Kushtia Textile Institute

KUSHTIA TEXTILE INSTITUTE

By

Nabilah Tabassum
18108008

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

School of Architecture
BRAC University
September, 2023

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 have acknowledged all main sources of help.

Student's Full Name & Signature:

Nabilah Tabassum

18108008

Approval

The project titled “Kushtia Textile Institute” submitted by Nabilah Tabassum (18108008) of Summer, 2023 has been accepted as satisfactory in partial fulfillment of the requirement for the degree of Bachelor of Architecture on 09-09-2023.

Examining Committee:

Supervisor:
(Member)

_____

Mohammad Habib Reza, PhD
Associate Professor, School of Architecture
Brac University

Supervisor:
(Member)

_____

Iftekhar Ahmed, PhD
Associate Professor, School of Architecture
Brac University

Supervisor:
(Member)

Mohammad Faruk, PhD
Associate Professor, School of Architecture
Brac University

Supervisor:
(Member)

Mohammad Zillur Rahman,
Lecturer, School of Architecture
Brac University

Departmental Head:
(Chairperson)

Zainab Faruqui Ali, PhD
Professor, School of Architecture
Brac University

Abstract

Textile is a very important industry in Bangladesh and has grown a lot in the past few years. To make sure the quality of the textiles stays good, the government and private companies are making special schools for people to learn how to make textiles. These schools are different from regular schools because they have special labs and places where students can practice what they learn. Anyone can go to these schools, even if they are not a full-time student. Some students can even live on campus. The goal is to make a good environment for learning and help students grow their skills.

Keywords: Textile Institute, Textile, Fashion design, Kushtia, RMG industry, Rural Institute.

Acknowledgement

Firstly, I would like to thank The Almighty for blessing me with the patience to face all the difficulties and continue this journey.

I want to convey my gratitude toward my mentors Mohammad Habib Reza sir and Zillur Rahman sir, who were always available to help and guide me. Without their push and help it would not be possible for me to complete my project.

I specially thank Bejeta and Zawad for constantly being there for me and believing in me. I would like to thank Rizwan, Zinan, Faria, Sabiha, Taiha, Papri, Alisha and Tasfin for being there when I needed you the most. Thanks to my youngest brother Aurko for being understanding enough and trying to help me out. Also thanks to Farhan and Ajay for the last moment help.

Last but not the least, I would thank my friends Shukhi and Proma and my respected seniors Bappi bhaiya and Arik bhaiya for being there and helping me out whenever I needed.

Table of Contents

Declaration 2

Approval 3

Abstract 5

Acknowledgement 6

Chapter 1: Introduction 12

1.1. Project Introduction 12

1.2. Aim and Objects 12

1.3. Project Summary 13

1.4. Proposed Programs 13

Chapter 2: Literature Review 14

2.1. History of Textile in Bangladesh 14

2.2. Types of Handlooms 16

2.3. Basics of Textile Engineering and Institute 22

2.4. Laboratories and Units of Textile Industry 23

2.5. Textiles of Kushtia 26

Chapter 3: Site Appraisal..... 28

3.1. Site Location 28

3.2. Chronological Analysis of the site 29

3.3. Context Analysis 30

3.3.1. Urban Context..... 30

3.3.2. Socio-Economic Condition..... 31

3.3.3. Figure-Ground 33

3.3.4. Accessibility 34

3.3.5. Ecological 35

3.3.6. Building-Use..... 36

3.4. Climatic Conditions..... 37

3.5. Existing Site Condition 40

3.6. Possible Future Land-Use Pattern Analysis 42

3.7. S.W.O.T Analysis..... 43

Chapter 4: Case Studies 44

4.1. International Case Study 44

4.1.1. Textile Academy NRW 44

4.1.2. Location and Climate 45

4.1.3. Form and Function 46

4.1.4. Horizontal and Vertical Circulation 47

4.1.5. Facade Details 49

4.1.6. Interiors 50

4.2. Sub-Continental Case Study 51

4.2.1. NIFT, New Delhi 51

4.2.2. Location and Climate 52

4.2.3. Orientation 53

4.2.4. Concept 54

4.2.5. Functional Zoning 55

4.2.6. Circulation and Activity 57

4.3. National Case Study 59

4.3.1. BGMEA University of Fashion and Technology (BUFT) 59

4.3.2. Location and Climate 60

4.3.3. Horizontal and Vertical Circulation 60

4.3.4. Facade Details 62

4.3.5. Lab and Studio Facilities 63

4.3.6. Landscape 67

Chapter 5: Program Appraisal 68

5.1. Proposed Blocks 68

5.2. Program Analysis 69

5.2.1. Administrative Facilities 69

5.2.2. Academic Facilities: 69

5.2.3. Laboratory Facilities 70

5.2.4. Recreational Facilities 71

5.2.5. Residential Facilities 71

Chapter 6: Design Development 73

6.1. Functional Zoning and Concept 73

6.1.1. Functional Zoning 73

6.1.2. Concept and Form Generation 74

6.1.3. Bubble Diagrams 75

6.2. Plans 78

6.3. Elevations and Sections 80

6.4. Rendered Images 81

References 84

Chapter 1: Introduction

1.1. Project Introduction

The textile industry of Bangladesh is growing rapidly. Almost 84% of Bangladesh's overall export revenue comes from this sector. With the growth of the industry, the opportunities in this sector should be enhanced and the people working in the industry should be well trained. The government and BTMC plan to establish new schools to train individuals in the textile industry, potentially including one in Kushtia.

1.2. Aim and Objects

- Kushtia has a long history of textile production, with weavers creating cotton products for almost 300 years.
- Kushtia used to have the largest textile cotton industry in the Indian subcontinent.
- However, the cotton and handloom industries are struggling due to the decline of the cotton industry and lack of exposure.
- This project aims to revive the textile legacy of Kushtia by creating a platform that brings together textile experts, local weavers, and textile workers.
- The objectives of the project are to preserve and further develop Bangladesh's rich textile heritage.
- The project seeks to create a common platform between textile experts and local weavers and textile workers.
- The project aims to establish an institute that offers students a variety of celebrated and memorable spaces to enjoy their campus life.

- The project aims to provide students with a vibrant learning experience, promote community learning, and create a sustainable and eco-friendly structure.

1.3. Project Summary

- **Project Title:** Kushtia Textile Institute
- **Site Area:** 5.61 Acres.
- **Location:** Alampur, Kushtia.
- **Client:** Bangladesh Textile Mills Corporation (BTMC).
- **Built Area:** 1,50,000 Sqft. (approx.)

1.4. Proposed Programs

- Administration
- Classrooms
- Laboratories
- Seminar rooms
- Design Studios
- Exhibition Space
- Multi-purpose Hall
- Workshops
- Library
- Cafeteria
- Dormitories

Chapter 2: Literature Review

2.1. History of Textile in Bangladesh

Bangladesh has a long history of textile production, dating back centuries (Islam & Hossain, 2012). One of the most prominent examples of traditional textile production in Bangladesh is handloom weaving, which has been a part of the country's culture since the 17th century (Islam & Hossain, 2012). Handloom weaving produces versatile textiles and fabrics using a combination of the weaver's hand and foot and has played an essential role in the economy of the Indian subcontinent. The handloom fabric of Bengal, known as muslin, is a symbol of aristocracy and is renowned for its fine quality (Jamie, 2014).

However, the Bengal textile industry began to decline during colonial rule. British goods soon took over the market after the Industrial Revolution caused a sudden increase in textile productivity in Britain, leading to lower prices for imported goods in Bengal (Banglapedia, 2014). After the partition of Bengal in 1947, the country's industries remained dominated by West Pakistan, which produced more cotton. As a result, the textile industries were mostly shifted to West Pakistan, stagnating East Pakistan's textile industry. However, during the Pakistan period, the government allowed the import of yarn on an open general license and declined the sales tax on handloom products, which flourished the industry tremendously in the early 1950s (Bangladesh Cotton and Textile Convention, 2006).

After the independence of Bangladesh in 1975, the government created a new "Handloom Board" in 1978, which 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). Today, 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 embroiderers contribute to producing 687 million meters of fabric from 0.30 million active looms (Bangladesh Handloom Board, 2010).

In conclusion, handloom weaving has been an integral part of the textile industry in Bangladesh for centuries, with muslin being a symbol of aristocracy and renowned for its fine quality. The industry faced decline during the colonial rule and partition of Bengal but saw growth during the Pakistan period with the government's support. After the independence of Bangladesh, the government created a new "Handloom Board" in 1978 to develop the handloom industry, which has resulted in a significant increase in the number of handloom units and workers in Bangladesh.

Figure 01: Raw Jute Materials; ***Source:*** *Jain.Y. R (N.D).*

Figure 02: Jute Processing Mills; ***Source:*** *Jain.Y. R (N.D).*

2.2. Types of Handlooms

According to operational practice, there are two types of looms: handloom and power loom. While handlooms are manually operated, power looms are operated by power. The Bangladesh Handloom Board (BHB) ordinance of 1977 defines a handloom as "a weaving device operated manually for production of fabrics other than hundred percent silk or art silk" (Ali, 2014). Bangladesh has several types of handlooms, such as pit loom, power loom, Chittarranjan loom, Benarasi and Jamdani loom, and Kamer/Waist loom. The Benarasi looms are concentrated in Mirpur area of Dhaka, while the Jamdani looms are operated in Rupganj (Tarabo) area of Narayanganj District, and the Kamer/Waist loom is found in the Hill Tracts of Chittagong.

The majority of handlooms in Bangladesh weave cotton and blended fabrics, although handloom cloth of silk has a good reputation. Rajshahi, Tangail, and Nobabganj are famous areas for silk weaving, with Rajshahi producing mainly silk sarees, Tangail producing Tangail Muslin silk saree, and Narayanganj producing famous Jamdani saree and silk sarees. Brocade work called zari is famous in Mirpur, Dhaka. In Bangladesh, different schools of weaving use jacquard, dobby, frame, and pit looms to make a variety of products such as sarees, lungi, gamcha, grameen check fabrics, printed bed covers, pillow covers, table mats, kitchen and hand towels, apron, curtain and

upholstery, furnishing fabrics, bags, and bandages. The different parts of the handloom include reed, heald shaft, treadle, cloth beam, shuttle, warp beam, and reversing roller shaft (Ali, 2014).

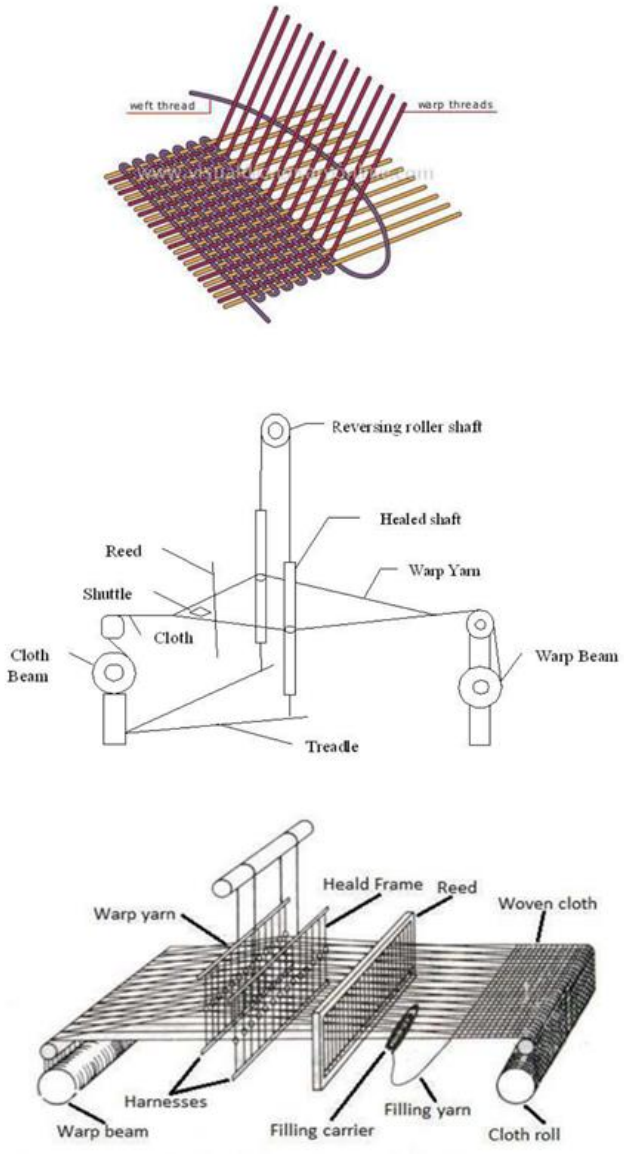


Figure 03: Basics of a Handloom; ***Source:*** *Ali.M. (2014).*

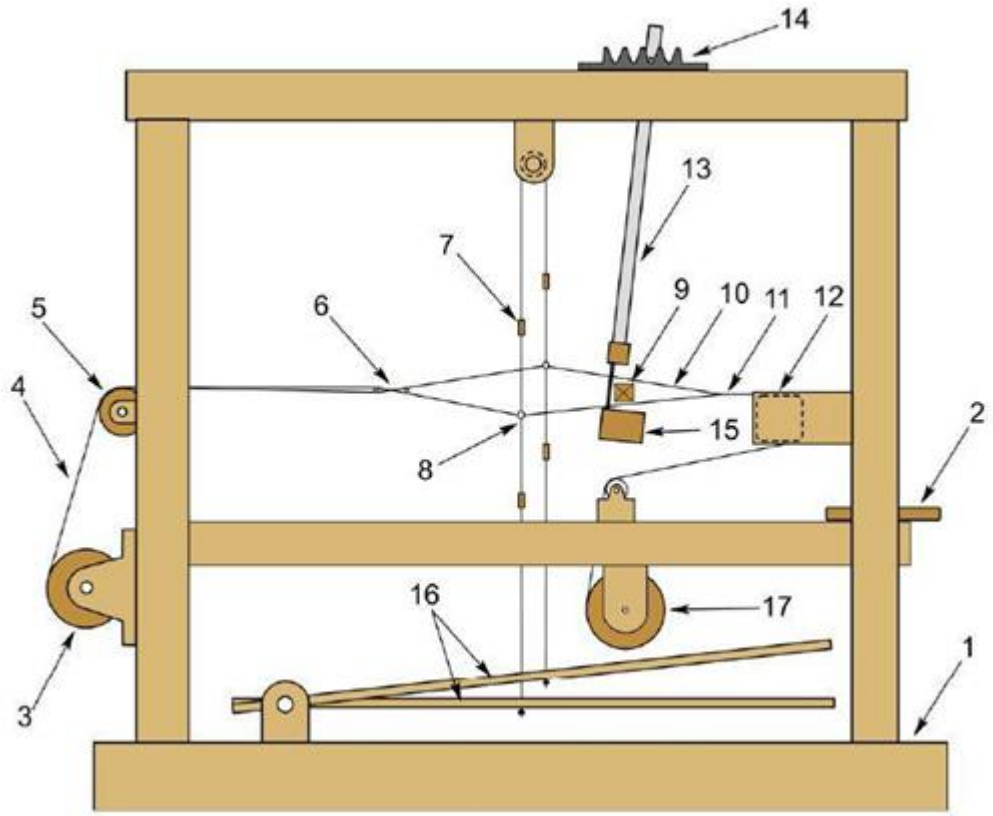


Figure 04: Basics of a Foot treadle floor loom; ***Source:*** *Ali.M. (2014).*

The components of a foot-treadle floor loom include the following:

- A wooden frame
- A seat for the weaver
- A warp beam for let off
- Warp threads
- A back beam or platen
- Rods that create a shed
- A heddle frame or harness
- Heddles or healds with eyes

- A shuttle with weft yarn
- A shed where the shuttle passes through
- Completed fabric
- A breast beam
- A batten that includes a reed comb
- Batten adjustment
- Lathe
- Treadles that control the heddles
- A cloth roll for take up

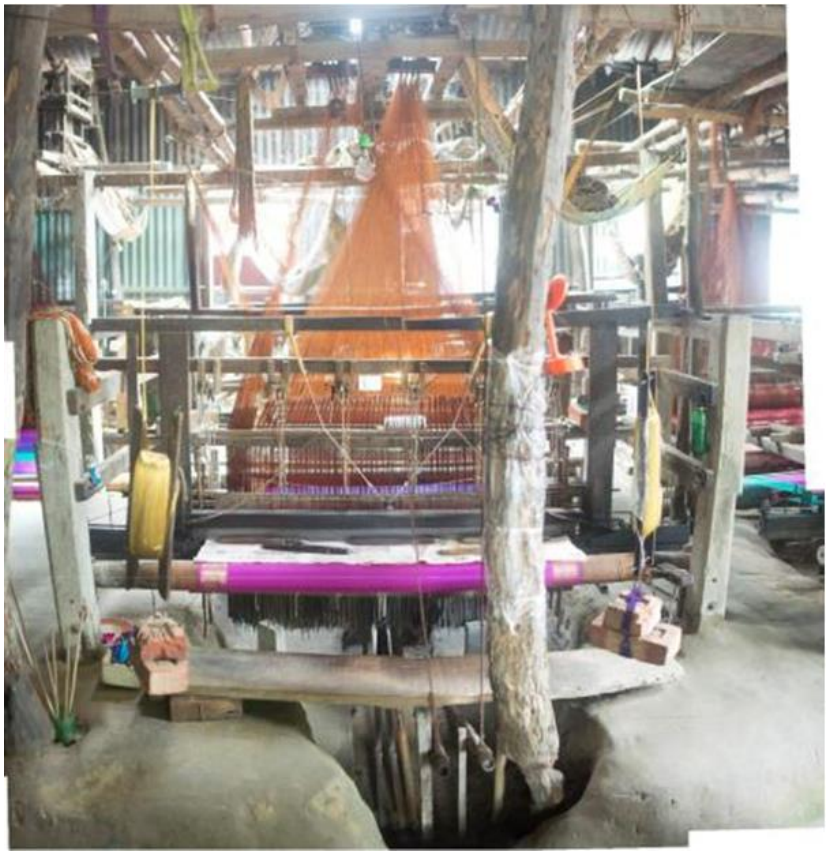


Figure 05: Traditional Pit-loom machine with Jacquard Weaving; ***Source:*** *Ali.M. (2014).*

