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Consultancy Services for Carrying Out Feasibility Study and Review Study on Rural Growth Centre/Hat Bazar under My Village My Town Project (MVMT)

FINAL REPORT

DEVELOP DESIGN FOR SPECIAL BAZAR AND GROWTH CENTER

SEPTEMBER 2022

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EQMS Mystic Solidaridad

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Consultancy Services for Carrying Out Feasibility Study and Review Study on Rural Growth Centre/Hat Bazar under My Village My Town Project (MVMT)

Reviewed by:
(Signature) 
Name: Indu Bhushan Roy
Title: Deputy Team Leader-1 (Agricultural Marketing/ Economics Expert) &


Golam Mawla
Deputy Team Leader-2 (Rural Infrastructure Expert)

Approved by:


Name: Dr. Md. Mustafa Saroar
Title: Team Leader cum Regional Planner

EQMS Consulting Limited

House #53, Road #4, Block-C, Banani, Dhaka
Country: Bangladesh
info@eqms.com.bd | www.eqms.com.bd

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EXECUTIVE SUMMARY OF STUDY 4&5:

Study 4 & 5 is based on the construction and management of agricultural product collection center and special bazaar (based on case studies for each type).

The main target of the study is to develop a replicable design strategy for collection centers special bazaars and growth centers in different contexts and improve construction and management strategies for the effective provision of supporting infrastructure.

Chapter 1 explains the role bazaar in our country. It also gives a glimpse of the problems of the existing bazaar and the government's approach to making infrastructure tendencies in growth centers. This chapter includes project methodology and activity list, the key target of the project, selection of sites for case studies, site analysis, accessibility, bazaar timing, the present physical structure of the bazaar, the trend of changes, finding the existing problems, demand gap, local demand, and future potentialities.

Chapter 2 describes the case study selected by the team. After selecting case studies of the collection center and special bazaar, a countrywide survey was conducted where the infrastructure requirements of those case studies have been identified, the existing problems of the bazaars have been addressed and the probable important functions have been found which are not available in the present site. The survey is based on FGD (Focal group discussion), KII (Key interview information), investigations, analysis, and studies. The survey includes a performance analysis of the case study, the trend of changes, the current status of bazaars, site analysis and the site surrounding analysis, collecting available social, historical, climatic, geographical, legal, and infrastructural data, and finally develop a replicable design which is not only sustainable for the users but the environment.

Chapter 3 refers to the prototype guidelines of bazaar functions that can be replicated throughout the country. It offers the designated guidelines for the planning of a growth center. It shows in an architectural plan, how the required value-added functions can be integrated with the present bazaar functions sustainably.

Chapter 4 describes the operational guidelines of the market management committee.

Chapter 5 describes the design principles which have to be followed in future Haat-Bazaar design manuals.

CHAPTER -1: INTRODUCTION

1.1. STUDY BACKGROUND HAT-BAZAR DESIGN CONSIDERATION:

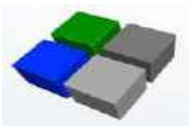
Growth centers and hat bazars constitute the financial lifeline of the rural economic system. A bazaar is a social mechanism for producing and exchanging goods and services**.** However, the present scenario of rural bazaars expresses the deficiencies of number of amenities and facing the lacking of insufficiencies. Apart from parking, traffic congestion, accessibility, and circulation are also major problems of current rural bazaars. The combination of old narrow pedestrian, corridors with non-standard infrastructure like electricity networks and sanitary and sewage systems has resulted in complicated problems. Little attention is paid to the maintenance and repair of the infrastructure of the bazaar. Necessary steps should be taken for infrastructural improvement of the bazaars to enhance the rural and national economies.

Rural areas have a massive potential to start up new business practices for young people. Regional road connectivity has improved and distance between city and village has reduced. Rural Hat-Bazar has not developed with its full modern features to accommodate digital facilities where young people get equipped market access for developing rural entrepreneurship as per local agricultural production and other human capital services. Designing some value additional functions in bazaars can significantly contribute to solving the employment problems of young rural people where employments generation as well enhancing productivity.

It was not far when rural bazaars mostly used to be male-dominated places, it was socially women were engaged mostly in domestic works, but now the situation has changed dramatically and women are participating more in the labor force than ever before. Women's inclusion in formal and informal marketplaces and designing women zone in bazaars is a must need for women empowerment.

