Textile Institute, Kushtia
[TEXTILE INSTITUTE, KUSHTIA]

By

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A thesis submitted to the Department of Architecture
in partial fulfillment of the requirements for the degree of
Bachelor of Architecture

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Declaration

It is hereby declared that

1. The thesis submitted is my/our own original work while completing degree at Brac University.
2. The thesis does not contain material previously published or written by a third party, except where this is appropriately cited through full and accurate referencing.
3. The thesis does not contain material which has been accepted, or submitted, for any other degree or diploma at a university or other institution.
4. I/We have acknowledged all main sources of help.

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Approval

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Abstract

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Chapter 1: Introduction

1.1 Introduction to the Project

The textile is one of the largest industries in the world in terms of output or production and employment. It plays a very significant part in the economy of Bangladesh for a very long time. Bangladesh is considered as the second largest Textile exporter. Textile industries provides employment for 45% of industrial population and contributes approx. 14% of the national income. However, this sector can expand much if it gates proper resources and skilled people. Currently Bangladesh can only sell cheap labor but not skilled labors. If the country has experts such as textile engineers, researchers, experts, designers who can invent new manufacturing techniques, train the weavers, research and improve the quality, preserve the existing textile heritage the country can earn much more foreign exchange. But the country owns only a handful of textile institutes which is unable to match the massive demand. So the Bangladesh Govt. in Association with BTMC (Bangladesh Textile Mill Corporation) is planning to build new Textile Universities. One of the proposed Project is Kushtia Textile Institute.

1.2 Aim and Objectives of the Project

- Kushtia has a very rich history of textile. Weavers of Kushtia are making cotton products for almost 300 years. Besides it used to own the largest textile cotton industry in the Indian subcontinent. But due to demolish of the cotton industry and proper exposer both the cotton business and the handloom industry are getting perish. This project aims to create a platform to revive the textile legacy of Kushtia.
- To preserve the rich textile heritage of Bangladesh and also to develop it furthermore.

- Create a common platform between textile experts (textile engineers, textile researchers, fashion designers) and local weavers and textile workers.
- To create such an institute that offers the students a variety of celebrated and memorable spaces to enjoy their campus life.
- To provide the students a vibrant learning experience.
- To promote community learning.
- To create a sustainable and ecofriendly structure.

1.3 Project Summary

Name of the Project: Kushtia Textile Institute

Implementer of the Project: PWD and BTMC

Location: Alampur, Kushtia, Bangladesh

Site area available for the Project Development: 4.99 acres

Proposed built-up area of the Project: 176,300 sft

Proposed Program of the Project:

1. Academic
2. Administrative
3. Research and lab
4. Recreational
5. Residential

Chapter 2: Literature Review

2.1 Background of Textile in Bangladesh

Textile enterprise has been an integrated part of our tradition over centuries. Handloom is an example of the textile enterprise that is nevertheless present in the country and is manufacturing versatile textiles and fabrics. It's far a system that produces woven fabric using the mixture of the weaver's hand and foot. Following the history of this industry, handloom goes back as early as the 17th century. The industry had played an essential role in the economy of the Indian Subcontinent (Islam and Hossain, 2012).

Besides in the global history, the role of "Muslin", and handloom fabric of Bengal, is undeniable due to its fine quality and symbol of aristocracy. The exporting of the handloom fabrics flourished generously during the Mughal period. The different types of Muslins were, Tanzeb, Sarband, Badan, Khos, Ellebelay, Sharbati, Tarangam, Kumis, Turya, Nayansukh, Charkhana, Malmal, Addi (Jamie, 2014). Duarte Barbosa, a Portuguese traveler in 1518, also mentioned some of the Bengal‟s handloom fabrics in his journal; Memona, Chowlari, Cinebafa and Balihar.

However, the Bengal Textile Industry began to decline during the Colonial rule; the market was taken over by the British products and goods soon after industrial revolution. The Industrial revolution caused and sudden raise in productivity of textiles in the Britain and thus lowering the price of the products which was imported to Bengal markets. While, the exported products were imposed with heavy duties and thus the price of the products increased, causing the market to decline. There Bengal lost its dominance in the global textile industry around 1830 and the British textile took over the markets of Bengal around 1850 (Banglapedia, 2014).

After the partition of Bengal, in 1947, the Country's industries remained dominated

By the West Pakistan. Also since West Pakistan produced more cotton, the textile industries were mostly shifted to West Pakistan stagnating the East Pakistan's Textile industry. However, during the Pakistan period, the government allowed import of yarn on open general license and declined the sales tax on handloom products which flourished the industry tremendously in the early 1950"s. After the Independence of Bangladesh in 1975, Bangladesh Government created a new „Handloom Board" in 1978. The Handloom board works for the development of the Handloom industry of Bangladesh, and is a priority sector for development for Labor intensity, Female employment, Product demand and Profitability (Bangladesh Cotton and Textile Convention, 2006).

Recently, Bangladesh has developed 0.183 million handloom units, with 0.505 handlooms and about 1 million handloom workers, in which 50% are female workers. About 1 million handloom weavers, dyers, hand spinners and embroideries contribute to producing 687 million meters of fabric from 0.30 million active looms. (Bangladesh Handloom board, 2010).

Extended studies have been done on different aspects and issues of handloom weaving industries. Several studies have been conducted on handloom industries for the context on employment generation. Ahmed (1999) in his article attempted to present the socio- economic aspects of employment generation in the handloom industry and its importance in the national economy of Bangladesh. Sobhan (1989) sought the development of handloom industry under social contexts. The discussion identified the importance of the industry in meeting the clothing needs of the people of the country.

Raihan (2010) showed how rural poverty in Bangladesh could be reduced through developing the handloom industry. He also found that, now the industry is on the

Decline due to a number of factors including lack of education and skill, absence of organization of the weavers and smuggling of cloth from India. On the other hand, the history

of textiles has been immensely impacted by the jute industry of Bengal. The „Jute" being the „Golden Fiber" really has a golden background; it successively became merged to the culture of Bengal due to its self-excellence. The Jute is said to have launched Industrial revolution in the Indian subcontinent, especially in the East Bengal. Jute is not only a potential textile material but also acts as a raw material to many other products, such as Hessians, packaging materials, carpet backing, mats, bags, sacking, rope, twines, tarpaulin etc. In the Mughal century, during the poor rural people used coarser jute as a clothing fabric (BJMC, 2014)

However, Jute extended its excellence from local to the global atmosphere during the 18th century when the „British East India Company" acted as the sole exporter of Jute to Dundee, Scotland; transmitting about 100ton of jute experimentally in the beginning. This material attracted the British textile industry so immensely that soon all the flax mills were converted to jute mills at Dundee (Faisal, 2016). After about 20 years of providing at Dundee, a jute mill was established in Risraw, Calcutta at 1855 as the first in the subcontinent. The benefits spread the boom of the Jute industry rapidly by the end of 19th century in Bengal. However, after partition in 1947, Pakistan realized that most jute mills were on the west Bengal side, but soon the deficiencies were overcome by repaid development on the east Bengal side. The Jute mills became the property of Bangladesh sooner after independence after 1971. The Industries were then brought under the control of BJMC, and developed from the ruins of liberation war.

Figure 1: Raw Jute Materials

Source: *Jain.Y.R (N.D)*

Figure 2.2: Jute Processing Mills

Source: Jain.Y.R (N.D)

Today, Bangladesh is the only exporter of raw jute (Uddin, Hossain and Hoque, 2014) in the present scenario the term „Geo-fabric‟ is attaining recognition globally. Many fabric institutes are wearing out research on the various use of biodegradable and earth-friendly geo-textile substances such as fixtures clothing, footwear etc. (RESIL, 2010)

An instance of Geo fabric is the „Anji-Qinyung‟ cloth, where the fabric is produced from 100% Jute material (Islam, 2017). The commonly used cloth beneath improvement is the “Jute cotton” which is gaining reputation in the regional areas. Some of the Jute industries are also exporting Jute Geo-textiles besides raw jute in Bangladesh, for example “Latif Bawani Mills” and “Janata Jute Mills” are transmitting approximately 5000 and 2500 metric heaps of geo-textile respectively each year (RESIL, 2010)

2.2 Types of Handloom

There are two types of looms namely, handloom and power loom according to operational practice. A loom may be operated manually or mechanically. Normally handlooms are those, which are manually operated, and as such, these are distinct from power looms, which are operated by power. The Bangladesh Handloom Board (BHB) ordinance, 1977 defines 'handloom' as a 'weaving device operated manually for production of fabrics other than hundred percent silk or art silk'.

There are several types of handloom in Bangladesh. Such as:

a. Pitloom,

b. Power loom,

c. Chittarranjan Loom,

d. Benarosi and Jamdani Loom,

e. Kamer / Waist Loom

Among all types of loom Benarosi looms are concentrated in Mirpur area, Dhaka, the Jamdani looms are specially operated in Rupgang (Taraboo) area of Narayangang District and Kamer / Waist loom is found in the Hill Tracts of Chittagong.

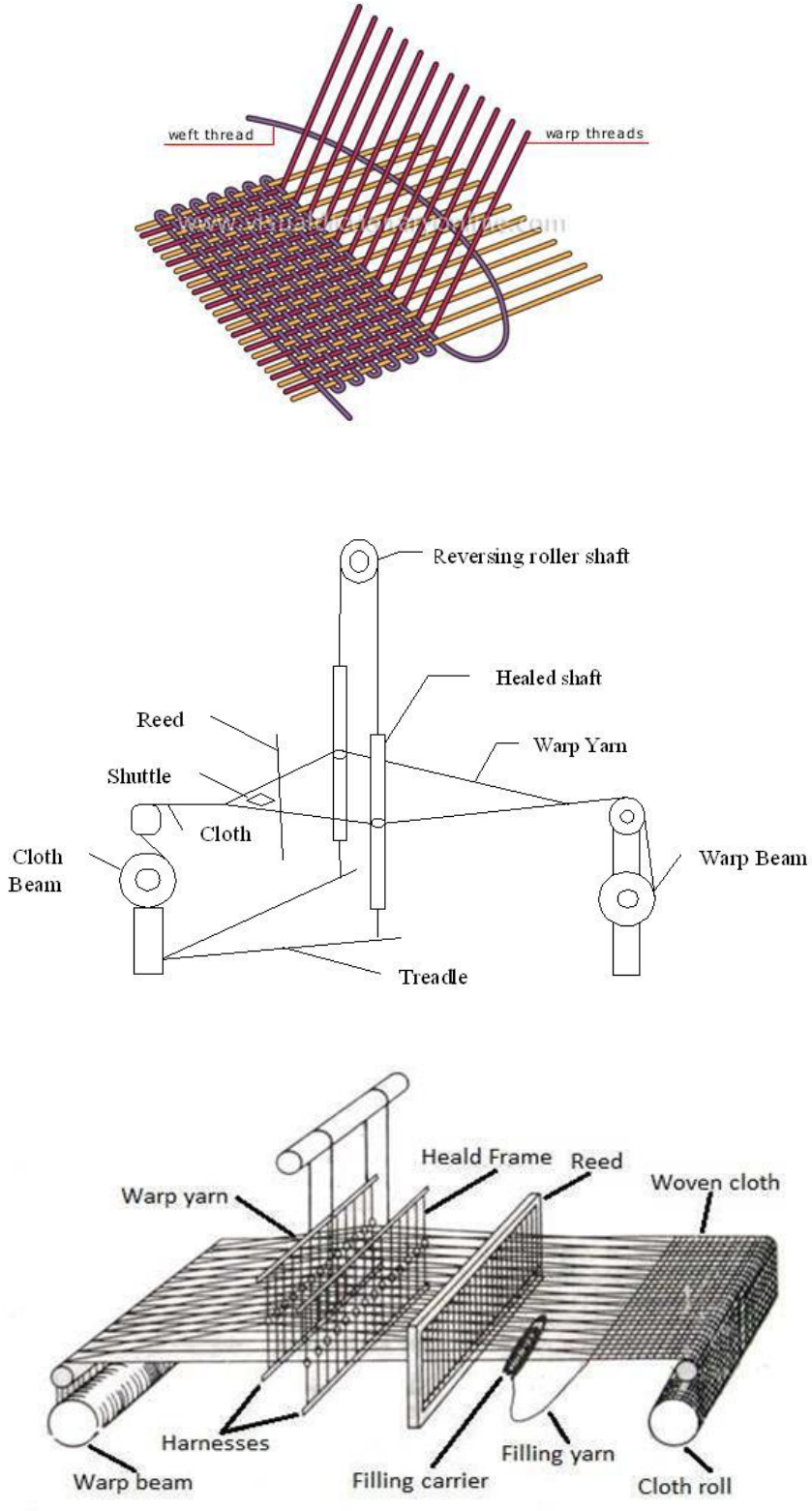
The vast majority of Bangladeshi handlooms are engaged in weaving cotton and blended fabrics although handloom cloth of silk earned a good reputation. Famous areas for silk weaving are Rajshahi, Tangail and Nobabgonj. Rajshahi produces mainly silk sarees, a special type of cloth weared by the women folk. Tangail produces also silk saree namely Tangail Muslin and Narayangonj produces the famous Jamdani saree, silk sarees Tangail Muslins and famous jamdani. Zari work called brocade is also famous in Mirpur, Dhaka. In Bangladesh there are different schools of weaving on jacquard, dobby, frame and pit looms. Product

assortments made of other are saree, lungi, gamcha, grameen check fabrics, printed bed covers, pillow covers, table mats, kitchen and hand towels, apron, curtain and upholstery, furnishing fabrics, bags bandage etc. (Ali, 2014).