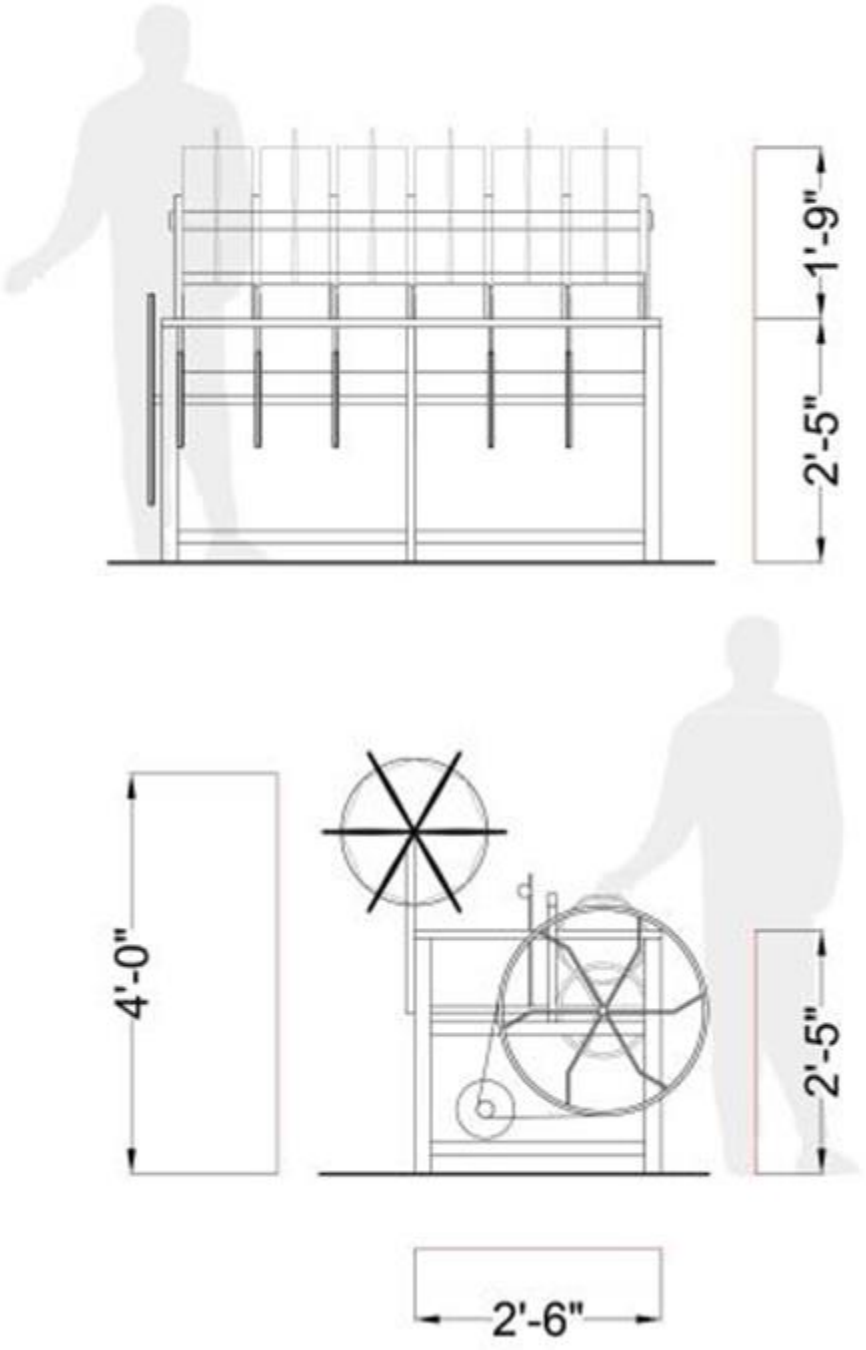


Figure 06: Charka / Spinning Machine; ***Source:*** *Ali.M. (2014).*

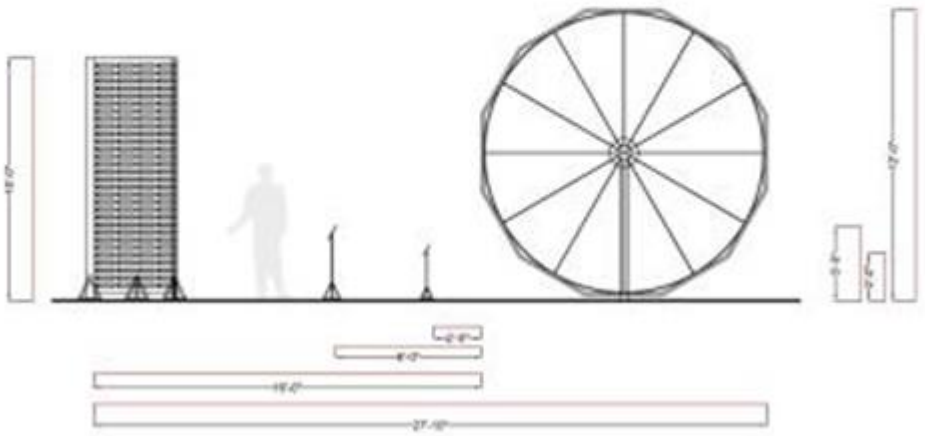


Figure 07: Thread Warping Machine; ***Source:*** *Ali.M. (2014).*

Figure 08: Thread Warping Machine present in Pathrail, Tangail; ***Source:*** *Ali.M. (2014).*

2.3. Basics of Textile Engineering and Institute

Textile engineering is a multidisciplinary field of study that involves the application of engineering principles and scientific knowledge to the design, development, and production of textiles and textile-based products. The field encompasses various aspects of textile manufacturing, including fiber production, yarn spinning, fabric weaving, dyeing, printing, and finishing. Textile engineers are responsible for developing and improving manufacturing processes, ensuring product quality, and designing innovative textile products.

The Textile Institute is a professional association that aims to promote excellence in textiles, clothing, and footwear. Founded in 1910, the institute has members from over 80 countries and provides educational programs and professional development opportunities for individuals involved in the textile industry. The Textile Institute plays a vital role in advancing the field of textile engineering through its research initiatives, knowledge dissemination, and networking opportunities.

According to Parthasarathi et al. (2014), textile engineering is a rapidly growing field that requires interdisciplinary knowledge and skills. The authors emphasize the importance of textile engineering education in producing skilled professionals capable of addressing the challenges faced by the textile industry. The Textile Institute's educational programs and research initiatives are crucial in preparing the next generation of textile engineers and advancing the field.

2.4. Laboratories and Units of Textile Industry

The textile industry is a complex and diverse industry that encompasses various processes and operations. In order to ensure the quality of textile products, various types of laboratories and units are required in the textile industry. These laboratories and units include physical testing laboratories, chemical testing laboratories, textile process laboratories, textile research centers, dyeing and printing laboratories, and quality control units (Gupta, 2012).

Physical testing laboratories conduct tests to determine the physical properties of textile materials such as tensile strength, shrinkage, and abrasion resistance. Chemical testing laboratories, on the other hand, test the chemical properties of textile materials such as fiber composition and dye fastness. Textile process laboratories conduct experiments and tests related to the various textile manufacturing processes such as spinning, weaving, and knitting.

Textile research centers are involved in research and development activities related to textile materials and processes. Dyeing and printing laboratories are responsible for developing and testing new dyeing and printing techniques. Quality control units ensure that the final textile products meet the required standards and specifications.

Various types of laboratories and units are necessary for the successful operation of the textile industry. These laboratories and units play a crucial role in ensuring the quality of textile products and in driving innovation in the industry.

Figure 09: Spinning Mills; ***Source:*** *Jain.Y. R (N.D).*

Figure 10: Composite Mills (weaving and Knitting); ***Source:*** *Jain.Y. R (N.D).*

Figure 11: Power looms; ***Source:*** *Ali.M. (2014).*

Figure 12: Fabric Dyeing Machines; ***Source:*** *Jain.Y. R (N.D).*

2.5. Textiles of Kushtia

Kushtia is a district in Bangladesh that has a rich heritage in the textile industry. It is famous for producing traditional textiles such as jamdani and katan. Jamdani is a handloom woven fabric made of cotton, silk or both, and is characterized by intricate motifs and designs. Katan is another handloom woven fabric made of silk, and is known for its smooth texture and high durability. The textile industry in Kushtia plays an important role in the economy of the district and provides employment opportunities to many people. (Haider, 2015)

The traditional textiles of Kushtia have gained global recognition for their intricate designs, high quality, and uniqueness. However, the industry has faced challenges due to competition from mass-produced textiles and the lack of modernization in production techniques. Efforts are being made to preserve and promote the traditional textiles of Kushtia through government initiatives, educational programs, and market development strategies. (Hossain, 2019)

Kushtia is also known for Lungi and Gamcha. Lungi is a popular garment worn by men, especially in rural areas. It is a type of sarong, made of cotton or silk, and is wrapped around the waist and worn as a lower garment. Gamcha is a type of towel, made of cotton, that is commonly used in Bangladesh for various purposes such as wiping sweat, cleaning, and as a head covering. Both Lungi and Gamcha are not only functional but also have cultural significance in the region. The traditional techniques and materials used in making these textiles are still practiced by local artisans in Kushtia. (Islam, 2021)

To conclude, the textiles of Kushtia have a significant cultural and economic value. The preservation and promotion of these traditional textiles can help to sustain the local economy and preserve the heritage of the region.

Figure 13: Traditional fabrics of Kushtia: Lungi, Katan, Gamcha, Jamdani; ***Source:*** *Google.*

Chapter 3: Site Appraisal

3.1. Site Location

Figure 14: Site Location; ***Source:*** *Author based on Google Earth.*

The proposed site location is situated in Alampur thana in Kushtia District under the Khulna division and is approximately 7 km away from Kushtia Pouroshova. The land area proposed for the project is divided into two parts, Alampur and Kanchanpur.

3.2. Chronological Analysis of the site

Figure 15: Chronological Analysis (800m radius approx.);
Source: *Author based on Google Earth.*

3.3. Context Analysis

3.3.1. Urban Context

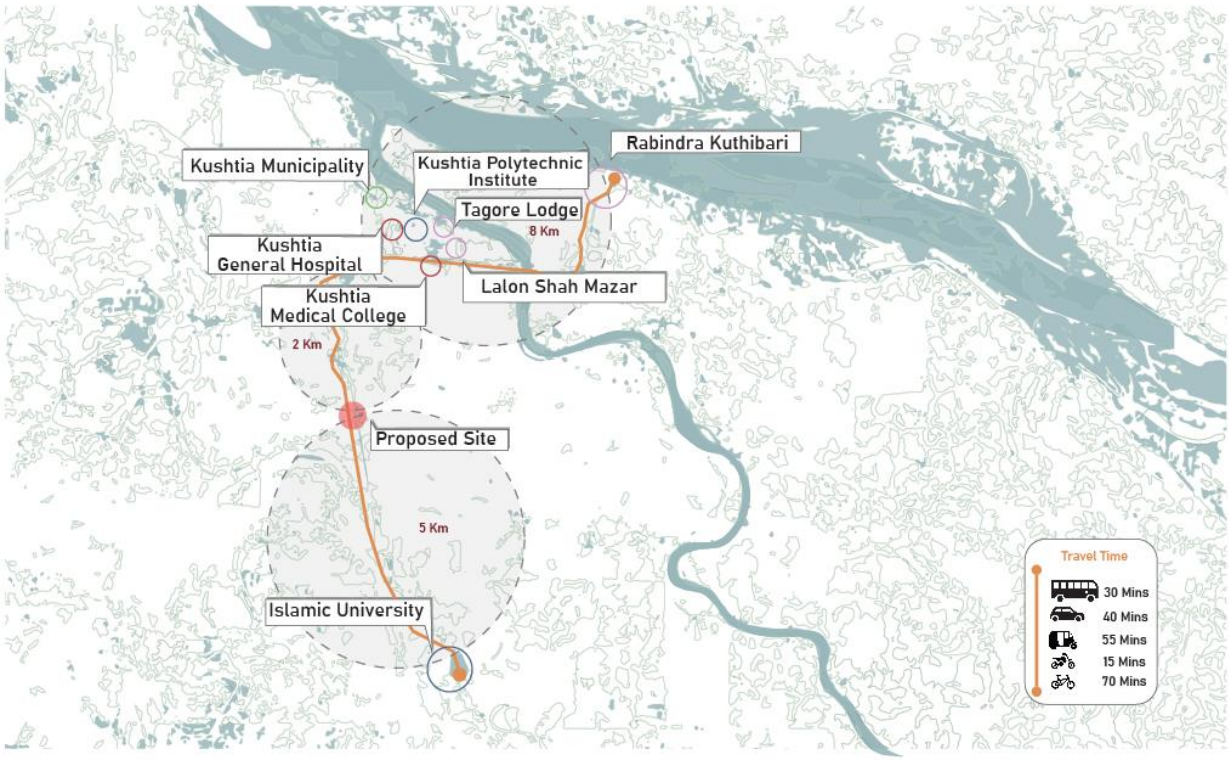


Figure 16: Urban Context Analysis Map; ***Source:*** *Author based on Google Earth.*

The site is situated at a distance of about 7 km from Kushtia Municipality and encompasses two thanas, named Alampur and Kanchanpur. Towards the northern direction of the site, there are Kushtia Sadar and Kushtia Medical College, while at the south there is Islamic University. Additionally, the area houses several historical tourist destinations such as Lalon Shah Mazar, Shilaidaha Rabindra Kuthibari, and Tagore Lodge.

3.3.2. Socio-Economic Condition

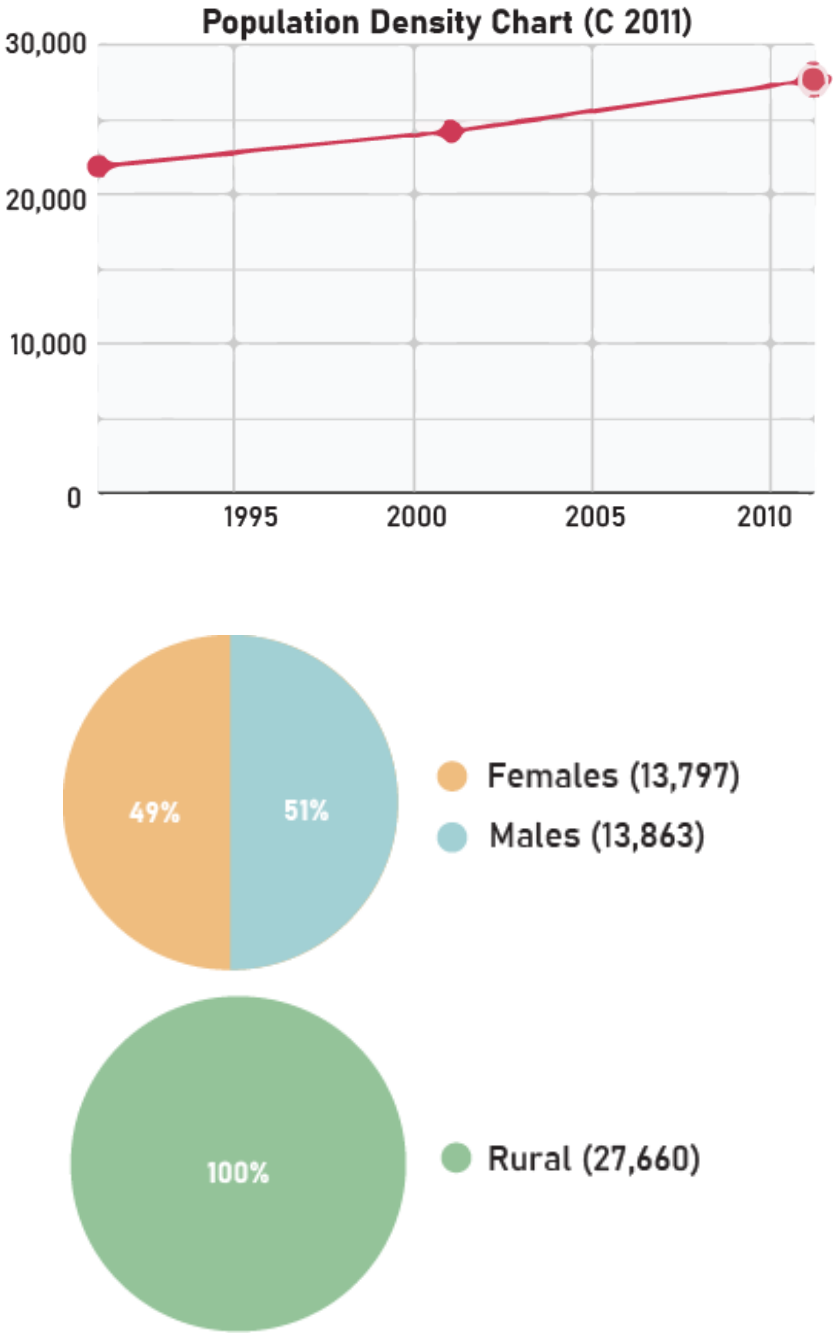


Figure 17: Socio- Economic Condition; ***Source:*** *Author based on Population Census 2011.*

Alampur's agricultural economy largely determines the socio-economic condition of the area, with the majority of the population engaged in agricultural activities such as paddy cultivation, vegetable farming and fishing. While some individuals have started to shift towards non-agricultural professions, Yet the literacy rate of this area is relatively low. As Alampur in Kushtia is an agricultural area, job opportunities related to textiles are limited. However, some people are involved in weaving traditional textiles such as lungi and gamcha. There are also a few small-scale textile factories in the nearby areas that provide employment opportunities for the local population. To improve the job situation related to textiles, the government has taken steps to establish a textile training institute in the area.

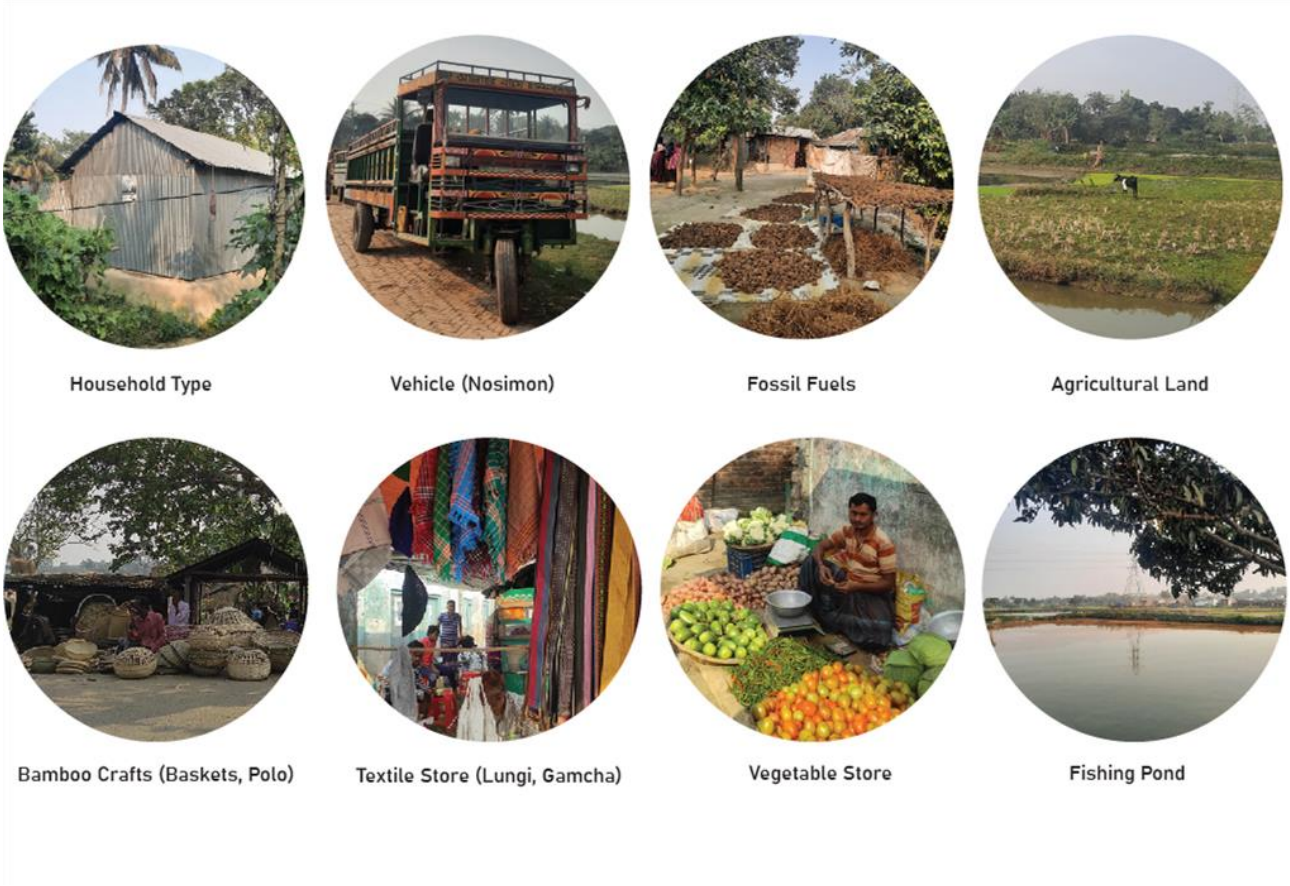


Figure 18: Socio-Economic Condition; ***Source:*** *Author.*

3.3.3. Figure-Ground

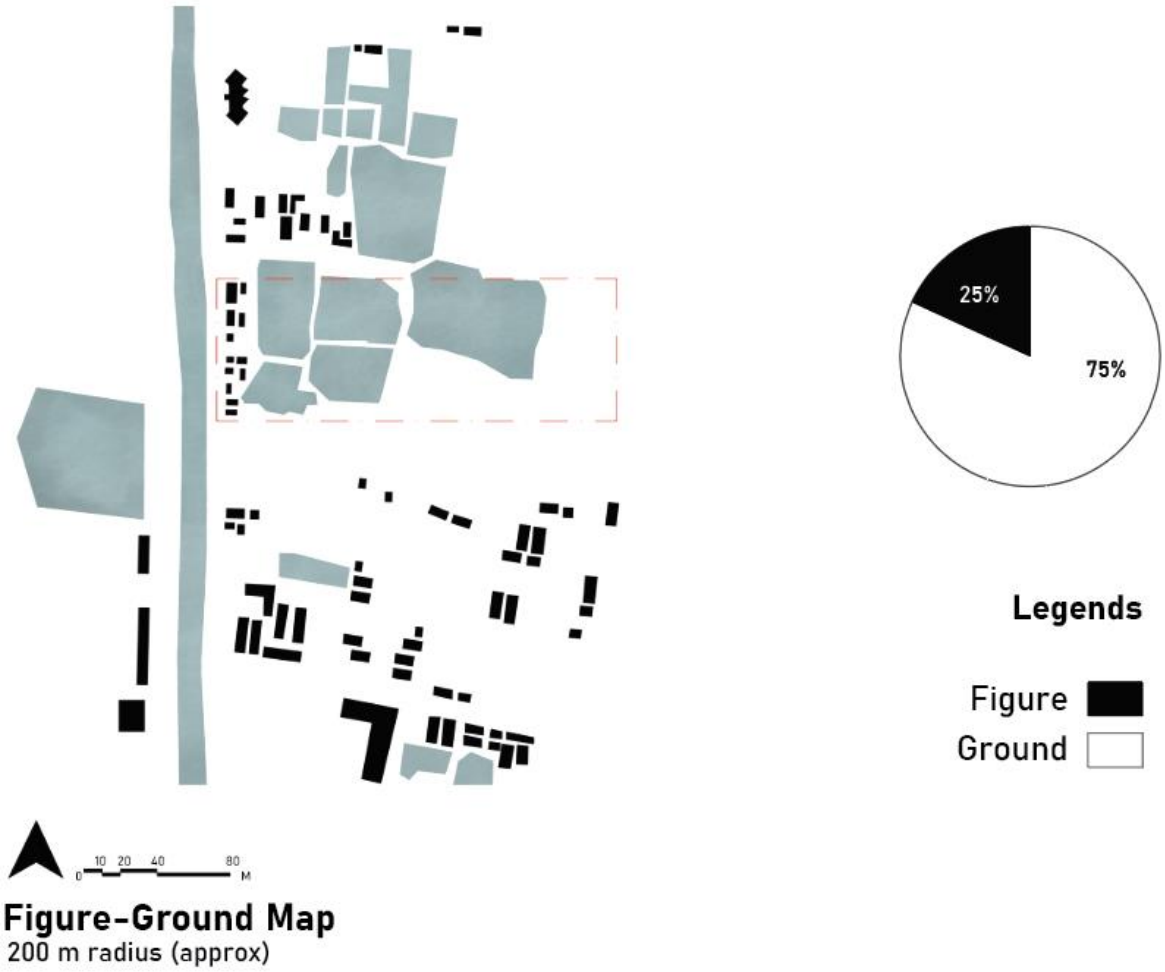


Figure 19: Figure-Ground Map; ***Source:*** *Author.*

The Figure-Ground map has been done to identify the ratio of figures and ground around the site. Around 200m radius from the site has been mapped and analyzed. There is almost 75% vacant and unbuilt land around the site.

