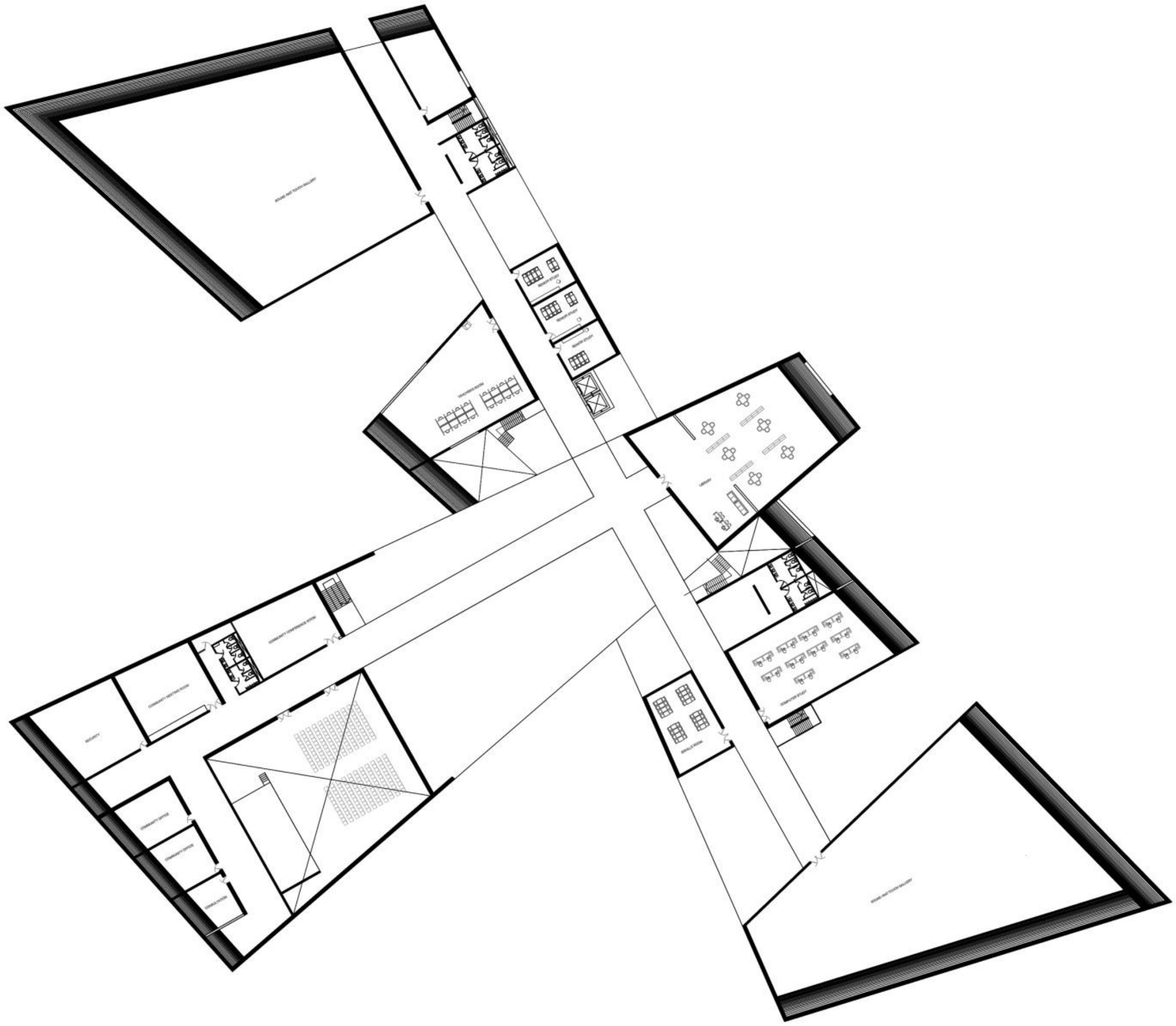


Fig. 7.3.1.4 Plan at +25'