Generally different parts of the handloom are called:

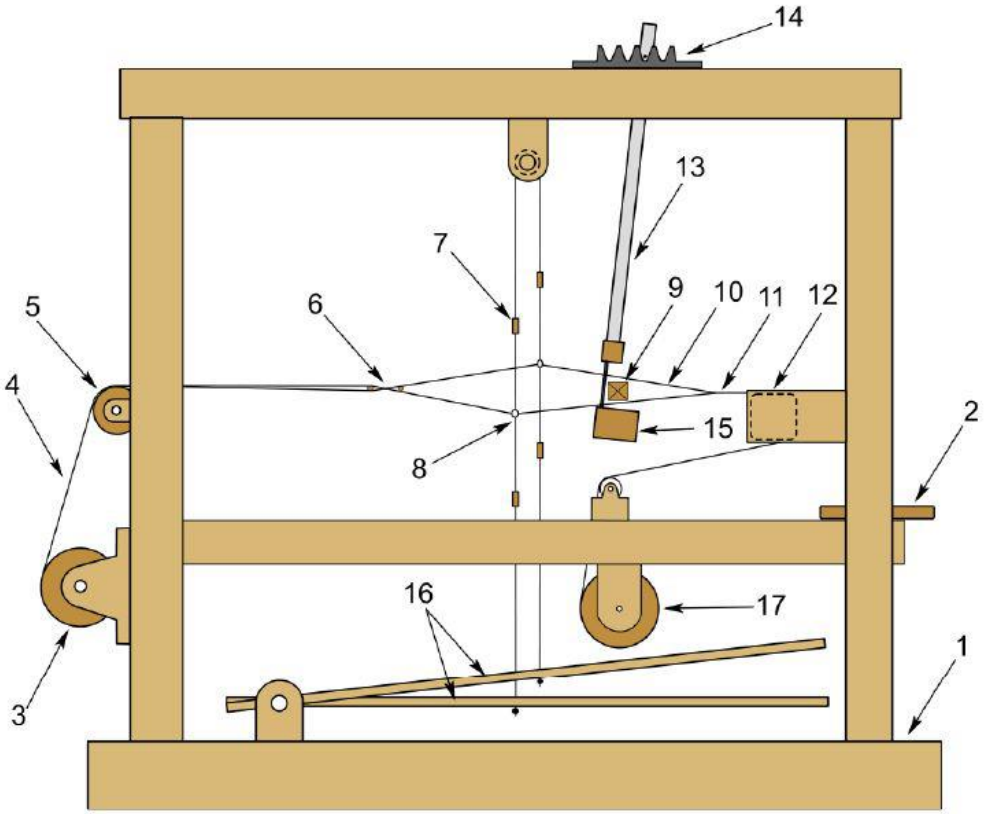
- Reed
- Heald shaft
- Treadle
- Cloth beam
- Shuttle
- Warp beam
- Reversing roller shaft

Figure 3.3: Basics of a Handloom



Source: Ali.M. (2014)

Figure 4.4: Basics of a Foot treadle floor loom



Source: Ali.M, 2014

Elements of a foot-treadle floor loom contain the following:

1. Wood frame
2. Seat for weaver
3. Warp beam- let off
4. Warp threads
5. Back beam or platen
6. Rods – used to make a shed
7. Heddle frame - heald frame - harness
8. Heddle- heald - the eye
9. Shuttle with weft yarn
10. Shed
11. Completed fabric
12. Breast beam

13. Batten with reed comb

14. Batten adjustment Fig 13: Basics of a Foot treadle floor loom

15. Lathe

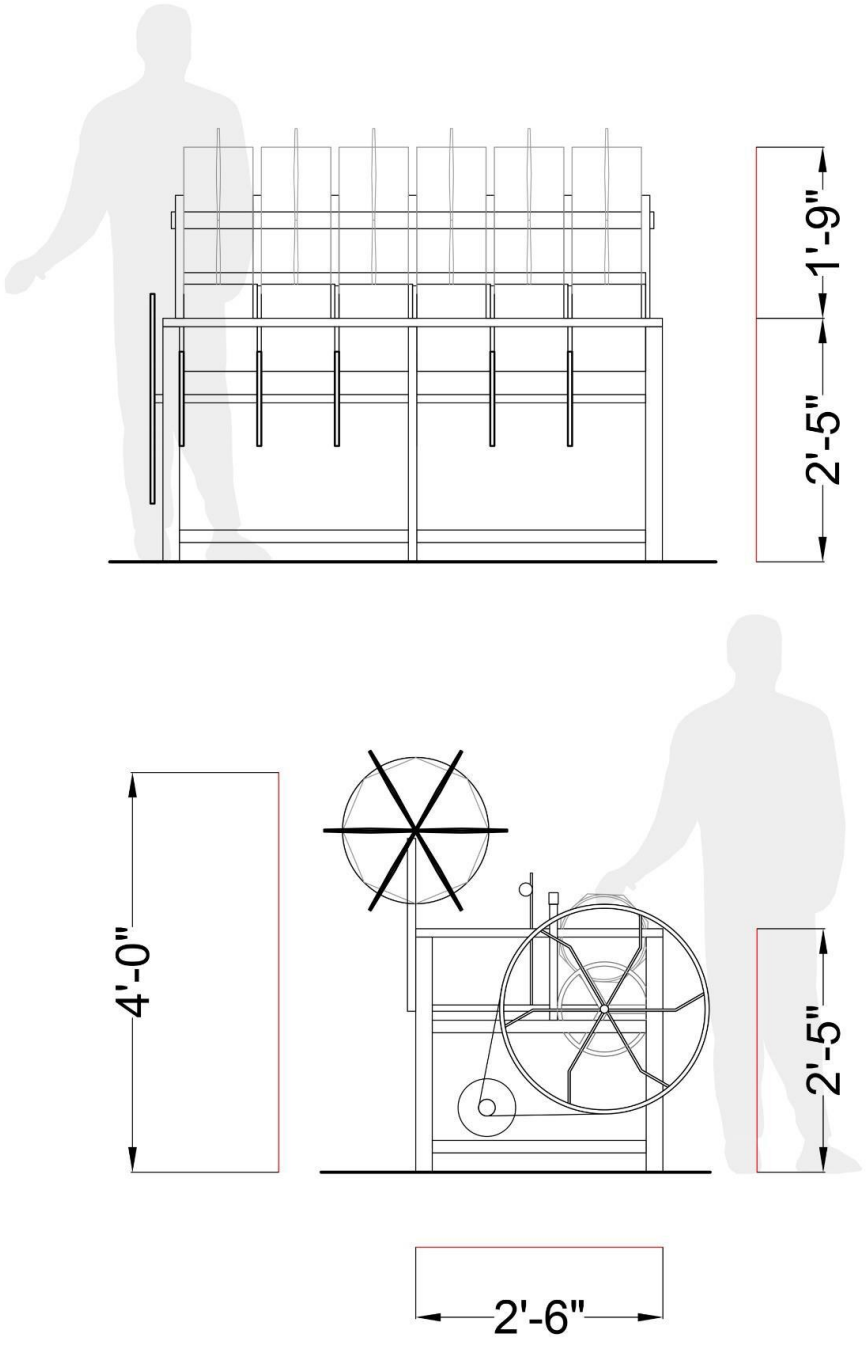
16. Treadles

17. Cloth roll- takeup

Figure 5.4: Traditional Pit-loom machine with Jacquard Weaving

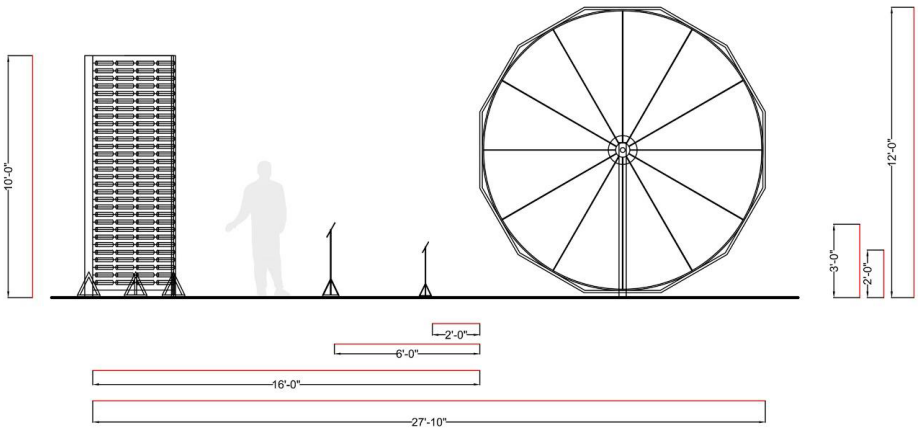
Source: Ali.S.M. (2014)

Figure 6.4: Charka / Spinning Machine



Source: Ali.S.M. (2014)

Figure 7.4: Thread Warping Machine



Source: Ali.S.M. (2014)

Figure 8.5: Thread Warping Machine present in Pathrail, Tangail

Source: Ali.S.M. (2014)

2.4 Basics of Textile Engineering

Earlier, the word „Textile“ applied to only woven fabrics, now applies to fibers, yarns and also fabrics. Textiles- especially fabrics, the fundamental components of a ready-made garment are the basic raw material of a garment. So, it is important to know the manufacturing sequence of fabric from fiber. The quality product is the main goal at present time, without knowledge of Textile manufacturing i.e. fiber, yarn and fabrics it is impossible to maintain the quality of a garment. Therefore, the Textile Engineering deals with the technologies involved in the production of high-quality fibers and fabrics, the raw material of garment industry.

Therefore, the Textile Engineering includes the study of :

1. All kinds of fibers (e.g.: Cotton, Jute, Wool, Polyester, Viscose etc.)

2. All kinds of Process (e.g.: Spinning, Weaving, Knitting, Dyeing, Printing, Finishing etc.)

3. All kinds of machineries (e.g.: Spinning machineries, weaving machineries, knitting machineries, dyeing machineries, Testing machineries etc.) 4. To convert textile fiber into finished or end use products (e.g.: Garments, Technical textiles, Geo textiles, Medical textiles, textiles etc.)

Textile engineering deals with the application of science and technology to reveal the relationship between the raw materials, process and the finished product to achieve the required functional and aesthetic effects on fabric. The success of fabric engineering depends upon the objectives and control of the fabric quality and its performance in use. Realization of the relationships between fabric parameters and structures allow the fabric designers to experiment with different fibers, yarns and thread, producing fabrics of different typology, textures and colors.

Textile Engineering therefore is the study of both the chemical and physical principals of processing and production of the textile fabrics and fibers. However, being one of the most innovative fields in the scientific realm, Textile Engineering includes research, development, manufacturing and merchandising. Currently most textile industries are in the South Asia- it has shifted from Europe and is declining in China; therefore, the scopes of Textile Engineering are high in these regions.

Textiles are prepared from:

Natural Fibers: Cotton, Silk, Wool and Jute. Man-made Fibers: Rayon, Polyester and Nylon Blended: Combination of Cellulose, Viscose, Synthetic and sometimes natural.

Fabrics are woven from Fibers: Fabric Types:

1. Knit Fabric - Warp knit and Weft knit

Figure 9.5: Warp knit

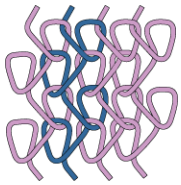
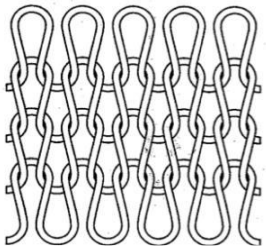


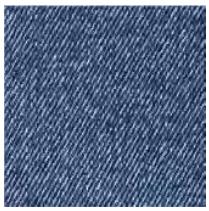
Figure 10.6: Weft Knit



Source: Jain.Y.R (N.D)

2. Woven fabric – Denims, Shirt, Pants and Home textiles.

Figure 11.7: Denim



Source: Cloth, P. (2020, December 09)

Figure 12.8: Shirt Fabric

Source: Cloth, P. (2020, December 09)

2.4 Structure of Textile Industry

Figure 13.9: Spinning Mills:

Figure 14.9: Composite Mills (weaving and Knitting):

Source: Jain.Y.R (N.D)

Power looms:

1. Hosiery and Khaddi Units.

2. Processing Units.

Other than knitting weaving, another major part is the „Wet processing" of Dyeing of Fabrics.

The term Wet processing also includes the washing of fabrics for the finished product:

1. Knit Dyeing and finishing.

2. Woven Dyeing and Finishing.

3. Yarn Dyeing and Finishing.

4. Denim Dyeing and finishing.

5. Denim Washing and Finishing.

6. Garments washing.

7. Sweaters washing.

8. Rotary/ screen printing.

Figure 15.9: Power looms

Source: Ali.M. (2014)

The dyeing process depends on types of fabrics: 1. Reactive dyeing: cotton, wool, silk, nylon.