3.3.4. Accessibility

Figure 20: Accessibility Map; ***Source:*** *Author.*

The Kushtia-Jhenaidah Highway which is 8m wide, is a significant road that connects Kushtia and Jhenaidah district. This road is also used for Kushtia Islamic University, Kushtia Medical College, and various industries in the area. Two secondary vehicular roads are situated on the north and south side of the site, both around 6m wide. The site is intersected by a neighborhood road which is approximately 3.6 m wide.

3.3.5. Ecological

Figure 21: Ecological Map; ***Source:*** *Author*.

The area consists mainly of agricultural lands and low-depth (2-3m) ponds, which are primarily used for irrigation and fishing. The GK (Ganga- Kapotakkho) canal runs alongside the main highway and serves as a water reservoir for the surrounding agricultural lands during the rainy season. Large trees are mostly found near the few residences and the highway.

3.3.6. Building-Use

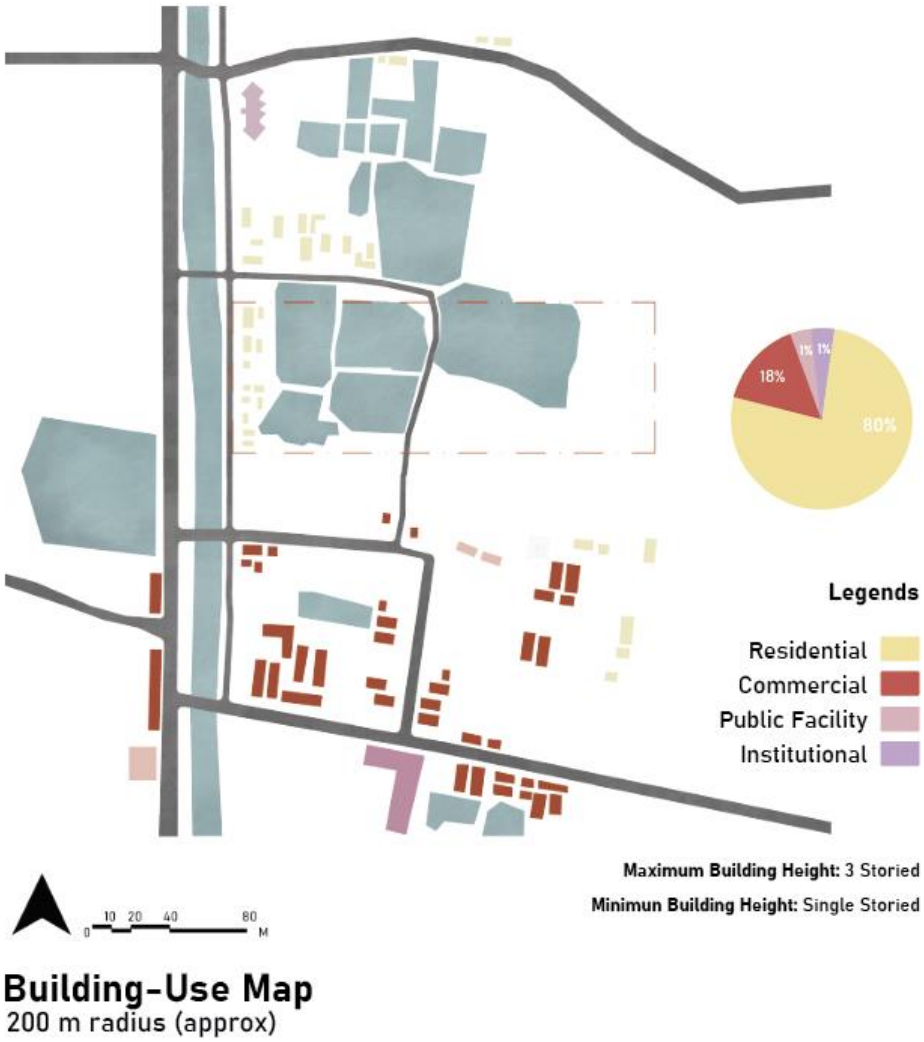


Figure 22: Building-Use Map; ***Source:*** *Author.*

Around 200 m radius from the site, 80% of the buildings are residential blocks, 18% commercial blocks, 1% public facility (Chourhas Highway Outpost) and 1% institutional (Alampur High School and College). Most of the residential blocks are 1 storied rural households. The commercial blocks include bazar and informal shops.

3.4. Climatic Conditions

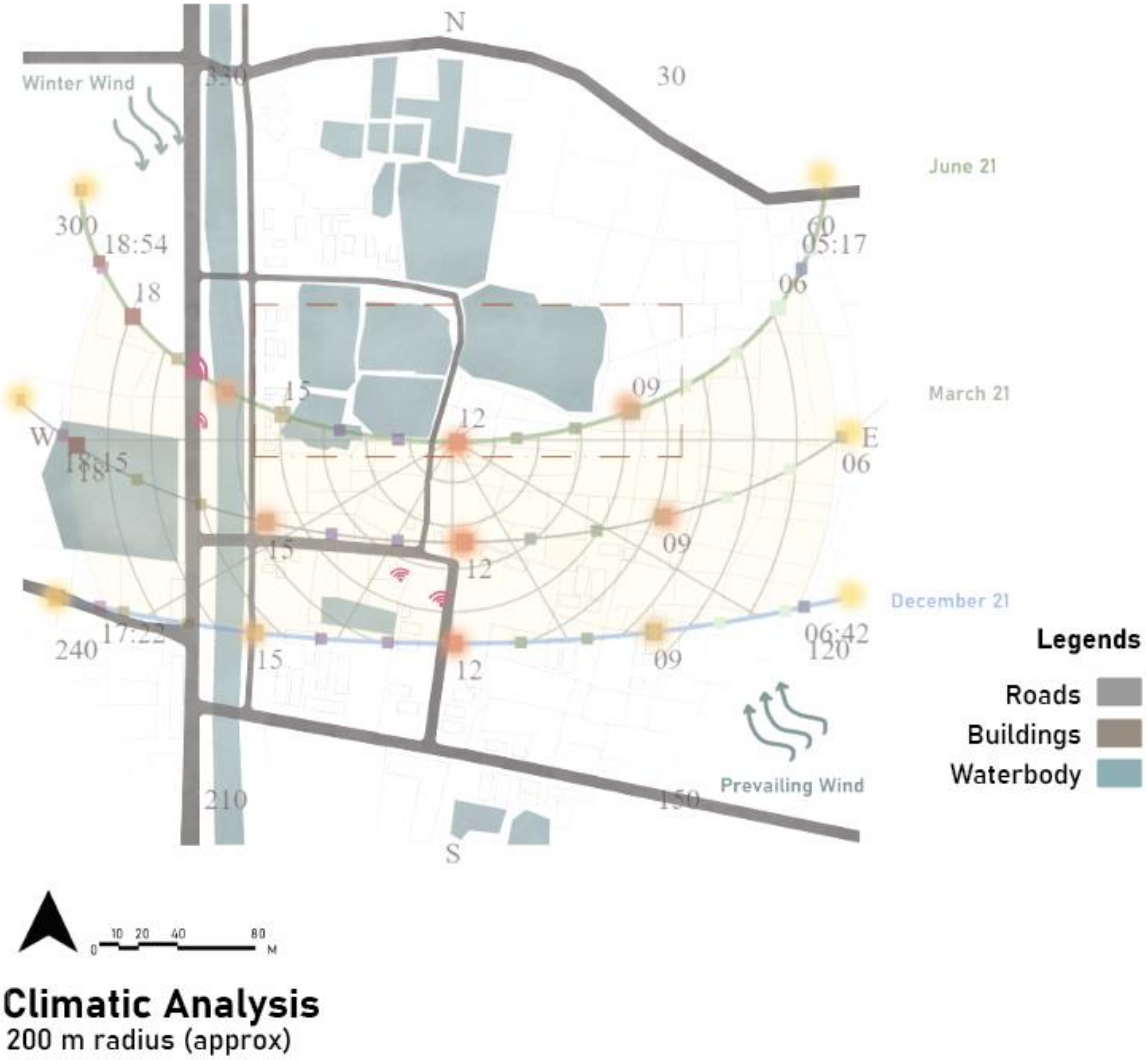


Figure 23: Climatic Analysis Map; ***Source:*** *Author.*

Kushtia is located in a fertile alluvial plain at the head of the Ganges-Brahmaputra River delta, with a latitude of 23.90 and longitude of 89.12. The climate is tropical, with heavy rainfall in June but no waterlogging. The driest month is December. The average annual temperature is 26.0 °C, with January being the coldest month with an average temperature of 18.5 °C.

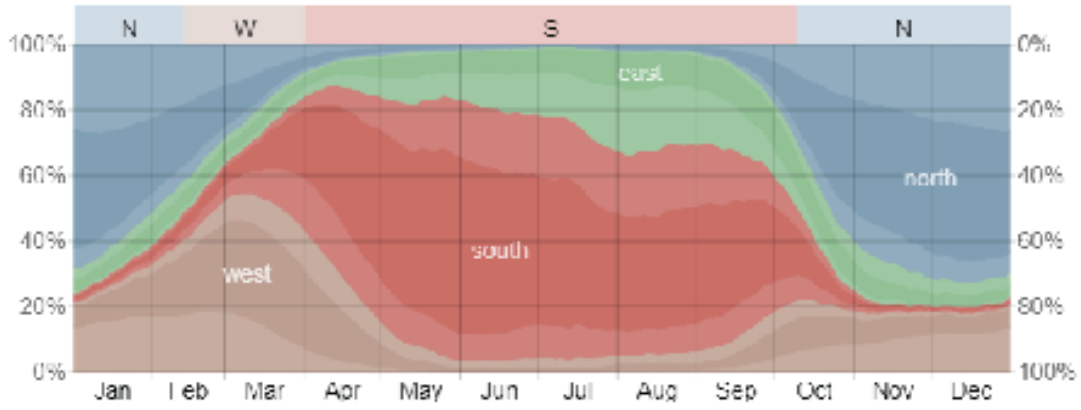


Figure 24: Wind Direction in Kushtia; ***Source:*** *Weather spark.*

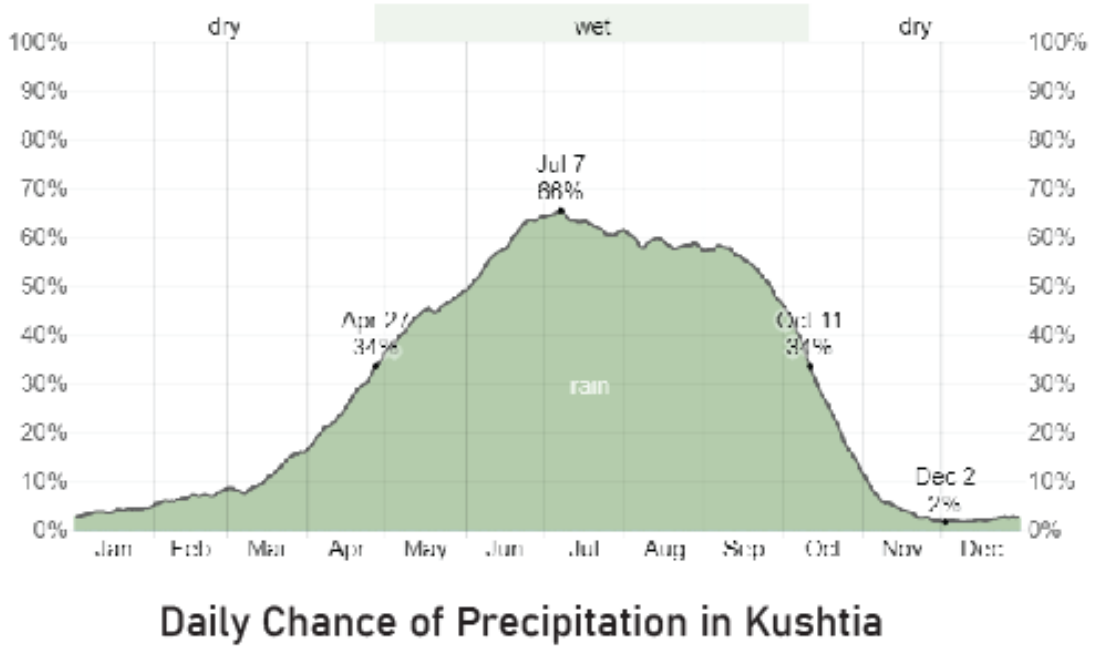


Figure 25: Daily Chance of Precipitation in Kushtia; ***Source:*** *Weather spark.*

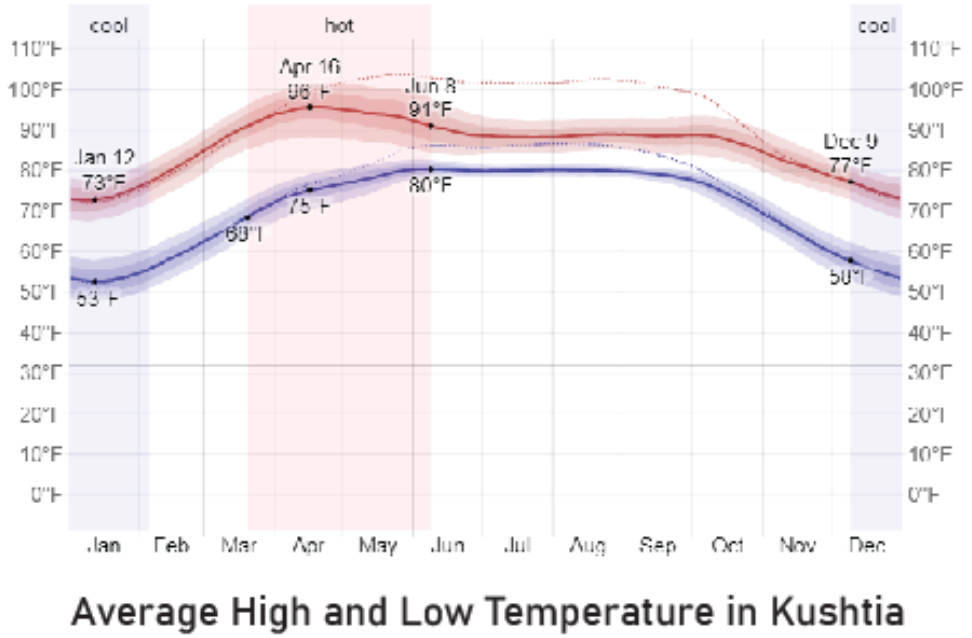


Figure 26: Average High and Low Temperature in Kushtia; ***Source:*** *Weather spark.*