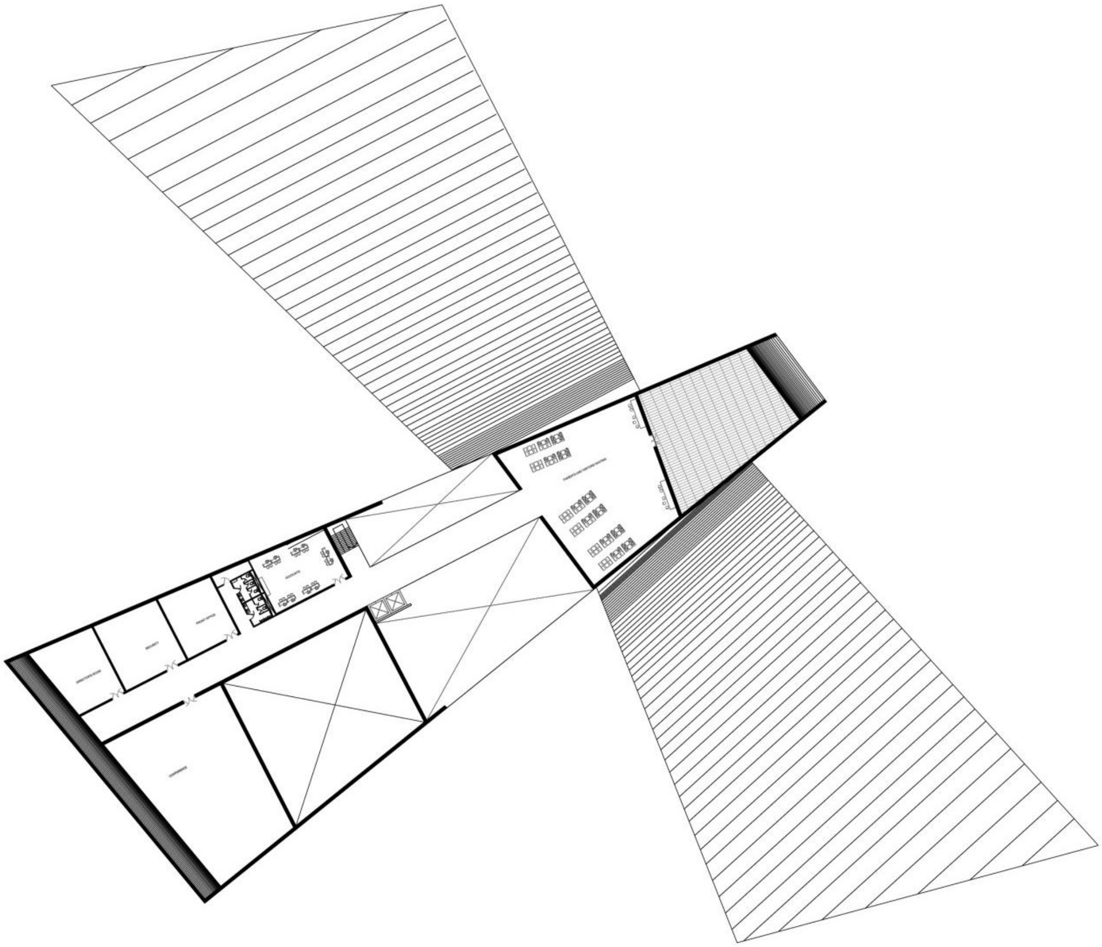


Fig. 7.3.1.5 Plan at +35'