Appropriate planning and development of those the Hat-Bazar are essential for a vibrant rural financial system, effective alternatives, and linkage between Bangladesh's rural and urban regions. This will combine the whole country into an unbroken network however will also make certain prosperous livelihood for rural manufacturers, especially farmers. Bazaar Infrastructure development will contribute to economic growth by stimulating economic activity, and productivity and simultaneously enhancing the quality of rural life.

1.2. AIMS AND OBJECTIVES:

	➢ To study the existing functional relationship between collection centers and growth centers to understand the traditional bazaar morphology.
	➢ To study the characteristics, Physical infrastructure, shop size, public-private land ratio, and MMC.
	➢ To study the cultural context of rural areas which is an important aspect to represent the city's retail and entertainment culture to the users.
	➢ To study accessibility, loading-unloading, parking, circulation, people movement, and mobility of the bazaar.
	➢ To study Bazaar timing, business hour, pick hours, dull hours, and flow rate.
	➢ To study growth patterns and trends of changes.
	➢ To study the demand gap, facilities for young entrepreneurs, women corner, and other value-added functions.
	➢ To study sustainable features, rainwater harvesting, solar panel, waste management, and drainage system of the bazaar
	➢ To find a design layout/framework of how multiple public functions of the site should coexist.
	➢ To provide a set of guidelines and activity lists having sufficient information and instructions that can be followed step by step to produce a development plan for Haat- Bazaar.

1.3. METHODOLOGY AND ACTIVITY LIST:

1.3.1. KEY TARGETS:

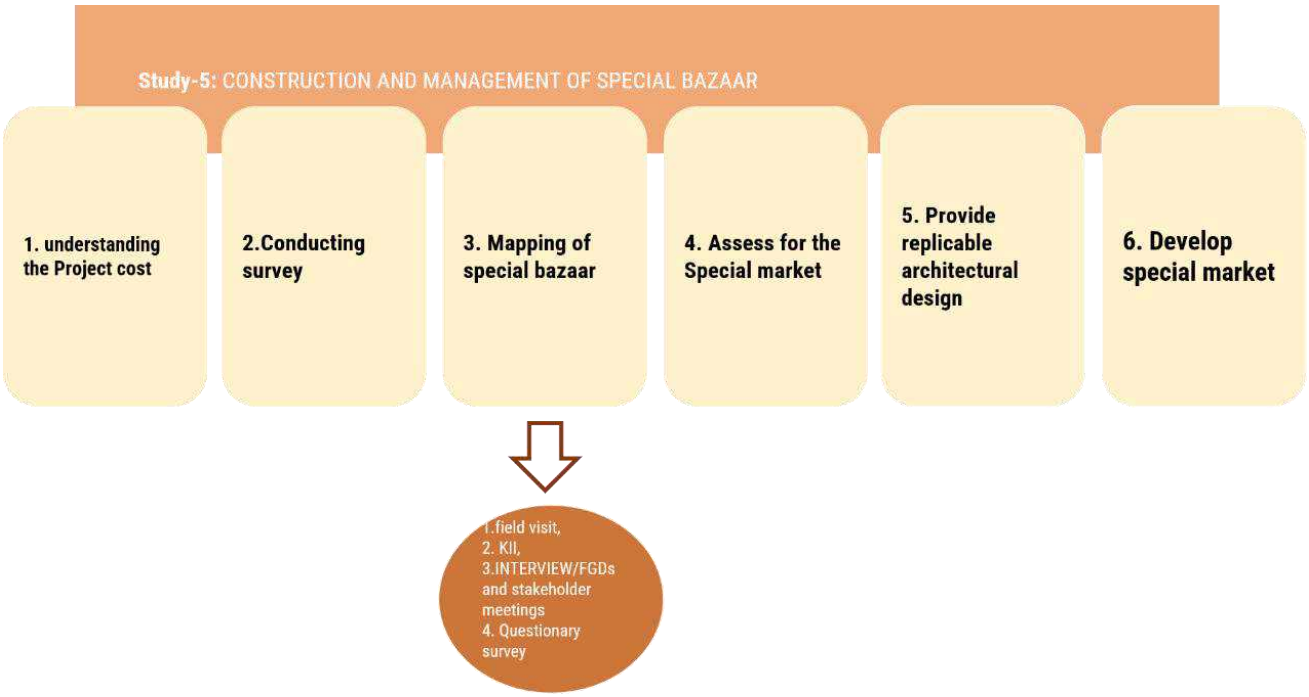
STUDY 4	• Conduct survey to create access network of collection centers • Select 3 collection centers as case study • Assess requirements of collection centers through field visit, KII, FGDs, stakeholders' meetings, value chain analysis • Proposed Design development based on a case study findings and recommendations.
STUDY 5	• Conduct survey to create a map of access network of special bazaar or seasonal fruits and vegetables • Digitize the special market location in maps • Provide replicable architectural design and guidelines of Special Bazar. • Recommendations to develop special Bazar and Growth Center

1.3.2. METHODOLOGY OF DESIGN STUDY:

To extract the true picture of the present state along with the demand and functional feature assessment the study took the methodology. Literature review, various articles and newspaper reports refer significant information of critical situation analysis.