2. Disperse dyeing: polyester, Acrylic, Nylon.

30

3. Acid dyeing: wool, cotton, linen.

4. Basic dyeing: Acrylic fibers.

5. Indigo Dyeing: Cotton, linen, rayon.

6. Sulfur dyeing: Cotton, Linen.

7. Pigment dyeing: cotton, wool.

8. Gel dyeing: polyester, acrylic.

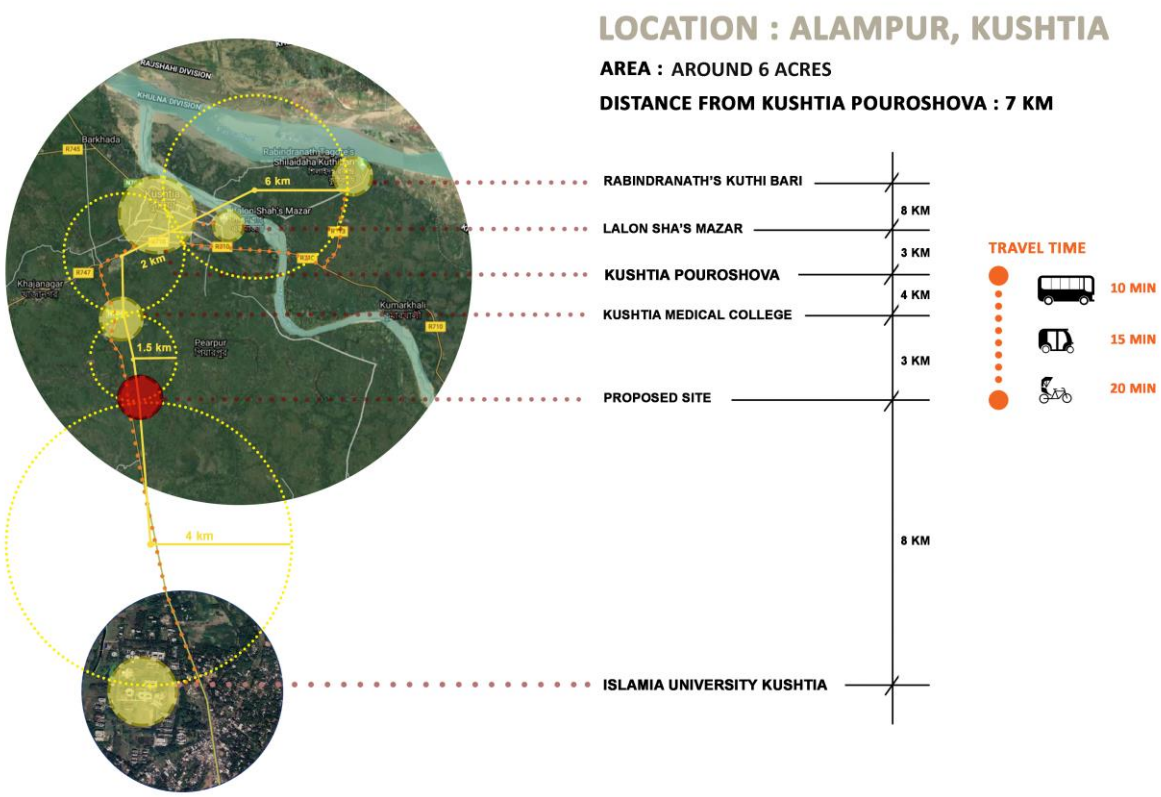
Figure 2.0: Fabric Dyeing Machines.

Source: Jain.Y.R (N.D)

Chapter 3: Site Appraisal

3.1 Site surroundings

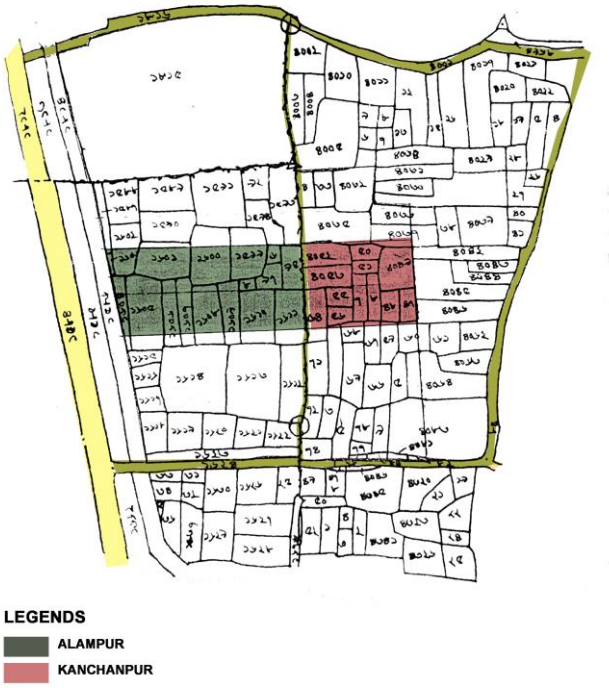
Figure 2.1: Site Surrounding



Source: Author

The proposed site is located in Alapur thana in Kushtia District under Khulna devision which is approximately 7 km away from Kushtia pouroshova. The proposed land for covers parts two areas accordingly Alampur and Kanchanpur. On north of the site is Kushtia Sadar and Kushtia medical college and Islamic University is on the south.

Figure 2.2: Site Mouza Map



Source: BTMC (Bangladesh Textile Mills Corporation)

Figure 2.3: Site blowup plan

Source: Author

3.2 Historical Development of the Site

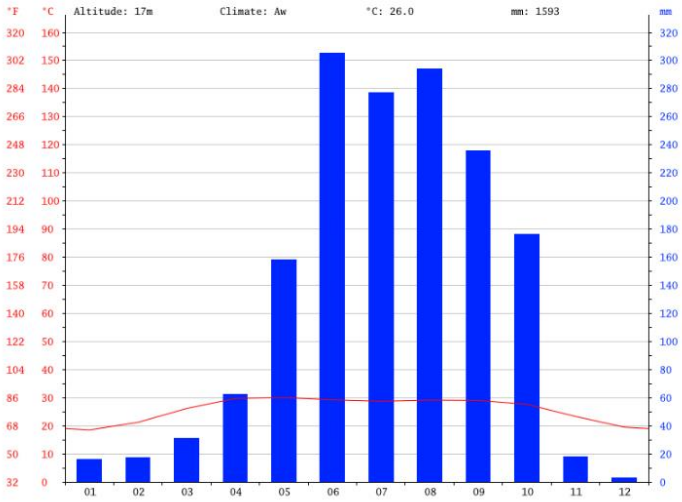
The given land belongs to hindu zamindars before 1947. In 1947 when the second partition of Indian subcontinent took place, the hindu-muslim riot broke out in Bengal. Many of the land owners flew to India abandoning their lands. From then till 1975 the lands were abandoned and were occupied by the local inhabitants. After 1975 the Bangladesh Govt. took possession of these abandoned lands. (Hasnayen, Sultana 2017. Kushtiar Itihash)

3.3 Geographical Characteristics and Climatic Conditions

Kushita is located 23.90 latitude and 89.12 longitude (Worldatlas,2015). The surrounding area is a wide, fertile alluvial plain situated at the head of the Ganges-Brahmaputra River delta. (Britannica, 2013).

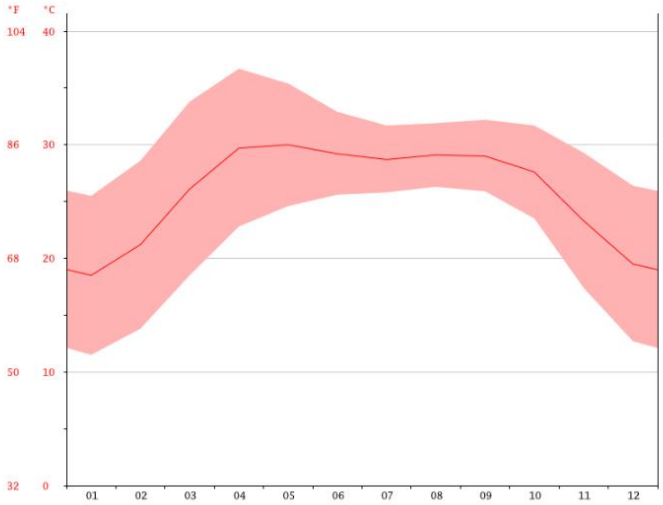
The Kushtia lies on 17m above sea level the climate here is tropical. Precipitation level is average. Heavy rainfall is frequent in summer around June with an average of 305 mm | 12.0 inch. But in proportion to the rainfall there is no trace of waterlogging. The driest month is December. In Kushtia, the average annual temperature is 26.0 °C | 78.8 °F. January has the lowest average temperature of the year. It is 18.5 °C | 65.3 °F which is the coldest month of the year. (En.climate-data, 2019)

Figure 2.4: Kushtia Climate Graph// Weather by Month



Source: https://en.climate-data.org/

Figure 2.5: Kushtia Average Temperature



Source: https://en.climate-data.org/

Figure 2.6: Kushtia Average Weather

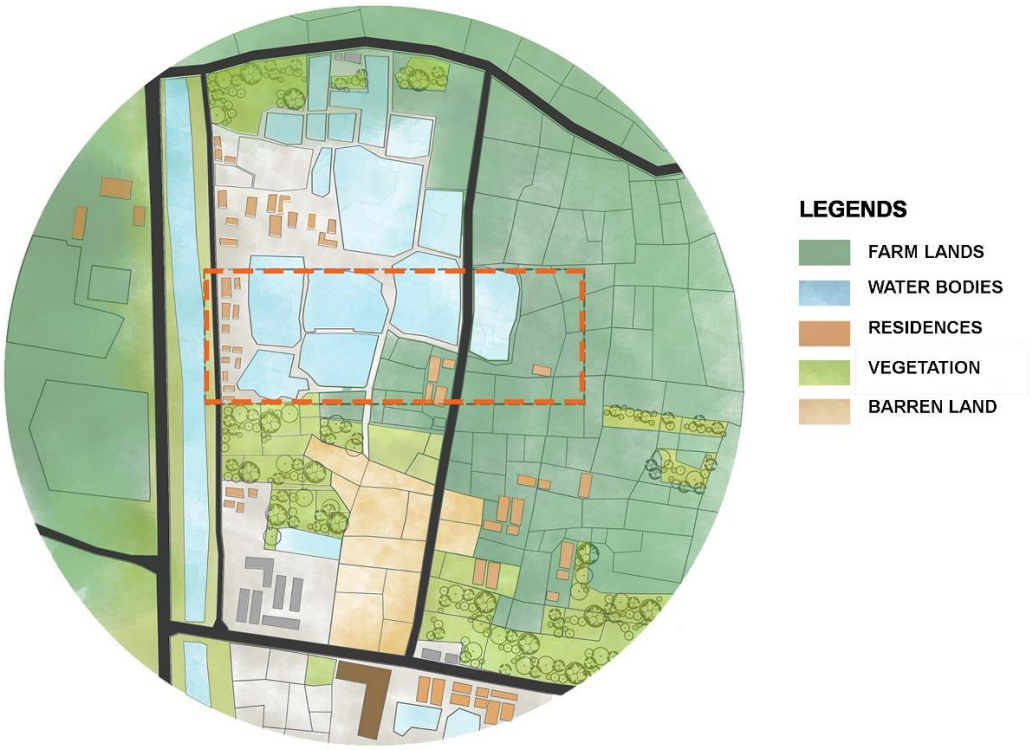
	January	February	March	April	May	June	July	August	September	October	November	December
Avg. Temperature (°C)	18.5	21.2	26.1	29.7	30	29.2	28.7	29.1	29	27.6	23.3	19.5
Min. Temperature (°C)	11.5	13.8	18.5	22.8	24.6	25.6	25.8	26.3	25.9	23.5	17.4	12.7
Max. Temperature (°C)	25.5	28.6	33.8	36.7	35.4	32.9	31.7	31.9	32.2	31.7	29.3	26.4
Avg. Temperature (°F)	65.3	70.2	79.0	85.5	86.0	84.6	83.7	84.4	84.2	81.7	73.9	67.1
Min. Temperature (°F)	52.7	56.8	65.3	73.0	76.3	78.1	78.4	79.3	78.6	74.3	63.3	54.9
Max. Temperature (°F)	77.9	83.5	92.8	98.1	95.7	91.2	89.1	89.4	90.0	89.1	84.7	79.5
Precipitation / Rainfall (mm)	16	17	31	62	158	305	277	294	236	176	18	3

Source: https://en.climate-data.org/

3.4 Land-use Pattern of the Surroundings

The area is mostly covered with agricultural land and low depth pond. The depth of the ponds are approximately 8-10 feet. The canals are basically used as water reservoirs that supports the surrounding agricultural lands. These ponds are also used for fishing by the local farmers. There is a canal the runs along the main highway road. This canal is known as GK (Ganga-Kopotakkho) canal. This canal was built by the East Pakistan Govt. in 1955. The main purpose of the canal is to support the surrounding agricultural lands by storing water in rainy season. There are very few residences around the site. Most of the large trees are located on the both side of the main highway and near the residences.

Figure 2.7: Landuse pattern



Source: Author

3.5 Accessibility and Connectivity

Ksutia-Jhenaidah Highway is the primary road which is about 30 feet wide. This road is the only connecting road between Kushtia and Jhenaidah district. It is also the only serving road for Kushtia Islamic University and Kushtia Medical Collage and industries such as Brb Industries, KNB industries, Kushita Metal Industries etc. There are also two secondary vehicular roads located accordingly on north and south side of the site. These roads are around 18 feet wide. There is a neighborhood road that intersect and divide the given site. In present this is a pedestrian road which is about 10 feet and is only used by the local people.

Figure 2.7: Accessibility and Connectivity

Source: Author

3.6 Socio-Cultural and Economic Contexts

The area is mainly occupied by farmers. These farmers are living here for a long time and directly depends on this lands and ponds for their livelihood. Near the site there a high school and college (Alampur high school and college), a bazar. There are no other school, college and bazar in 2.5 km radius. The hut is set on every Saturday for traders.