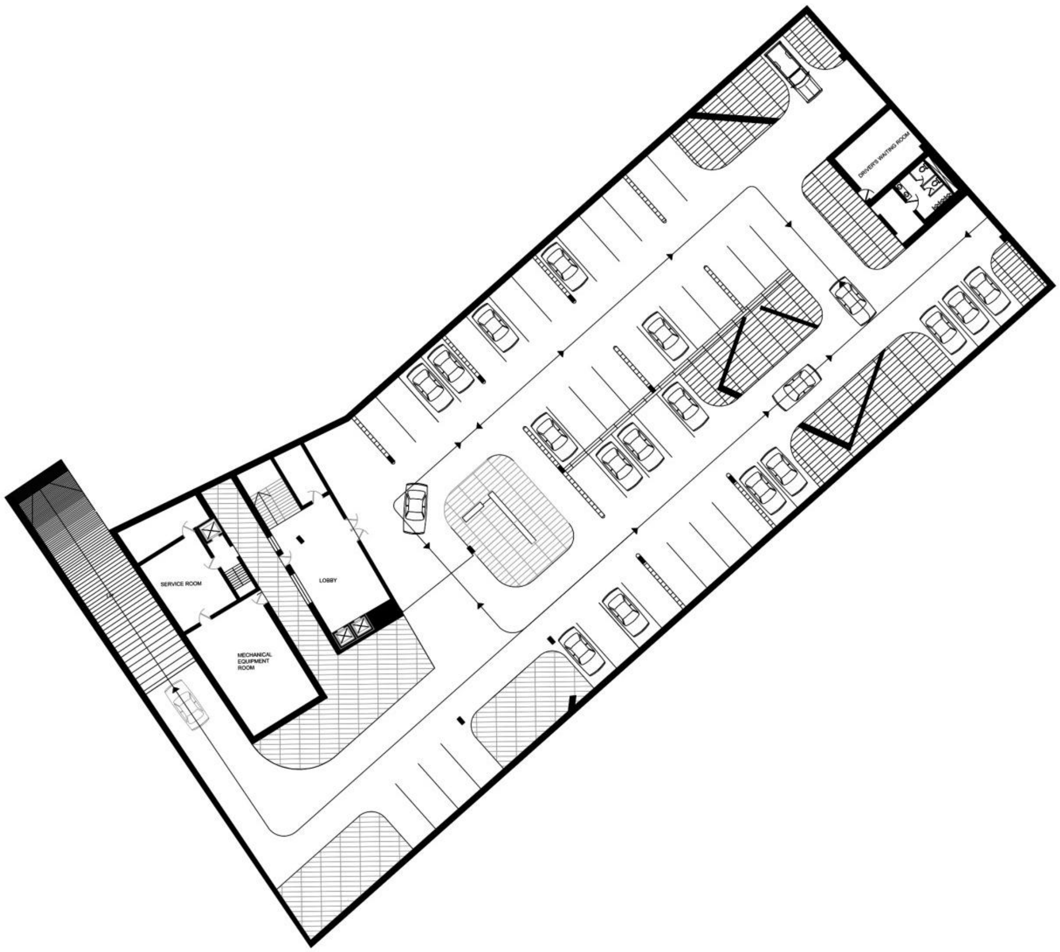


Fig. 7.3.1.6 Plan at -5'