Design Study followed the activities to understand the evaluation of the functional requirement of the collection center, examines the productivity of nearby manufacturing units, analyzes the trend of changes in the present bazaar, and assesses the requirements seasonal bazaar to determine the future prediction and generate a suitable program and plan for the construction of the agricultural product collection center.

For Special bazar, various analysis including agricultural production factor investigation, value and supply chain appraisal describes the evaluation of the functional requirement of the special bazaar. The aim is to generate a replicable plan after analyzing all the facts.



1.3.3. ACTIVITY LIST:

STEP 1: SELECTING CASE STUDY:

6 number of bazaars from different contexts such as plain land, hill, hawor, coastal, and island have been taken as case studies to gain a greater understanding of the bazaars. It will help the designers to understand the various aspects of designing, and generate in-depth, multi-faceted knowledge of such a complex issue in its real-life context.

Fig: Shatmile bazaar, Jessore

Fig: Chalakchar bazaar, Narshigdi

STEP 2: PREPARING QUESTIONS FOR THE SURVEY:

Some questions must be made for collecting, analyzing, and interpreting data from farmers, stalk holders, businessmen, women entrepreneurs, consumers, and MMC members. The questionnaire must be valid, reliable, precise, and responsive to target

respondents because at the end of the day the analysis is going to develop based on the information required from the questionnaire survey.

Fig: Example of the questionnaire survey

১	বাজারের স্বরূপ (বিক্রিত পণ্যের নিরিখে)		
২	দোকানের সাইজ	সরকারী	ব্যক্তিমালিকানাধীন
	ছোট		
	মাঝারি		
	বড়		
৩	কত ধরনের পেশা বাজারের সাথে জড়িত		
৪	ব্যবসায়ীর সংখ্যা	সরকারী	ব্যক্তিমালিকানাধীন
	২০০০		
	২০১০		
	২০২২		
৫	পাইকারী ব্যবসায়ীদের সংখ্যা		
৬	খুচরা ব্যবসায়ীদের সংখ্যা		
৭	কলা,পান ব্যবসায়ীদের সংখ্যা		
৮	দোকানের সংখ্যা		
৯	দোকান জোন		
	দোকানের সংখ্যা	খুচরা	পাইকারী
	২০০০		
	২০১০		
	২০২২		
১০	বিক্রেতাদের মাসিক আয় (পণ্যভেদে)		
১১	বিক্রেতাদের বার্ষিক আয়		
১২	বিক্রেতাদের দোকান ফি মাসিকভাবে		
১৩	কলা, পান ব্যবসায়ীরা অন্য কোন ব্যবসায়ের সাথে জড়িত কিনা		
	ঢাকা থেকে কি কি পণ্য বাজারে যায়		
	বাজার থেকে কি কি পণ্য ঢাকায় যায়		
	পণ্য ডেলিভারির সময়	LOADING-UNLOADING	SELLING
১৪	EXISTING BAZAAR ZONING		
	২০০০		
	২০১০		
	২০২২		