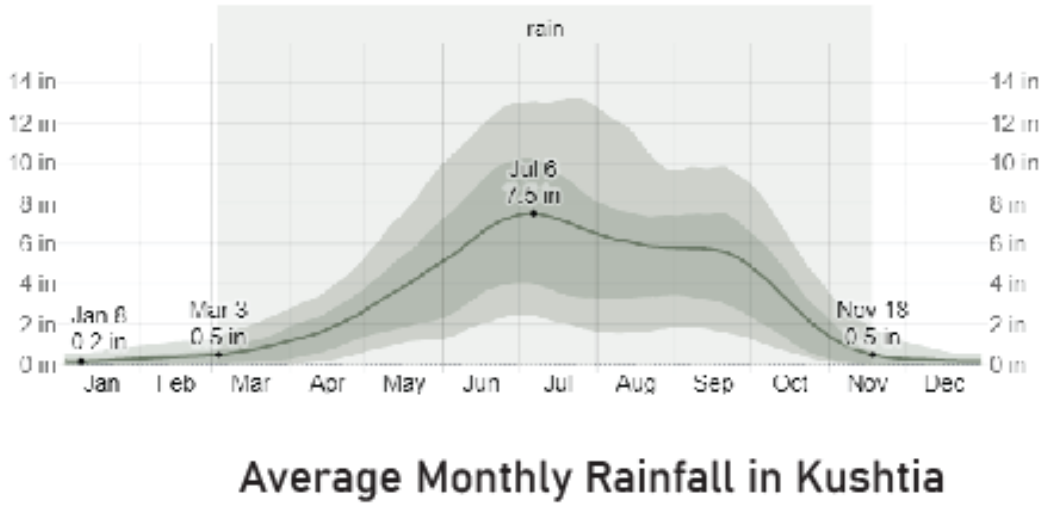


Figure 27: Average Monthly Rainfall in Kushtia; ***Source****: Weather spark.*

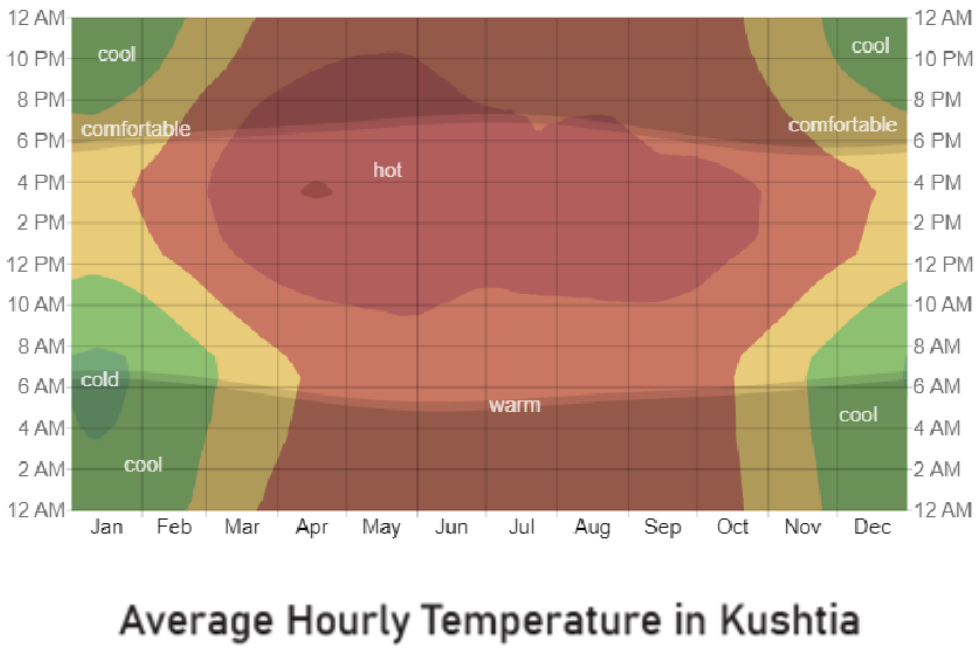


Figure 28: Average Hourly Temperature in Kushtia; ***Source:*** *Weather spark.*

3.5. Existing Site Condition

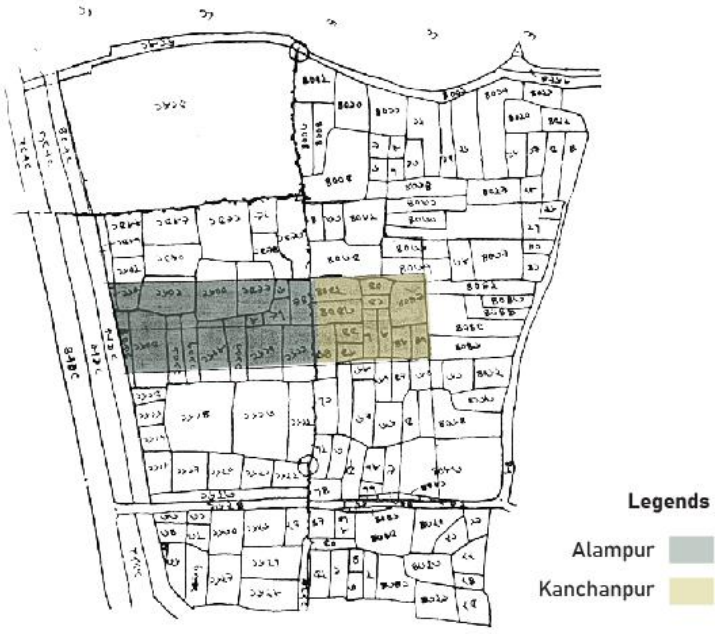


Figure 29: Site Mouza Map; ***Source:*** *Author based on PWD Draft.*

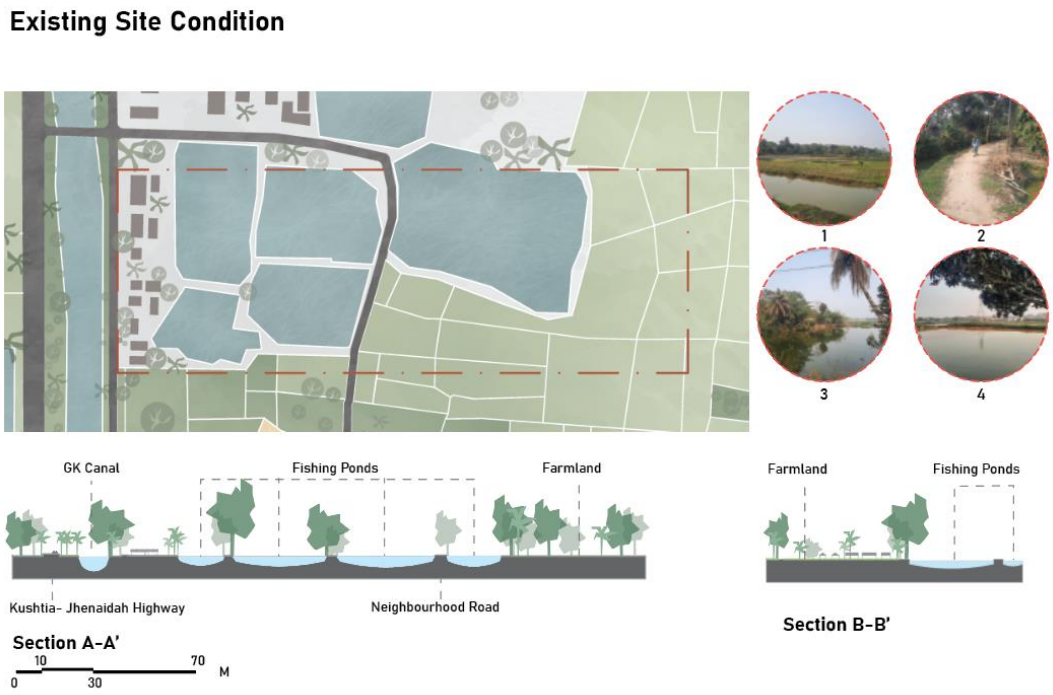


Figure 30: Existing Zoomed in Site; ***Source:*** *Author.*

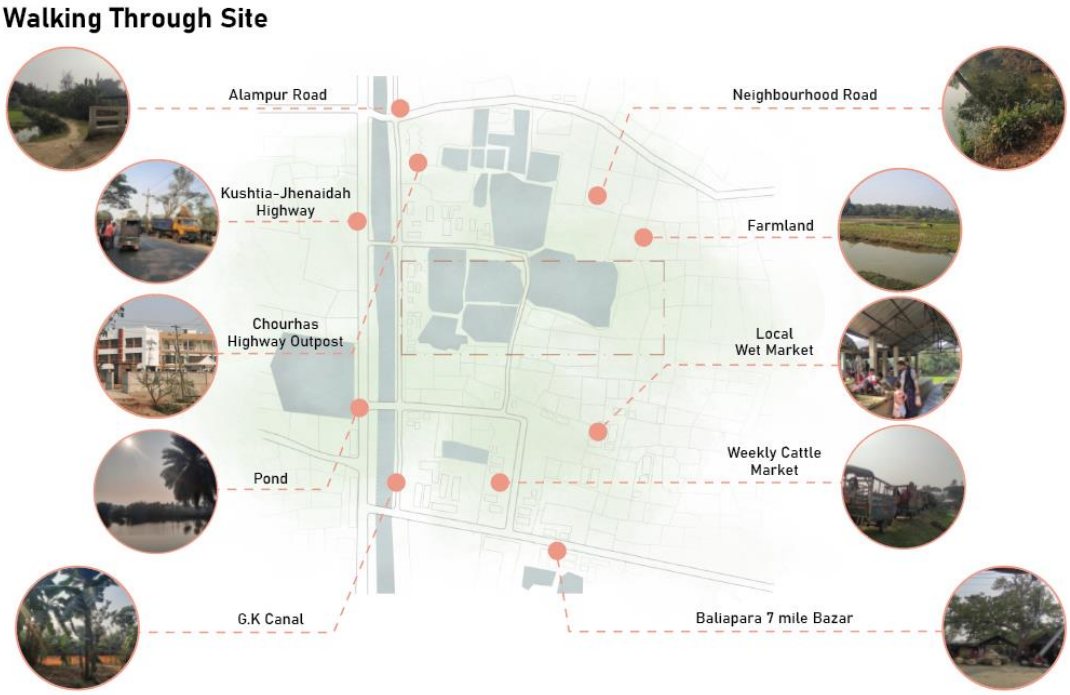


Figure 31: Walking Through the Site; ***Source:*** *Author.*

3.6. Possible Future Land-Use Pattern Analysis

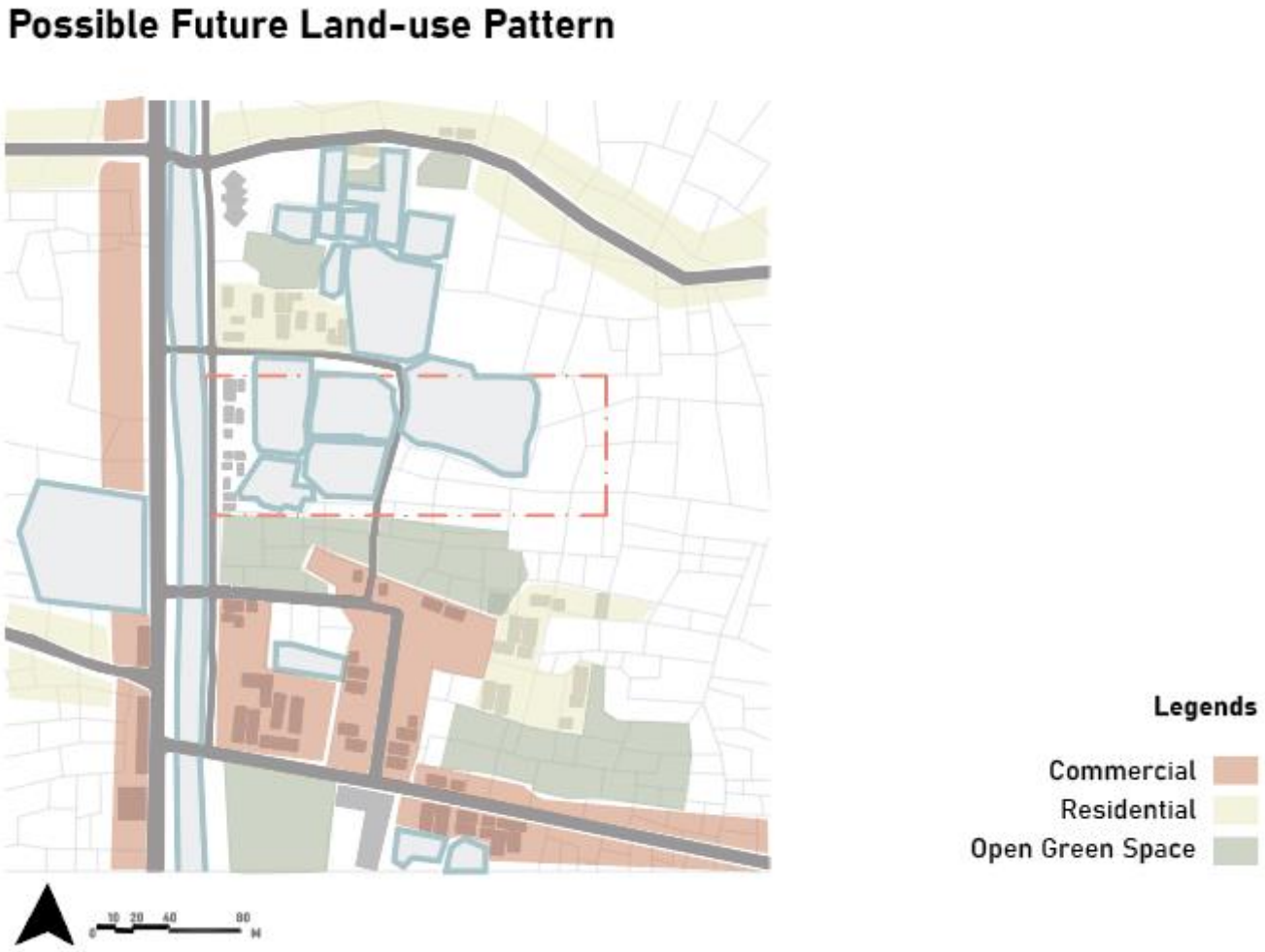


Figure 32: Possible Future Land-use Pattern Analysis; ***Source:*** *Author*.

3.7. S.W.O.T Analysis

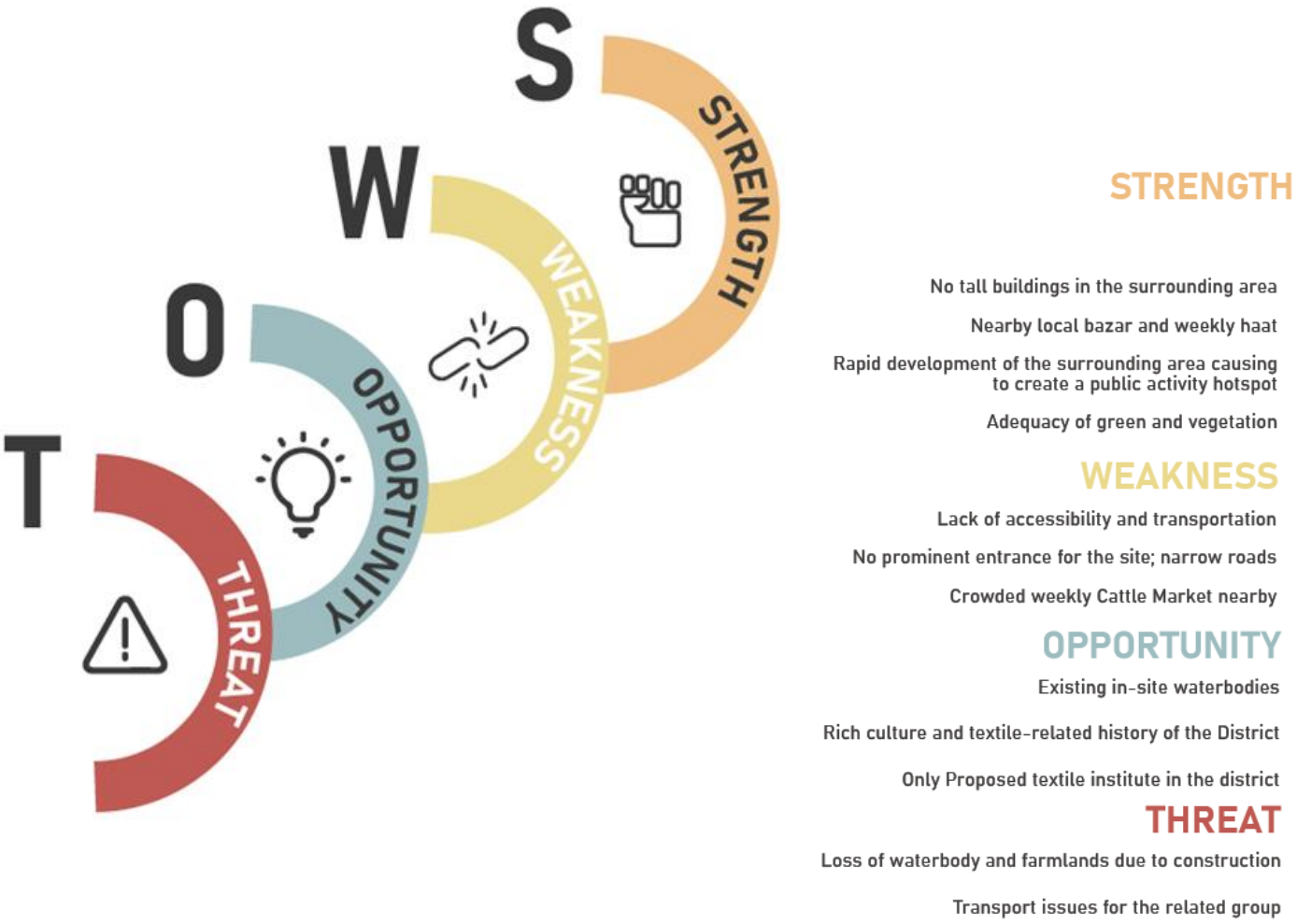


Figure 33: S.W.O.T Analysis; ***Source:*** *Author*.

Chapter 4: Case Studies

4.1. International Case Study

4.1.1. Textile Academy NRW

Project: North Rhine-Westphalia Textile Academy

Built year: 2018

Location: Mönchengladbach, Germany

Site Area: 3.2 acres.

Architect: SOP (Slapa Oberholz Pszczulny)

Materials: Steel, fabric, concrete, Cables: Stainless steel spiral cables;

Surface area of textile facade: 2,100 m²

Floor area: 2,827 m² above ground, 3,190 m² below ground.

Figure 34: Textile Academy NRW; ***Source:*** *Google.*

4.1.2. Location and Climate

It is situated in a mostly cold winter region. The summers in Monchengladbach are pleasant and partially overcast, while the winters there are bitterly cold, windy, and largely cloudy. The average annual temperature ranges between 33°F and 75°F, seldom falling below 20°F or rising over 86°F.

Figure 35: Satellite Image with surroundings; ***Source:*** *Author based on Google Earth.*

4.1.3. Form and Function

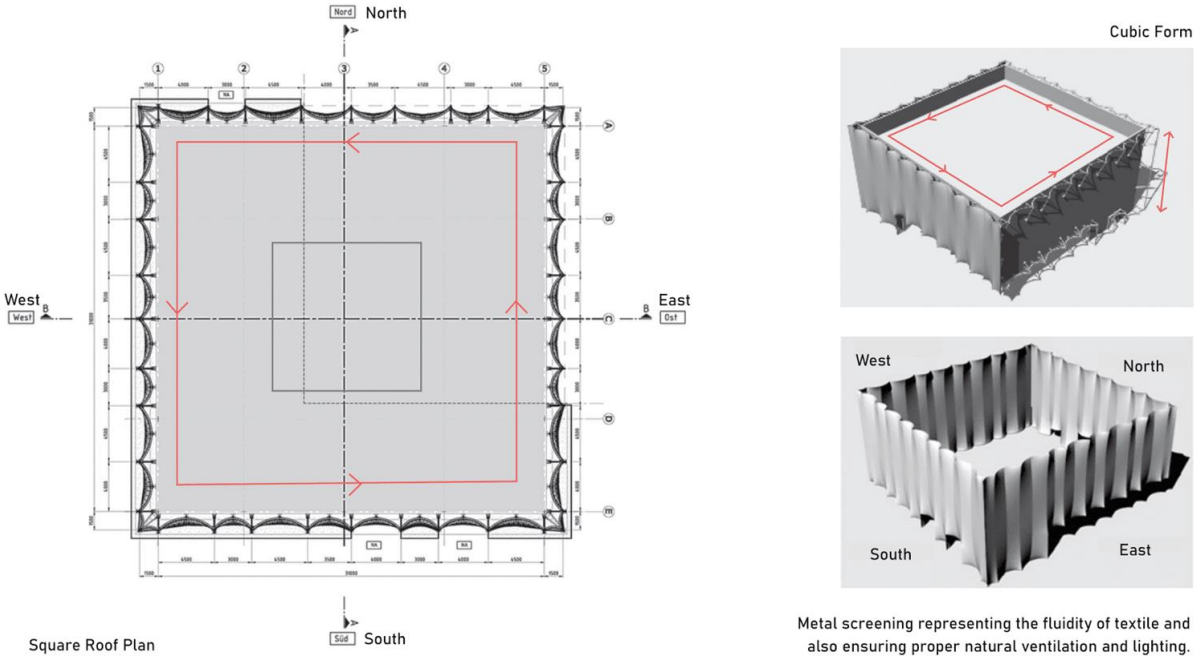


Figure 36: Form Generation; ***Source:*** *Author based on Image found in ArchDaily.*

Figure 37: Function and circulation; ***Source:*** *Author based on Plan found in ArchDaily.*

4.1.4. Horizontal and Vertical Circulation

Figure 38: Horizontal and vertical circulation; ***Source:*** *Author based on ArchDaily.*

Figure 39: Horizontal and vertical circulation; ***Source:****Author based on ArchDaily*.

The Textile Academy NRW has been designed with both horizontal and vertical circulation spaces. Horizontal circulation is achieved through open spaces and corridors that connect the different rooms and areas on the same floor. Vertical circulation is achieved through the use of stairs and elevators that connect the different floors of the building. Both horizontal and vertical circulation ensure that people can move around the building easily and efficiently, creating a productive working environment.

4.1.5. Facade Details

The fabric façade is intended to be a membrane-cable structure under pre-stress. The wires that cross the façade in a straight line serve as load-bearing components. The steel support structure, which is made up of horizontal steel arches that are fastened to the building, is where the cables and membrane are installed.

