Gopalganj Textile Engineering College

Kashiani,Gopalganj

Yasna Rahman Jain

ID: 10208014

Seminar II

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Abstract

The objective of this paper is to explain the complete process and methodology followed in the design phase of a Textile Engineering College. It also focuses on the necessity of multidisciplinary education and translates the understanding through the product of the design phase. Gopalganj Textile Engineering College, as the title refers, is an institute for Textile Engineering and related technologies, in Gopalganj, Dhaka. This paper shreds light upon the versatile possibilities that an institute can bring to its users, the city and the development of a nation, not only through its curriculum, but as a physical presence through spaces. The site is located in the Kashiani Upazila, Gopalganj, and covers an area of approximately 5 Acres, authorized by the Government of Bangladesh; The Ministry of Education. The design procedure has been developed through the assimilation of the revised programs, relevant case studies, and site and context analysis followed by the study of conceptual backgrounds, volumetric functions and the formal expression of the project with reference to its context. The media of the volumetric formal study includes experimental modeling.

Chapter 01: Introduction

1.1 Project Brief

Gopalganj, a district under Dhaka division, associated to a strong historical and political background has been going through rapid development, including University and several training centers and institutes. The projects are mostly authorized by the Government of Bangladesh, thus creating a prominent scope in the expansion of the rate in higher educational degrees; such projects include the Gopalganj Medical College, Bangabandhu University of Science and Technology, Gopalganj Vocational Institute, Public Training Institute etc.

The objective of an Educational institute is not only to train students on certain disciplines, but also to develop the ideologies of humanities and fostering relationships. The institute also offers certain curriculum that sculpts and guides a student to attain knowledge and aspiration. The Undergraduate program is a platform that plays a vital role in the education history and future of a student. However, it is also the transformation period for many, between student life and working life and thus it becomes the most memorable time in the timeline.

The Textile Engineering College is considered as the ground to build the future Textile engineers of the country. The future of textile is also very ambitious through foreign exchange of exporting textile materials. It also adds to the developing garment industries of our country. This opportunity also magnifies the context of revival of jute and it"s implication in textile. The Gopalganj Textile Engineering College will therefore open the window for jute, which is cultured largely in Gopalganj.

The College has been designed with an aim to foster the human relationships, the spaces that will help in carving the relationships between the students and the teachers. The College is also proposed in a future “education hub” with neighboring Gopalganj Vocational institute: thus creating a challenge for the designer to connect the relationships in a broader scale through its spaces. This “network” of proposed interwoven spaces are inspired from the very basic “knitting” of textile, integrating the functional flow with the formal expression of the building.

1.2 Background of the project

The project requires a wide phenomenon of conceptual framework and its realization through functional development. This chapter of the paper deals with the literature and studies behind the rationalization and development of this project. It is the reflection of the transformation of a concept into a functional entity.

A textile institute is not only an institution where the future textile engineers of the nation have the opportunities to enhance their capacities and knowledge, it is also a platform of relationships, and most importantly opens up the window exposing the possibilities of textile for that area it is located in. An institute is a place of higher aspirations (Jamie, 2014).

Besides, one of the broader goals of this project is to contribute in a future education based development, unlike the gated neighboring institutes that surrounds the site. The prime challenge is to overcome the typical concept of isolation of individual projects and integrate spaces that will link the education system together and help build better human values.

Chapter 02: Literature Review

2.1 Background of Textiles in Bangladesh

Textile industry has been an integrated part of our culture over centuries. Handloom is an example of the textile industry that is still present in the country and is producing versatile textiles and fabrics- it is a machine that produces woven fabric using the combination of the weaver"s hand and foot. Tracing the history of this industry, handloom goes back as early as the 17thcentury. The industry had played an important role in the economic factor of the Indian subcontinent (Islam and Hossain, 2012).

Also, 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.

Fig 2.1.1: Raw Jute Materials

Fig 2.1.2: Jute Processing Mills

Today, Bangladesh is the sole exporter of raw jute (Uddin, hossain and Hoque ,2014) In the present scenario the term „Geo-textile" is attaining popularity globally. Many textile institutes are carrying out research on the various use of biodegradable and earth-friendly geo-textile materials including furniture clothing, shoes etc (RESIL, 2010). An example of Geo textile is the „Anji-Qinyung" fabric, where the fabric is produced from 100% Jute material (Islam, 2017). The commonly used fabric under development is the „Jute cotton" which is gaining popularity in our local context. 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 tons of geo-textile respectively every year (RESIL, 2010).

Fig 2.1.3: Jute products

Fig 2.1.4: Jute fabric and shoes

Therefore, the rise of the handloom and textile industry has been of great importance and requires more guidance in technologies and technicians who will contribute to the development of this industry. The proposed Gopalganj Textile Engineering College may have the possibility in the further research of these development

processes. Furthermore, the students are a combination of different points of the country and thus will diffuse their knowledge in different parts of the nation in seeking of future textile development.

2.2 Types of Handloom:

According to Bangladesh Handloom Ordinance, 1977, there are two types of looms in operation:

1. The Handloom: operated manually.
2. The Power loom: operated by power.

The handloom has versatile categories: 1.Pitloom

3. Power loom.
4. Chattaranjan loom.
5. Benarasi and Jamdani loom.
6. Kamer and waist loom.

2.3 Local opportunities of Textiles:

2.3.1 Benarasi

Benarasi saree, whose history dates back to the Mughal rule in the 16th century, has its origin in Benaras, a northern city of India. In Bangladesh the migrated Muslim from Benaras started production of Benarasi saree at Mohammadpur and Mirpur in Dhaka since 1950. Today the Benarasi industry is facing enormous difficulties. As a result, the number of craftsman, handlooms and outlets are decreasing day by day. About 25,000 people are now involved in the Benarasi industry, where the number was one lakh, even 2-3 years ago. The number of handloom has reduced to five thousand now from 20,000 in 2004. There are a total number of 23 camps located at section No-10, No-11, No-12 of Mirpur. There are

8,560 households with a total population of 40,276. Among them 19,934 (49.5%) are women and girls. Fifty two Percent of women and girls are engaged in Benarasi work (Bangladesh Handloom Board). The reason behind such reduction is mainly because of rapid taking over of Indian clothes in the market. The other reasons include bad housing, accommodation, working space and less promotion of products from the Government and lack of citizenship of the craftsmen (Ferdous, Shawal and Badhan, 2014).

According to further description on Benarasi provided by Ferdous, Shawal and Badhan on 2014, there are typically four types of Benarasi fabrics including Pure Silk (Katan), Shattir, Organza (fine kora with zari and silk works) and finally the Georgette. The procedure of weaving Benarasi includes:

1. Preparation of Threads.
2. Smoothening and rolling thread using „Charka".
3. Weaving of the fabric using the Handloom instrument, known as „Taant"
4. Further adorning with „Karchupi"
5. Preparation and packaging the end product.

Fig 2.2.1: processing threads

Fig 2.2.2: Charka


Fig 2.2.3: Taant


Fig 2.2.4: Karchupi

Fig 2.2.5: A Typical Benarasi Shop

2.3.2 Jamdani

The word Jamdani is a derivation from a persian term, where „Jam" means flower and „Dani" means vase, however in practice Jamdani is a fabric flourished in the Bengal during the Mughal reign as part of the Muslin group. It"s a fine thin cloth mostly weaved from cotton threads, but there are different types of threas used including silk, half-silk, zari etc. The fabric mostly is weaved in varieties of floral or geometric patterns. During the Mughal Empire, the popularity of Jamdani reached its peak so that almost each village was engaged into weaving Muslin. However, Sonargaon, Dhamrai, Titabari, Jangalbari and Bajitpur were said to be the top on both quality and quantity of producing Jamdani and muslin. Jamdani has been

declared as an „Intangible Cultural Heritage of Humanity" by the UNESCO (Banglapedia, 2014).

By the 18th and 19th century the Jamdani broke its wall of the continent and adorned the homes and clothing of American and European aristocrats. According to Banglapedia, 2014, the Emperor of Delhi, the Nawab of Bengal and Jagat sheth were entertained with Muslin worth of Rs. 550,000 in 1747. Also, the European traders and companies gathered Muslin the price of Rs. 950,000 the same year.

After the 1971, the liberation of Bangladesh an individual village was declared to meet the production of the declining Jamdani in Demra, near Dhaka. The Jamdani produced here achieved such attention, the other Jamdani villages like Jangalbari and Bajitpur began to extinct.

At present day, the Government is taking initiatives to develop the Jamdani industry of the nation. Bangladesh Small and Cottage Industries Corporation (BSCIC) are in control of actions to expand the production of Jamdani since 1982. They have successfully increased the line of graph of weavers from 1119 to 5699 since surveyed in 1993 to 2002 (Banglapedia, 2014).

The process of weaving Jamdani:

1. Dyeing Threads:

Fig: 2.3.1

2. Processing threads by pulling and rotating in a „charka"

Fig: 2.3.2

3. Weaving using a handloom- „Taant" and detailing the patterns manually.

Fig: 2.3.3

4. Selling the final product.


Fig: 2.3.4

Hence, the scope of developing the textiles of Bengal has large opportunities and thus a Textile institute can contribute in considerable sectors of this process. The textile industry of Bangladesh has declined from its original roots as the history suggests despite the engagement of government. This decline is largely happening due to lack of research and further improvement of fabrics, while Indian fabrics are being shipped competitively into the country. The involvement of Textile Engineering can make a significant difference in the opportunities of our local products.