১৫	অন্যান্য জেলা থেকে কি কি পণ্য বাজারে আসে?		
১৬	বাজার থেকে কি কি পণ্য অন্য জেলায় যায়?		
১৭	নিকটে আর কোন বড় বাজার রয়েছে কিনা		
১৮	ম্যানেজমেন্ট সিস্টেম		
১৯	বাজারটি কারা এবং কিভাবে পরিচালনা করে?		
২০	[illegible] থেকে শহরমুখী মানুষের অনুপাত (ব্যবসা,শিক্ষার খাতিরে)		
২১	বাজারের কোন অংশটিতে সর্বাধিক লেন দেন হয়		
২২	দিনের কোন সময়টিতে বাজার সবচেয়ে জমজমাট থাকে		
২৩	বছরের কোন সময়টিতে বাজার সব চাইতে জমজমাট থাকে		
২৪	ঋতু পরিবর্তনের বাজারের পণ্য কেনা - বেচার উপর কোন প্রভাব আছে কি না		
২৫	একই ধরণের সবজি বাজারের বিভিন্ন জায়গায় কেন বিক্রি হয়?		
২৬	জায়গার একটি নির্দিষ্ট স্থান (2000) নিয়ে জানতে কোন সমস্যা আছে কিনা?		
২৭	হাইওয়ে এর দৈনিক [illegible]		
২৮	আপনি ভবিষ্যত বাজারটিকে কেমন দেখতে চায়?		
	খুচরা বিক্রেতা		
	পাইকারী বিক্রেতা		
	ক্রেতা		
	লোকাল মানুষ		
৩৬	জরুরী ব্যবস্থাপনায় বাজার কমিটির উদ্যোগ		
	আগুন		
	বন্যা		
	দুর্ভিক্ষ		
৩৭	বছরের বিশেষ সময়ে বাজারের অবস্থা (ঈদ, পূজা, [illegible])		
	ক্রেতা		
	বাড়তি পণ্য উৎপাদনের পরিমাণ		
	বাড়তি পণ্য ক্রয়ের পরিমাণ		
৩৮	সাপ্তাহিক বাজার জোনিং (সময়ানুযায়ী)		
	শনিবার		
	রবিবার		
	সোমবার		
	মঙ্গলবার		
	বুধবার		
	বৃহস্পতিবার		
	শুক্রবার		

STEP 3: CONDUCTING SURVEY:

A physical survey and socio-economic survey are conducted to evaluate the present condition, functional programs, target audience, market management policy, bazaar timing, the trend of changes, and morphology of the bazaar that helps to understand the present bazaar condition and bazaar zoning.


Fig: survey images

STEP 4: KII, FGD:

Both focal group discussion and key informant interviews are important to gather opinions about the present condition of the bazaars chosen as case studies. This information will help to take future actions, stimulate discussion, generate new ideas, and guide to produce a sustainable design. The FGD and KII will be conducted between businessmen, farmers, stalk holders, consumers, planners, bazaar committee, and consultants.

Fig: FGD in Chalakchar Bazaar

Fig: KIIi in Gazirhat Bazaar

STEP *5*: PROBLEM ANALYSIS*:*

Bazaar problems are the challenges, frustrations, and unmet needs of the user base. Those basic problems will be identified by talking with the people who are related to the bazaar such as businessmen, farmers, stalk holders, and consumers, and taking their interviews through KII and FGD. With problem identification; the designer can identify the root cause of a problem, develop a detailed problem statement and implement an ideal solution.

Fig: drainage system in existing bazaars

Fig: temporary bazaar shades:

STEP 6: DETERMINE THE FUTURE POTENTIAL AND FUNCTION:

Besides permanent platforms and shades, some value-added functions for different markets from different contents have to be specified. As an example, vegetable sellers bring their products after collection, drying, cleaning & grading for sale. So, a space for sorting grading, processing, and packaging is important in the vegetable market. A slaughtering house must-need in the meat market. It is essential to establish a godown to aggregate the stocks procured at each haat. Info corner, display center for young entrepreneurs, and women's corner are necessary for almost all bazaars. If such a system is kept in all the bazaars, the time and labor of the farmers will be saved and the rural economy will be boosted.

Fig: women zone

Fig: space for sorting-grading

STEP 7: PROPOSE DESIGN:

After analyzing all aspects and data, the design team will develop a design to improve the condition of these places and establish a formal structure where trading can take place in a systematic manner. The idea is to establish an infrastructure where examples of livelihood through value addition shall be created. Such examples shall be replicated at other places on its success.

Fig: proposed future bazaar scenario

1.4. SITE SELECTION:

There are almost 400 growth centers in Bangladesh. Each growth center has some basic functional and similar characteristics. the characteristics of haat bazaar vary with the progressive change in geography and topography. To assess the variety of these bazaars, the whole country is divided into some geographical contexts such as:

- Plainland
- Hill tracks
- Haor
- Coastal
- Island

Based on the above-mentioned context, the following bazaars have been selected as case studies:

a. ***Chalakchar Bazaar**: (Plainland)* Location: Chalakchar, Narshingdi, Dhaka
b. ***Shimulbaag bazaar**:(hawor)* Location: Shunamganj, sylhet
c. **Sha*tmile bazaar**: (coastal)* Location: Shatmile, Jessore, Khulna
d. ***Gazirhat Bazaar**: (coastal)* Location: Gazirhat, Shatkhira, Khulna
e. ***Abu Torab Bazaar:**(hill track)* Location: MIreshorai, Chittagong