7.3.2 Elevations

Fig 7.3.2.1 Southeast Elevation

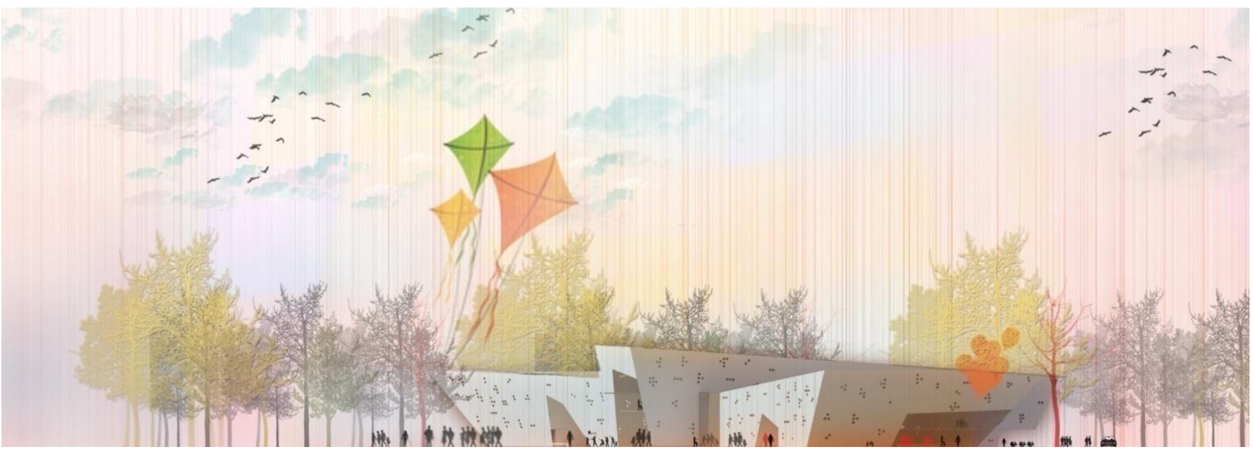


Fig 7.3.2.2 North Elevation

7.3.3 Sections

Fig 7.3.3.1 Section A-A