3.7 Images of Existing Site Condition

Image 1:

Source: Author

Image 2:

Source: Author

Image 3:

Source: Author

Image 4:

Source: Author

Chapter 4: Case Study Appraisal

4.1 Bangladesh University of Textiles (BUTEX)

Bangladesh University of textile is the only public Textile University in Bangladesh. It was established as a textile university on 22nd December, 2010 by an ordinance of Education Ministry but the foundation of this institute was laid on 1921 by the British rule as a weaving school. Since then it has been running as a textile institute in our country.

Location: Tejgaon, Dhaka, **Site area:** 10 Acre (approx.)

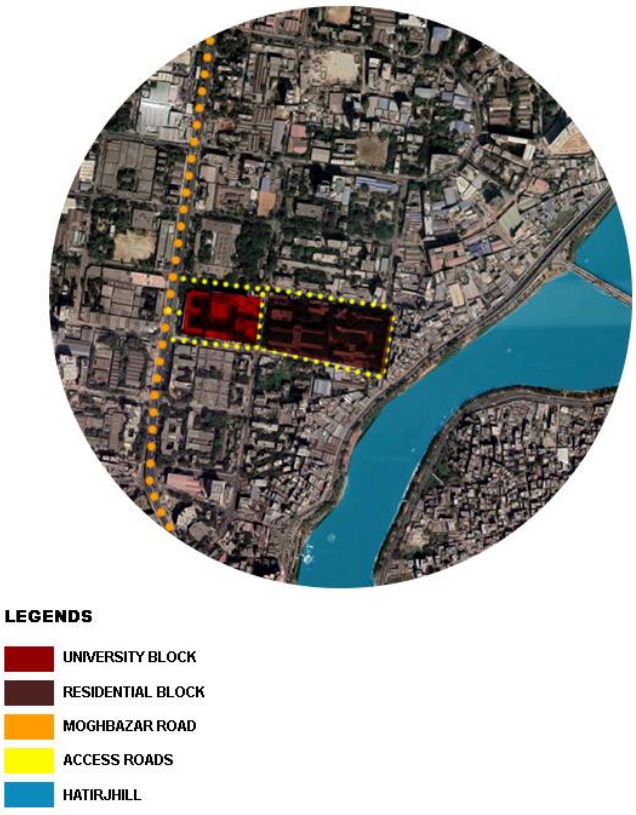


Figure 2.8: SITE

Source: Author

The institute is located in midst of dense urban area of Tejgaon and is sourrounded by commercial buildings. But the campus remains disintegrated, since the very regular urban grid has disintegrated the residential zone of the campus from the Educational zone.

4.1.1 Aim of study

- To understand the zoning and functional relationship of a Textile Institute.
- To understand the functional flow of laboratories and their intensive purpose
- To understand the structural requirements and ventilation requirements for laboratories.
- Integration of landscape design, to distract users from monotony of heavy machine works.

4.1.2 Functional zoning

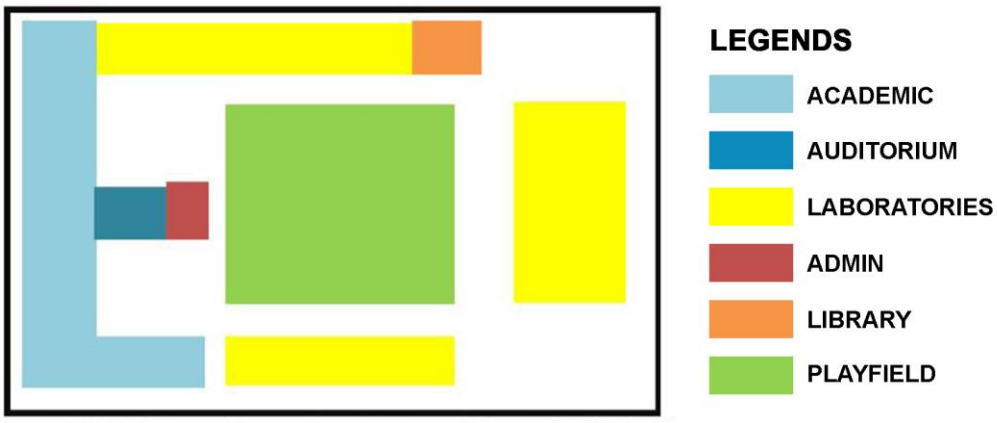


Figure 2.8: Functional

Source: Author

The functions of the university are heavily engulfed with laboratories that hold heavy machineries and work process, the machines are very heavy and create jerking, and thus placed

at ground level for structural risk. The laboratories also generate heavy noise. Because of that a clear buffer is required between classrooms. The functions are arranged around a central playfield. The field act as a buffer zone between the academic block and laboratories. But due to the arrangements of the surrounding function the seclusion between the environment and built forms have become distinct. The laboratories are very integrated part of Textile education, and students spend their times here the most to have clear practical knowledge. The laboratories have a very monotonous interior that does not provide a pleasant experience while working all day. The laboratories are not well ventilated and cause suffocation for long spans and lower ceiling heights. The structural elements are not well designed either and create visual interruptions. Altogether, the functional relationships are not well integrated and exhibition spaces are not well maintained.

4.2 Indian Institute of Management Bangalore

Indian Institute of Management is located at the hilly areas of south Bangalore in Bannerghatta. It was designed by Architect Bal Krishna Doshi. The campus in Bangalore occupies about 54,000 square meters within an area of 100 acres.it is designed as a poly-nuclear plan. The overall spatial arrangement relies on a series of intersecting corridors that form the basic skeletal structure.

4.2.1 Aim of study

- To understand the form, hierarchy and threshold of spaces
- To develop a sense of scale, proportion and light.
- To understand the relations of hard and soft textures
- To understand the way of incorporating local materials and concepts into the design
- To perceive the drama of light and shadow changing with time
- To make the classrooms more celebrated for students

4.2.2 Hierarchy of spaces

The plan follows a series of courtyard and corridor spaces following design of the city Fatehpur Sikri. The overall sequence of movement – from the lush, open campus to the semi-open corridors and eventually to the more enclosed and protected spaces generates multiple threshold conditions. These unique locations in the plan allow the functional spaces to interact and assimilate more freely with the overall scheme creating a set of fluid and easy connections between the spaces for movement and spaces for work. In the third dimension, the plan creates much complexity and layering. One can observe the emphasis on the diagonal while moving through the complex as these layers are revealed.

4.2.3 Light and Textures

Hand-chipped granite and concrete are the two primary materials that composed the space. Floors made of rough and polished Kota stone. The overall composition of textures create a e neutral palette for trees and humans to pop out which makes the spaces look more lively Some of the granite walls are covered with flora that receives and releases the light. The indoor and outdoor is gently blended with rich flora. . The internal spaces are in transition and the presence of time finds a wonderful expression through the ever-changing light within. The pergola's used in the corridors and interacting spaces creates unique drama of light and shade with the continuous changing light which makes the space more dynamic.

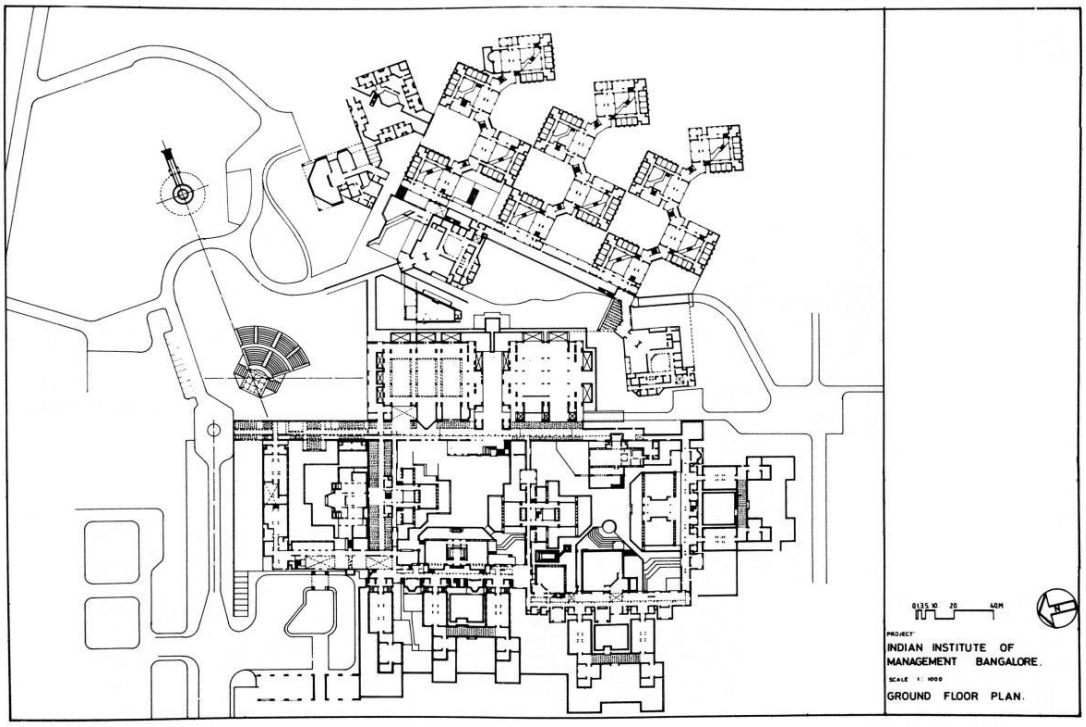


Figure 2.9: Ground Floor Plan

Source: https://thinkmatter.in

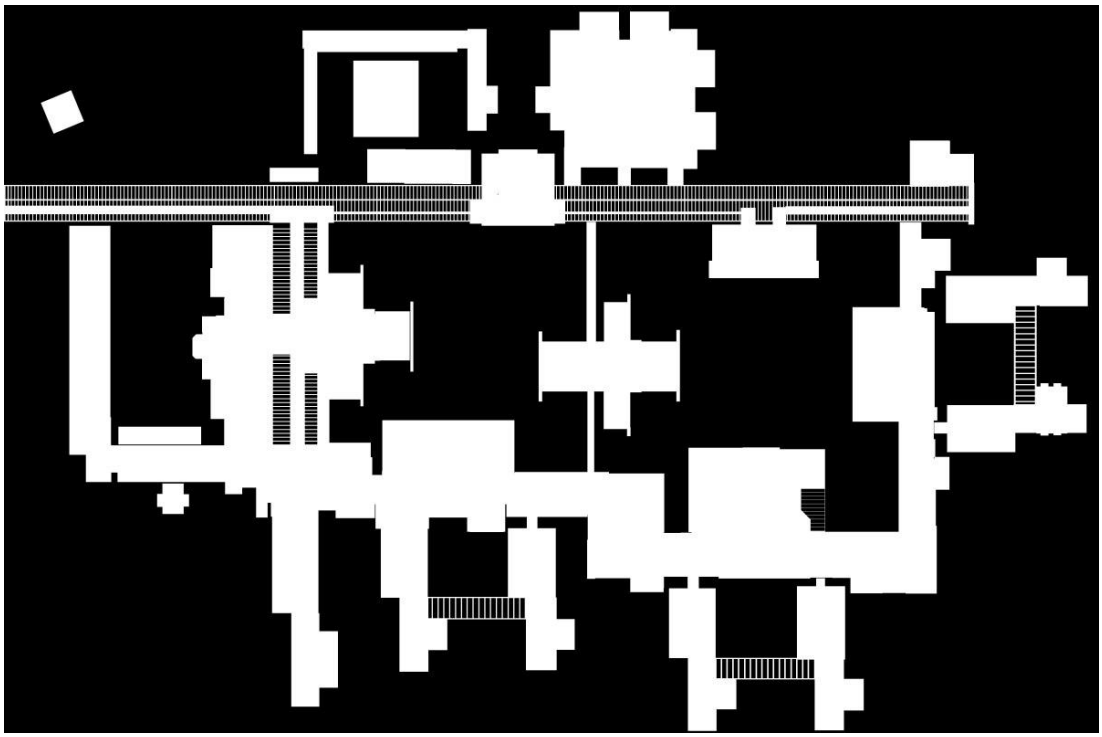


Figure 3.0: Solid void relationship

Source: https://thinkmatter.in

Figure 3.1: Hierarchy and Thresholds

Source: https://thinkmatter.in

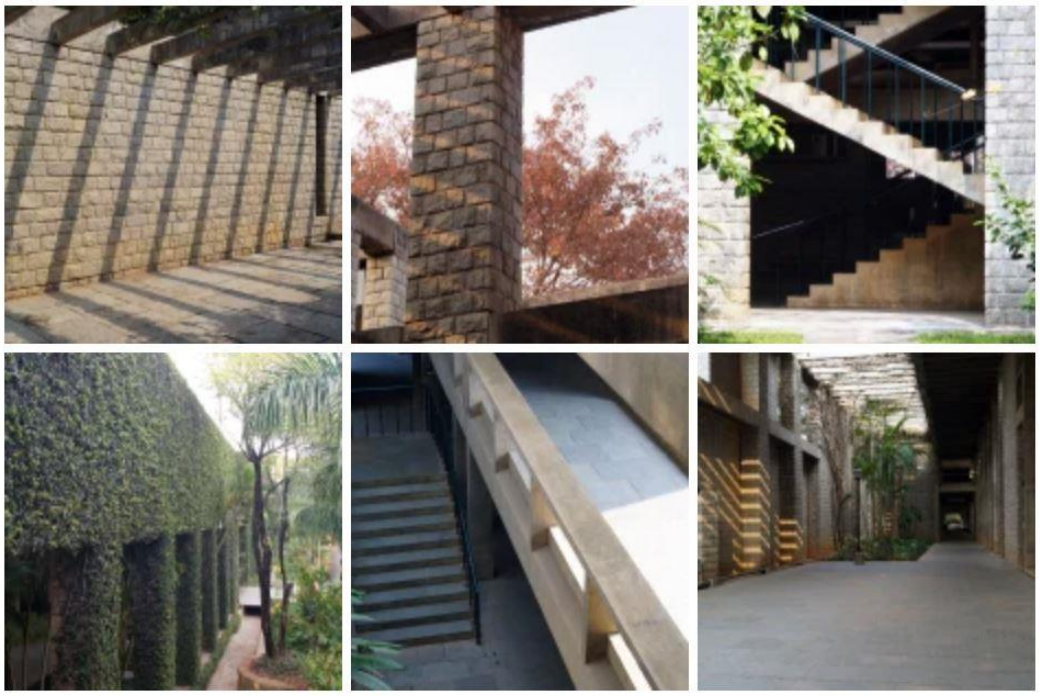


Figure 3.2: Textures and Shade- Shadow

Source: https://thinkmatter.in

4.2.4 Classroom Layout

The new classroom block is designed by Mindspace. It is proposed above an existing building along the main movement axis of the campus. This block consists 8 gallery classrooms which are connected by a wide flight of steps perpendicular to the central spine creating a central axis. The courtyard at the end of the axis acts as the focal point of the classroom block. The ground floor is kept free for wide movement and treated with the common functions. The classroom block is made disable friendly by providing ramps and lifts to access all the levels. The classrooms are also disabled friendly by keeping the first row of seats at the same level of corridors. The layout of classrooms and the location of openings are aimed at improving natural air circulation across. The openings are designed with three layered screens which can adapt to the following methods of teaching like lecture, projection, lecture with AC and projection without AC.