Figure 40: Facade Details; ***Source:*** *Author based on Images found in ArchDaily.*

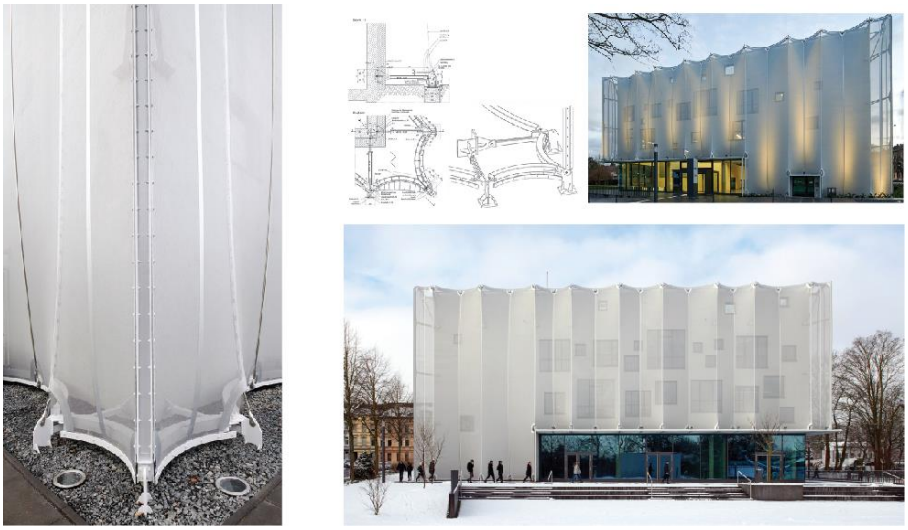


Figure 41: Facade Details; ***Source:*** *Author based on Images found in Google.*

4.1.6. Interiors

The Textile Academy NRW features a modern and functional interior design, with a white color scheme complemented by black and gray accents. Classrooms and lecture halls are equipped with the latest audiovisual technology and flexible furniture, while the laboratories are designed to be efficient and conducive to research with state-of-the-art machinery in the center of the space. The common areas are comfortable and inviting, with large windows and a kitchen area in the cafeteria. The overall design supports the facility's mission to provide an innovative learning and research environment.

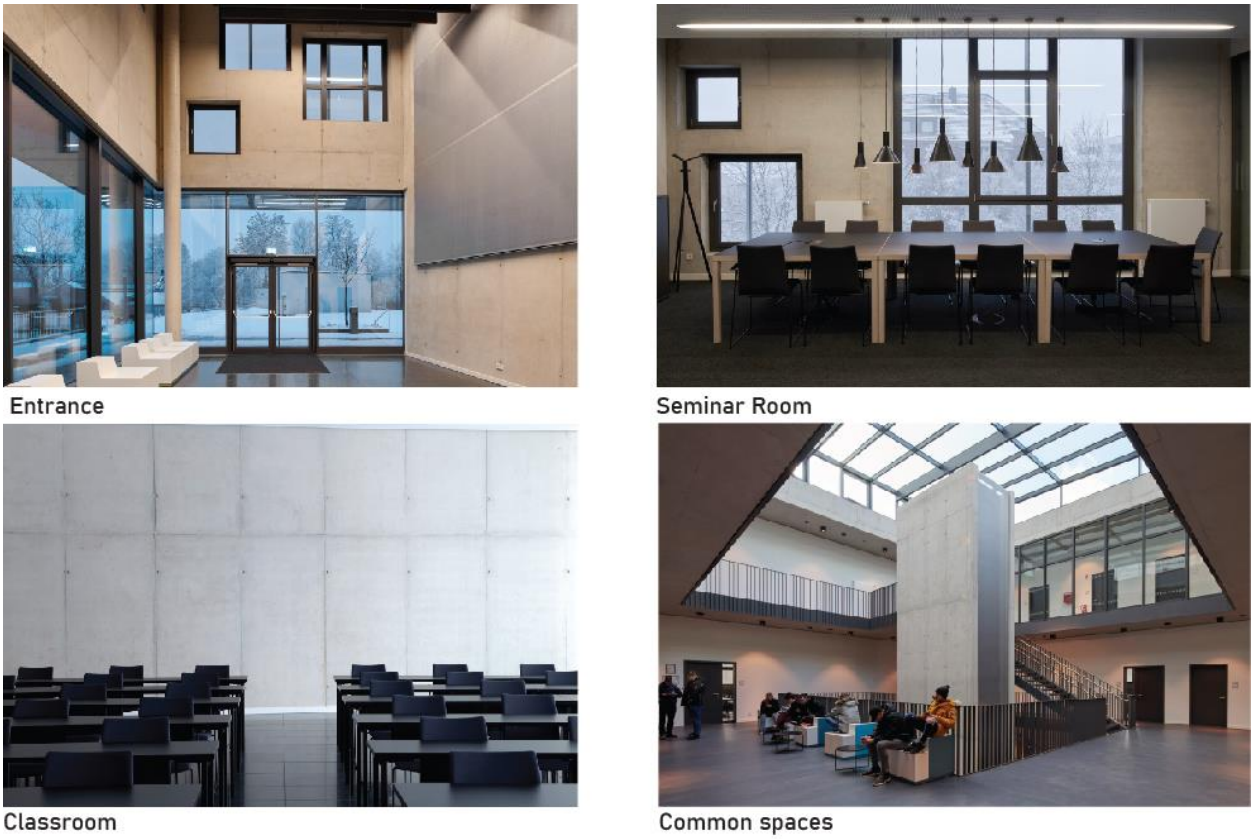


Figure 42: Interior Details; ***Source:*** *ArchDaily*.

4.2. Sub-Continental Case Study

4.2.1. NIFT, New Delhi

Project: National Institute of Fashion & Technology

Built year: 1986

Location: Hauz Khas, New Delhi

Site Area: 3 acres.

Architect: Stein, Doshi & Bhalla

Figure 43: NIFT New Delhi; ***Source:*** *Google.*

4.2.2. Location and Climate

The institute is situated in the Hauz Khas institutional zone. Access is from the North east and south west side of the campus. Site is irregular in shape and is surrounded by classical institutes. The Humidity level is high. So local material has been used. It is surrounded by Hauz Khas apartments, spastic society building.

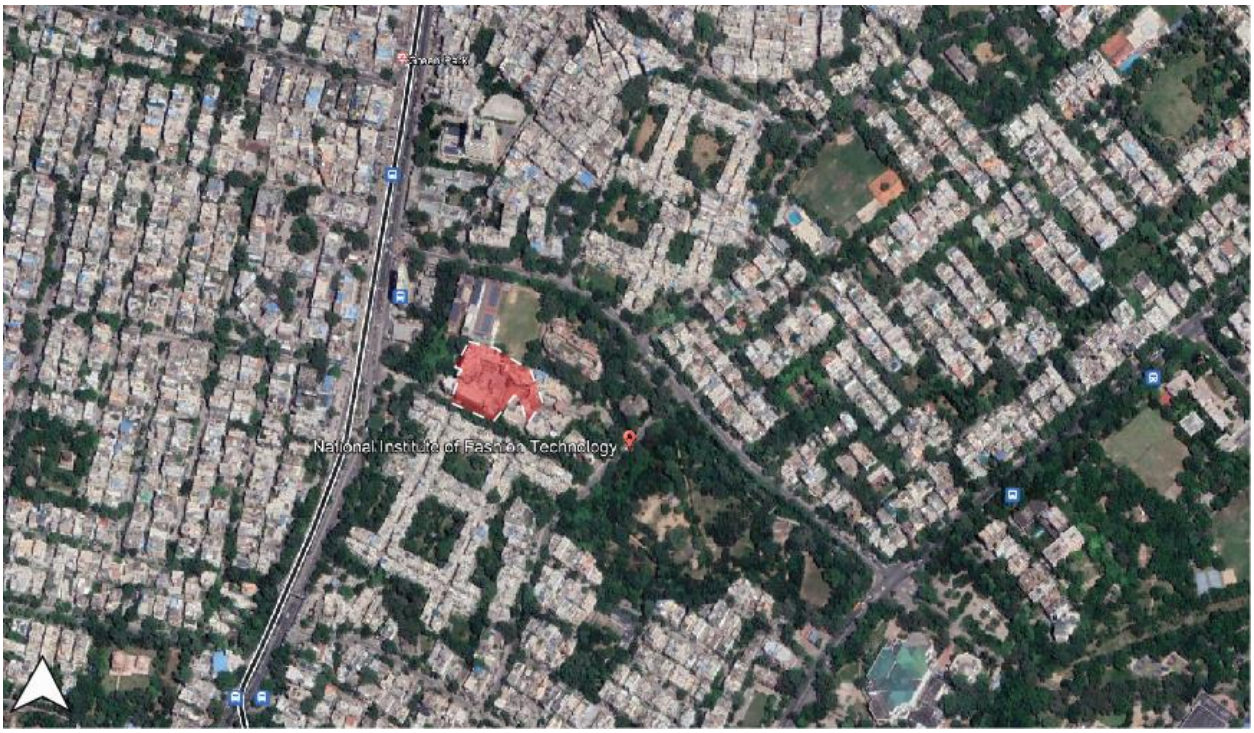


Figure 44: Satellite image of NIFT New Delhi; ***Source:*** *Author based on Google Earth.*

4.2.3. Orientation

The Institute is aligned along its longer sides on a North-West to South-East axis, which allows it to receive a generous amount of sunlight and airflow. However, this orientation also causes excessive glare, which can be uncomfortable and inconvenient for occupants. The peripheral buildings are positioned in alignment with the site's view, creating a cohesive and visually pleasing composition. However, in order to prioritize the building's aesthetic appeal, the design has sacrificed some of the ventilation openings, which may compromise the indoor air quality and comfort for occupants.

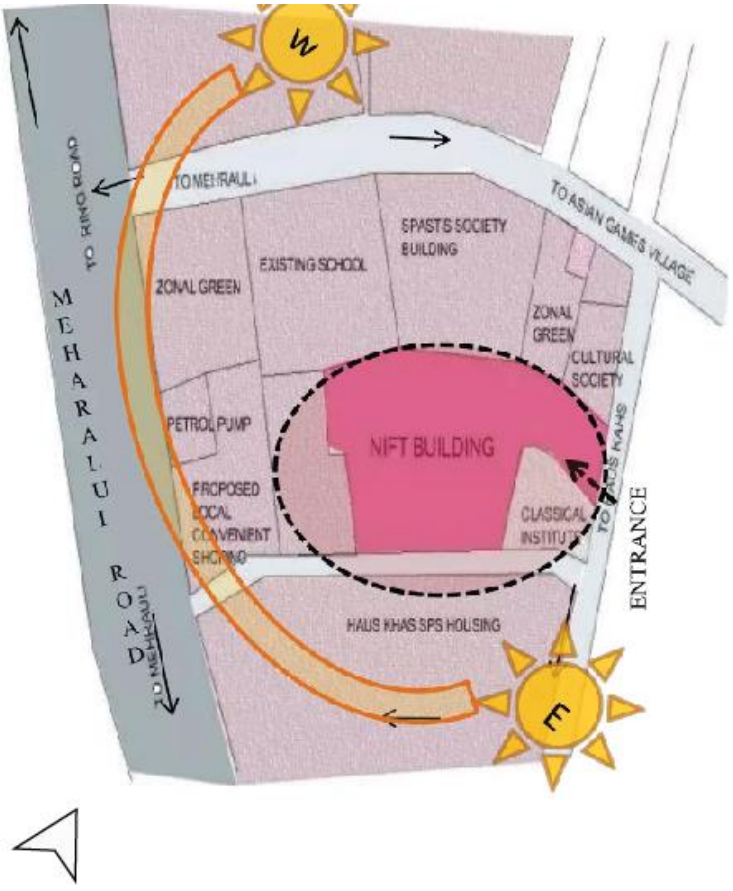


Figure 45: Orientation Diagram of NIFT New Delhi; ***Source:*** *Rashid, 2013, Slideshare.*

4.2.4. Concept

Balkrishna Doshi's design concept for NIFT in New Delhi aimed to create a building that would inspire creativity and innovation among students. The building's form is inspired by the flow of fabric, and it includes a central courtyard that brings natural light and ventilation into the interior spaces. The materials used were selected for both their aesthetic and functional properties, with exposed brick walls creating a warm atmosphere and metal and glass in the façade giving the building a modern look. Overall, the design reflects the institute's commitment to innovation, creativity, and sustainability.

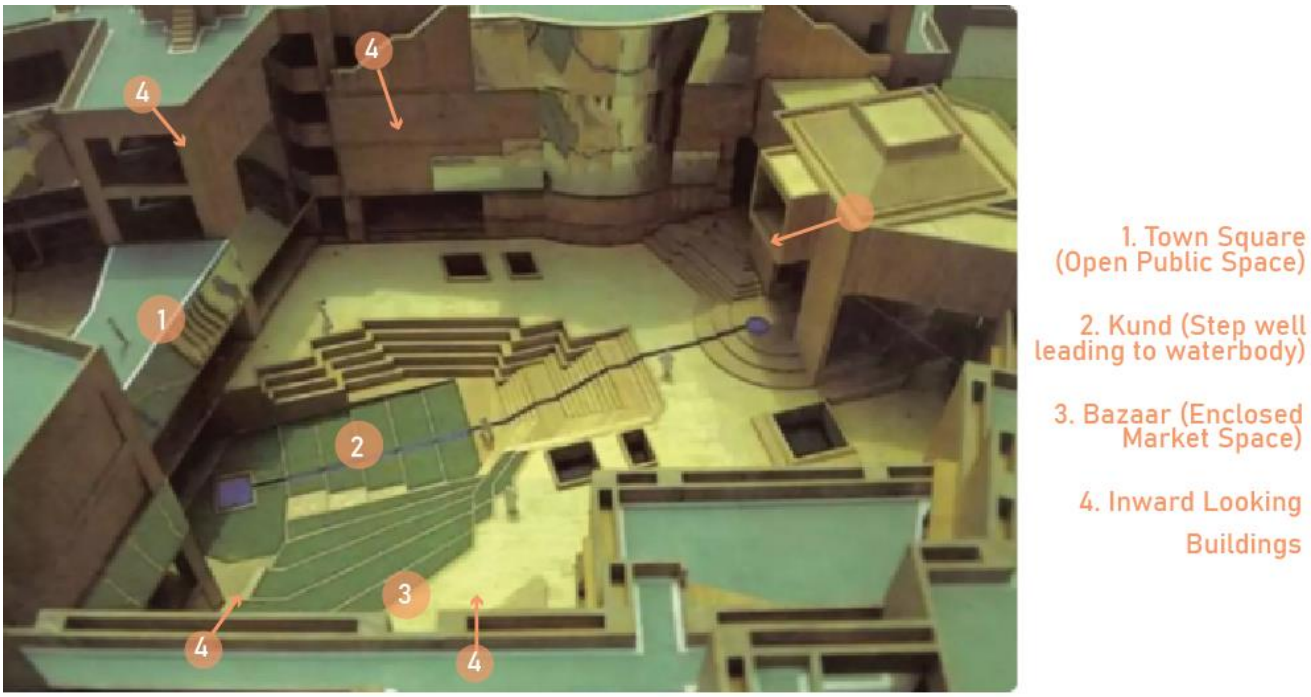


Figure 46: Concept Diagram of NIFT; ***Source:*** *Author based on image found in Google.*

4.2.5. Functional Zoning

NIFT in New Delhi includes a functional zoning strategy that optimizes the building's layout for educational purposes. The ground floor is dedicated to public and semi-public spaces, while the upper floors are for classrooms, studios, and offices. The central courtyard connects these different areas and provides natural light and ventilation. Functional zoning ensures efficient use of space and resources, facilitates movement, and fosters a sense of community and shared purpose among the students and faculty.

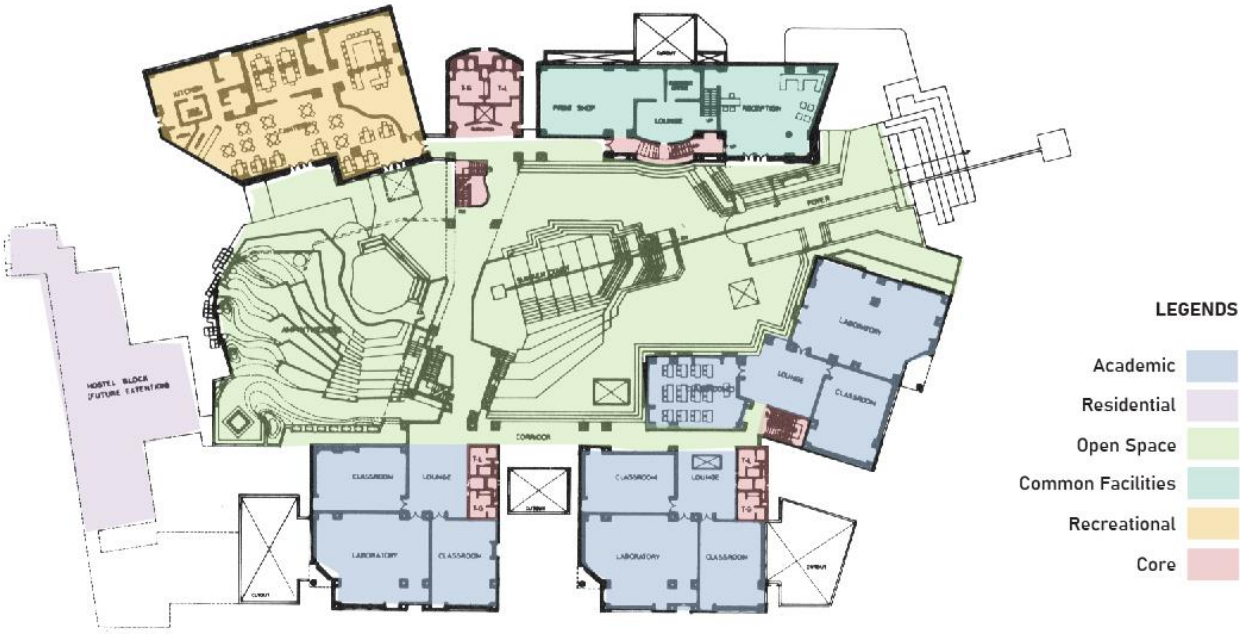


Figure 47: Functional Zoning of NIFT; ***Source:*** *Author based on plan found in Google.*