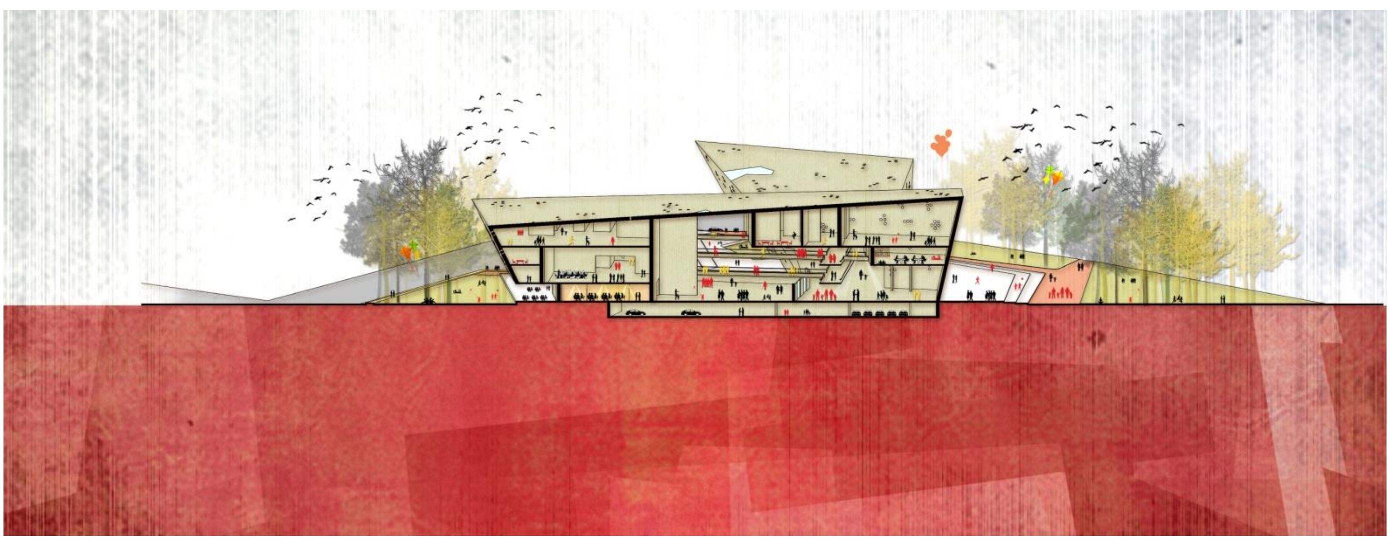


Fig 7.3.3.2 Section B-B

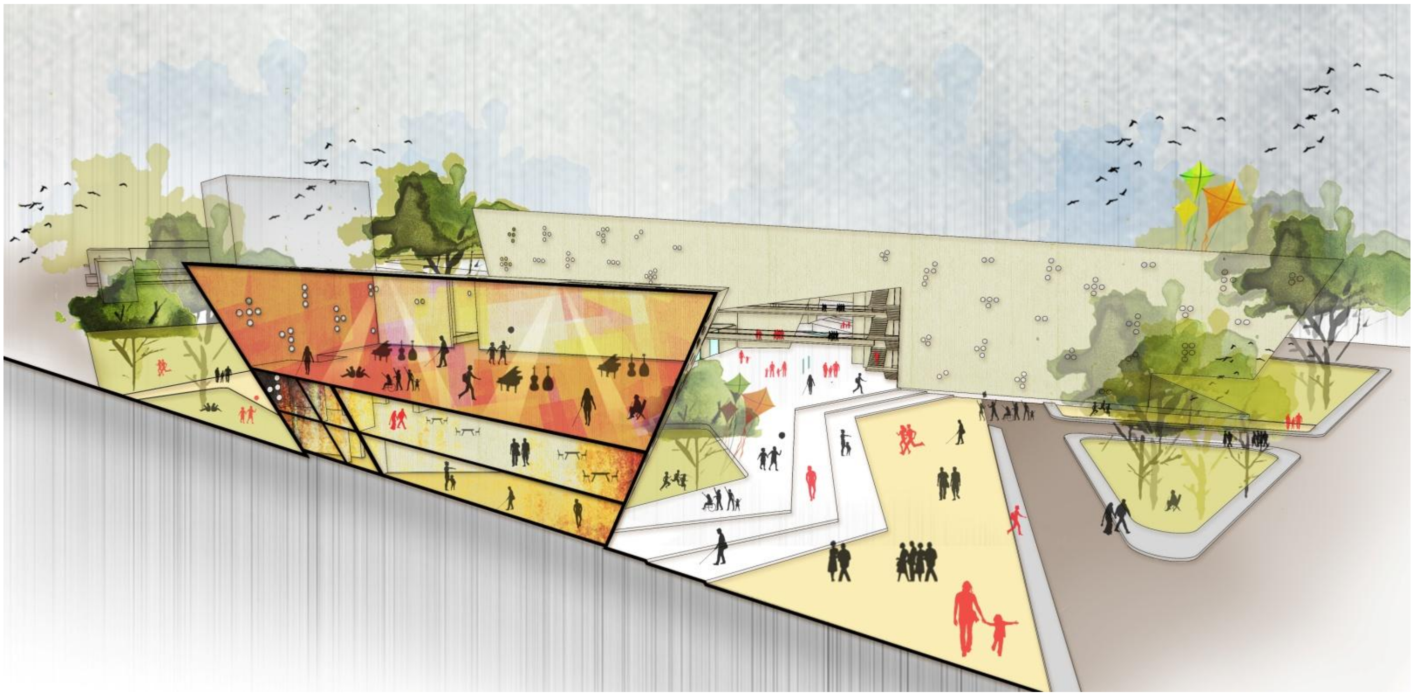
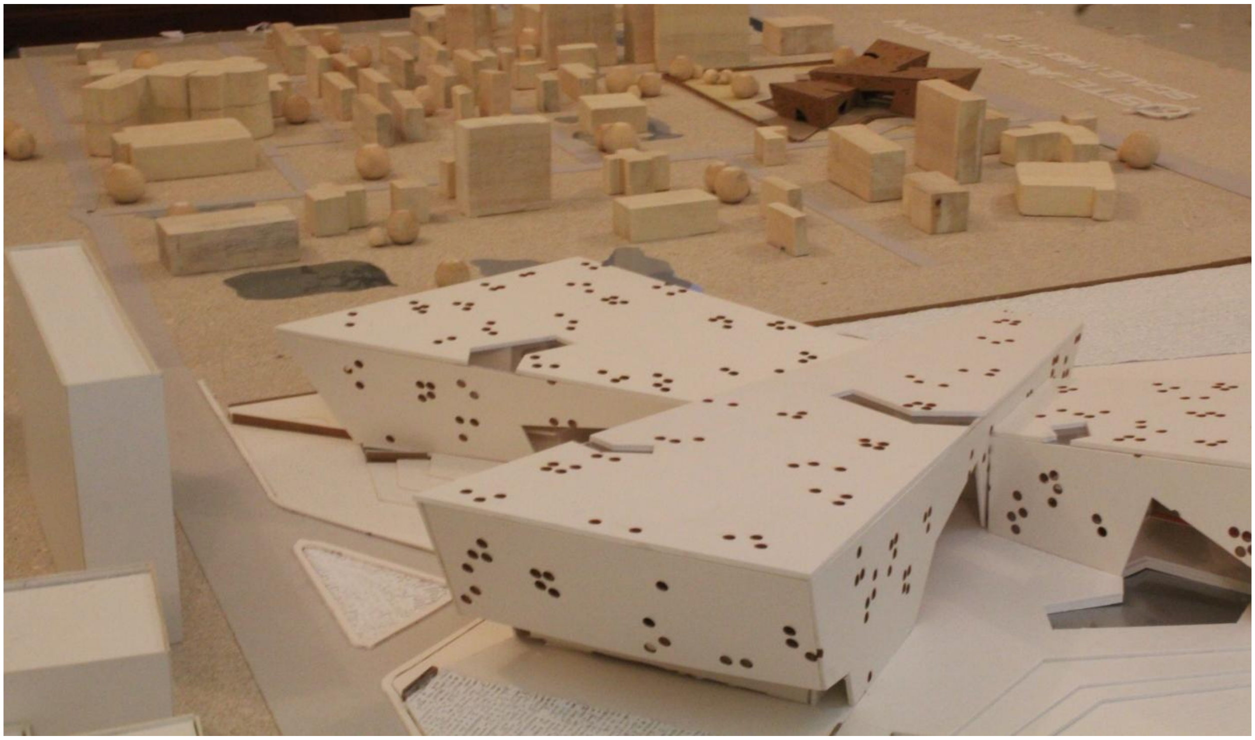