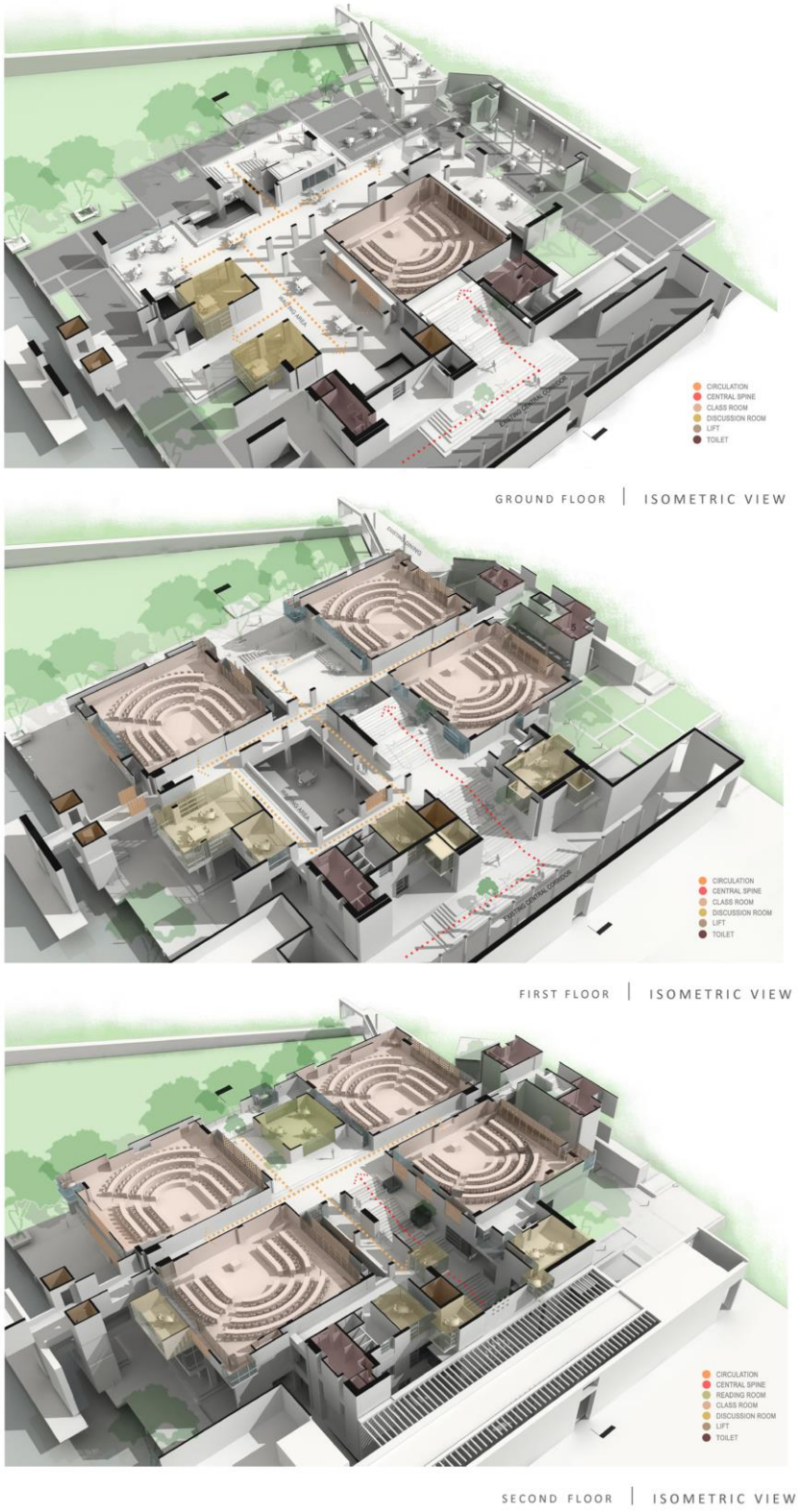


Figure 3.3: Isometric view of the new classroom block in IIM Bangalore

Source: https://thinkmatter.in

Figure 3.3: Concept and Section of the new classroom block of in IIM Bangalore

Source: https://thinkmatter.in

4.3 Friendship Centre

Friendship centre is designed by architect Kashef Mahboob Chowdhury the founder of "Urbana". It is a training center. It offers training programs for the poorest individuals in Gaibandha, a town where most of the community are employed in agriculture.

Location: Gaibandha, Bangladesh Site **area:** 9'210**; Built area:** 2'897 m2

4.3.1 Aim of study

- How to design in midst of vast farming land.
- Explore regional climatic design and design solutions.
- Understand the landscape design.
- Explore the ways to connect the landscape with build functions.
- Explore regional material and architecture.

• 4.3.1 Landscape

The Friendship Centre is built on low-lying land surrounded by farming lands. The entire complex is depressed approximately 12'. Green roofing inspired by Buddhist Bihara blends the complex seamlessly with the surrounding landscape. Even the elevation blends with the surrounding farming lands due to depressed roofline. The purpose was to keeps the original fabric and character of the proposed land.

Figure 3.3: Site Plan with Image

Source: https://www.archdaily.com

Figure 3.4: Section

Source: Author

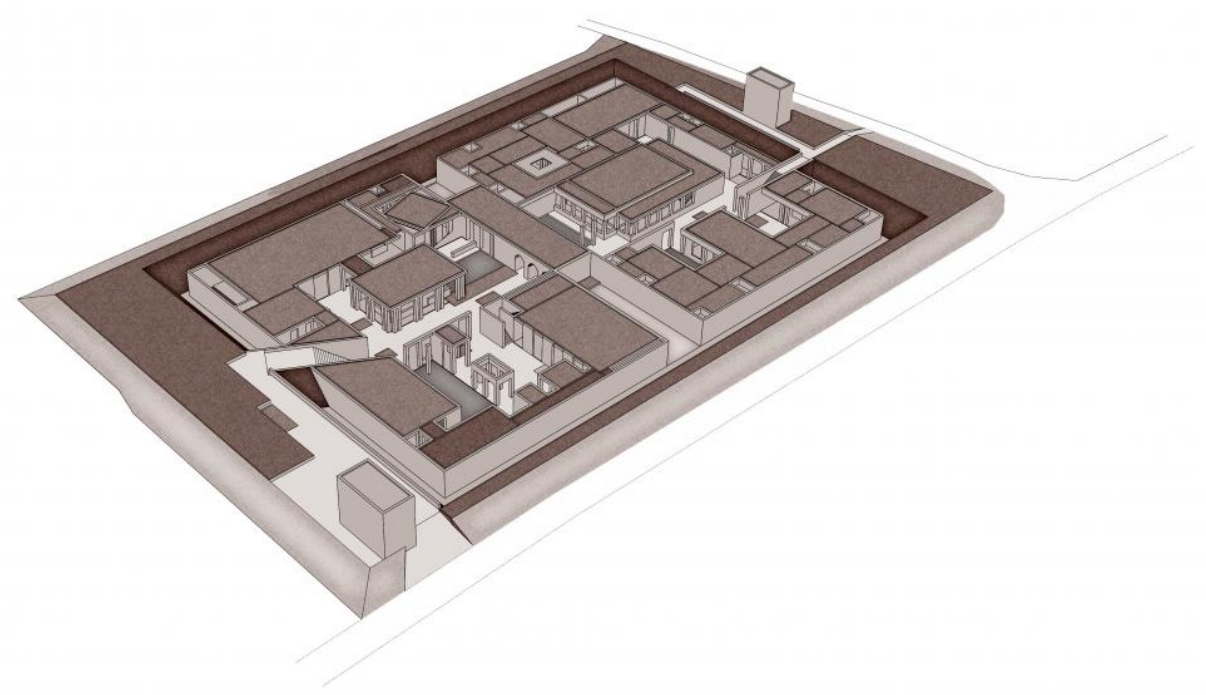


Figure 3.4: Isometric View

Source: www.archdaily.com

Figure 3.5: Common spaces

Source: www.archdaily.com

Chapter 5: Program Appraisal

The functions of a textile Institute can be divided into 5 facilities. These facilities are-

1. Administrative facilities
2. Academic facilities
3. Laboratories
4. Common Facilities
5. Residential facilities

5.1 Administrative facilities

The admin block consists the Dean's room, Deputy Director's room, accounts department room, Teacher lounge and toilet facilities, lobby and waiting room and 8 textiles department rooms. These 8 departments are-

- Department of Fabric Engineering
- Department of Textile Machinery Design and Maintenance
- Dept. of wet process
- Dept. of dyes and chemical
- Dept. of yarn
- Dept. of knitting and stitching
- Dept. of Apparel Engineering
- Dept. of Fashion Designing

Total users-

- Teachers- 50
- Dean-1
- Vice chancellor-1
- Staff- 20

Figure 3.6: Table of Administrative Facilities

A. Administrative facilities							
1	Reception	Provide information	1	6	6.5		39
2	Vc office	Individual work spece for Vice Chancelor	1	1	200		200
3	single offices	Individual work spece for senior management officials (dean + deputy director+ VC assistant)	3	3	150		1350
3	Departmental offices	Common work areas for teacher and instructors	8	5	80	400	3200
4	Accounts office	Common work area for admistritive work	1	4	80		320
5	Teacher's loung		1	25	15		375
6	Dining	Lunch space for adminstritive staffs	1	25	15		375
7	Medical		1			180	180
8	Prayer space		1	50	10		500
9	Toilet	For use of administrative staffs	2	25		150	300
10	circulation	30% of total					2020
					Subtotal		8859

Source: Author

5.2 Academic facilities

The academic facilities consist classroom facilities for 800 students along with washroom facilities, and student common rooms. It also has 4 fashion design studios; each serves 25-30 students.

Figure 3.7: Table of Administrative Facilities

C. Academic facilities							
1	Lecture halls	For theory classes	12	30	10		3600
2	Design Studios	For fashion design classes	4	30	20		2400
3	Seminer halls	For workshops	2	50	15		1500
4	Common rooms	For leisure activites	2	50	15		1500
5	Exibition hall	For exibiting student works	1	100	10		1000
6	Toilet		6			150	900
5	30% circulation						3387
					Subtotal		14287

Source: Author

5.3 Laboratories

5.3.1 Yarn manufacturing laboratory

This laboratory provides practical knowledge regarding the yarn preparing technology; both short staple (cotton) and long staple (jute). The laboratory facilities include conventional and modern machinery with the technology of open-end spinning and air jet spinning.

5.3.2 Weaving laboratory

This laboratory has the facility to weave cotton, synthetic and jute fabric including tappet, dobby and jacard. Available are hand operated looms, ordinary power looms, automatic power looms and modern looms with CAD systems. Modern looms include air-jet looms, rapier looms with electronic jacquard and projectile looms.

5.3.3 Knitting laboratory

This laboratory is equipped with both warp and weft knitting machinery. The warp knitting machinery includes both the raschel and tricot machines, and the weft knitting machine include circular (single jersey, interlock, rib, jacquard) and flat knitting machines.

5.3.4 Wet processing laboratory

This laboratory includes machinery for singeing, desizing, mercerizing, dyeing, printing and finishing and students are able to gain a thorough knowledge of wet processing technology. It has the facility for dyeing material as fiber, yarn and fabric and various style of printing. It also has computerized data color system, gas chromatography and mass spectrometer, light fastness and other quality control equipment required to ensure high quality dyeing and finishing.

The wet processing laboratory has recently expanded. A new building named Dyeing Building has been recently completed, with the most recent and modern machines placed there.

5.3.5 Garments laboratory

The garments laboratory is equipped with all the types of cutting, sewing and finishing machinery used in the garment industry. It is also equipped with Lectra CAD-CAM system for computerized marker making, cutting and garments dyeing, washing and embroidery.

5.3.6Testing laboratory

The testing laboratory has the facility to test fibers, yarn and fabric. The conventional and modern testing equipment includes an evenness tester, Classimat, single yarn strength tester, multifunctional Superba tester, HFT and electronic microscope.