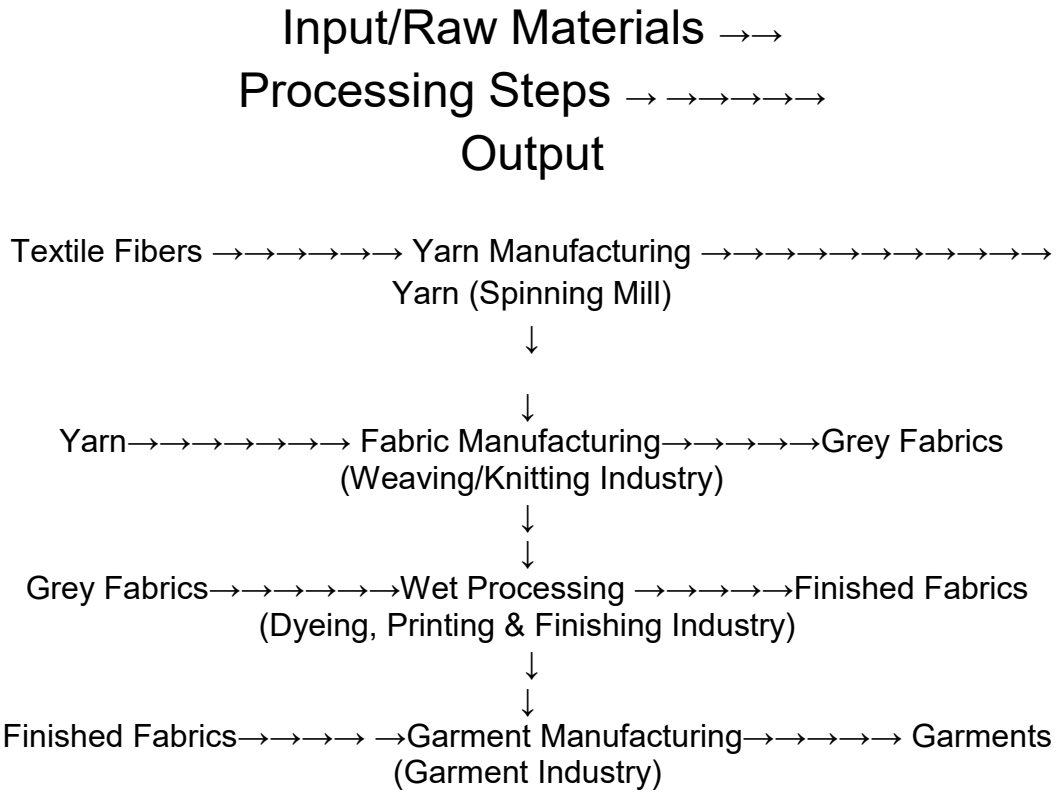
2.4 Basics of Textile Engineering

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 is 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.)

The following chart shows the brief process of Textile industry:



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 is 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

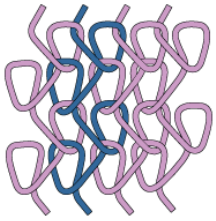


Fig 2.4.1: Warp knit

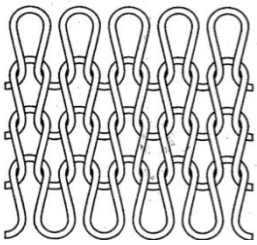


Fig 2.4.2: Weft Knit

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

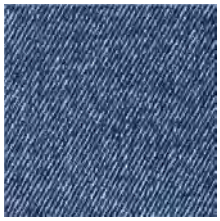


Fig 2.4.3: Denim

Fig 2.4.4: Shirt fabric

2.5 Structure of Textile Industry

Organized/ central Sector/ Mill Sector:

Spinning Mills:

Fig: 2.5.1

Composite Mills (weaving and Knitting):

Fig: 2.5.2

Unorganized/ Decentralized sector:

Handlooms:

Fig: 2.5.3

Power looms:

Fig: 2.5.4

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.

The dyeing process depends on types of fabrics:

1. Reactive dyeing: cotton, wool, silk, nylon.
2. Disperse dyeing: polyester, Acrylic, Nylon.

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.

Fig 2.5.5: Fabric Dyeing Machines.

Chapter 03: Case Studies

3.1 Case study 01: Bangladesh University of Textiles (BUTEX)

Location: Tejgaon, Dhaka

Site area: 10 Acre (approx.)

3.1.1 Aims of study

- Understanding the zoning and functional relationship of an TextileInstitute.
- Understanding the relationship of an outdoor and indoorspace.
- Understanding the functional flow of laboratories and their intensivepurpose.
- Understanding structural requirements and ventilation requirements for longspans.
- Integration of landscape design, to distract users from monotony of heavymachine works.

Fig 3.1.1: Site: Bangladesh University of Textiles

Bangladesh University of Textiles, located on the main road of Tejgaon is mostly surrounded by many commercial projects and thus it has been a challenge in creating a secluded institutional area in the midst of a prime urban location. The campus remains quite disintegrated, since the very regular urban grid has disintegrated the residential zone of the campus from the Educational zone.

3.1.2 Functional relationship of Educational zone

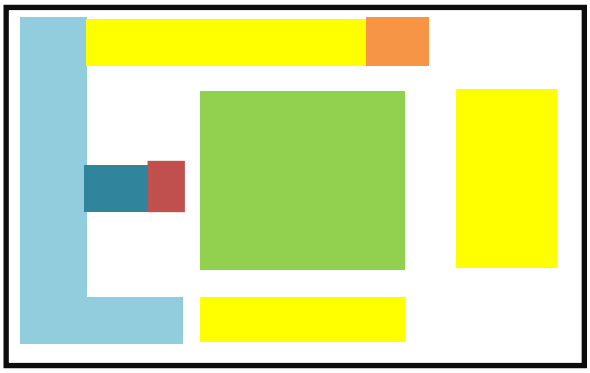


Fig 3.1.2: Functional relationship of BUTEX

Academic
admin
Canteen and Auditorium

Laboratories
Play field
Library

The functions of the university is heavily engulfed with laboratories that hold heavy machineries and work process, the machines are very heavy and create jerking, and thus must be placed at ground level for structural risk. The laboratories also generate heavy noise and must have a clear buffer between classrooms and residential zones. The functions in the BUTEX campus are arranged around a central playfield, which is not very encouraging and due to the building treatment, 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 theoretical 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.

3.2 Case study 02: Institute of Fine Arts, Dhaka University (Charukola)

Location: Shahbagh, Dhaka

Fig 3.2.1: Institute of Fine Arts

The Faculty of Fine Arts is an institute under Dhaka University. First established in 1948, it was the first educational institute on fine arts of Bangladesh and thus became the center of cultural practice. The present location is in Shahbagh, Dhaka, neighboring the national Museum. Architect Muzharul Islam designed the institute as a center for all types of people, let alone the artists. The institute has long merged

with our cultural heritage- „Pohela Baishakh", „Choitroshonkranti", „Pohela Falgun". The institute is a unique example of openness for all; it is the first institute that has gone behind the boundary walls of the individuality of an institution.

Fig 3.2.2: Public Celebration

A site that was provided for the project was a natural site with a large water body with dotted trees. The site inspired Muzharul Islam to design a semi permeable institution that allows landscapes to merge with a built form through transparent spaces on the ground floor. The architect retained almost all trees of the site and designed accordingly.

The scheme of this project is well climate responsive with large continuous verandah that shades the inner spaces. The use of louvers, sun-breakers and „Jalis" (perforated walls and screens) reflects transformation of traditional elements into the elements of modern architecture. The project is often compared to a pavilion with indoor and outdoor galleries on the ground floor. The project features a beautiful „sculptural staircase" placed in a courtyard that connects the two floors. The height of the project reflects the scale at which human psychology bonds with the spatial quality of a building. Also, the use of courtyards, are spaces that create comfortable semi-enclosed spaces which is very much associated with the cultural and traditional spaces of Bangladesh.

The classrooms and studios are placed longitudinally with the semi-open corridor that lines the existing landscape. A gradual depression by the water body is maintained and a semi-circular strip is aligned to the natural curve of the pond.

The project is so well customized to our natural context and site that even the brick modules were custom designed by Muzharul Islam himself. The Bricks are placed in such a way so that they create shading on the walls, and thus reduces solar heat gain. The architecture of this building could be called the architecture of the “in-between”- where semi open spaces become the thresholds between the inside and outside of spaces.

These „in-between" spaces has the quality to serve as spaces that allow the artists to be inspired from their surrounding landscape and activities and provoke the skills of art. An institute shall have the capacity to invoke the self-learning within artists even in absence of any instructors. The Fine arts institute holds the ability to facilitate its participants with countless vistas of both nature and the interaction of nature with its users to learn from.

This masterpiece, in brief, is very much like the primeval shelters, with the minimalism of enclosures that provide the habitants a close psychological interaction with the natures" ragas throughout the six seasons. The institute of Fine arts is said to be the threshold between „Modernism" and long influence of colonialism. It is the reflection of „Bengali Modernism" in Muzharul Islam"s terms.

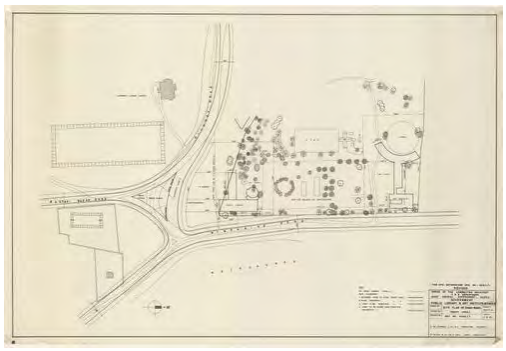


Fig 3.2.3: site plan

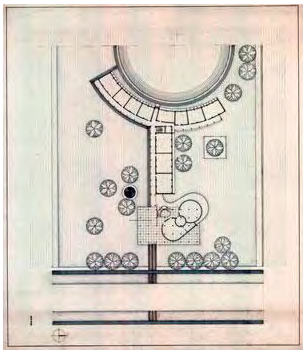


Fig 3.2.4 Ground floor plan

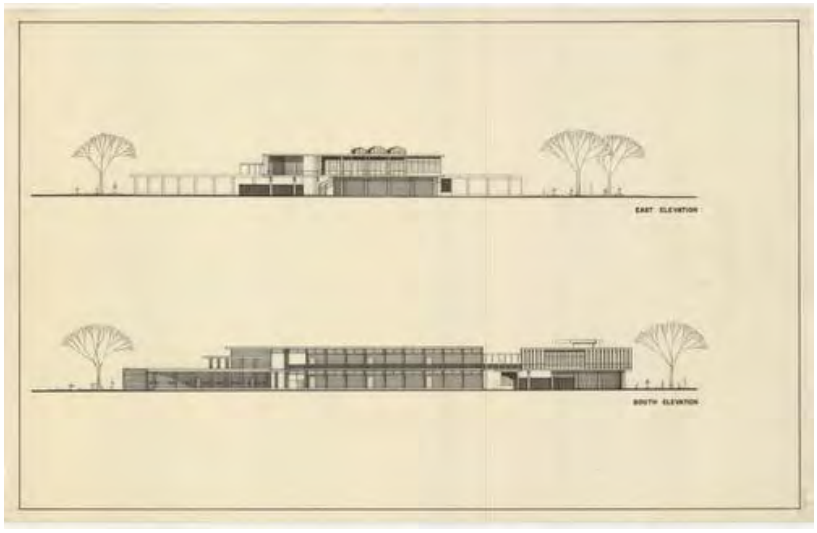


Fig 3.2.5: Elevation

Fig3.2.6: Sun-breakers

Fig3.2.7 : Sculptural stair

Fig 3.2.8: Semi-open corridor

Chapter 04: Program Analysis

The major programs of the project comprises of Administrative, Academic, Laboratories, residential, and other ancillary facilities. The initial program was provided by the Government authority based on requirements, however the final programs were developed based on context, survey and case studies and modified for the project.