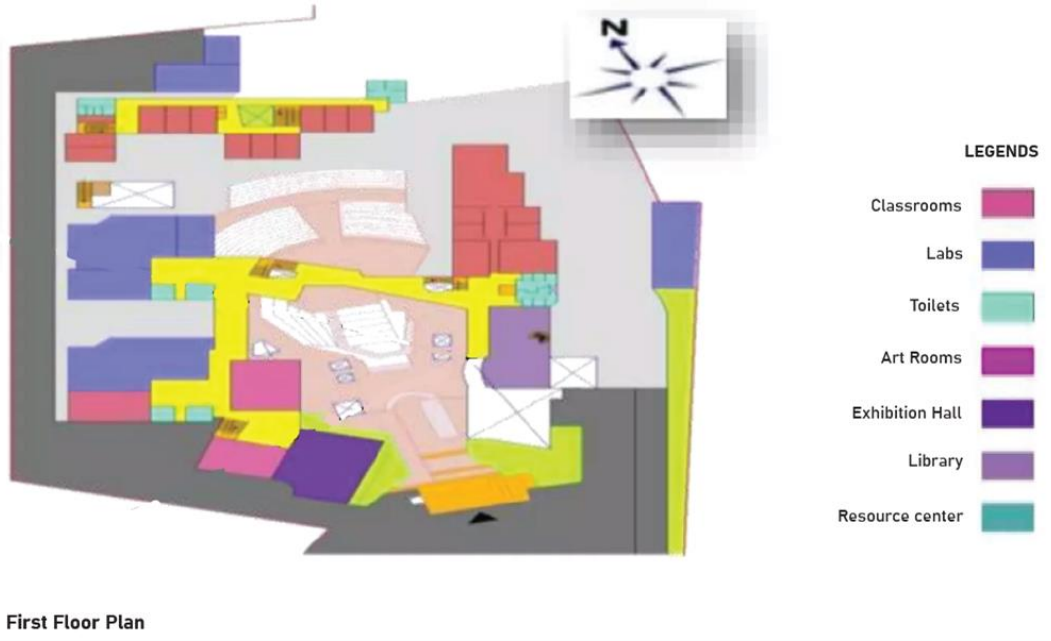


Figure 48: First Floor Plan ; ***Source:*** *Rashid, 2013, Slideshare.*

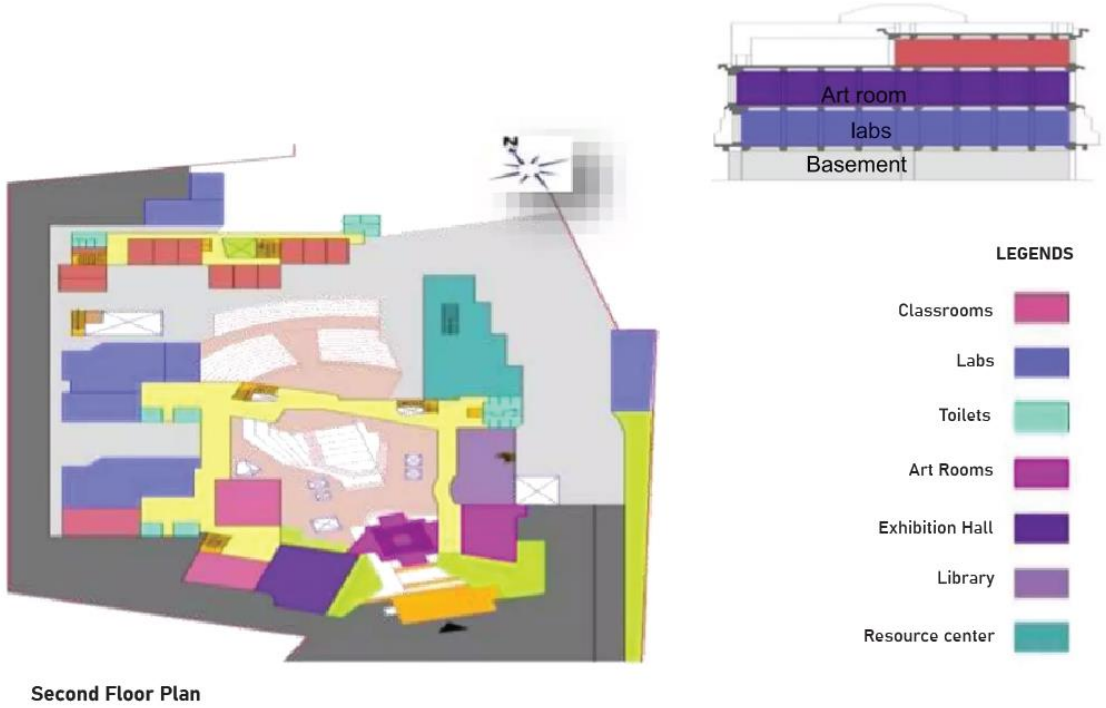


Figure 49: Second Floor Plan; ***Source:*** *Rashid, 2013, Slideshare.*

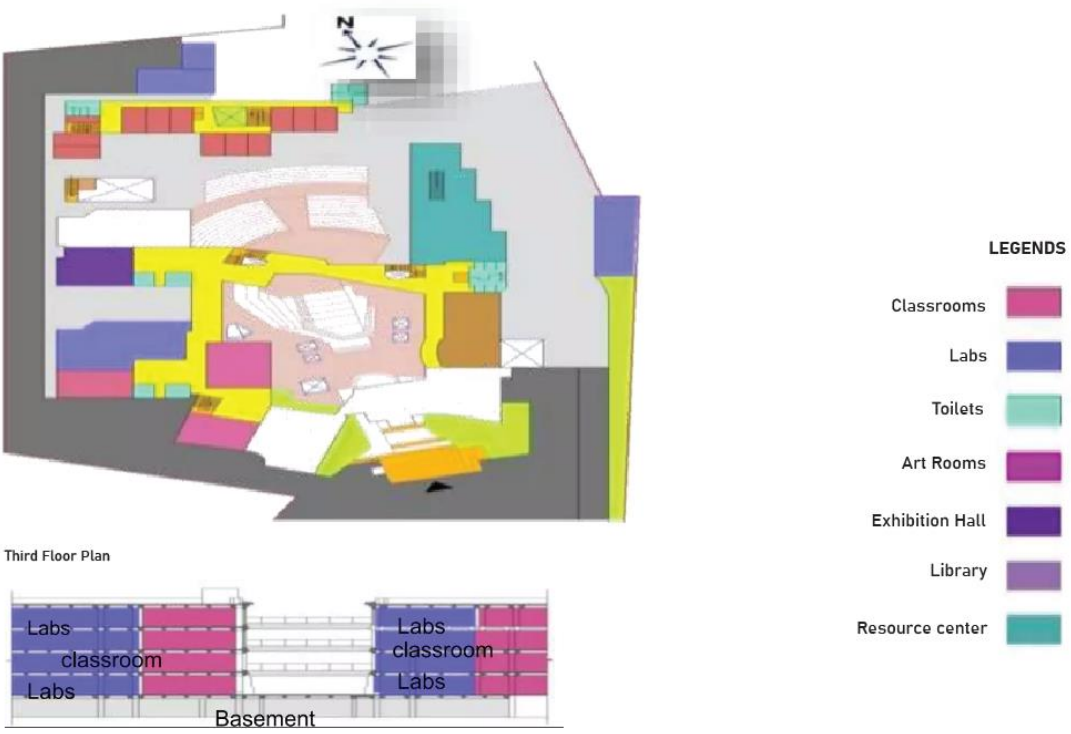


Figure 50: Third Floor Plan ; ***Source:*** *Rashid, 2013, Slideshare.*

4.2.6. Circulation and Activity

NIFT includes a central courtyard that connects different areas of the building with open galleries and walkways, promoting a sense of openness and connectivity. The building features efficient circulation with strategically placed staircases and elevators, and uses natural light and ventilation to enhance occupants' comfort and reduce energy consumption. Different areas of the building are designated for specific activities, with the ground floor hosting public and semi-public spaces and upper floors for classrooms, studios, and offices. Doshi's design is a holistic approach that caters to the functional, social, and cultural needs of the occupants, creating a space that enhances the educational and creative experience.

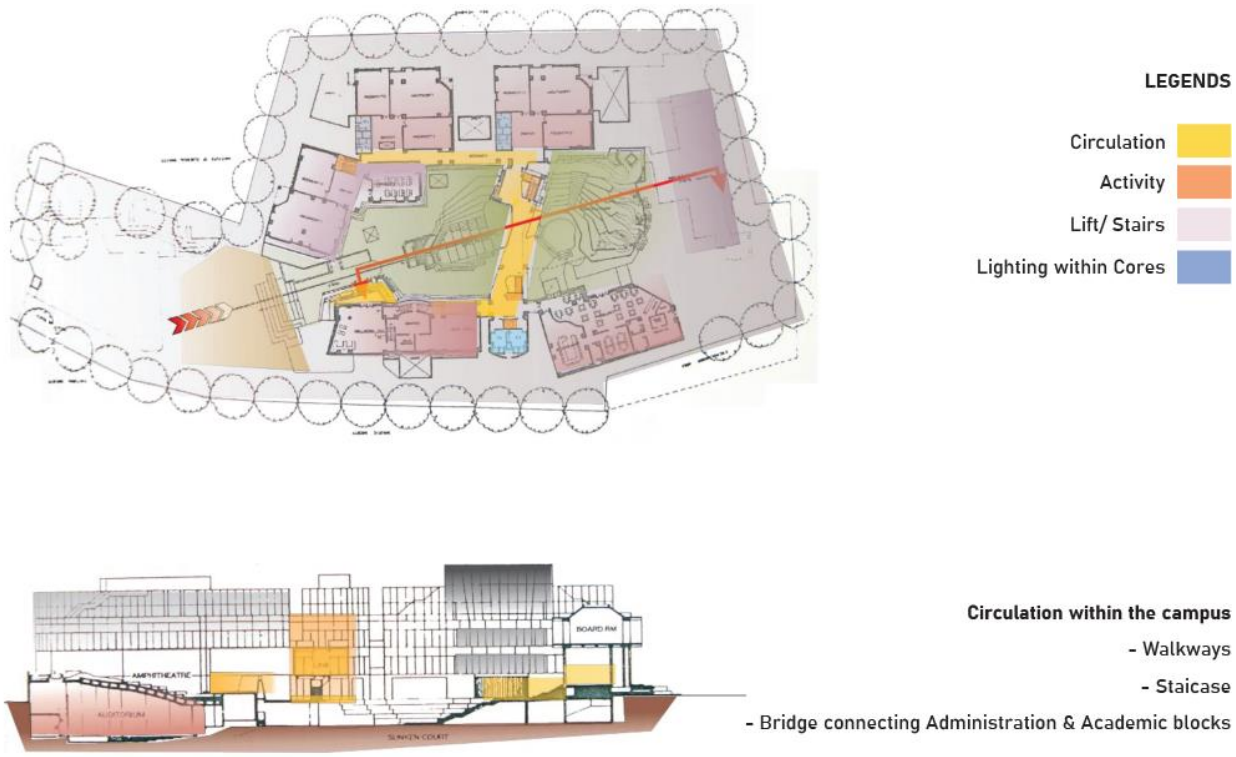


Figure 51: Circulation and Activity ; ***Source:*** *Author based on image found on Google.*

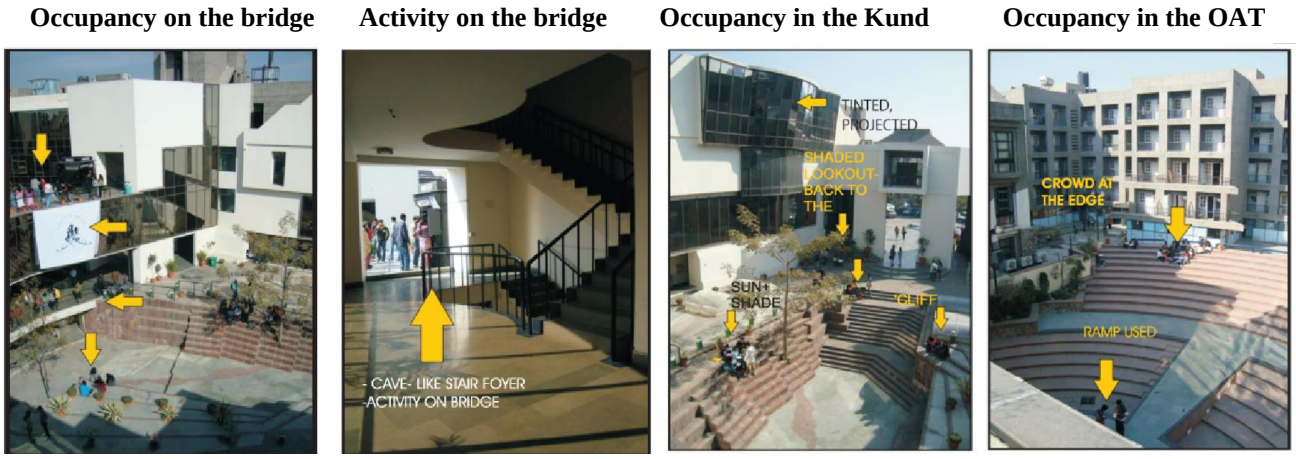


Figure 52: Circulation and Activity**; *Source:*** *Author based on image found on Google.*

4.3. National Case Study

4.3.1. BGMEA University of Fashion and Technology (BUFT)

Project: BGMEA University of Fashion and Technology (BUFT)- Permanent Campus

Built year: 2018

Location: Dhaur, Dhaka, Bangladesh

Total area: 5 acres

Built area: 4,000000 sqft

Figure 53: BUFT Permanent Campus; ***Source:*** *Google.*

4.3.2. Location and Climate

The dry season is warm and primarily clear at Dhaur, whereas the wet season is oppressively hot and generally overcast. The temperature seldom falls below 53°F or rises over 99°F throughout the year, often ranging from 58°F to 93°F.

Figure 54: Satellite image of BUFT; ***Source:*** *Author based on Google Earth.*

4.3.3. Horizontal and Vertical Circulation

The academic building consists of various sections that are connected by hallways and corridors. The main entrance features a double-height atrium area, and the public areas such as the help desk, cafeteria, auditorium, and seminar rooms are positioned around the atrium to centralize

these functions. The building has multiple staircases and elevators in different locations. The northern part of the building houses the classrooms and labs, which have a dedicated staircase from the ground floor to the top floor or 10th level.

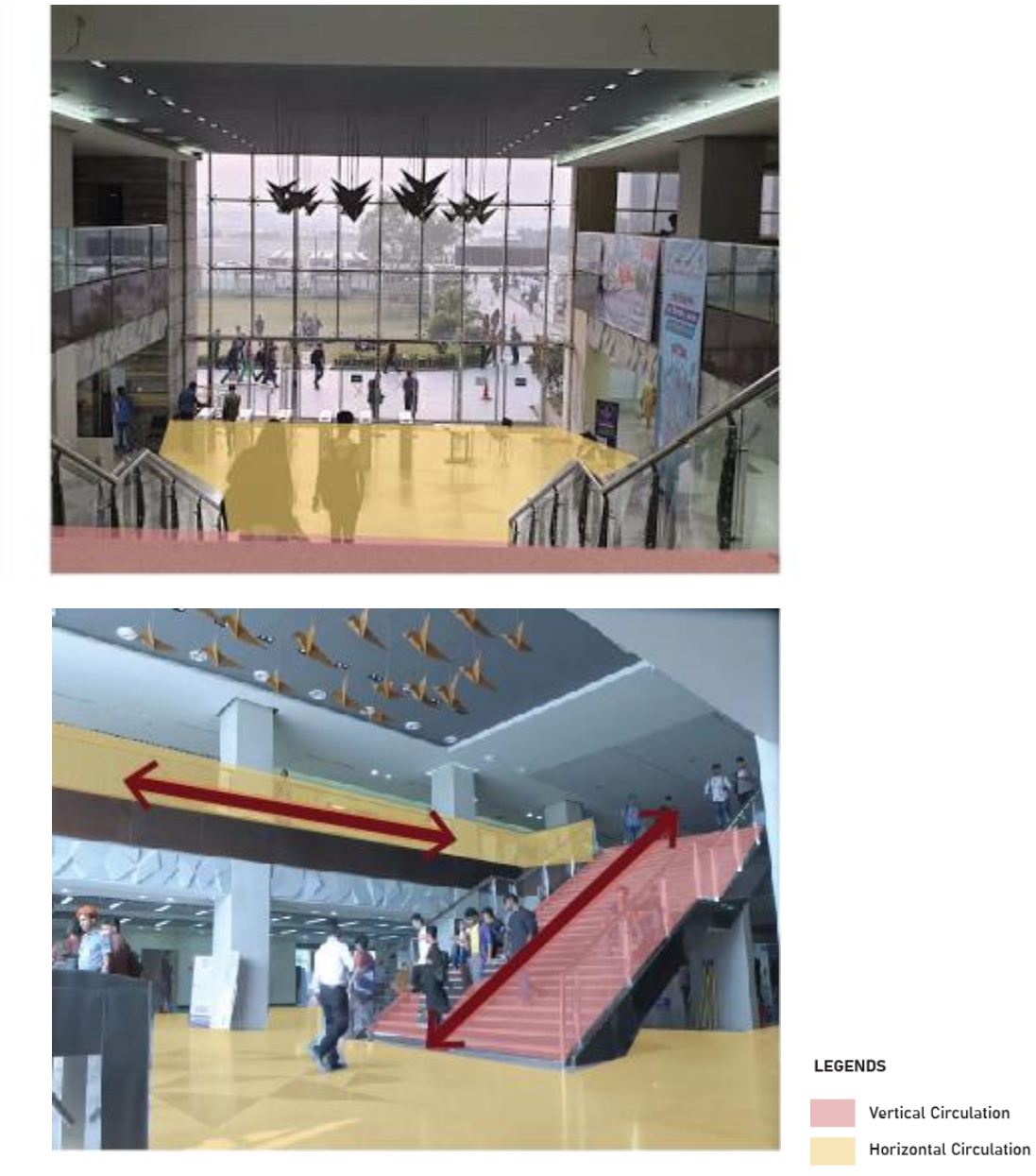


Figure 55: Horizontal and vertical circulation; ***Source:*** *Author based on image found on Google.*

4.3.4. Facade Details

The BGMEA University of Fashion and Technology (BUFT) building has a façade design that combines modern and traditional elements. It is made of glass, steel, and brick, giving it a contemporary look while also reflecting Bangladesh's cultural heritage. Glass is used to bring in natural light, while steel adds strength and flexibility to the layout. The brickwork on the exterior is arranged in a pattern inspired by Bengali weaving techniques, showcasing the institute's focus on fashion and textiles. The use of local materials and craftsmanship highlights BUFT's commitment to sustainability.

Figure 56: Facade Details; ***Source:*** *Author based on image found on Google.*

4.3.5. Lab and Studio Facilities

The BGMEA University of Fashion and Technology (BUFT) offers advanced laboratories and studio facilities that focus on providing practical training and hands-on experience to the students in the field of fashion and textile design. The facilities include CAD labs, textile testing labs, fashion design labs, and various studio facilities equipped with advanced technology and equipment. The campus also has production facilities that allow students to experience the manufacturing process. The open workspaces encourage collaboration and creativity, while the latest technology such as 3D printers and laser cutters help students gain industry skills.

Laboratories and Studios:

- Fashion Illustration Studios
- Pattern Making & Draping Studios
- Photography Studio
- CAD Studios
- Surface Ornamentation Studio
- Spinning Lab
- Fabric Structure Analysis & Design Lab
- Weaving Lab
- Knitting Lab
- Dyeing & Printing Labs
- Textile Testing & Quality Control Labs
- ACT Lab
- Textile Research Lab
- Apparel Manufacturing Labs
- Mechanical Workshop
- EEE Labs

- CSE Labs
- Physics and Chemistry Labs
- Language Labs
- Sewing Lab

Figure 57: Product Developing Lab; ***Source:*** *Author based on image found on Google.*

Figure 58: knitting Lab; ***Source:*** *Author based on image found on Google.*

Figure 59: TTQC Lab; ***Source:*** *Author based on image found on Google.*

Figure 60: Sewing Lab; ***Source:*** *Author based on image found on Google.*

Figure 61: Knitting Lab; ***Source:*** *Author based on image found on Google.*

Figure 62: Spinning Lab; ***Source:*** *Author based on image found on Google.*

Figure 63: Fashion Design Studio; ***Source:*** *Author based on image found on Google.*

4.3.6. Landscape

Figure 64: Outdoor Seating; ***Source:*** *Author based on image found on Google.*

The campus has a landscape design that complements its modern architecture with green spaces, gardens, and a rooftop terrace. Native plants and trees, including fruit-bearing ones, are used to create a sustainable environment. The outdoor areas encourage collaboration and social interaction, with seating areas and walkways that provide easy access to the different buildings. The central courtyard, with its open-air amphitheater and landscaped terraces, serves as a focal point for the campus and a versatile space for outdoor events.

Chapter 5: Program Appraisal

5.1. Proposed Blocks

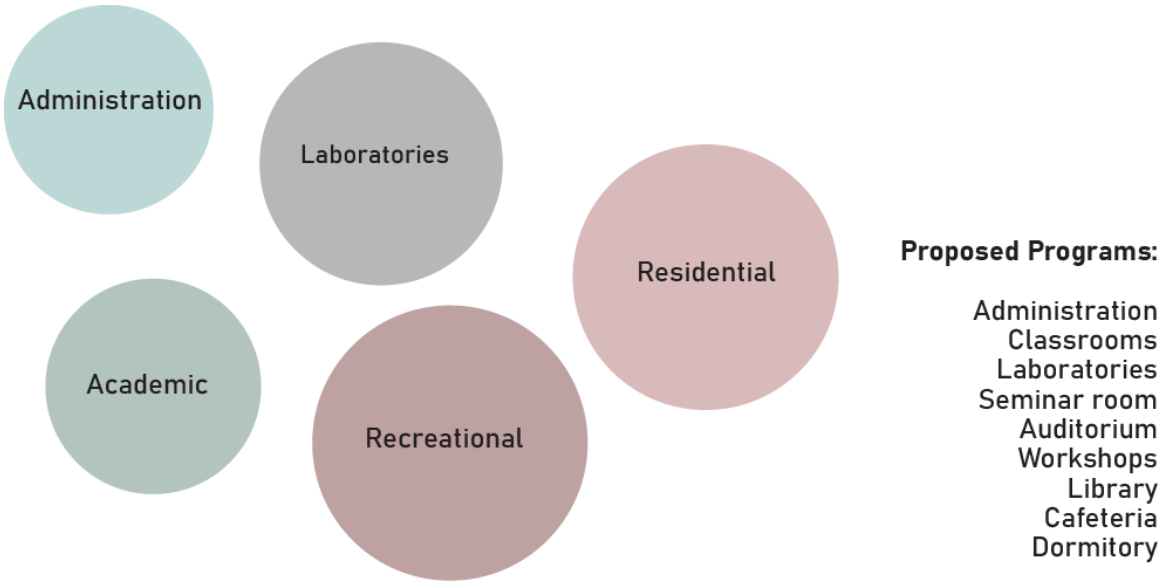


Figure 65: Proposed programs ; ***Source:*** *Author*.