5.3.7 Computer laboratory

A fully equipped computer laboratory provides practical opportunities for thirty students at a time. Use of the Internet is available for teachers and students.

5.3.8 Electrical laboratory

This laboratory gives students the chance to become acquainted with electronic and electrical technology. It is equipped with pneumatic and electro-pneumatic control systems.

5.3.9 Physics laboratory

The physics laboratory is equipped with machinery and equipment for practical works.

5.3.10 Chemistry laboratory

The chemistry laboratory is suitable for thirty students at a time to undertake practical work.

5.3.11 Engineering workshop

The engineering workshop is equipped with lathes, universal strength testers, shaping machines, cutting machines, drilling machines, welding machines, circular saws and various types of tools for carpenters.

Figure 3.8: Table of Administrative Facilities

D. Laboratory facilities							
1	Yarn Manufacturing Lab	For demonstration of 8 yarn manufacturing machine	1			1350	1350
	lecture area		1	30	10		300
	storage area	for storing raw materials and build products				400	400
	office	For Lab instructors	1	2	60		120
2	Spinning Lab	For demonstration of weaving and knitting Machines.	1			300	300
	lecture area		1	30	10		300
	office	For Lab instructors	1	2	60		120
	storage area	for storing raw materials and build products	1				216
3	Computer Lab		1	30	20		600
4	Physics lab	For Physics practical work	1	30	20		600
5	EEE Lab	For EEE practical work	1	30	20		600
6	Apparel Lab	For Textile packeging Detailing	1	30	20		600
7	TTQC Lab	For textile testing and quality control	1	30	20		600
8	Mechanical Lab	For Textile packeging Detailing	1	30	20		600
9	Drawing Lab	For engineering drawings	1	30	20		600
10	Dying lab						
	Physical Lab	Demonstrarion of dying machines				1350	1350
	Chemical lab	For chemical experiments	1	30	20		600
	office	For Lab instructors	1	2	60		120
	storage area						
11	30% circulation						2812.8
					Subtotal		12188.8

Source: Author

5.3 Recreational Facilities

Recreational facilities are referring to common spaces such as Auditorium, canteen and Library where the students can pass their leisure time.

Figure 3.9: Table of recreational Facilities

B. Recreational facilities							
1	Multipurpose hall	To organize institution events	1	850	15		12750
2	Store	Staorage space for multipuropose hall	1				4250
3	Cafeteria	For supporting dining faciliy for the students	1	350	15		5250
4	Kitchen	For supporting cafeteria	1	6	50		300
5	Club rooms	For club works, meetings, discussions	4	50	15		3000
6	Library	For studying and storing books	1	350	50		17500
7	30% circulation						12915
					Subtotal		55965

Source: Author

5.6 Residential facilities

The residential facilities include-

- Boys Dormitory for 100 people
- Girls dormitory for 100 people
- Officers dormitory for 20 people
- Staff dormitory for 15 people
- 1 principle's dormitory

Figure 3.10: Table of Residential Facilities

E. Residential facilities							
1	Male Dorm	residential facilities for male students	100	2	180		36000
2	Female Drom	residential facilities for female students	50	2	180		18000
3	Dean Quarter	residential facilities for the dean	1	1		1200	1200
4	Officer's Drom	residential facilites for the admistritives workers	20	1	120		2400
5	Staff Dorm	Resential facilities	15	1	90		1350
6	Toilet						
							0
					Subtotal		58950
	Total area						150249.8

Source: Author

Total Institute area compromises 150249 sft.

Chapter 6: Design Considerations

According the site analysis, Literature review and Program appraisal there are few things that must be considered before start designing. These considers include-

6.1 Road connectivity and access

The primary road is the main vehicular access to the site which will be the primary access for the Textile Institute campus. Furthermore, the neighborhood road in the east divides the plot into two halves. As this road serves the surrounding neighborhood, keeping this road can help to create interaction between the students and local residents and will also help to divide the residential zone from the Institutional campus.

6.2 Rain and Waterbodies

According to the site analysis it rains very frequently in Kushite. The canals and water bodies that are exiting in the site collects the rain water and prevent water logging. Again according to the case study of “Amber denim loom shade” textile manufacturing needs moisture and so most of the textile industries are built near the rivers. Furthermore, the local farmers are directly depending on the existing waterbodies to support their farming lands. So preserving these waterbodies is one of the major considerations.

6.3 Noise

Machineries used in the textile Laboratories create a lot of noise which can hamper the quite zones like class rooms and library and also the surrounding neighbourhood. So separation of the noise zone from the quite zones is one of the major considerations.

6.4 Dust

Raw material use for yarn manufacturing, waving, knitting and jute works create lot of dust. If it is not carefully planned it can lead to a very unhealthy environment for students who will study in the laboratories. So mitigating the dust is also major consideration.

6.5 Light

Classroom, library, practical labs all need proper Natural lights to function properly. Especially the apparel and design studios need a lot of natural light for doing stitching and drawing works. So guiding the natural light to all these places is a major consideration.

6.6 Landscape and site surrounding

According to the site analysist the whole site is in the midst of a rural setting consisting green farming lands and trees. So one of the major consideration would be planning the zones respecting the site surroundings. Another consideration would be blending the structure with the surrounding landscape.

Chapter 7: Design Solution

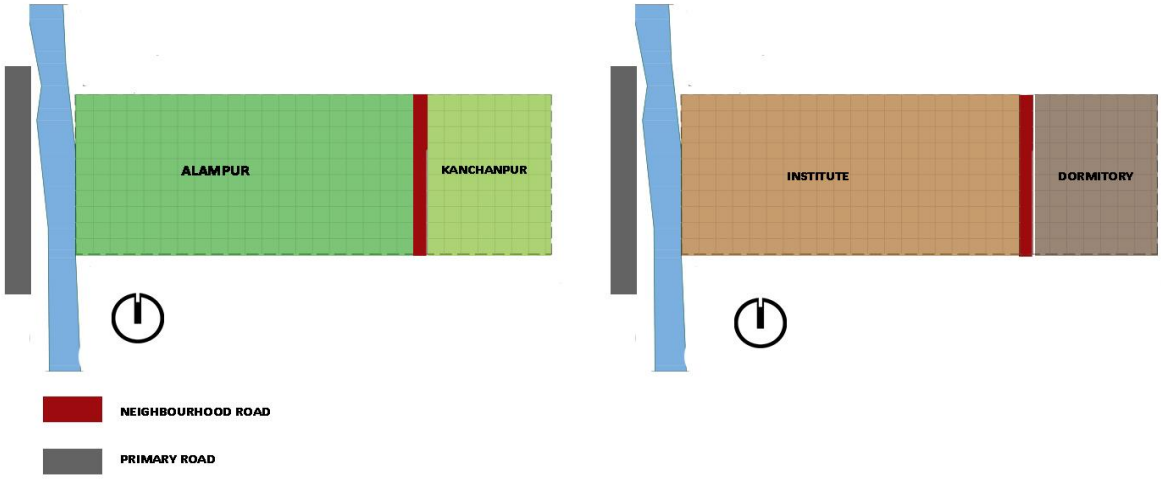
7.1 Concept

The is located in a rural setting which offers a very soothing environment including green farmlands and a series of ponds. This ponds almost covers the 70% of the given site which are used by the local farmers as water reservoirs to collect rain water for farming and also for fishing as well. Local farmers are directly depending on these ponds. So, the idea is to create a structure in harmony with the existing setting where the students of institute and the local people can equally enjoy and utilize the site.

7.2 Primary zoning

Dividing the site into institutional zone and residential zone using the existing neighborhood road.