The programs have been arranged within 4 blocks in the project initially.

4.1 Block 01: Administrative

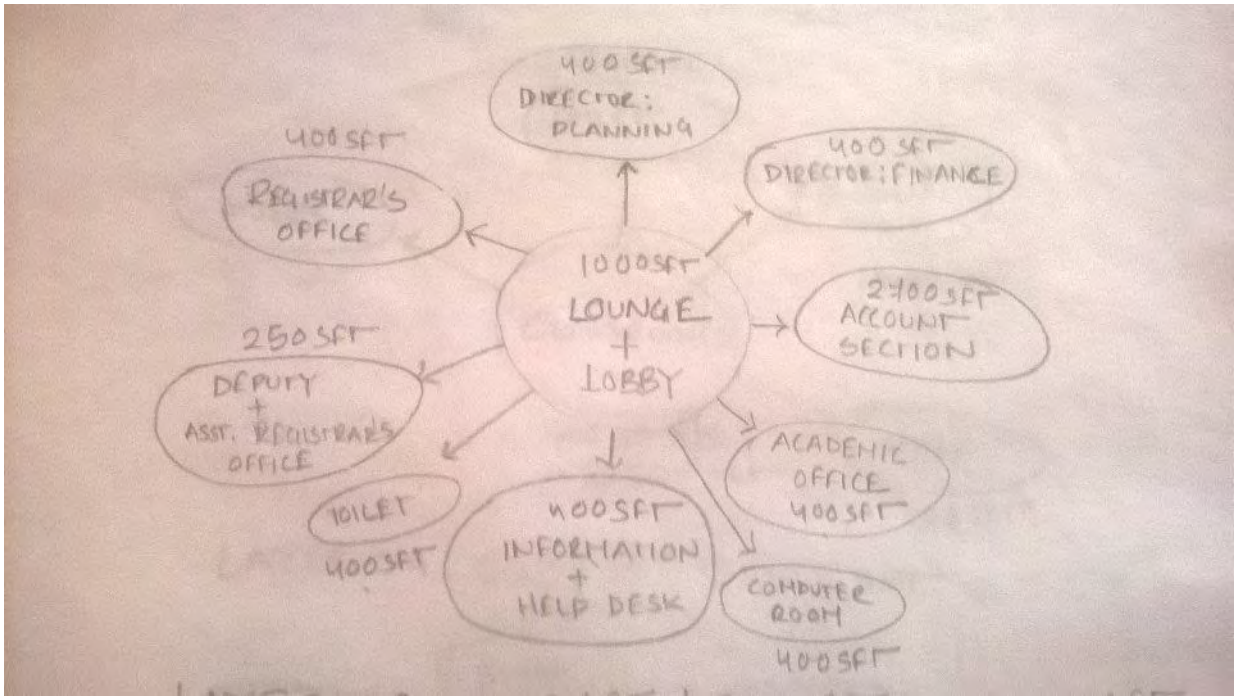


Fig 4.1.1: functional relationship in Block01- Layer01

Layer 01:

5750 sft+ 1725 sft = 7475sft

Functions:

Lounge + Lobby = 1000sft

Information + help desk = 400sft Academic office = 400sft

Account section = 2700 sftRegistrar‟s office = 400sft

Deputy registrar + Assistant Registrar‟s office= 250 sft

Director planning= 400 sft

Computer room = 400 sft

Toilet=400 sft

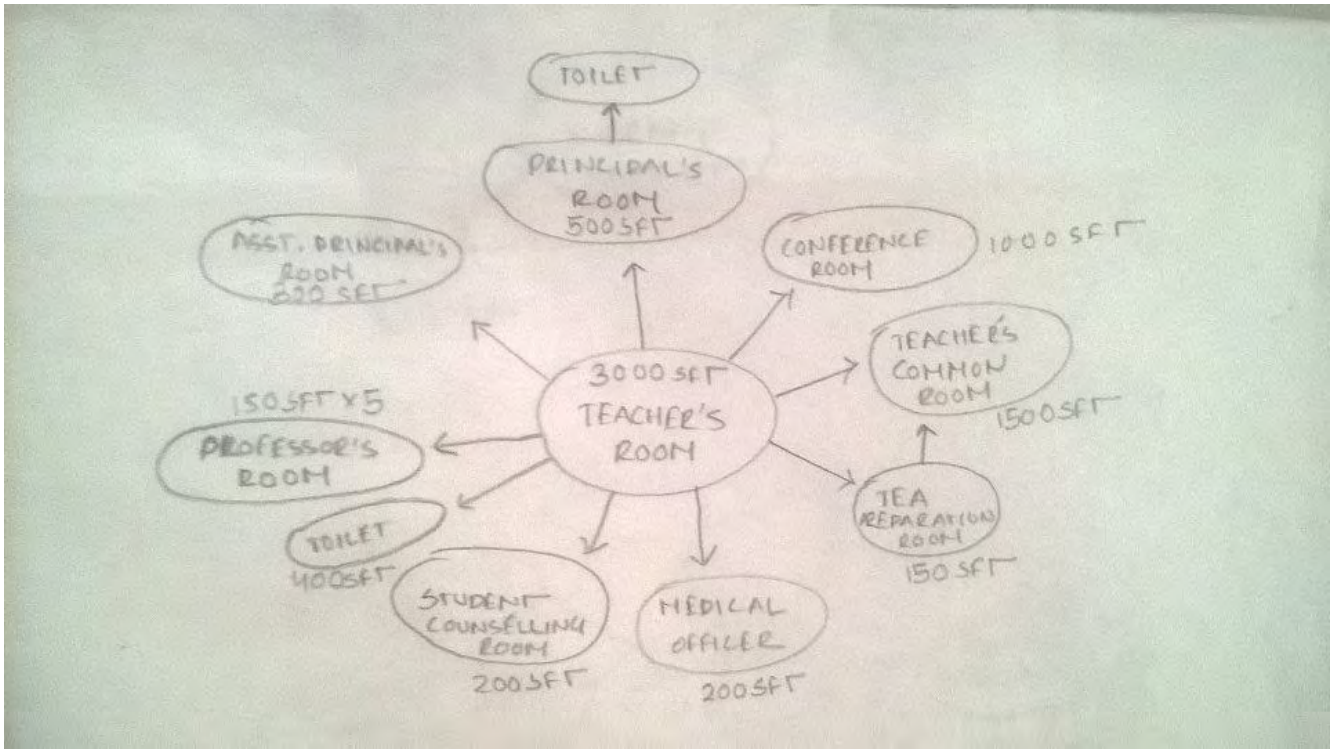


Fig4.1.2: functional relationship in Block01- layer 02

Layer 02:

8000sft + 2400 sft = 10400sft

Functions:

Principal"s room = 500 sft

Asst. principal"s room= 300 sft

Teachers" room = 3000 sft

Teacher"s common room = 1500 sft

Tea preparation room = 150 sft

Professor"s rooms = 150x5 sft =750 sft

Conference room = 1000 sft

Student Counseling room = 200 sft

Medical Officer = 200 sft

4.2 Block 02: Academic

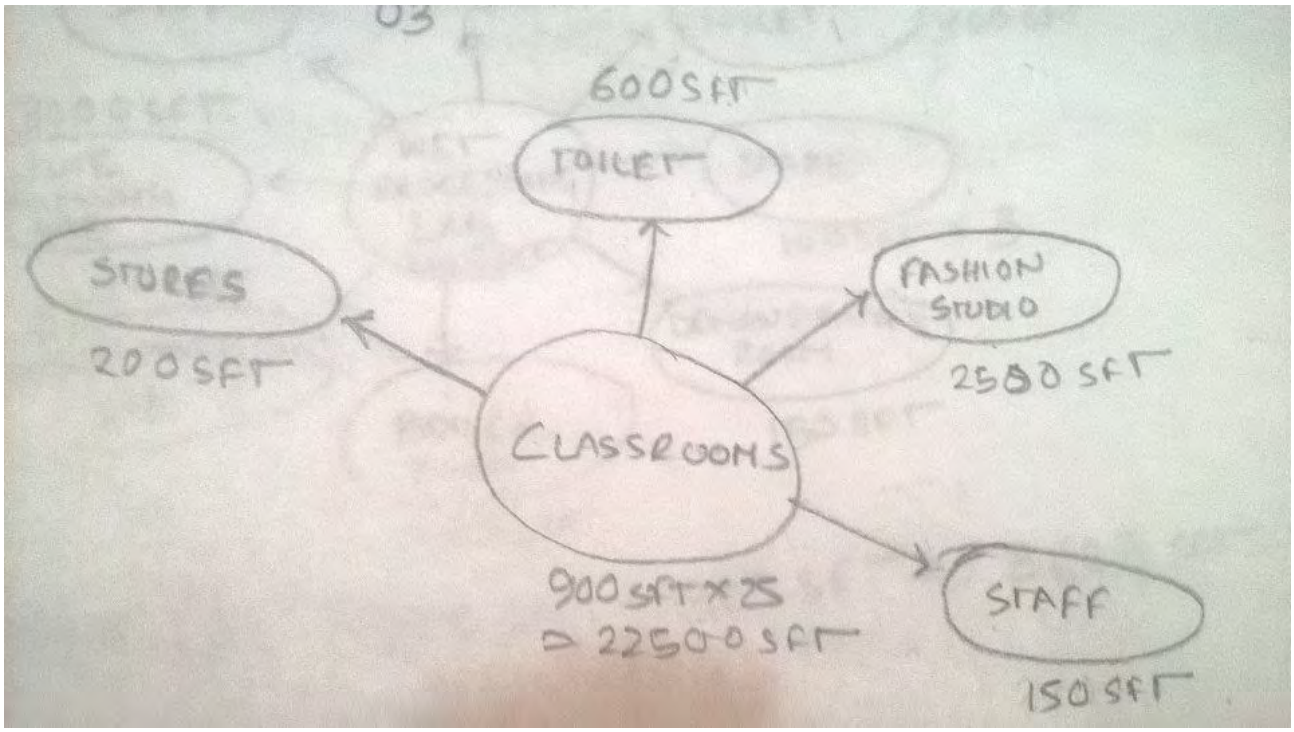


Fig 4.2.1: functional relationship Block 02 – layer01/02/03

Layer 01/02/03:

25950sft+ 7785sft = 30,735 sft

Functions:

Classrooms= 900 x 25 = 22500sft

Fashio studio= 2500 sft

Staff= 150 x3 = 450sft

Store= 200 sft

Toilet= 600 sft

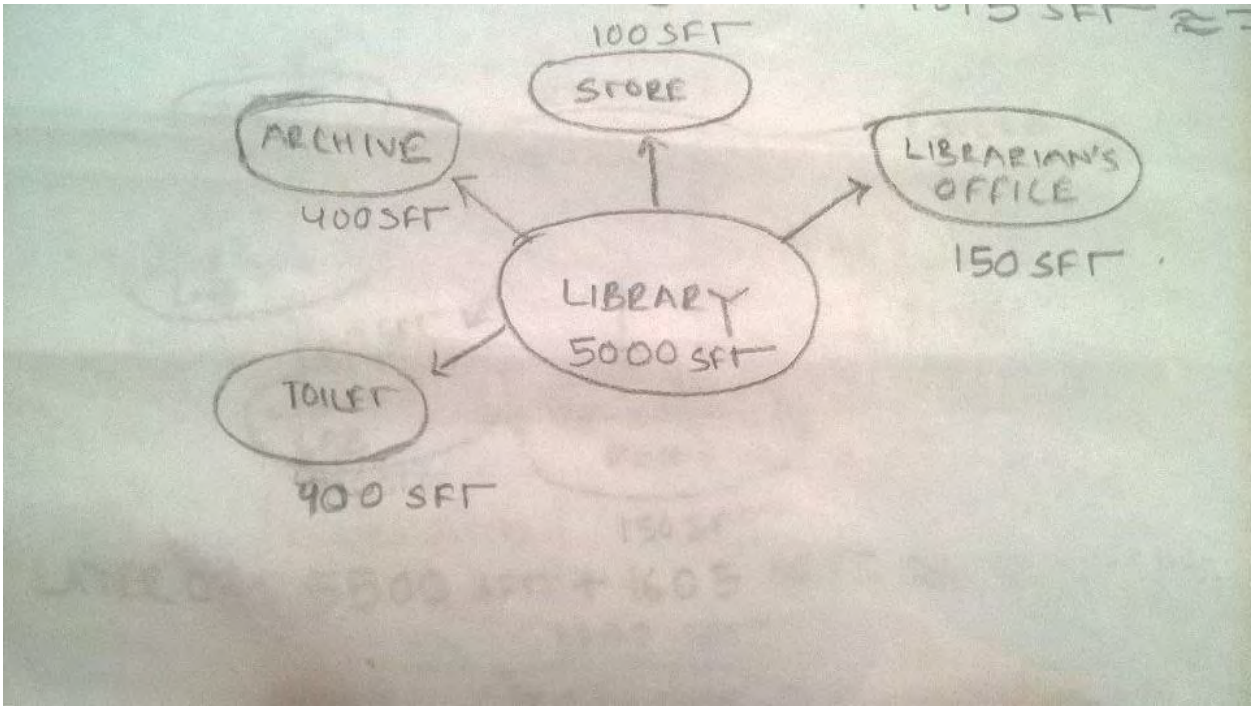


Fig4.2.2: functional relationship of Block02- layer04

Layer 04: 6050sft+ 1815sft = 7865sft

Functions:

Library = 5000sft

Archive = 400sft

Librarian"s office = 150sft

Store = 100sft

Toilet = 400sft

4.3 Block03: Laboratory

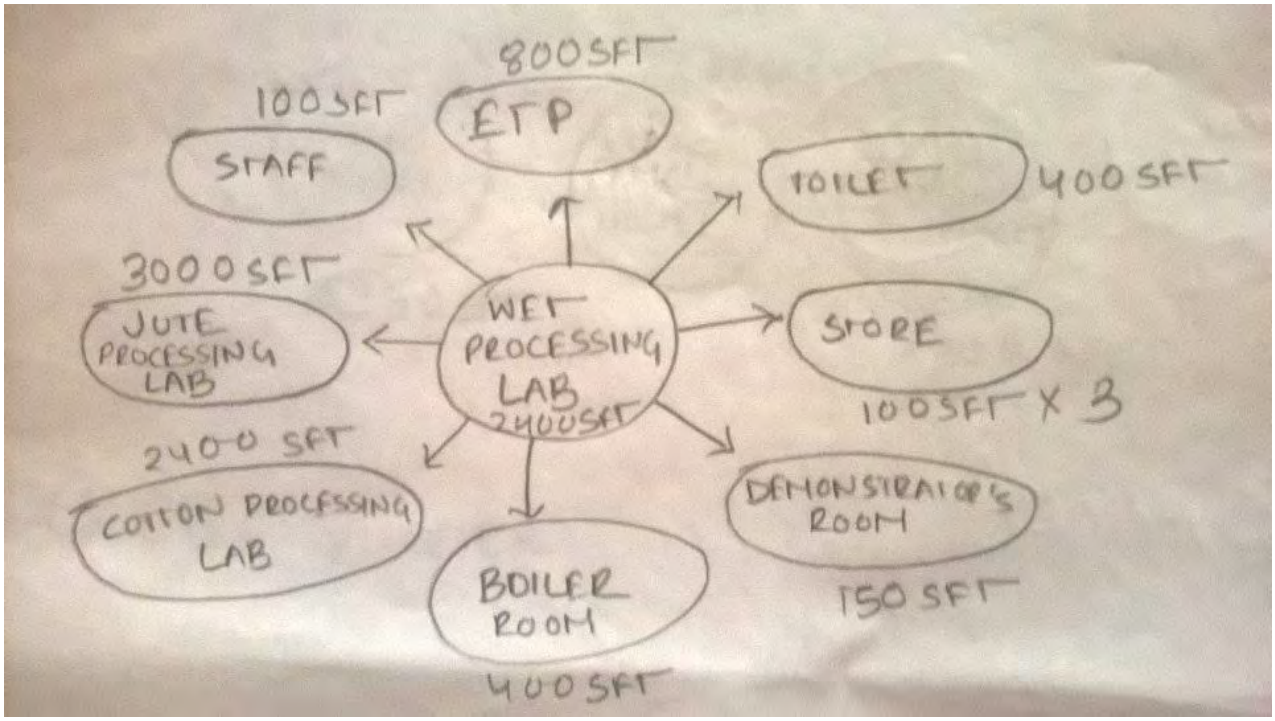


Fig4.3.1: Functional relationship of Block03-layer01

Layer01: 9750sft + 2925sft = 12675sft

Functions:

Jute processing lab= 3000sft

Cotton processing lab= 2400sft

Wet processing lab= 2400sft

Demonstrator"s rooms= 150x3 sft= 450sft

Staff= 100sft

Boiler room= 400sft

Store= 100x3 sft= 300sft

Toilet= 400sft

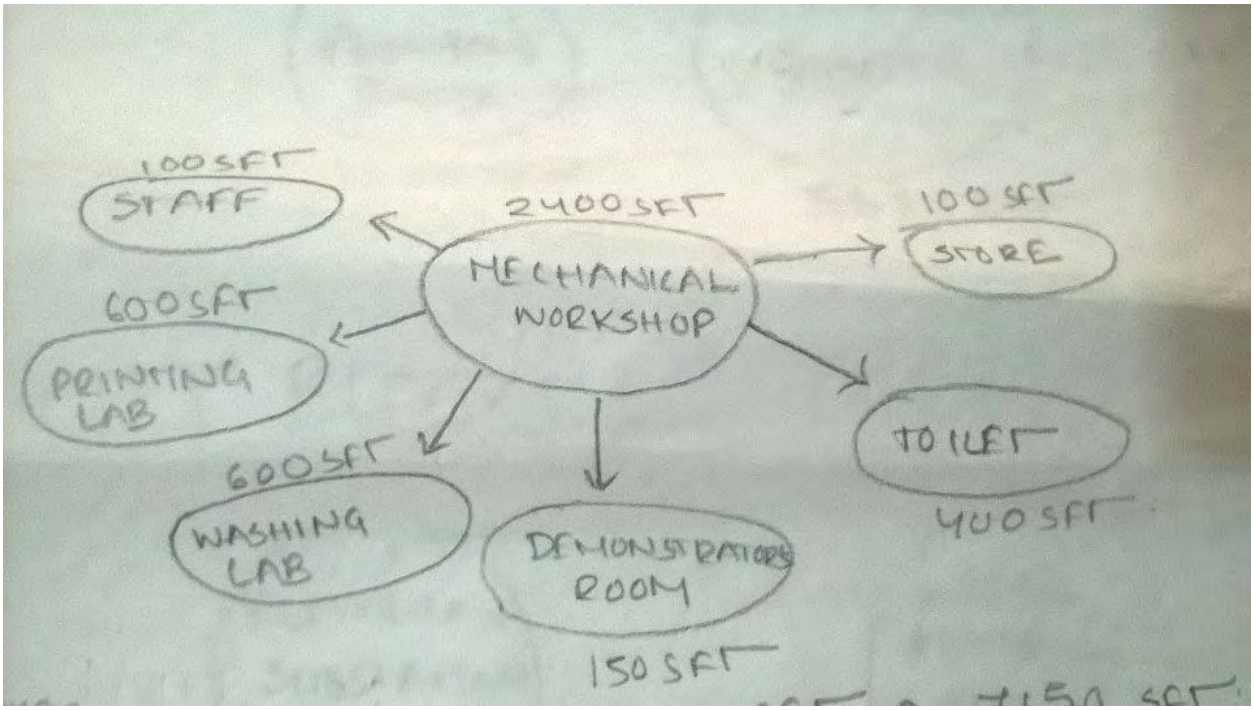


Fig4.3.2: Functional relationship in Block03- Layer02

Layer02: 4300sft + 1305sft= 5605sft

Functions:

Mechanical workshop= 2400sft

Printing lab= 600sft

Washing lab= 600sft

Staff= 100sft

Store= 100sft

Toilet= 400sft

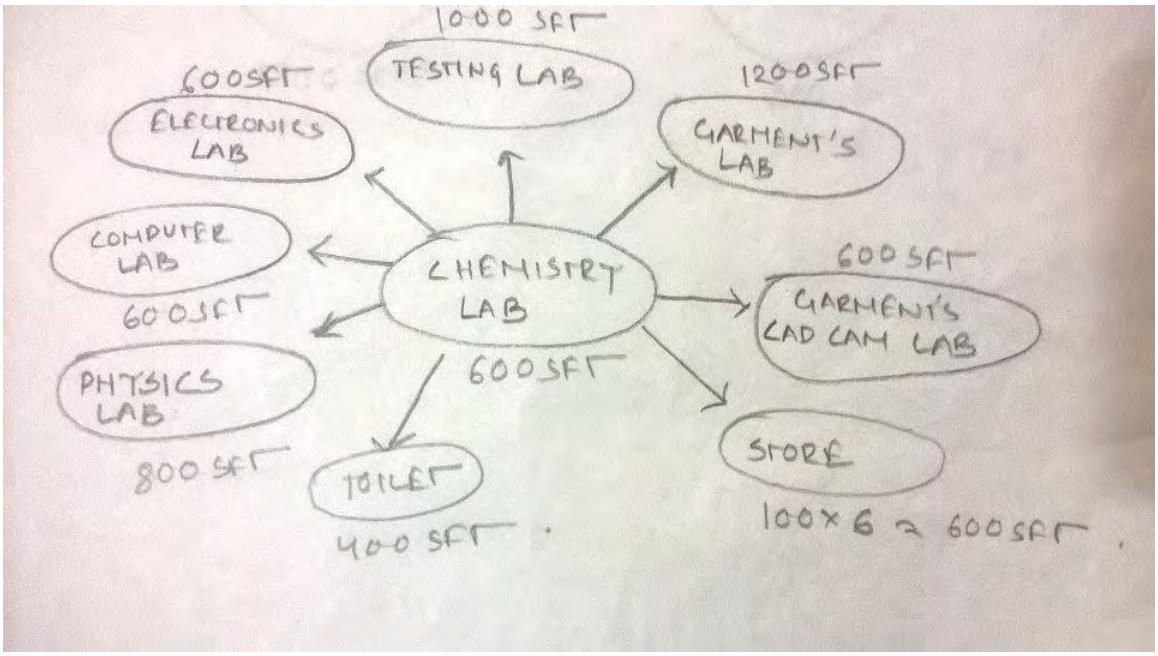


Fig4.3.3: functional relationship in Block03- Layer03

Functions:

Layer03: 5500sft + 1605sft= 7150sft

Chemistry lab= 600sft

Physics lab= 800sft

Electronics lab= 600sft

Computer lab= 600sft

Garments lab= 1200sft

Testing lab= 100sft

Garments CAD cam lab= 600sft

Store= 100x 6 sft= 600sft

Toilet= 400sft

4.4 Block04: Residential

Type01: Dormitory

Male Hostel = 5350sft

Female Hostel = 8000sft

Type02: Teacher"s Accommodations

Teachers" Hostel = 5000 sft

Apart from the major functions, there are some Ancillary and utility facilities, that must be added to the program:

4.5 Functions: Utilities

Water pumping station = 300sft

Electrical substation = 1200sft

4.6 Functions: Ancillary and Recreational

Gymnasium =500sft

Cafeteria = 16000sft

Student"s common room = 1800sft

Prayer space = 500sft

Auditorium = 12000sft

Amphitheater = 500sft

Football field = 45000sft

Chapter 05: Site Appraisal

5.1 History of Gopalganj

The site is located in the Kashiani Sub-district of Gopalganj district under Greater Dhaka Division. It is located at the Southern Central part of Banglaesh. This region is recognized as part of the ancient „Banga" This city was named after „Naba Gopal", the grandson of „Khatra" landlord. Gopalganj has a very glorious chapters in the history; The Battle of Babur Shah against Nusrat Shah, Fakir- Sannyasi Movement, Anti- British movement, The Mass upsurge of "69 are a few of the golden past.

Around 300 BC Kotalipara in Gopalganj, neighboring present kashiani subdistrict was a capital of Gangaridai Dynasty- a powerful kingdom of the subcontinent; a few of the Hindu Dynasties that survived through the Mughal and Sultanate period (Ibrahim, 2011).

Gopalganj is located about 200 km away from the main Dhaka city in the Kashiani sub-district which is located another 20 km from the main Gopalganj District. The Gopalganj district is important in its historical and political background- the birthplace of „Bangabandhu Sheikh Mujibur Rahman", the founder of „Awami League" and the leader of Independence during the Liberation war of "71. Other significant personalities from Gopalganj are- Writer Tarapod Chakrabarti, Noren Biswas, poet Sukanta Bhattachariya, Historian Ramesh Chanda Mazumdar, Nazrul Singer Firoza Begum, Current Indian politician Buddhadeb Bhattachariya

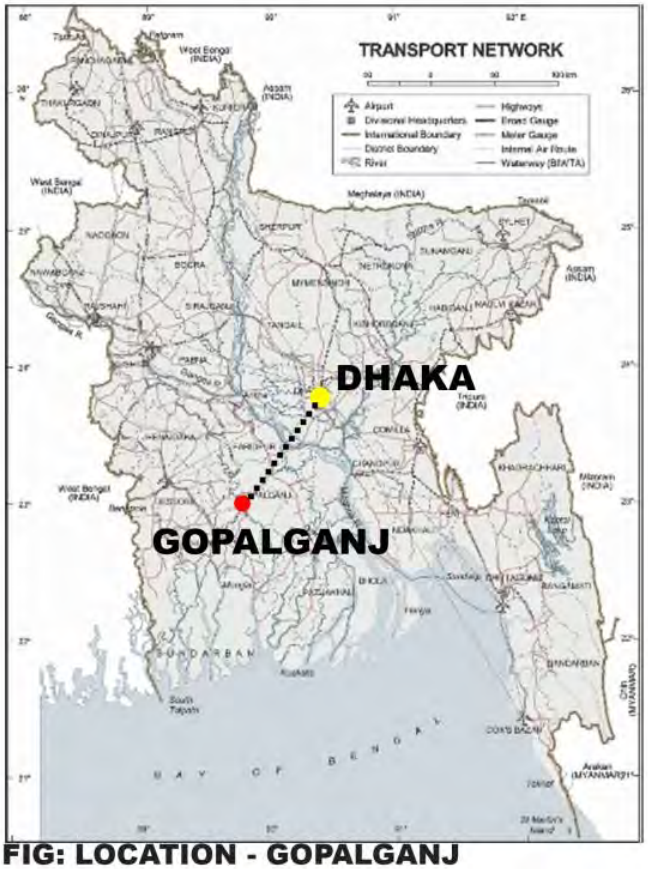


Fig 5.1.1: Gopalganj

5.2 Gopalganj at a Glance:

The city"s surface area is 1490 square km with a population of 1,172,415 civilians, including people of different backgrounds, origin and religion. The Annual average temperature varies between within a range of Maximum 35.8 degrees to a minimum of 12.6 degrees. Total rainfall is 2105 mm. The prime rivers are Garai,Madhumati, Kaliganga, Hunda, Ghagar etc.

The Gopalganj district was established in 1984; and belonged under the Faridpur District before it was established as an individual district itself. The District is associated with 5 sub-divisions, 68 unions, 597 Mauzas, 889 Villages, 4

pouroshobhas, 36 wards and 84 mahallas.

The principal crops include paddy, jute, sugarcane and ground nut, in which Jute and sugarcanes are exported widely (Ibrahim, 2011).

5.3 The Site and the City

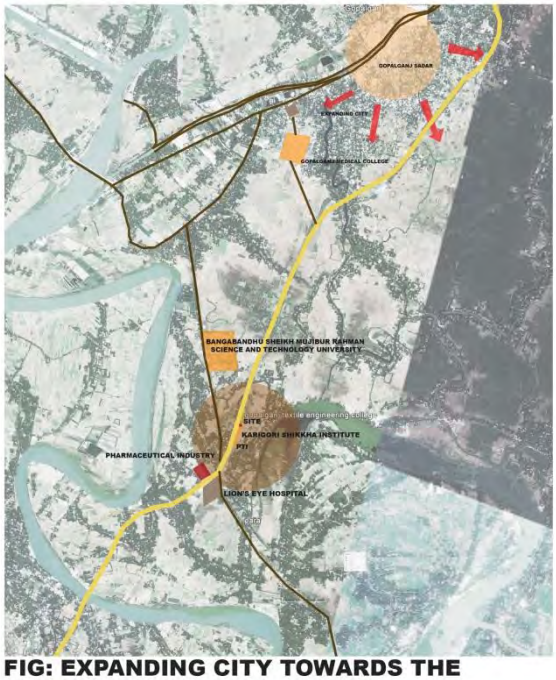


Fig 5.3.1: Site Context

Gopalganj, due to its significant historical and political remarks has been undergoing rapid development since the last 8 to 10 years. In the above Diagram, it is clearly visible that the city is rapidly expanding towards the south that is the Kashiani sub-district. The Government has developed and proposed several significant projects, mostly institutions on the south to attract the growing city towards an education based development. Since the major projects are educational, it can be remarked as a „Future Education hub".