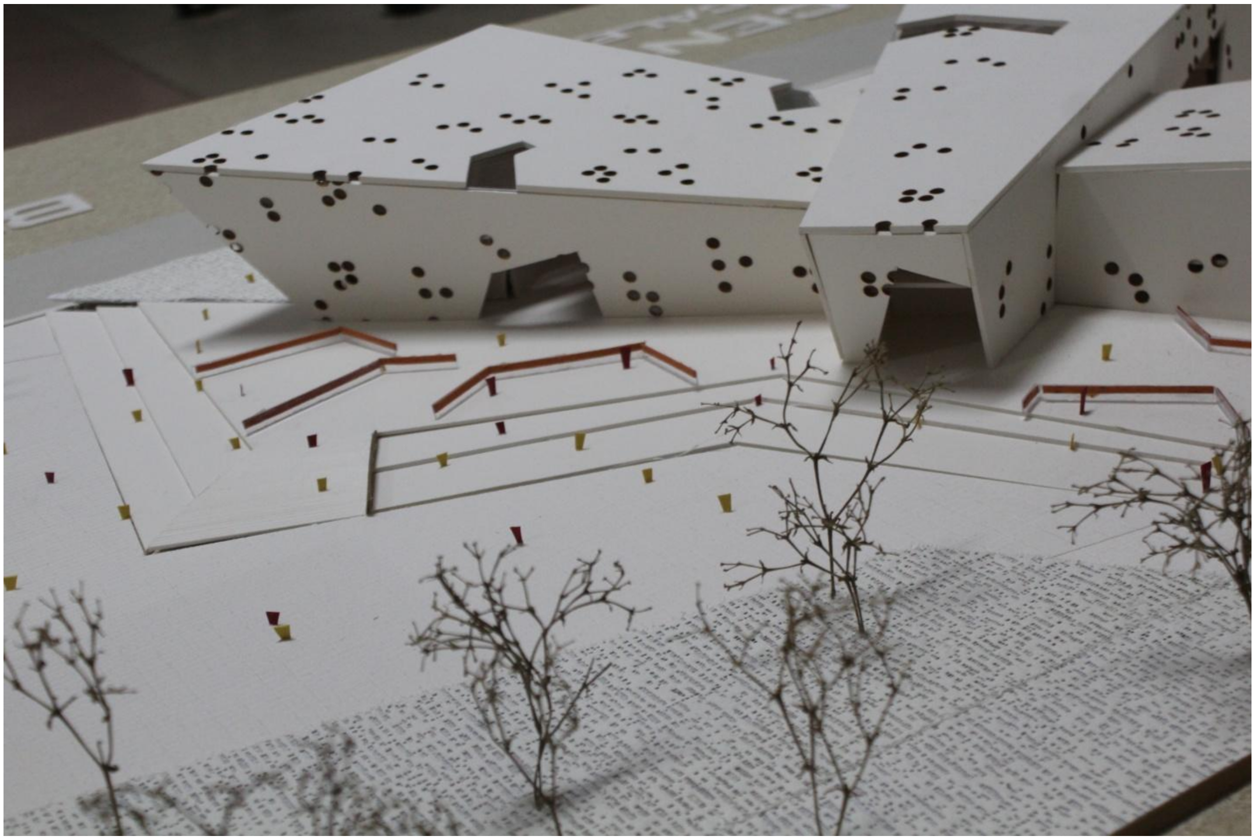
Fig 7.3.3.3 Sectional perspective

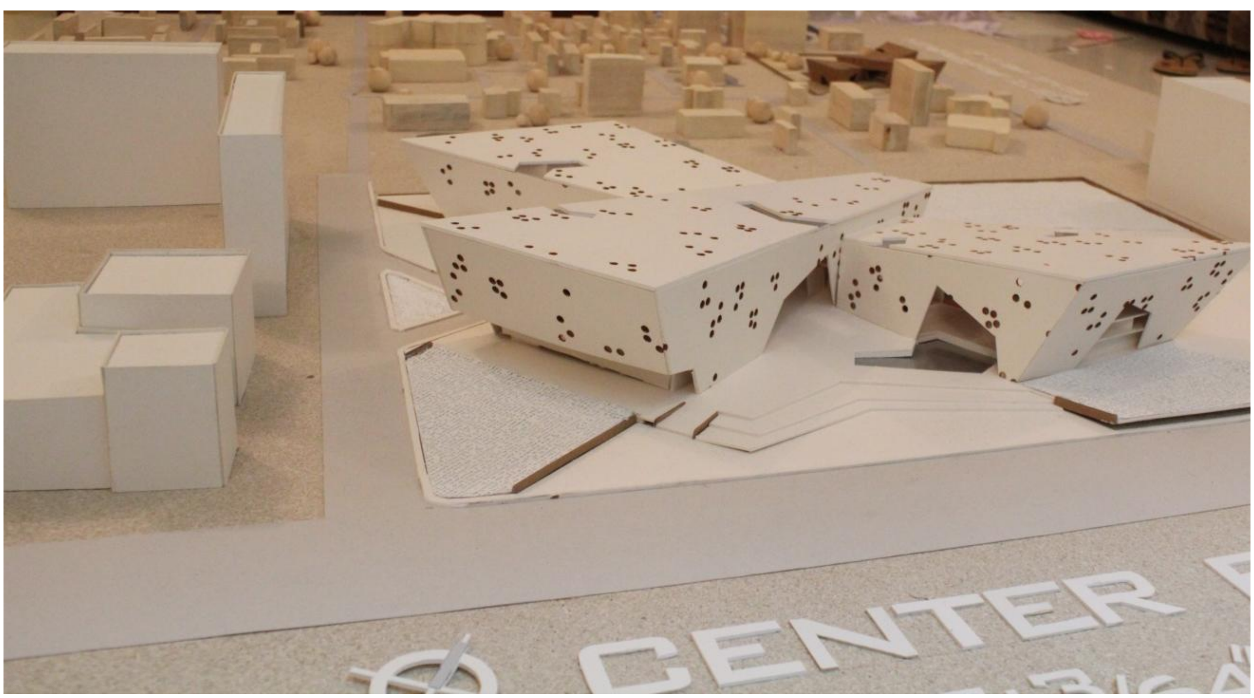
7.3.4 Computer generated images

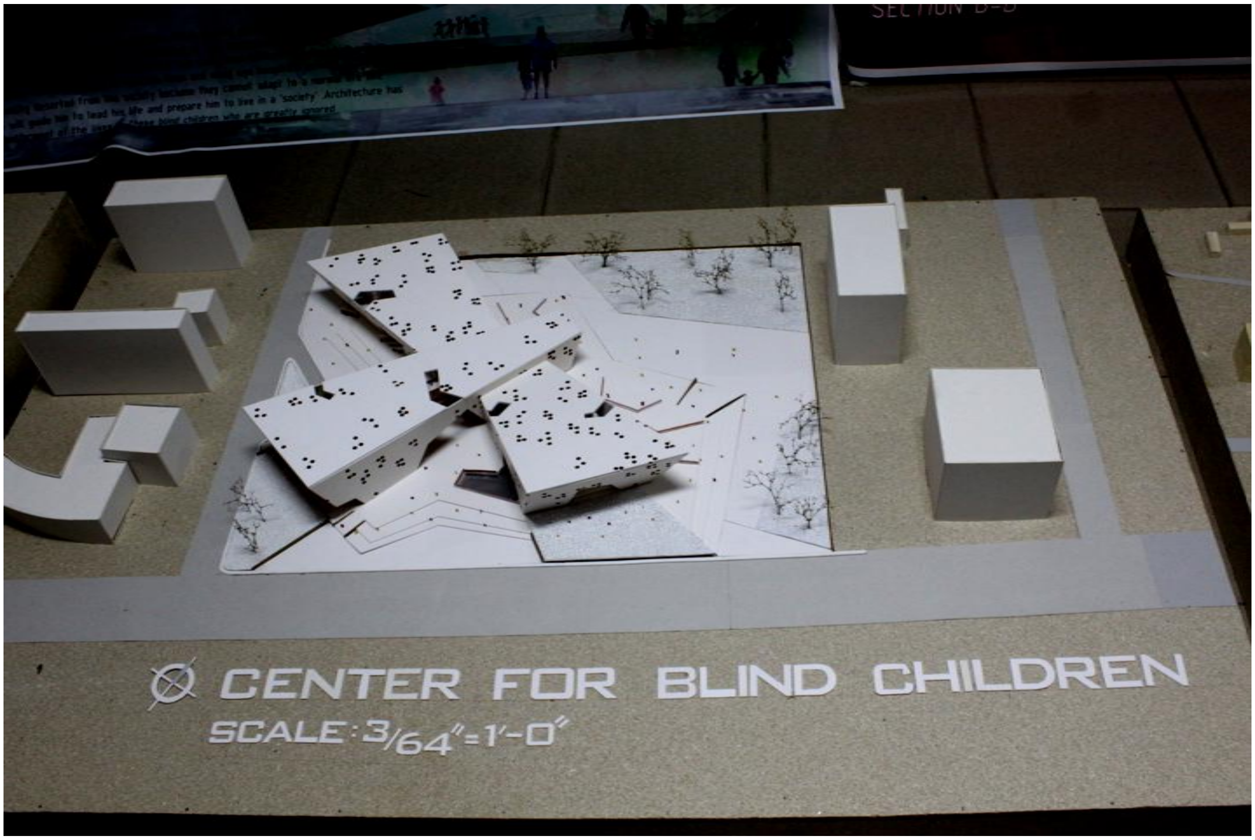
Fig 7.3.4.1 Rendered Perspectives

7.4 Model Images






CENTER



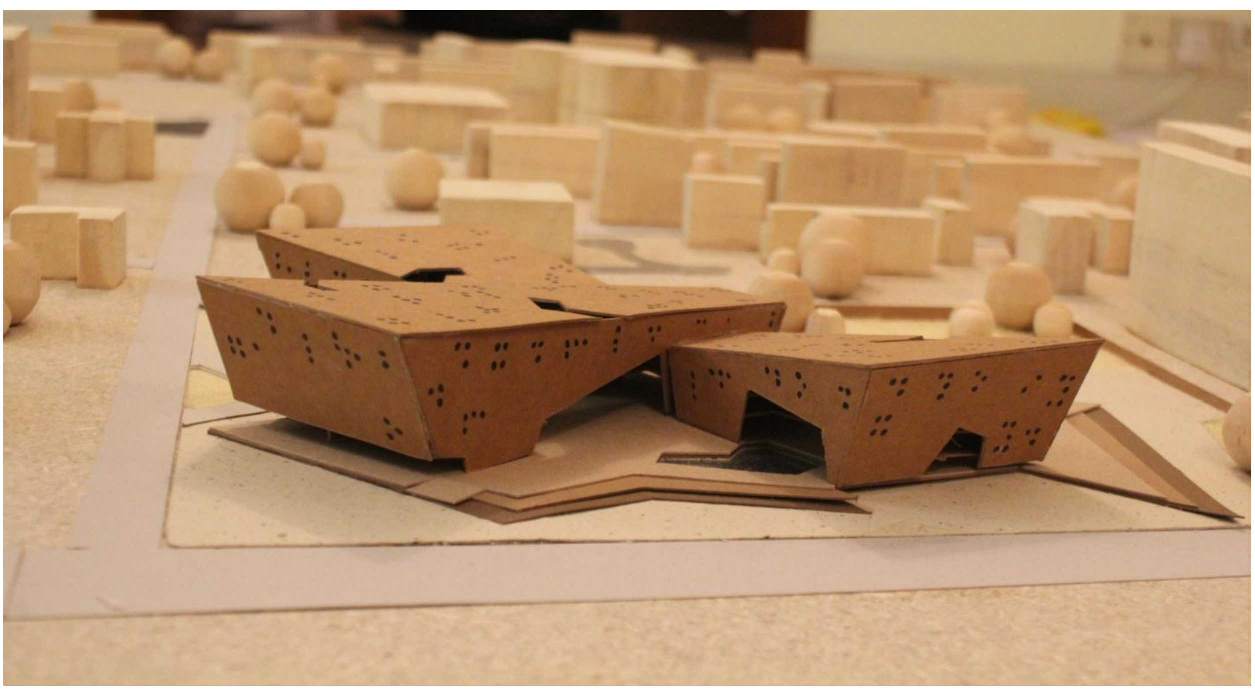


fig.7.4: Model Images

Chapter 08: Conclusion

The blind and visually handicapped have the right to be able to navigate effortlessly through the built environment. The blind compensate for their lack of sight by relying more heavily on the other senses. Navigation through and the action of experiencing a place depends on a person's ability to collect information through his or her senses. We as designers often focus most of our time only on the visual aspects of a design. This center will examine the different ways in which the blind and visually handicapped navigate through and experience the built environment. Understanding of these interactions will be used to develop architecture that enhances the specific characteristics, which help the blind and visually handicapped.

References:

Department of Justice. *2010 ADA Standards for Accessible Design.* Washington, D.C: Department of Justice, 2010.

DETR. *Guidance on the use of Tactile Paving Surfaces.* DETR.

Diversity Management and Community Engagement. *ACCESSIBILITY DESIGN GUIDELINES.* Toronto, 2004.

Dudek, Mark. *Children's Spaces.* Linacre House, Jordan Hill, Oxford OX2 8DP, 30 Corporate Drive, Burlington, MA 01803: Architectural Press an imprint of Elsevier, 2005.

Gough, Nathaniel. "DESIGNING FOR THE SENSES." Fargo, North Dakota, 2010.

Kate, Walden. "Architecture for the visually impaired." 2008.

Schinazi, Victor Roger. *Centre for Advanced Spatial Analysis.* London: The Bartlett School of Graduate Studies, 2008.

Smithsonian Accessibility Program. *Accessible Exhibition Design.* Washington, D.C.: Smithsonian Accessibility Program.