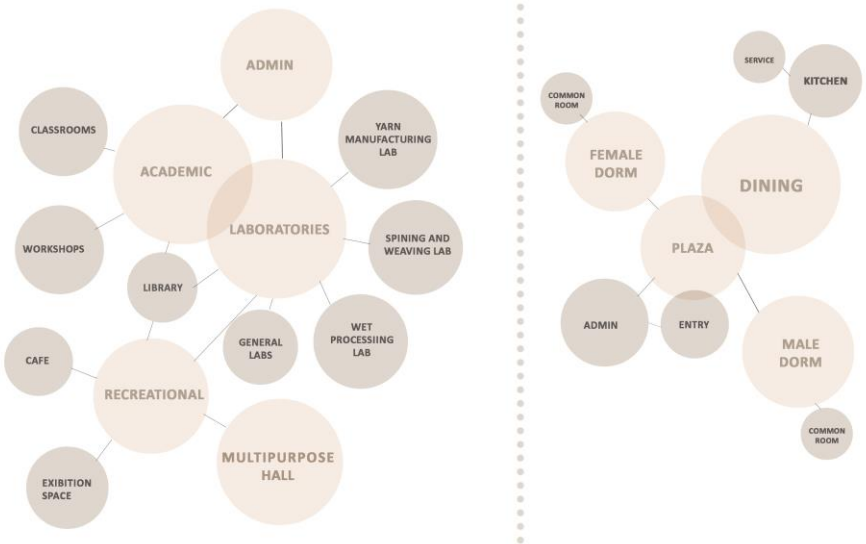
Figure 4: Primary zoning



Source: Author

7.3 Bubble Diagram

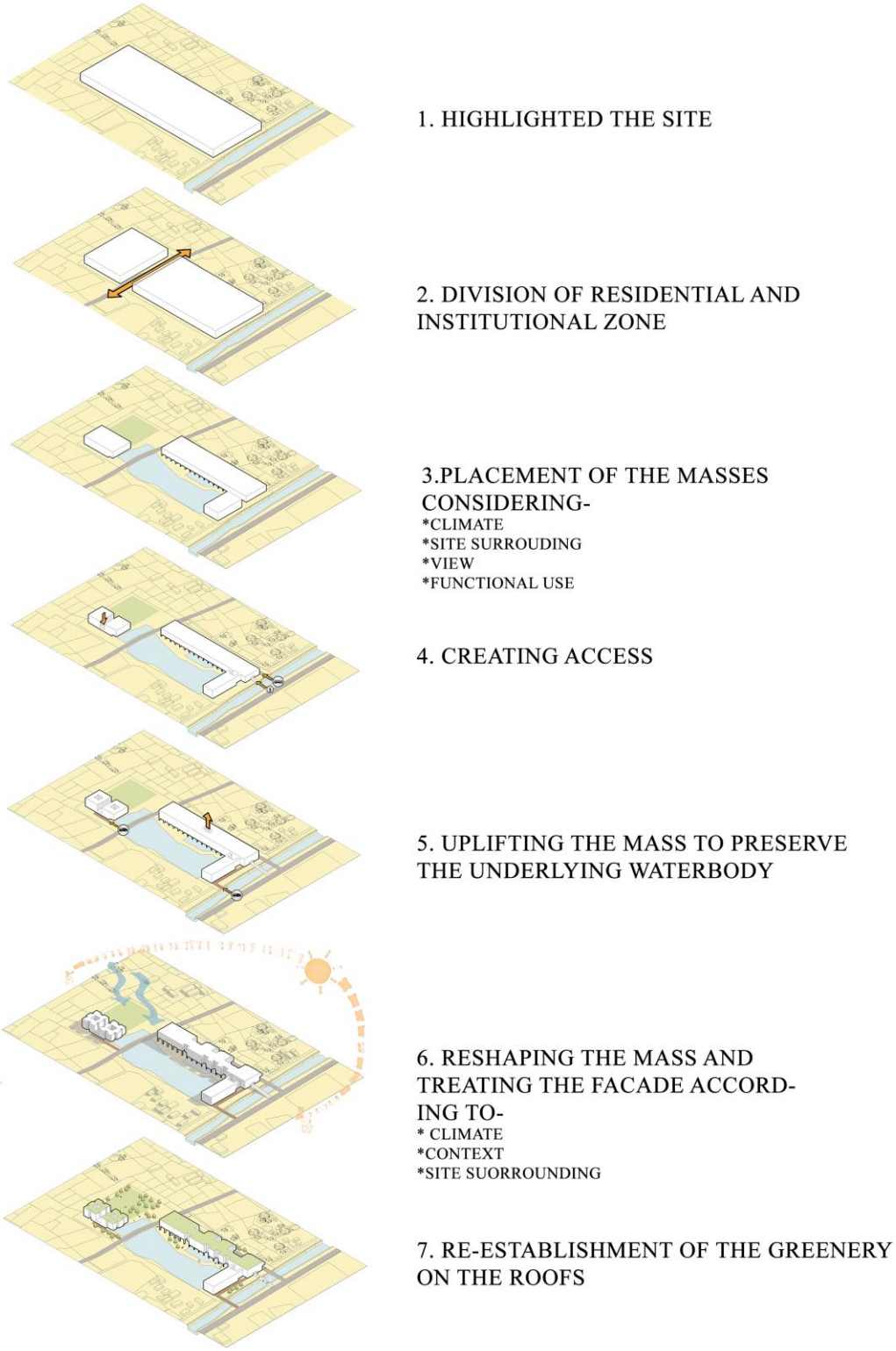
Figure 4.1: Primary zoning



Source: Author

7.4 Form Derivation

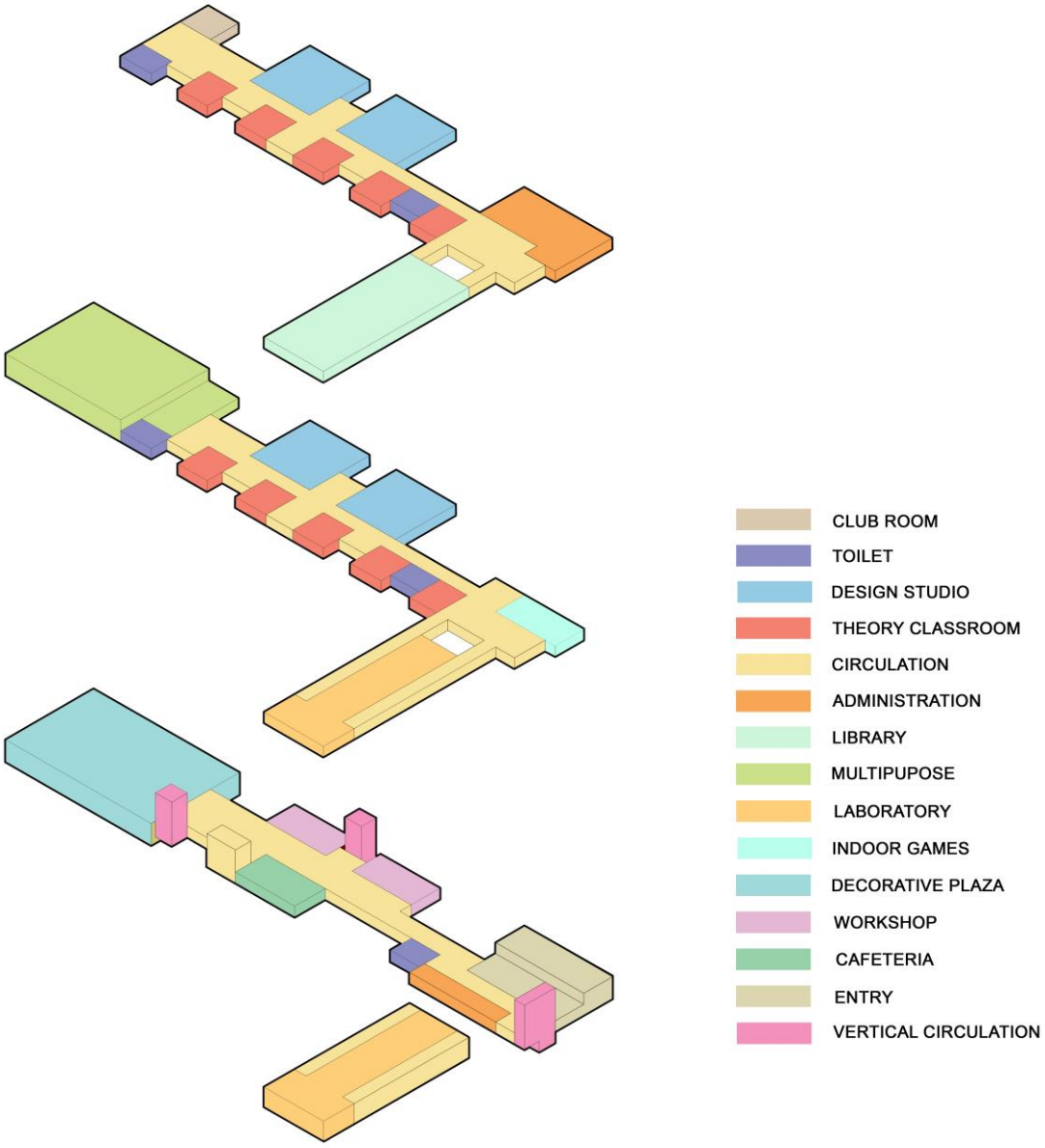
Figure 4.2: Form Derivation



Source: Author

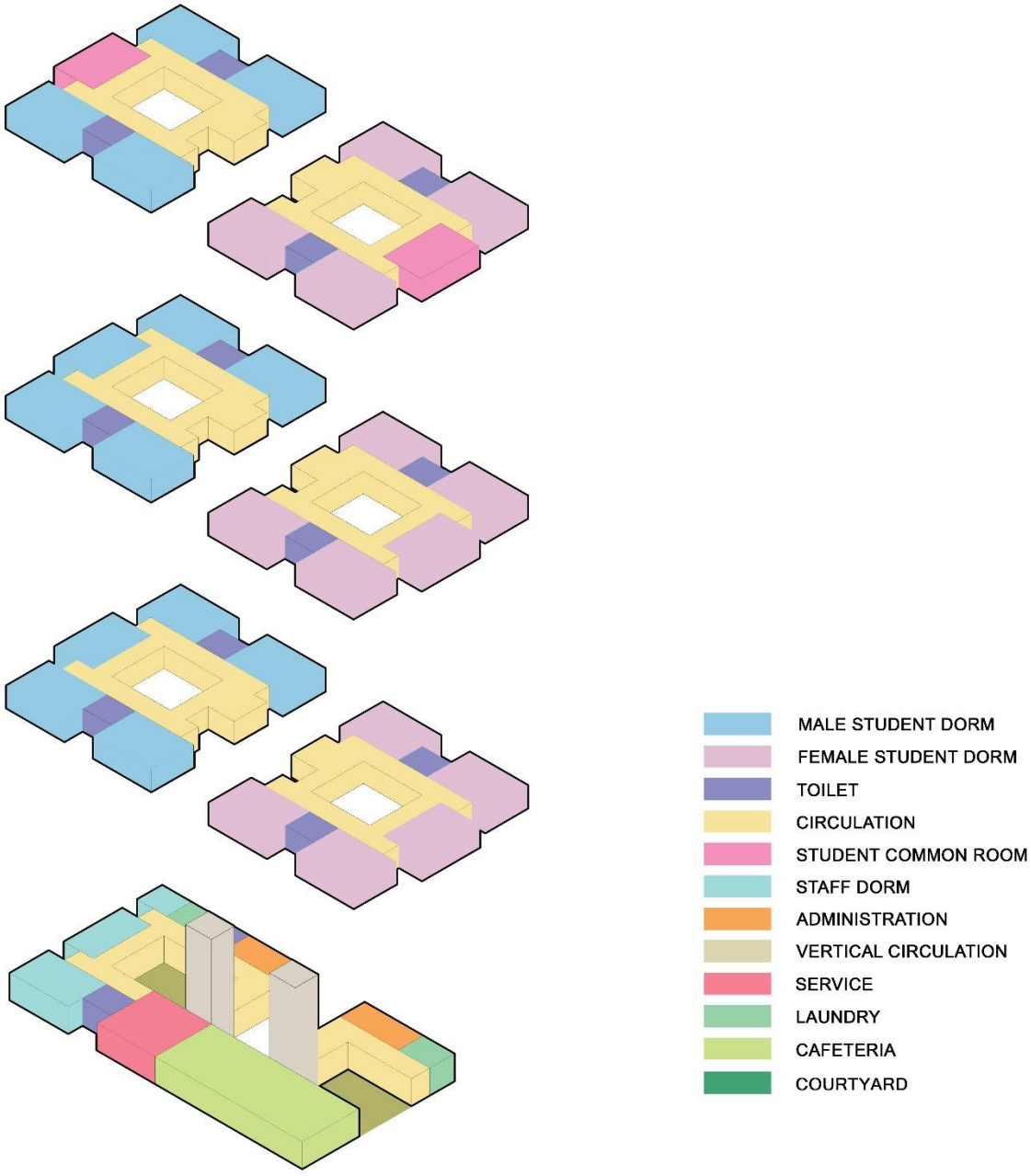
7.5 Functional Flow

Figure 4.3: Functional flow of the Institutional zone



Source: Author

Figure 4.4: Functional flow of the residential zone



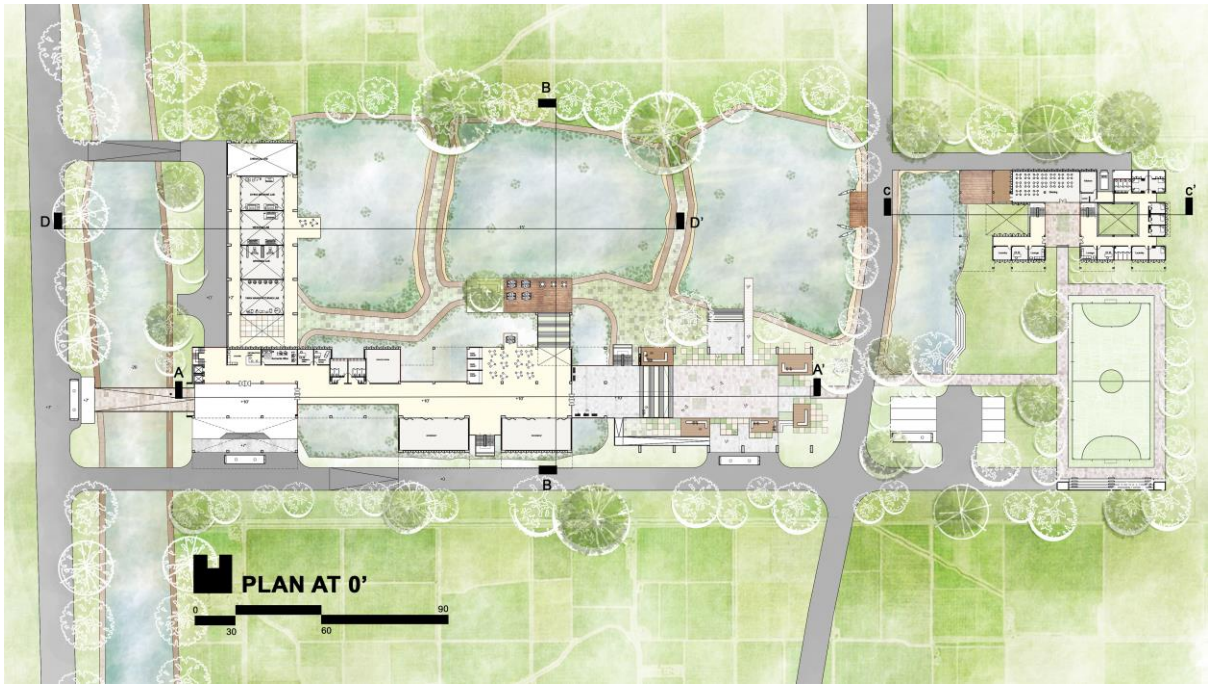
Source: Author

7.6 Plans

Figure 4.5: roof plan

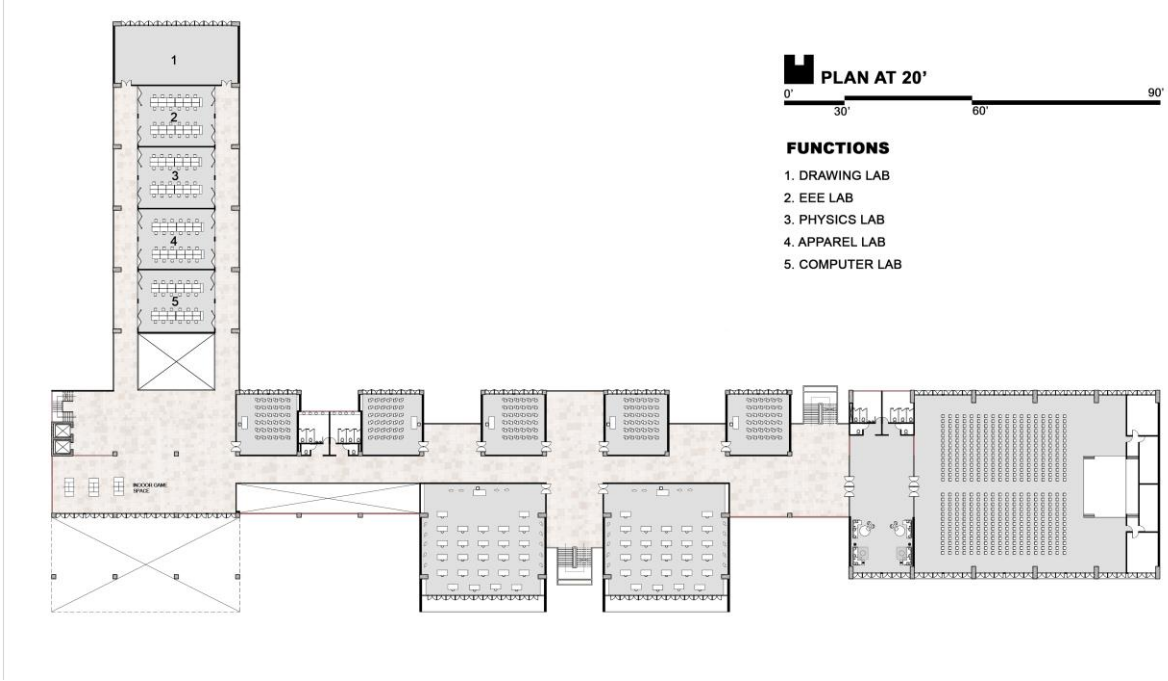
Source: Author

Figure 4.6: Ground Floor plan



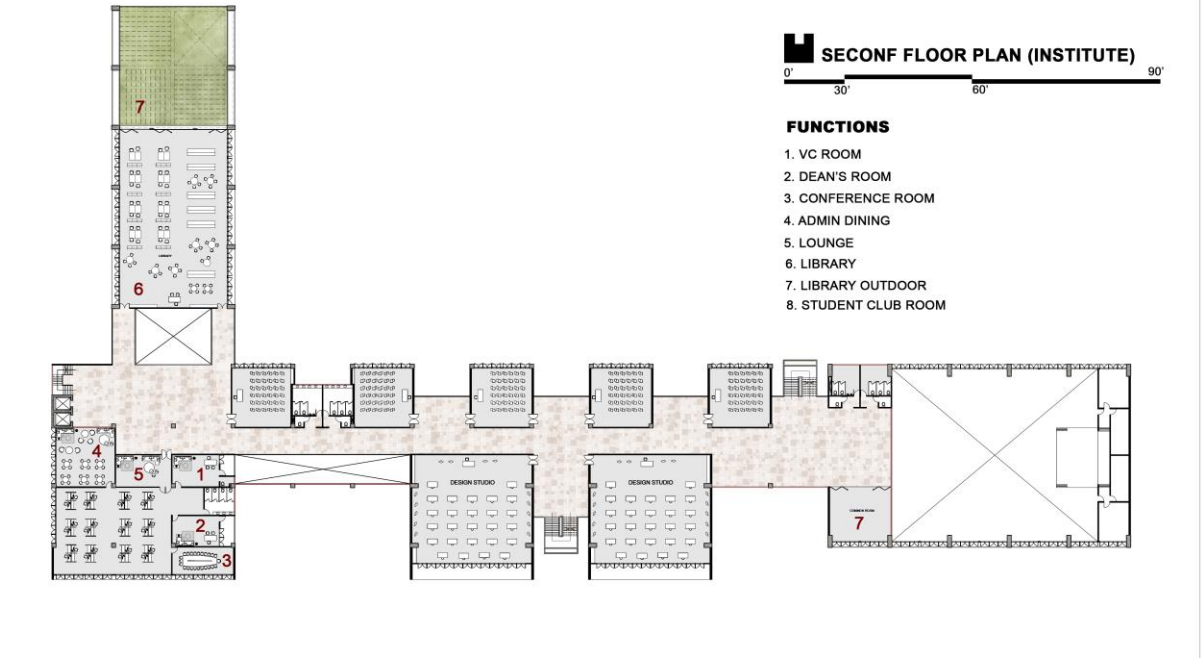
Source: Author

Figure 4.7: Institute First Floor plan



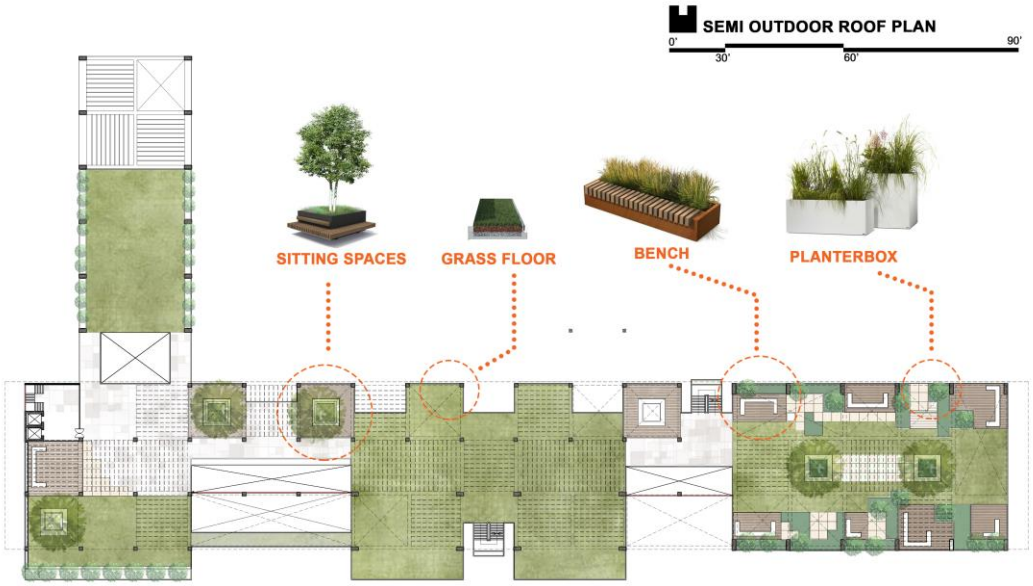
Source: Author

Figure 4.8: Institute First Second Floor Plan



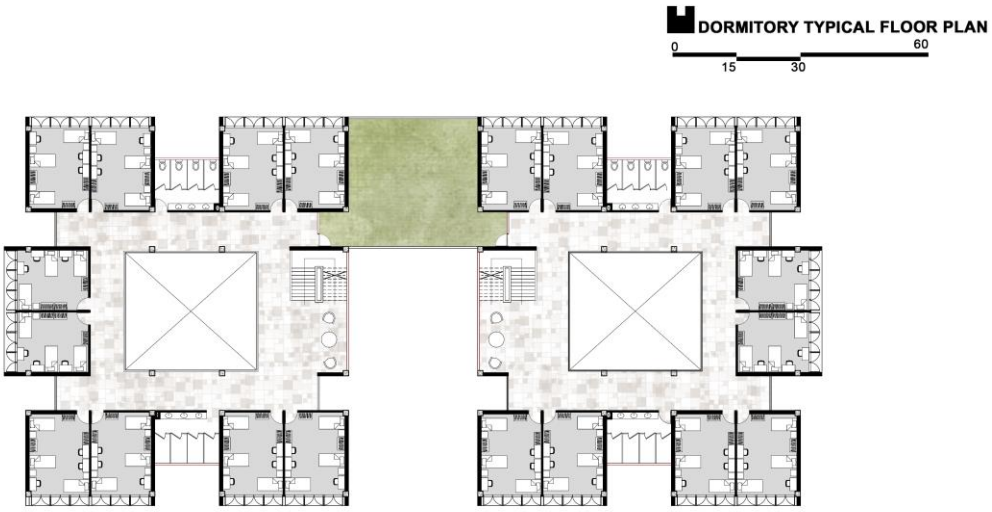
Source: Author

Figure 4.9: Institute Semi-Outdoor Roof Plan