5.4 Site Surroundings

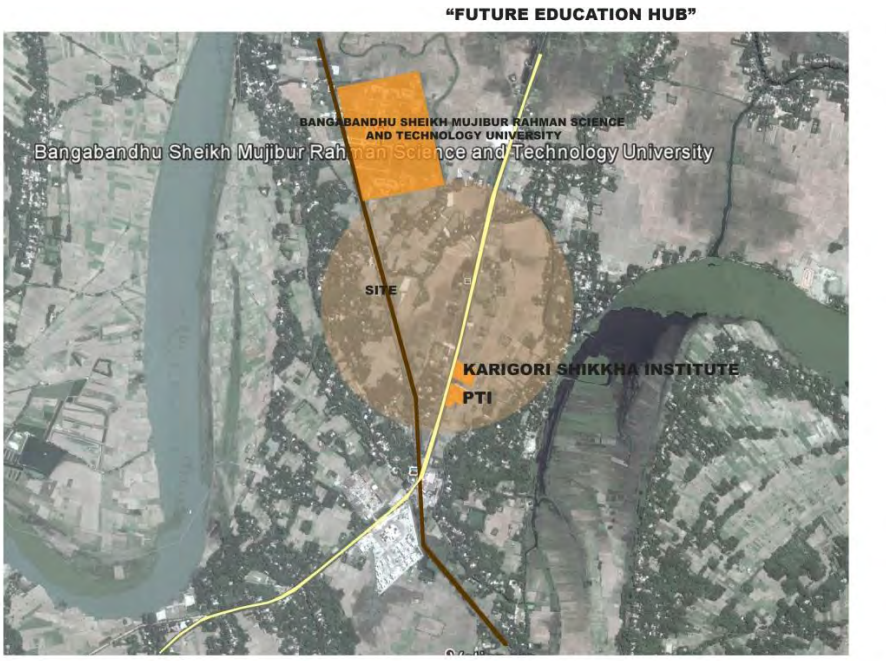


Fig: 5.4.1: Site Surroundings

The site is located on the Dhaka-Khulna highway, near the junction of another secondary road connecting Gopalganj Sadar and Tungipara Sub-district. The proposed site is located in an under urbanizing region, but mostly surrounded by rural developments. It is approximately 8 acres, surrounded by privately owned agricultural fields and two neighboring institutes- The Vocational Institute and the Public Training Institute.

Aligning the Dhaka-Khulna highway are also other newer developments that is attracting the city growth towards the south; The Lion"s Eye Hospital, SKF Pharmaceuticals Industry etc.

5.5 Climatic Response

The south of Bangladesh, due to its marine topography is usually more humid and suffers more precipitation compared to the North. The average rainfall varies within a range of 30 to 350mm, while the maximum precipitation is expected in July (Climate-data, 2014). The maximum Jute cultivation occurs in the rainy seasons while the precipitation is high.

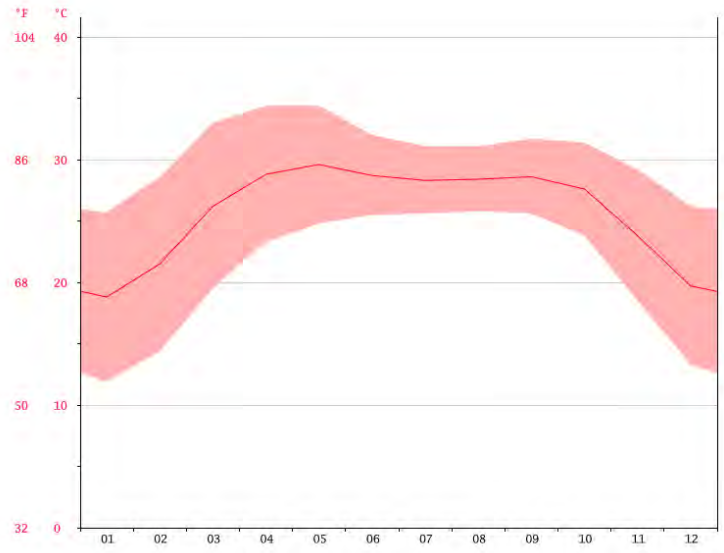


Fig 5.5.1: Average Temperature Graph, Gopalganj (climate-data.org)

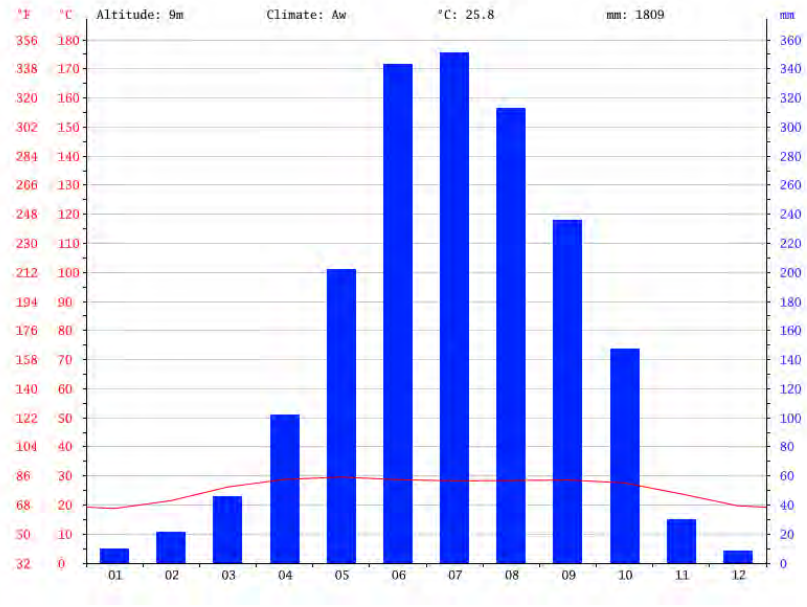


Fig 5.5.2: Average precipitation graph for Gopalganj (climate-data.org)

The site is located at a lower level compared to that of the road, causing water clogging during the rainy season. This region is highly water based, with developing city by the water body. However in the recent years many water bodies has filled up due to rapid development, reducing the region‟s water retention capacity. The site is also dotted with numerous trees and also surrounded by dense green surroundings. It is a great challenge to be submissive towards the ecology with minimum disturbance and also return the region its water retention capacity. Displaying sensitivity to the flora and fauna of the existing site is a must.

The site is blessed with the openness on the north to access better light and ventilation. The air has fair velocity with minimum obstruction due to low to medium height constructions surrounding it.

5.6 SWOT Analysis

Strength:

Free from Urban chaos.

Close to nature.

Located within an Eductional Hub, within a rapidly urbanizing area.

Pollution - free Environment.

Easy accessibility since it‟s located near a Connecting Highway.

Easy access to light and wind due to open surroundings.

Spectacular view of green and agricultural landscape surrounding the site.

Weakness:

Water clogging at the peak of rainy seasons.

Infrastructures under development.

Strong site forces are abscent unlike any urbanized area.

Opportunity:

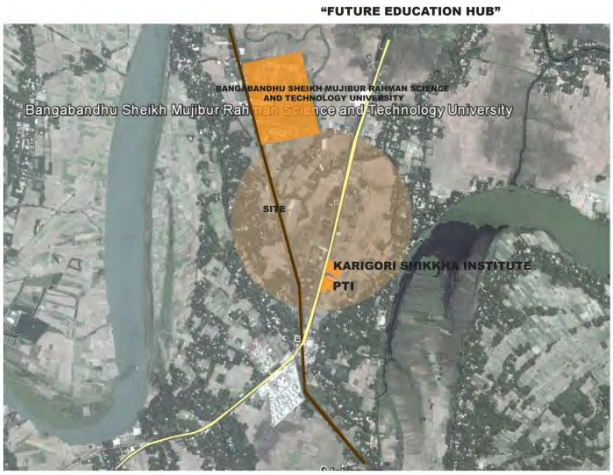
Revival of water body that will refer to diminishing water bodies due to rapid urbanization.

Sustainable design to address the climate.

The campus is located in a to-be-urbanized area, and thus allows opportunities to integrate nature into design and an urban project.

Threats:

The project consists of Industrial laboratories that may increase pollution.



The Proposed site is located in a "Future Education Hub, with two neighbouring institutes,

"The Vocational Institute"
"Public Training Institute"

The following figure shows the current relationship of the existing institutes and the proposed site.

Fig 5.6.1: Site Analysis

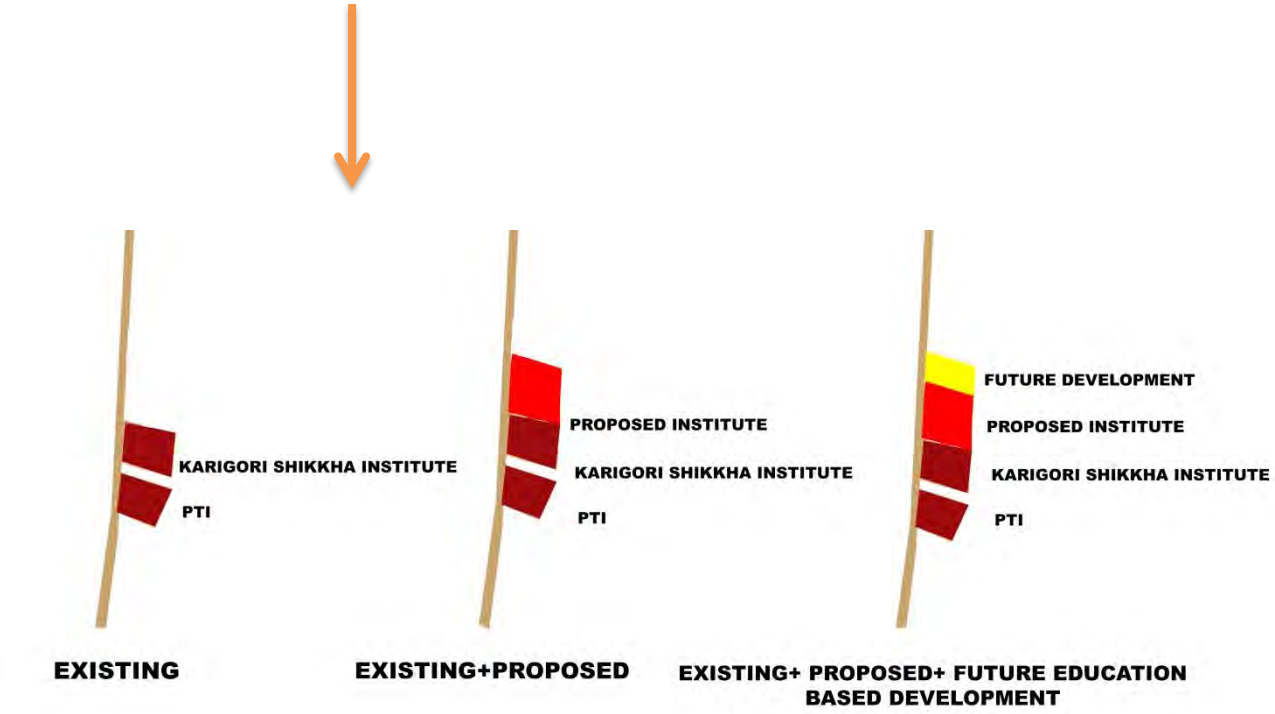


Fig 5.6.2: The relationship between existing institutes and the proposed site.