Administration

1. Department of Fabric Engineering
2. Department of Textile Machinery Design and Maintenance
3. Dept. of wet process
4. Dept. of dyes and chemical
5. Dept. of yarn
6. Dept. of knitting and stitching
7. Dept. of Apparel Engineering
8. Dept. of Fashion Designing

Users:
- Teachers- 25
- Dean-1
- Vice chancellor-1
- Staff- 20

Academic

Lecture Halls - 12
Fashion Design Studios - 4
Seminar Halls - 2
Common Rooms - 2
Exhibition Hall - 1
Library- 1

Total Students - 800

Laboratories

Yarn manufacturing laboratory
Spinning Lab
Dying Lab
Apparel Lab
TTQC Lab
Knitting Lab
Computer Lab
EEE Lab
Physics Lab
Chemistry Lab
Mechanical Lab
Drawing Lab

Recreational

Multipurpose Hall
Cafeteria
Club Rooms

Residential

Male Dorm- 150 students
Female dorm- 100 Students
Dean's Quarter- 1
Officers Dorm- 15
Staff Dorm- 10

5.2. Program Analysis

5.2.1. Administrative Facilities

Administrative Facilities							
No.	**Functional space**	**Purpose**	**Number of units**	**Number of users**	**Area per person (Sqft)**	**Area per Unit (Sqft)**	**Total Area**
1	Reception	Provide information	1	6	13.33	80	80
2	VC Office	Individual work spece for Vice Chancelor	1	1	200	200	200
3	Single offices	Individual work space for senior management officials (dean + deputy director+ VC Assistant)	3	3	150	1350	1350
4	Departmental offices	Common work areas for teachers	8	5	80	400	3200
5	Accounts office	Common work area for admistritive work	1	4	80	320	320
6	Teacher's lounge	Common space for the teachers	1	25	15	375	375
7	Dinning	Lunch space for adminstritive staffs	1	25	15	375	375
8	Medical Room		1			180	180
9	Prayer space		2	15	10	150	300
10	Toilet	For administrative staffs	2	25		150	150
11	Circulation	30% of total					1959
Sub-total							**8489**

5.2.2. Academic Facilities:

Academic Facilities							
No.	**Functional space**	**Purpose**	**Number of units**	**Number of users**	**Area per person (Sqft)**	**Area per Unit (Sqft)**	**Total Area**
1	Lecture halls	For theory classes	12	30	10	300	3600
2	Design Studios	For fashion design classes	4	30	20	600	2400
3	Seminar halls	For workshops	2	50	15	1500	1500
4	Common Rooms	For leisure activites	2	50	15	750	1500
5	Library	For studying and storing books	1	300	50	15000	15000
6	Exibition hall	For exibiting student works	1	100	10	1000	1000
7	Toilet		6			150	150
8	Circulation	30% of total					3045
Sub-total							**28195**

5.2.3. Laboratory Facilities

Laboratory Facilities							
No.	**Functional space**	**Purpose**	**Number of units**	**Number of users**	**Area per person (Sqft)**	**Area per Unit (Sqft)**	**Total Area**
1	**Yarn Manufacturing Lab**	For demonstration of 8 yarn manufacturing	1			1350	1350
	Lecture area	For demonstration of 8 yarn manufacturing	1	30	10	300	300
	Storage area	For storing raw materials and build products	1			400	400
	Office area	For Lab instructors	1	2	60	120	120
2	**Spinning Lab**					300	300
	Lecture area	For demonstration of weaving and knitting	1	30	10	300	300
	Storage area	For storing raw materials and build products	1			216	216
	Office area	For Lab instructors	1	2	60	120	120
3	**Dying Lab**					1350	1350
	Physical Lab	Demonstrarion of dying machines	1	30	20	600	600
	Chemical Lab	For chemical experiments	1	30	20	600	600
	Storage area	For storing raw materials and build products	1			300	300
	Office area	For Lab instructors	1	2	60	120	120
4	**Knitting Lab**	For Knitting work	1	30	160	160	4800
5	**Computer Lab**		1	30	20	600	600
6	**EEE Lab**	For EEE practical work	1	30	20	600	600
7	**Physics Lab**	For Physics practical work	1	30	20	600	600
8	**Apparel Lab**	For Textile packeging Detailing	1	30	20	600	600
9	**TTQC Lab**	For textile testing and quality control	1	30	20	600	600
10	**Mechanical Lab**	For Textile packeging Detailing	1	30	20	600	600
11	**Drawing Lab**	For engineering drawing	1	30	20	600	600
12	**Circulation**	30% of total					4522.8
Sub-total							**19598.8**

5.2.4. Recreational Facilities

Recreational Facilities							
No.	**Functional space**	**Purpose**	**Number of units**	**Number of users**	**Area per person (Sqft)**	**Area per Unit (Sqft)**	**Total Area**
1	Multipurpose hall	To organize institution events	1	800	15	12000	12000
2	Store Room	Storage space for multipuropose hall	1			4250	4250
3	Cafeteria	For supporting dining faciliy for the students	1	300	15	4500	4500
4	Kitchen	For supporting cafeteria	1	6	50	300	300
5	Club Rooms	For club works, meetings, discussions	4	50	15	750	3000
8	Circulation	30% of total					7215
Sub-total							**31265**

5.2.5. Residential Facilities

Residential Facilities							
No.	**Functional space**	**Purpose**	**Number of units**	**Number of users**	**Area per person (Sqft)**	**Area per Unit (Sqft)**	**Total Area**
1	Male Dorm	Residential facilities for male students	38	4	140	280	21280
2	Female Dorm	Residential facilities for female students	25	4	140	280	4250
3	Dean's Quarter	Residential facilities for the dean	1	1	1200	1200	1200
4	Officer's Dorm	Residential facilities for the administritive officers	15	1	120	120	1800
5	Staff Dorm	Residential facilities for the staffs	10	1	90	90	900
6	Dinning (M/F)	Dinning facilities	1	200	17.5	3500	3500
7	Prayer space (M/F)		2	10	10	100	200
8	Kitchen		1			814	814
9	Study Room			20	25	500	500
10	Common Room		1	20	25	500	500
11	Indoor Game Room		1	20		500	500
12	Toilet		17			150	2550
13	Circulation	30% of total					11398.2
Sub-total							**49392.2**

Grand Total	**136940**

Figure 66: Standard Layout; ***Source:*** *Author based on Time saver Standards.*

Chapter 6: Design Development

6.1. Functional Zoning and Concept

6.1.1. Functional Zoning

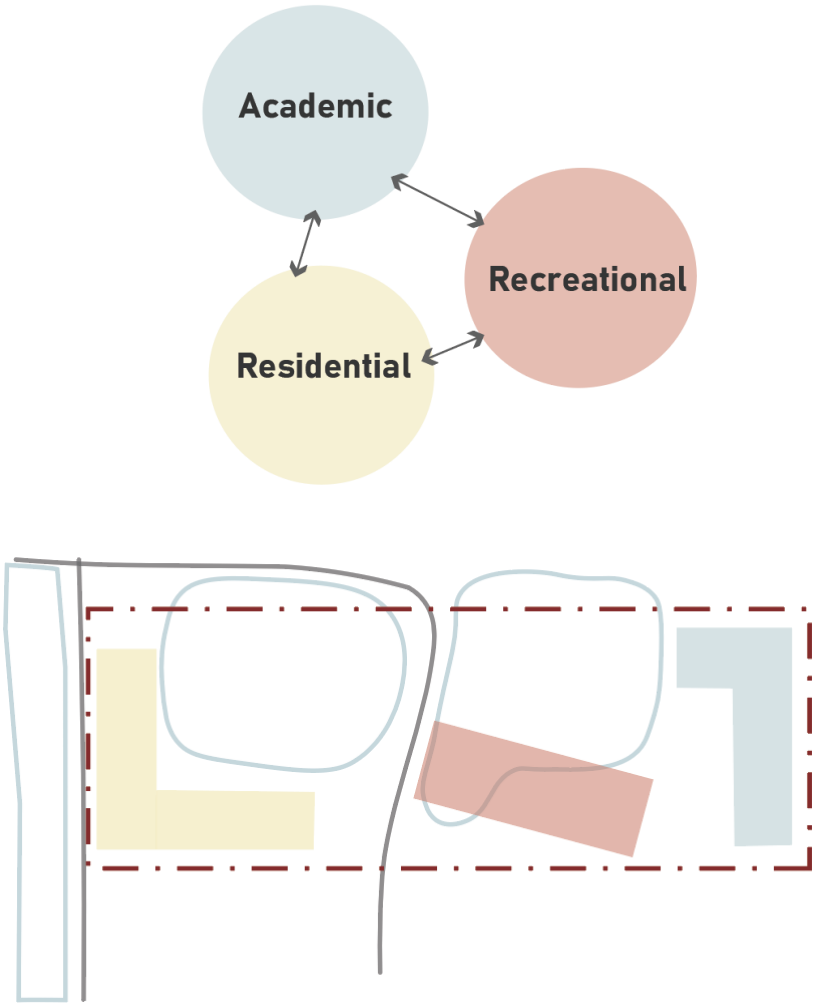


Figure 67: Zoning Diagram; ***Source:*** *Author.*

6.1.2. Concept and Form Generation

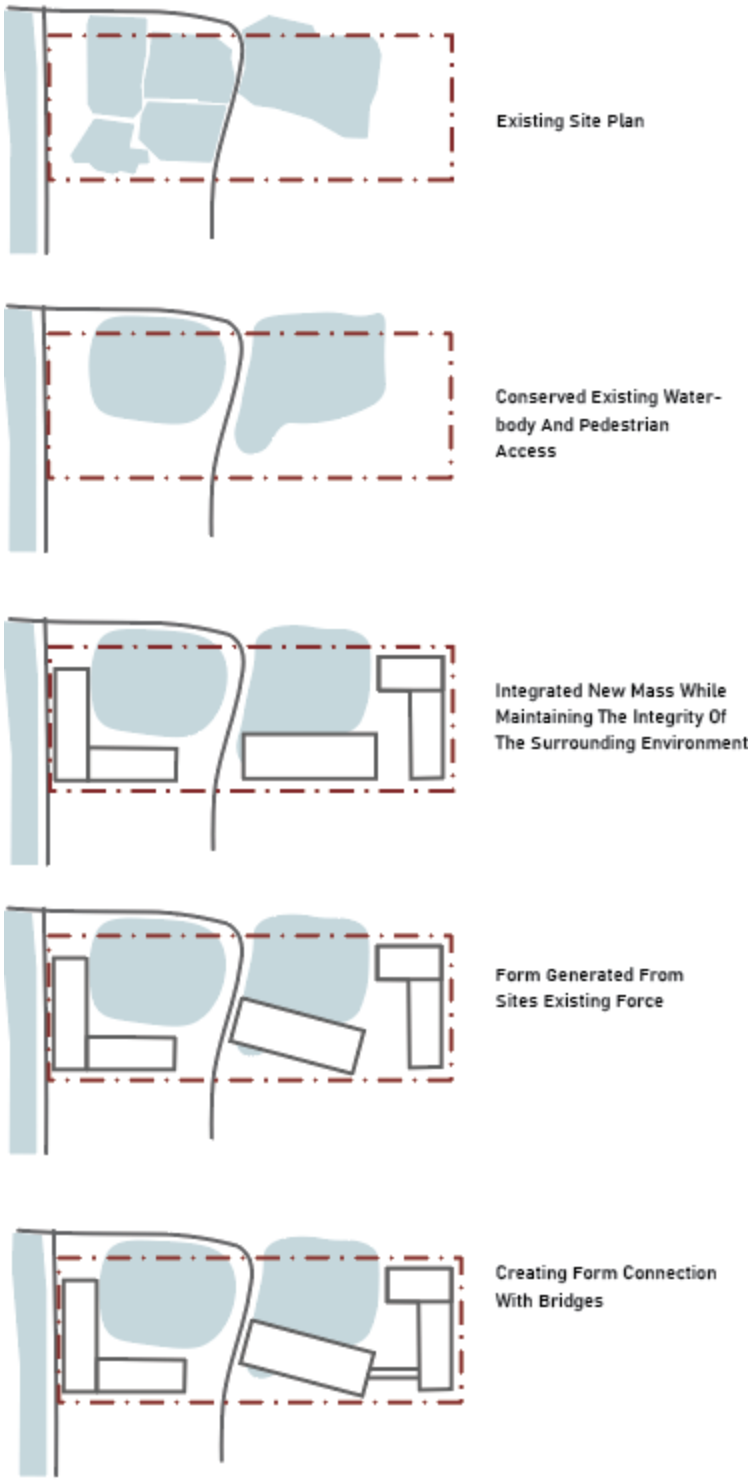
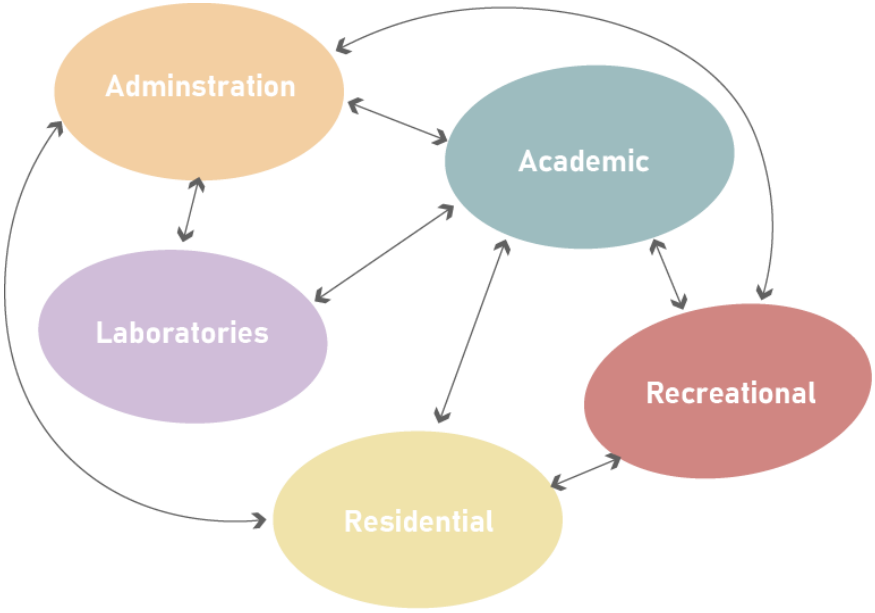
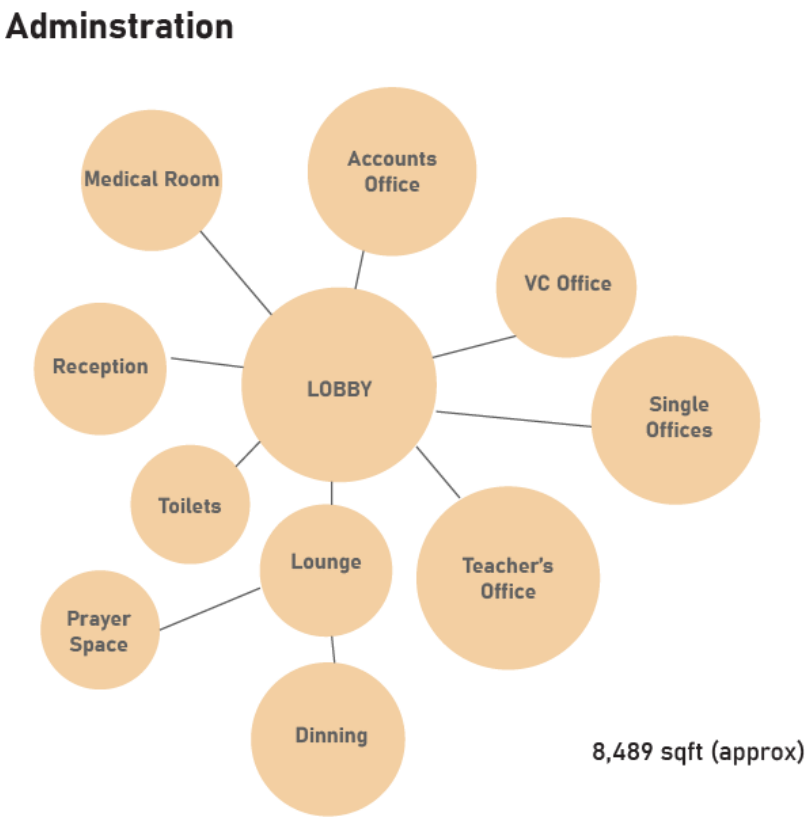


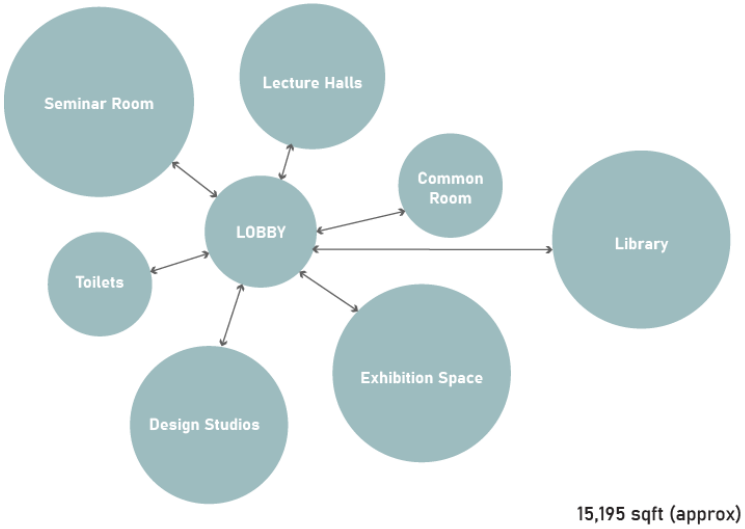
Figure 68: Concept Diagram; ***Source:*** *Author.*

6.1.3. Bubble Diagrams



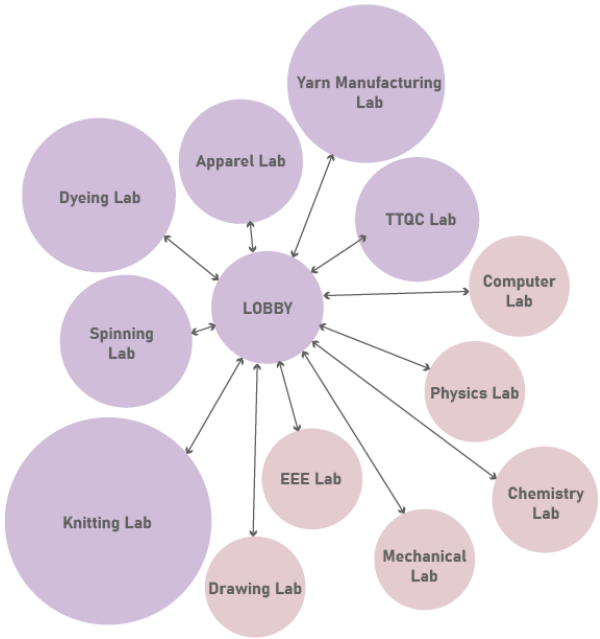


Academic



15,195 sqft (approx)

Laboratories



19,599 sqft (approx)