Source: Author

Figure 4.10: Residential Typical floor plan



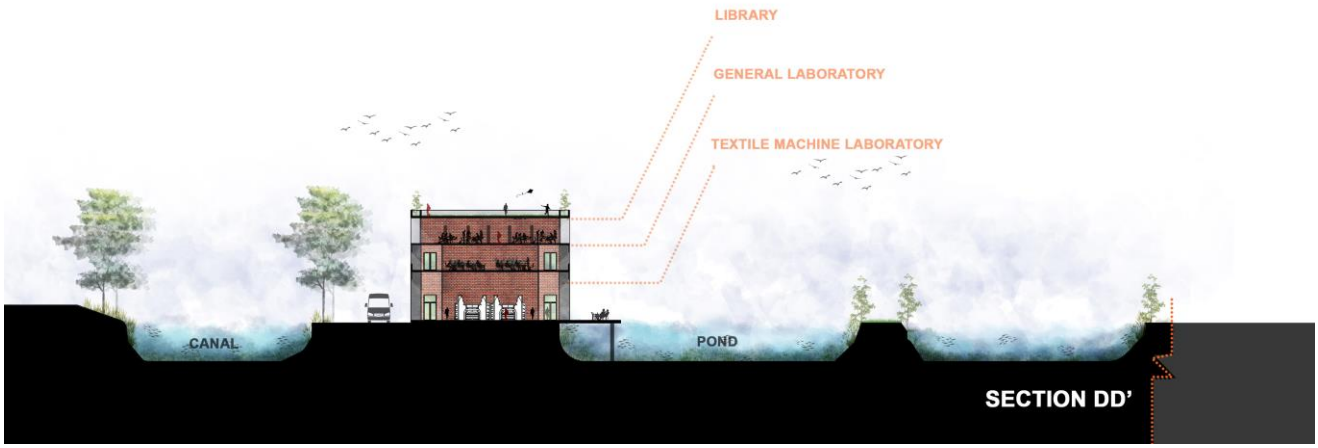
Source: Author

7.7 Elevation and Sections

Figure 5: South Elevation and Section AA'

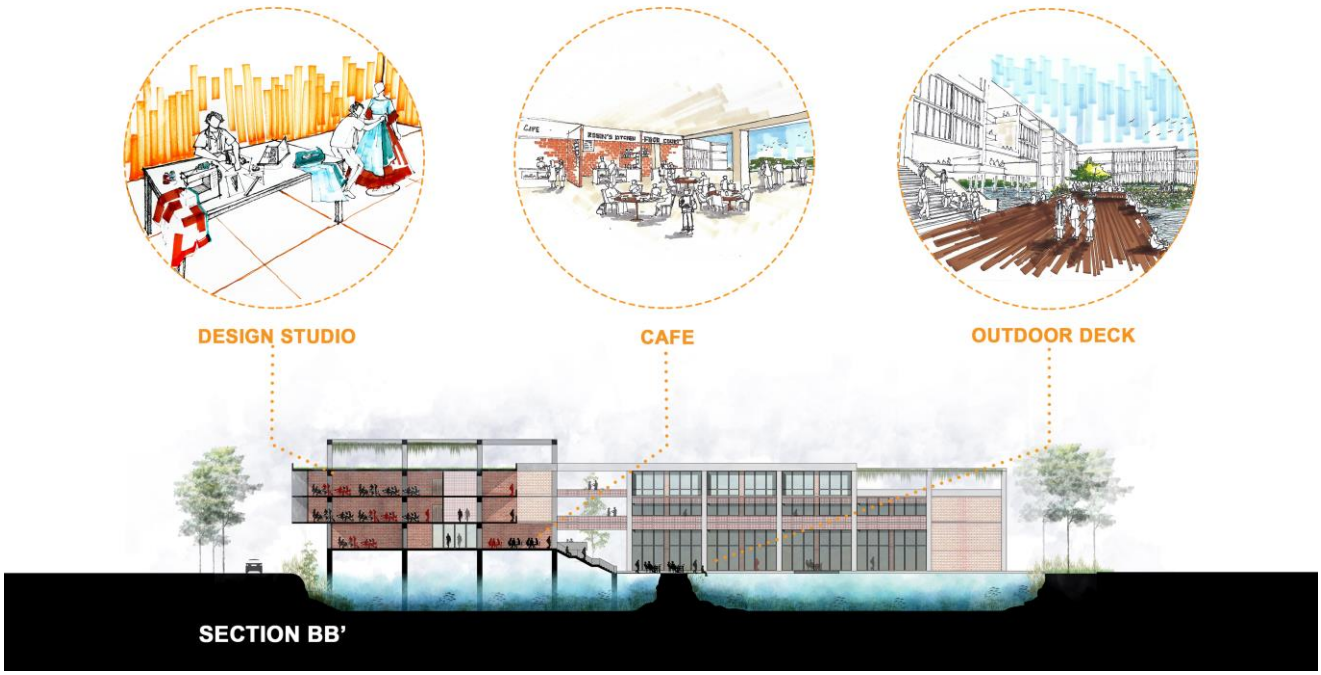
Source: Author

Figure 5: Section DD'



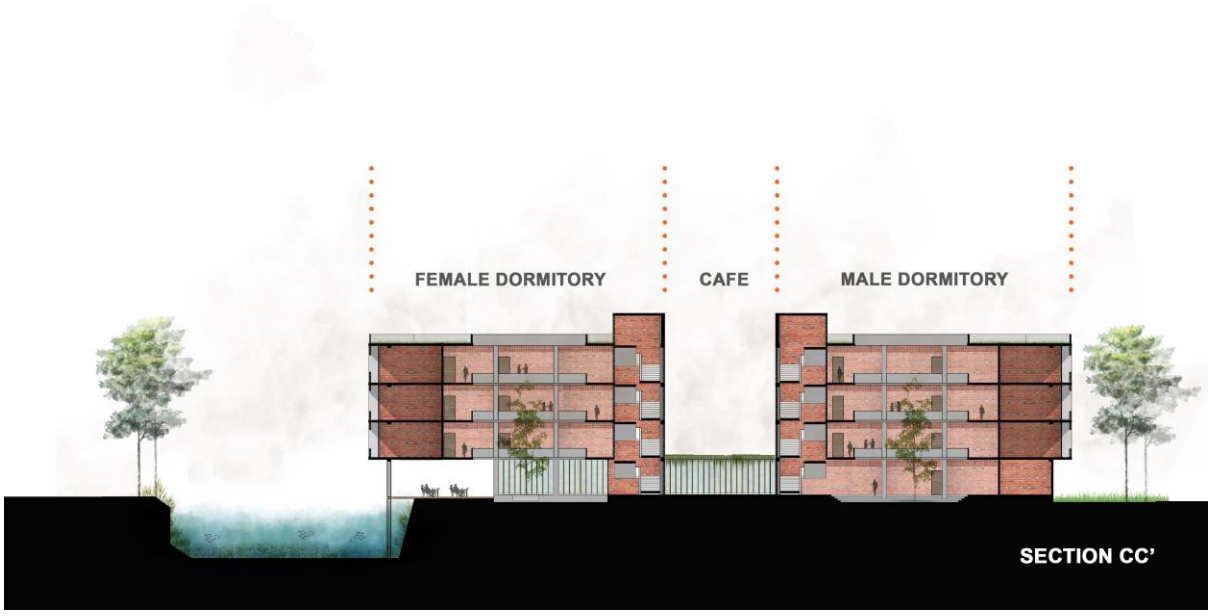
Source: Author

Figure 5.1: Section BB'



Source: Author

Figure 5.2: Section CC'



Source: Author

7.8 3D Renders and Perspective sketches

Figure 5.3: South-East Façade

Source: Author

Figure 5.4: Deck

Source: Author

Figure 5.5: Entry space

Source: Author

Figure 5.6: view of the institute from the dormitory

Source: Author

Figure 5.7: Semi outdoor Roof

Source: Author

Figure 58: Institute Corridore

Source: Author

Figure 5.9: Dormitory

Source: Author

Figure 5.10: Institue plaza

Source: Author

Figure 6: Institue plaza in festivals

Source: Author

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