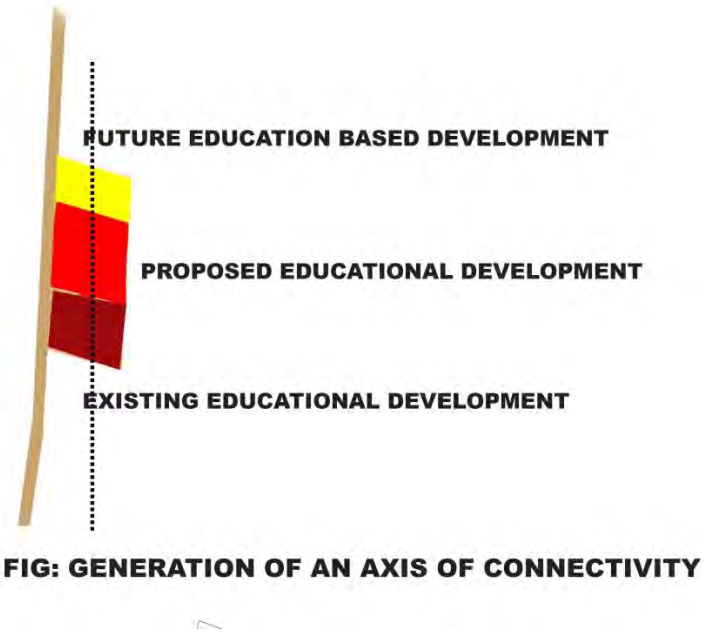


Fig 5.6.3: Initial Idea

The initial idea was to develop an institutional environment with no physical or psychological boundaries; this idea was further facilitated by the fact that the proposed College and the existing Vocational institute belonged to the same client, The Ministry of Education. Therefore it could be possible to remove the Boundary walls of the existing institute and propose spaces in the Textile engineering institute that will bond the institutes together despite different curriculum. Also, it can be assumed that even though there is an adjacent free plot on the north of the site, but there will be further education based developments due to its context and location. Therefore, an axis of integration can be developed which will unite the three spaces together.

6.2 Design Development

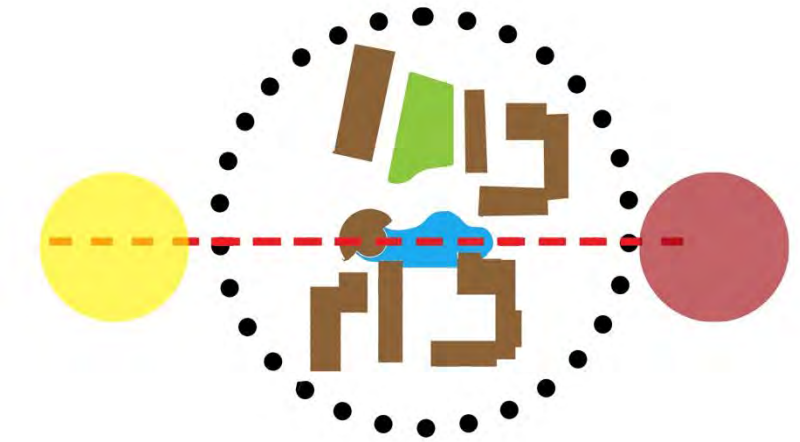


FIG: AXIS IN PLAN

Fig 5.6.4: The conceptual axis is realized in design.

The Diagam above shows how the two factors; the existing Vocational institute is integrated to the future education based development through an axis translated into a waterbody in the proposed institute. Public spaces are created around the waterbody in such a way as to transform an idea into the reality.

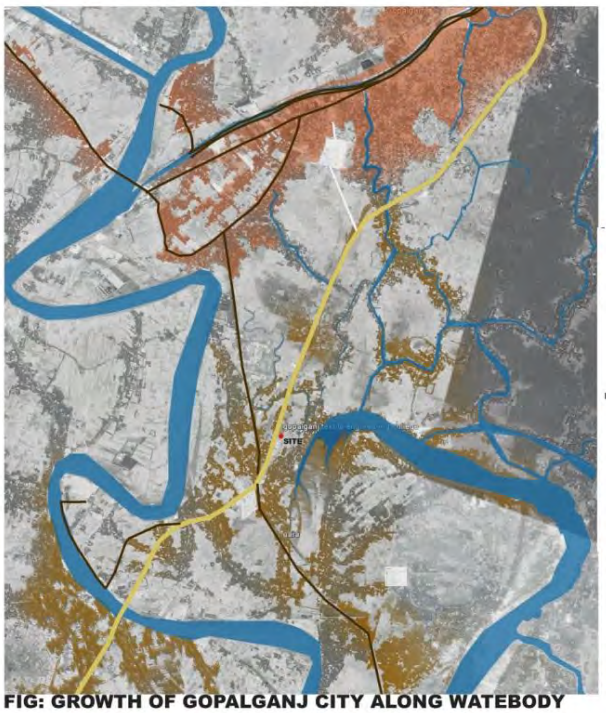


FIG: GROWTH OF GOPALGANJ CITY ALONG WATEBODY

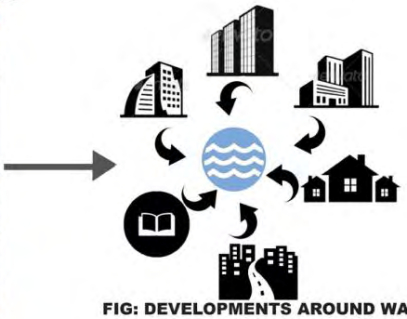


FIG: DEVELOPMENTS AROUND WATERBODY

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Fig 5.6.5: Relationship of the topography of Gopalganj and development of the city alongside waterbody

It is very clear from the above extended map of Gopalganj that the fabric of Gopalganj has been developing alongside the water bodies and expanding towards the south. Even the rural fabric is clearly developing alongside the rivers and canals. This shows how the lifestyle of Gopalganj is closely associated with water. The prime economy of Gopalganj is dependent on agriculture, jute cultivation and fishing. This explains the bondage between water and people of this region.

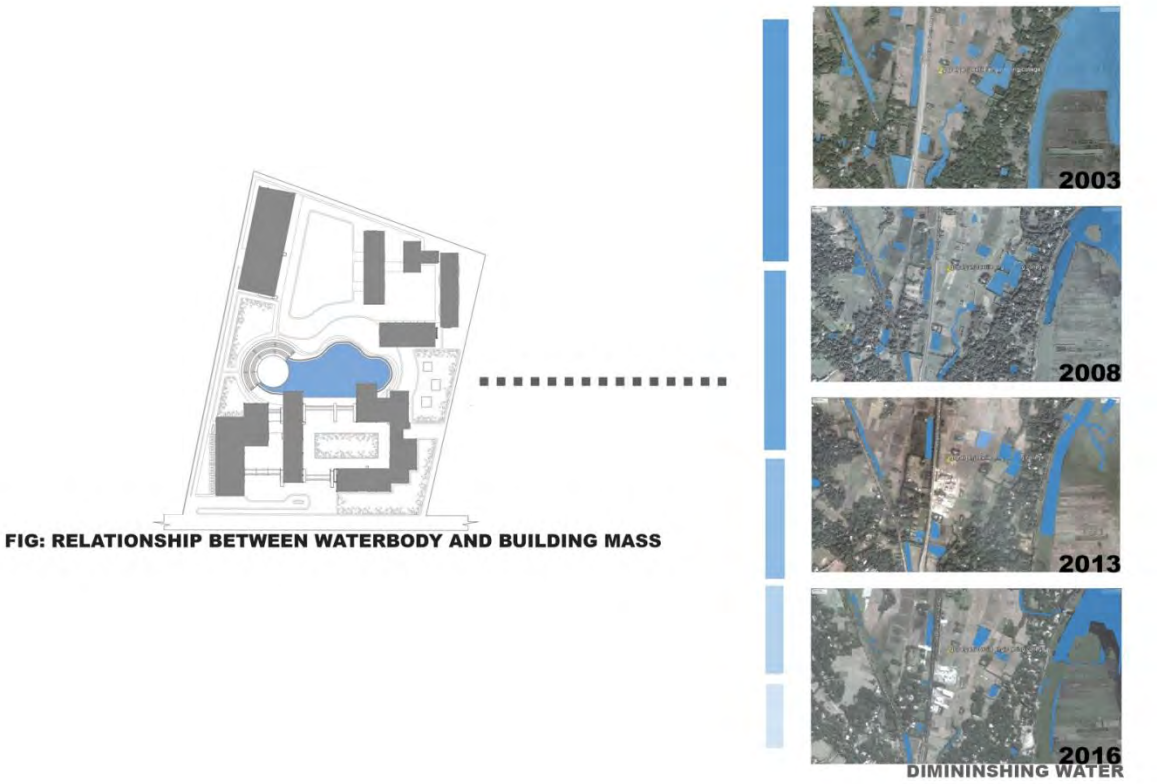

Fig 5.6.6: Timeline showing diminishing Water Bodies over time in site surroundings

However, the timeline in the diagram above shows diminishing water bodies around the site over the fifteen years is alarming due to rapid and unplanned urbanization of Gopalganj city. It shows the insensitivity of urbanization which is opposing the basic essence or lifestyle of the region. Instead of developments associated with the marine lifestyle, water bodies are being filled up for construction. This is not only harming the ecology of that area but also is damaging water retention capacities for the city.

Therefore, the idea was to revive and remind the basic essence of gopalganj through this project. The figure above shows the water body as a prime focus of the project and the relationship of the built areas with the water bodies.

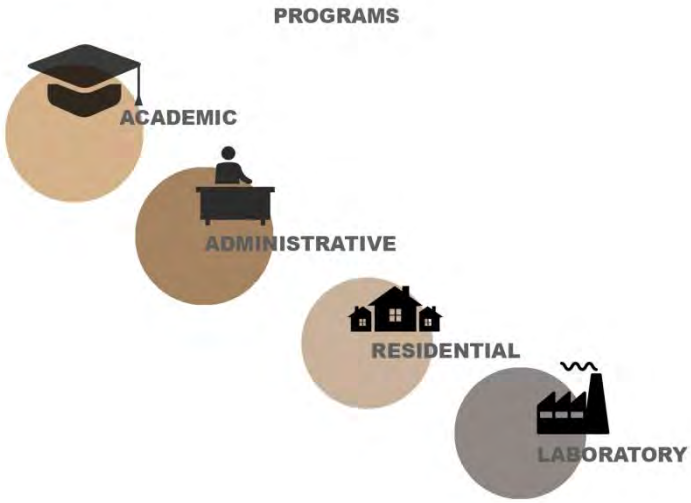

Fig5.6.7: Programs

The Programs of this project could be assorted into 4 programs from the variety of their functions: Academic, Administrative, Residential and Laboratories.