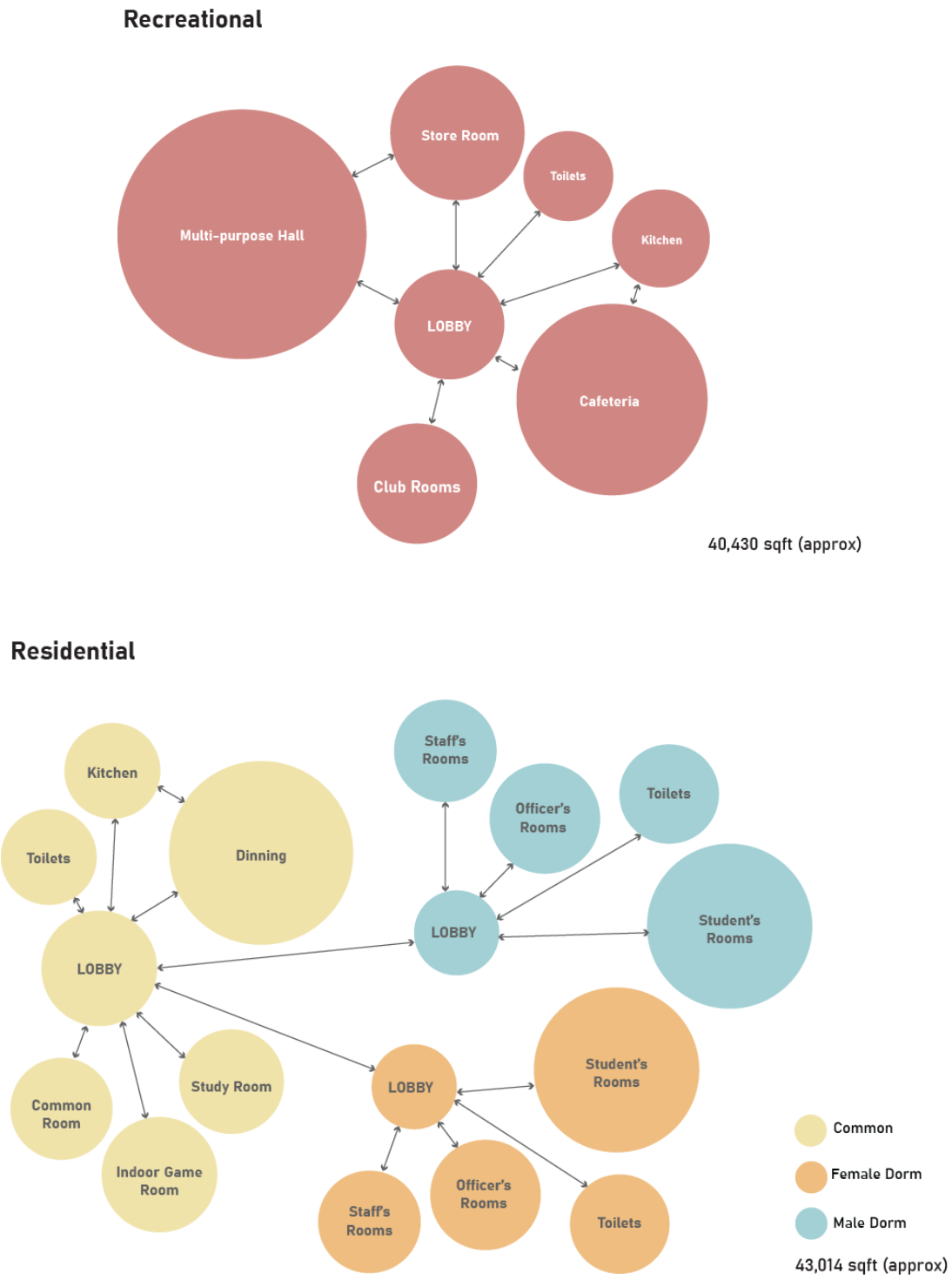


Figure 69: Bubble Diagrams; ***Source:*** *Author.*

6.2. Plans

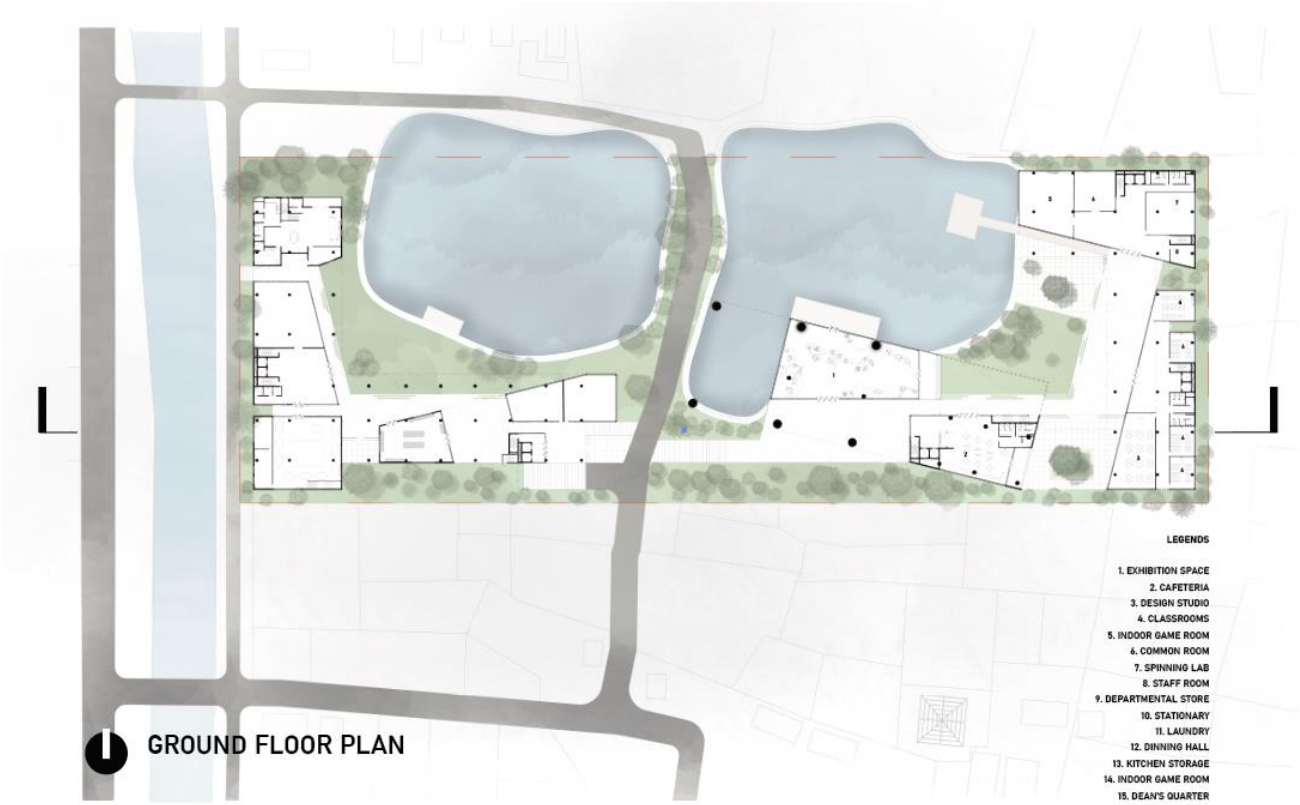


Figure 70: Ground Floor Plan; ***Source:*** *Author.*

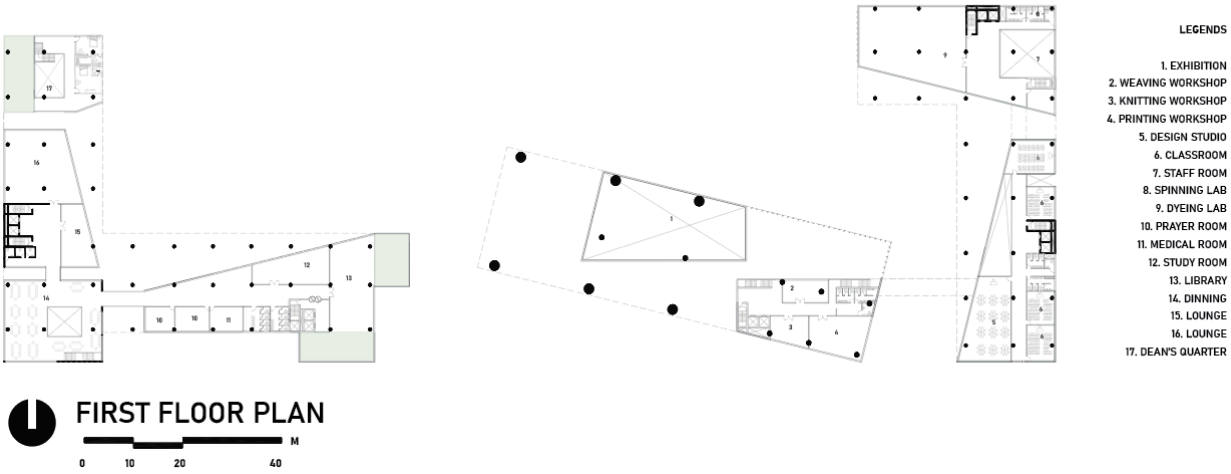


Figure 71: First Floor Plan; ***Source:*** *Author.*

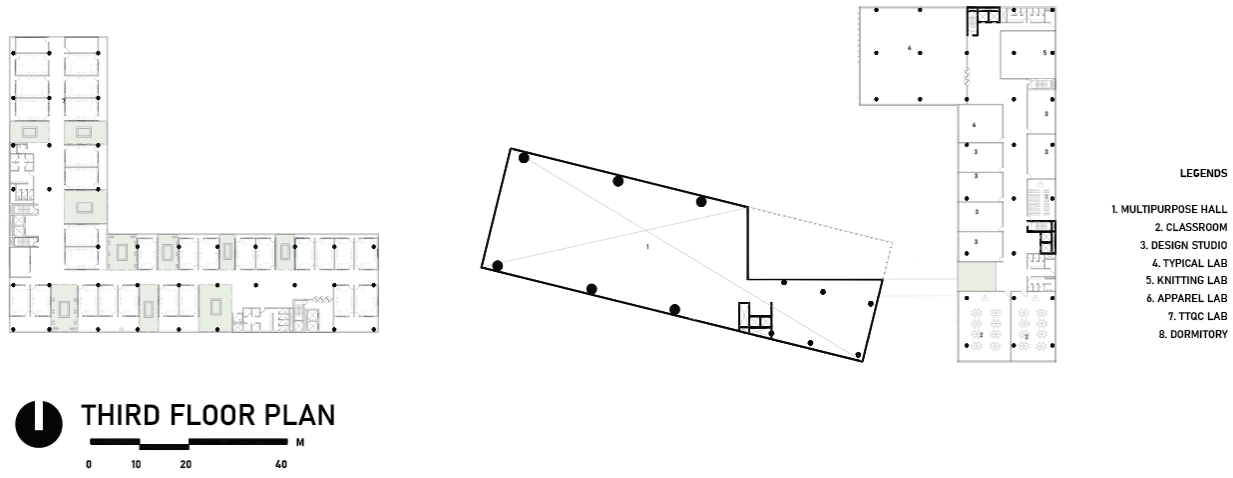


Figure 72: Third Floor Plan; ***Source:*** *Author.*

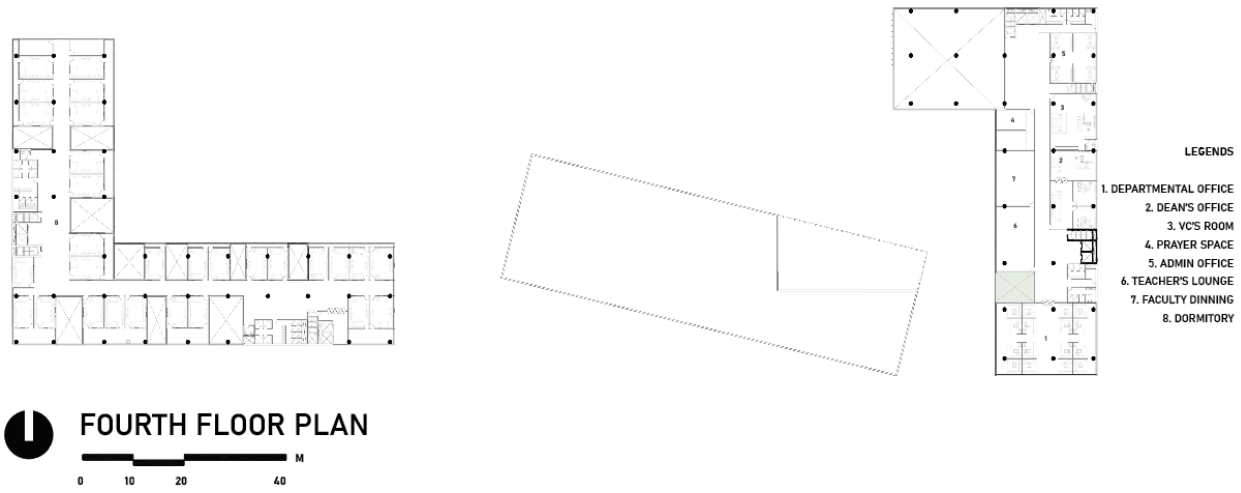


Figure 73: Fourth Floor Plan; ***Source:*** *Author.*

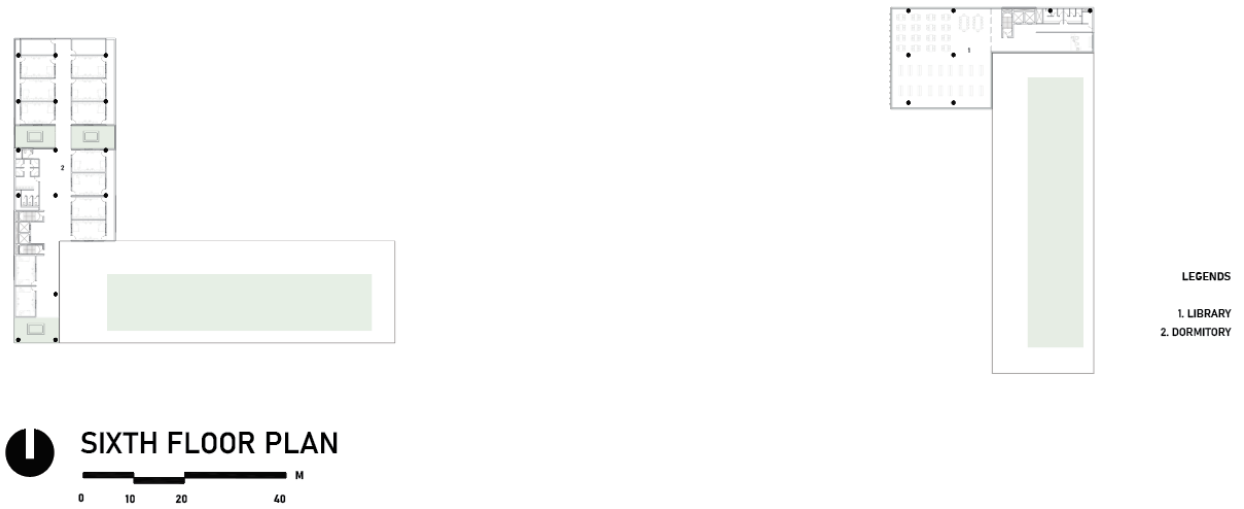


Figure 74: Sixth Floor Plan; ***Source:*** *Author.*

Figure 75: Basement Plan; ***Source:*** *Author.*

6.3. Elevations and Sections

Figure 76: South Elevation; ***Source:*** *Author.*

Figure 77: Section A-A'; ***Source:*** *Author*.

6.4. Rendered Images

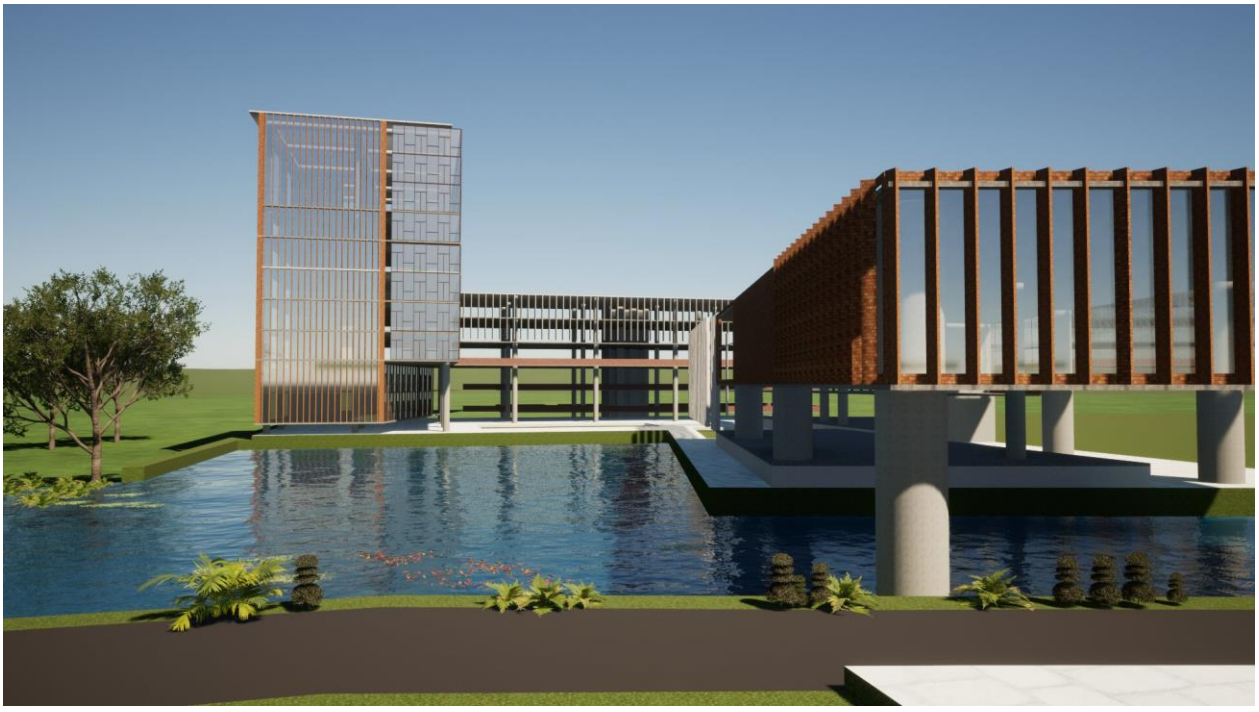


Figure 78: View from the Existing Road; ***Source:*** *Author*.

Figure 79: Entrance View; ***Source:*** *Author*.

Figure 80: View from Academic Block; ***Source:*** *Author*.

Figure 81: View from Plaza to Academic Block; ***Source:*** *Author.*

Figure 82: View from Multi-Purpose hall; ***Source:*** *Author.*

References

Ali, M. (2014). Handloom industry of Bangladesh. Asian Textile Journal, 23(7), 55-60.

Bangladesh Cotton and Textile Convention. (2006). Textile Industry in Bangladesh: A Survey.

Retrieved from http://www.bangladeshconvention.com/wp-content/uploads/2012/08/Textile-Industry-in-Bangladesh.pdf

Bangladesh Handloom Board. (2010). About Handloom Industry. Retrieved from https://handloom.gov.bd/home/page/9

Banglapedia. (2014). Textile Industry. Retrieved from http://en.banglapedia.org/index.php?title=Textile_Industry

Chauhan (2020). NIFT Delhi architecture. Retrieved from https://www.slideshare.net/AmayVikramaChauhan1/nift-delhi-architecture

Hossain, M. A., & Ferdous, F. (2019). The textile industry of Bangladesh: The present and future. Journal of Textile and Apparel, Technology and Management, 10(3), 1-19

Islam, M. M., & Hossain, M. S. (2012). Traditional handloom weaving in Bangladesh: problems and prospects. Journal of Textile Science & Engineering, 2(1), 1-6.

Islam, M. S. (2021). Traditional Textiles of Bangladesh: A Study on Lungi and Gamcha of Kushtia District. Journal of Textile Science & Fashion Technology, 5(5), 111-113. doi: 10.33552/JTSFT.2021.05.000624

Jamie, K. (2014). Muslin - The fabric that inspired the world. Retrieved from https://www.bbc.com/culture/article/20140929-the-fabric-that-inspired-the-world

Parthasarathi, P., Kothari, V. K., & Basu, S. (2014). Textile engineering education: An overview. Journal of Textile Science and Technology, 1(1), 1-10.

Rashid (2013). Case study nift final. Retrieved from https://www.slideshare.net/taiyabarashid/case-study-nift-final

Siddiqua, S., & Akter, S. (2018). Muslin fabric: A glimpse of history, production, and end uses. Journal of Textile and Apparel Technology and Management, 10(3), 1-11.