These programs were studied and zoned according to the context of the site and concept. The following diagram explains the zoning of the blocks according to the programs, site context and climate.

The academic block is placed in reference to the existing academic block of neighboring institute.

The administrative functions are placed in between the academic and the public functions, since it is a semi-public function.

The residential block is associated with the existing dormitories of the vocational institute, where the male dormitories are placed in reference to each other. A green courtyard is designed with sculpture gardens in between the male dormitories, linking both the projects.

The laboratory block is disintegrated from the main academic building, because of its distinct functions of industrial laboratories. The laboratories could be a disturbance due to high vibrancy of machines, pollution and high noise. The laboratory is also placed on the north, for more access to natural light.

The public functions are placed adjacent to the future education based development, so that it opens up an opportunity for the future developments to interlink the project.

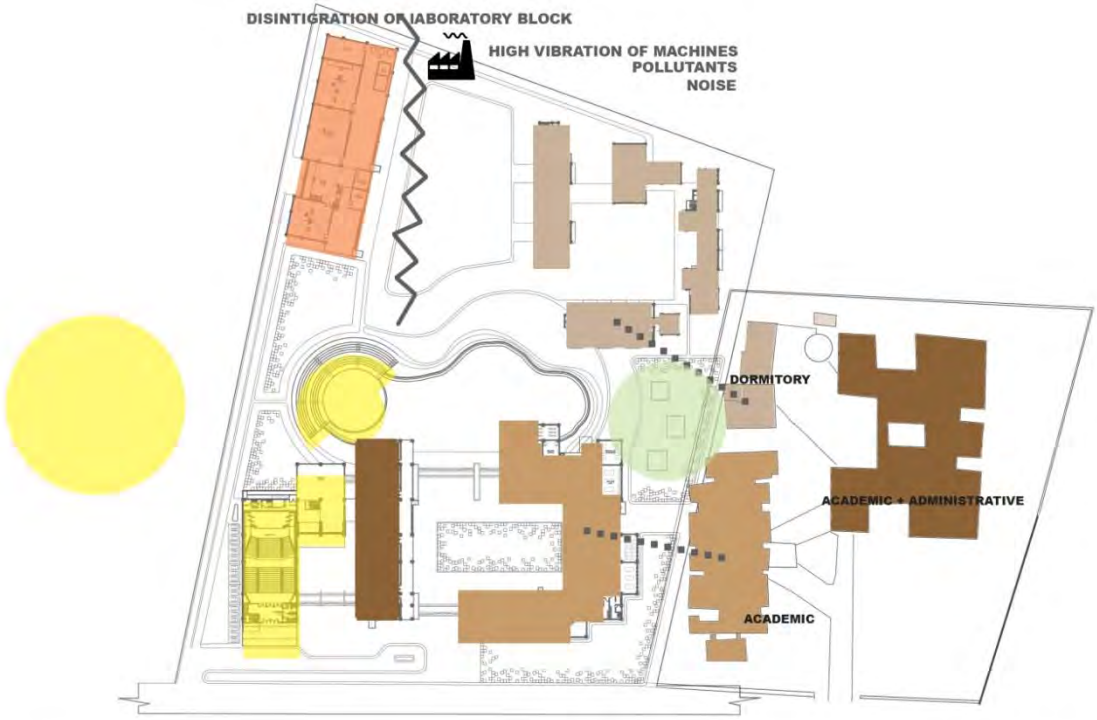

FIG: TRANSLATING THE INTERCONNECTION THROUGH ZONING

Fig 5.6.8: Zoning

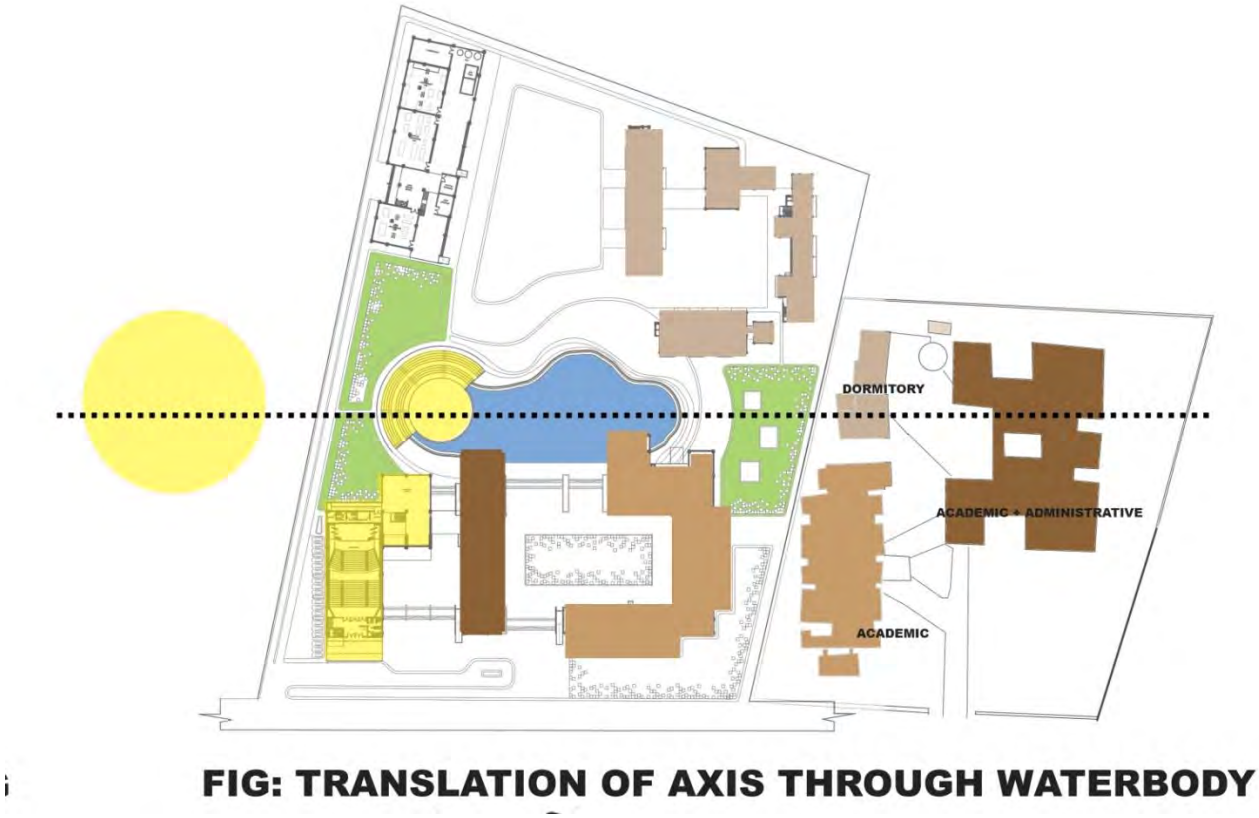

Fig:5.6.9: Water body in Axis

The axis is established through a water body as a prime focus of the project. Public spaces and introvert public spaces are produced according to the requirement of the project, surrounding the prime focus. The functions that are more accessible to the public are clustered together on the northern side of the water body, adjacent the future public development. On the other side of the marine focus is an introvert sculpture garden, with less accessibility of the public. This sculpture garden is surrounded by the dormitories and academic building, making the space more private for the use of the student.

Chapter 07: Final Design

7.1 Site Plan

Fig 7.1.1

7.2 Ground Floor Plan

Fig 7.2.1 GROUND FLOOR PLAN

7.3 Plans, Sections and elevations:

Fig 7.3.1 PLAN @ 25"

Fig 7.3.2 Plan @ 35"

Fig 7.3.3 SEC A-A"

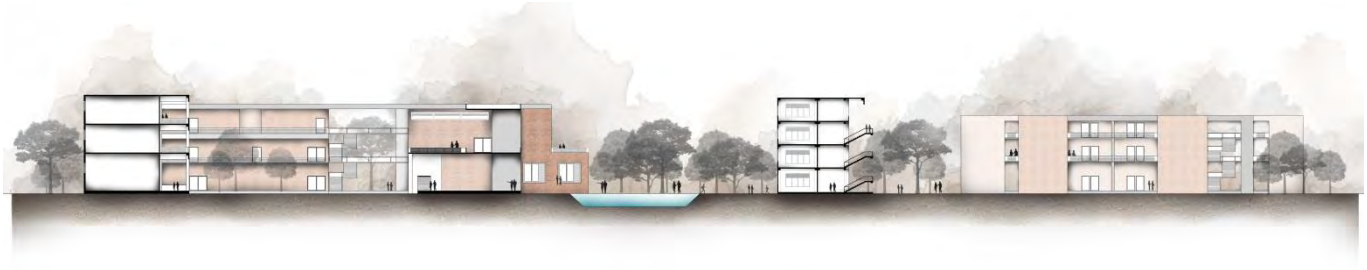

Fig 7.3.4 SEC B-B"

Fig 7.3.5 SOUTH ELEVATION

Fig 7.3.6 WEST ELEVATION

7.4 Perspectives

PERSPECTIVE: VIEW FROM WATER TO ACADEMIC PLAZA

PERSPECTIVE: VIEW FROM ACADEMIC PLAZA

Fig 7.4.1: Perspectives

Chapter 08: Conclusion

The most interesting part of designing an institution is that it gives the designer directions in creating spaces that elevate the learning process. This project is different to many projects in any urban centers, due to the verities of cultures mix in such an educational zone from different regions of the country, and thus the interaction occurs more outside the classrooms. The designer must control the types of generated spaces to allow the students to mix between themselves or amongst the public gatherings or to find their individuality in an open campus.
However in the end, the campus shall open doors to the prime focus of learning.

Designing an institution is challenging enough, but if one understands its users, their lifestyles, and their way of interaction with the nature, it is possible to design a successful educational institution easily.

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