Chalakchar Bazaar, Narshingdi

Chalakchar Banana Bazaar

Shatmile bazaar, Jessore

Gazirhat Bazaar, Shatkhira

Abu Torab Bazaar,Mirsharai

1.5. SITE ANALYSIS:

Before starting any design, it is too important to know if the site is suitable for the project. A detailed site analysis will assess whether development is economically feasible, and establish parameters to implement the best design solutions that respond to the physical and environmental features of the site. It helps the architects to understand the present problem and predict future solutions. It allows us to understand the existing problems, opportunities, and weaknesses in a site which helps to make decisions on how to respond to the findings for future development.

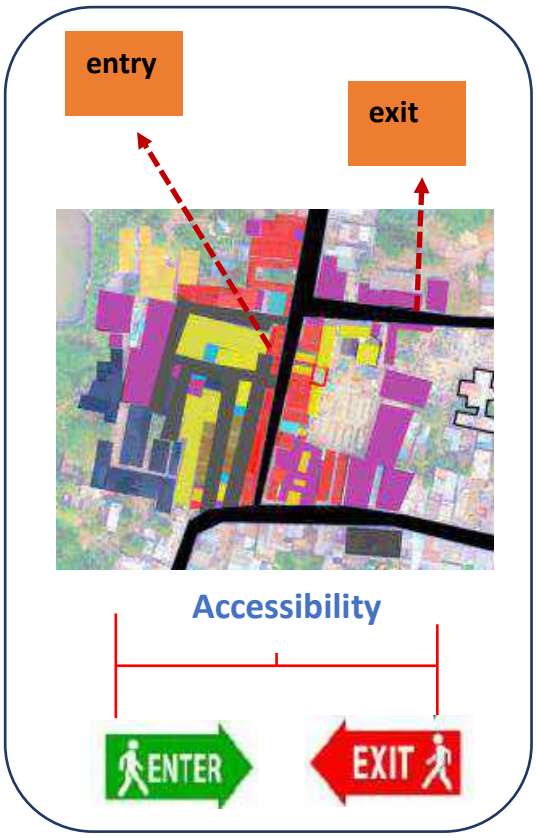
An architectural site analysis will look at issues such as site location, land use, area, topography, zoning, schematic, number of functions, types of functions, site surroundings, traffic conditions, mobility, vehicular and pedestrian movement, source of noise, and views. The analysis also assesses if any future development, such as a change of road development, or other significant building developments is proposed to take place within the area. In a sentence, architectural site analysis means collecting available social, historical, climatic, geographical, legal, and infrastructural data that relates to the site. Site analysis has a great impact on the project's programmatic realities as well as structural, and functional decisions.

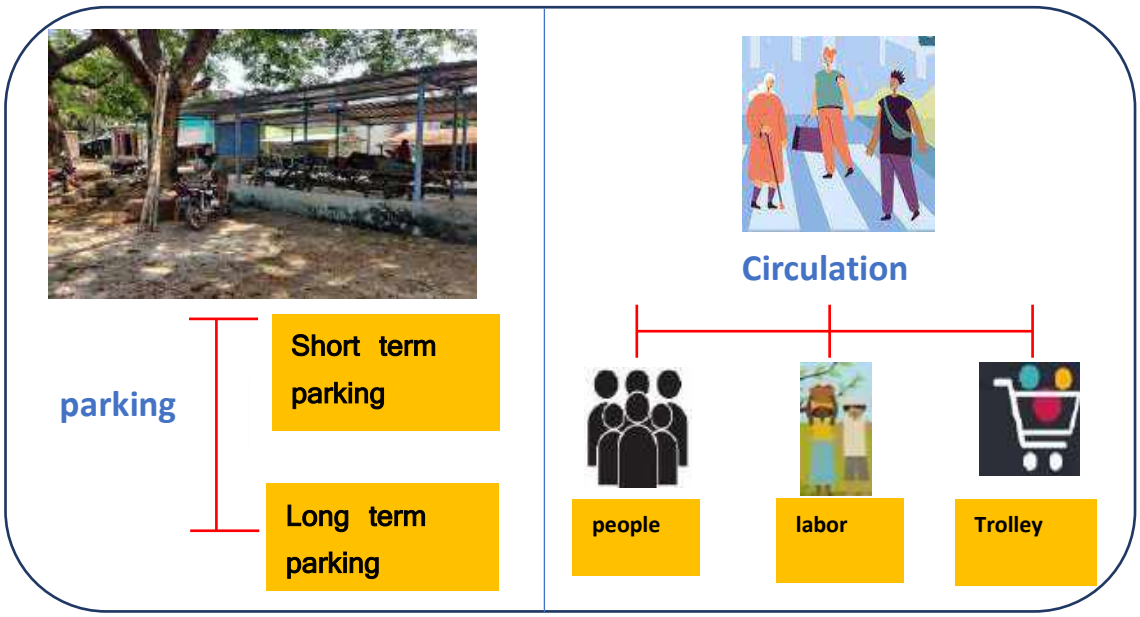
Things to consider in Growth Center and Haat- Bazaar's site analysis:

Part 1 (Accessibility)	Bazaar location, bazaar type, accessibility, road, circulation, parking, loading-unloading of products, pedestrian movement
Part 2 (Bazaar timing)	Bazaar timing, business hour, pick hour, dull hour, flow rate
Part 3 (Physical infrastructure)	Physical infrastructure, shop size, shop number, number and types of aarot, present condition, public-private land ratio, MMC, Electricity, water, gas, toilet, tube well facility
Part 4 (Trend of changes)	Trend of changes, Shop rent, Number of businessmen, Types of businessmen, Monthly/ annual income of businessmen, expenses
Part 5 (Climatic analysis)	Climatic considerations, Drainage and waste management system
Part 6 (Demand gap)	Demand gap, facilities for young entrepreneurs, women corner and other value additional functions

1.5.1.PART 1: ACCESSIBILITY, LOADING UNLOADING, PARKING, CIRCULATION:

Before starting the design, some important topics must have to be acknowledged such as where is the market located, the bazaar type (growth center/ special bazaar/collection center/), how to reach this market from other districts, how many entrances are used in the market, entry-exit path, whether there is any enclosure or not, human traffic, the width of circulation used for users, types of roads that are used for loading and unloading, space kept for long-term and short-term parking.

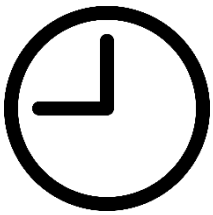




1.5.2.PART 2: BAZAAR TIMING:

Bazaar is a function that is active almost for roughly 24 hours. The loading and unloading of the bazaar happen mainly at night and early morning. The wet market sits in the morning at the end of loading and unloading which is called the 'morning market'. There is a slight slowdown in the afternoon and then it is activated again at night.

Existing bazaar timing:



Peak time: 5 A.M. – 9 A.M.

3 P.M. – 6 P.M.

Dull time: 9 A.M.- 3 P.M.

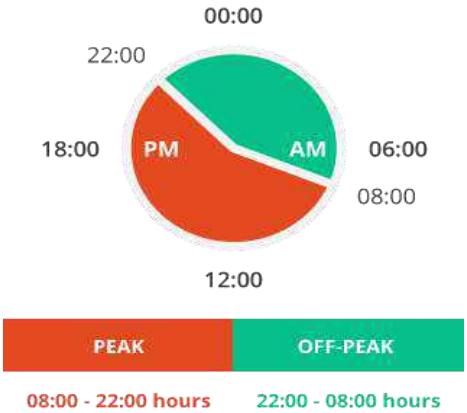
5 P.M.- 12 A.M.

Nil time: 12 A.M- 5 A.M.

Devoting two to three hours to peak time is often better for most traders of bazaars than buying and selling stocks the entire day. Specific hours provide the greatest opportunity for day trading, so trading only during these hours can help maximize the efficiency of trading. In many cases, sellers tend to lose money outside of these ideal trading hours. The proposed design will concentrate on this issue and try to prolong peak hours.

Many day traders also trade the last hour of the day, from 9 to 10 p.m. By that time, traders have had a long break since the morning session, allowing them to regroup and regain their focus. Multiple uses of bazaar space help to rationalize time and keeps the business going.

Trading requires discipline and focus not only for the development of local businessmen but also to enhance the opportunity for young entrepreneurs.



Prolong peak hour and time rationalization

Enhance the opportunity of local businessmen

1.5.3.PART 3: PHYSICAL STRUCTURE:

buyers and sellers use a dealing pattern in the bazaar that is different from other bazaars. Interactions between each role lead to the formation of networks with different contents. The present physical structures of bazaars are not in accord with the dealing pattern thus leading to irregularity. The changed structure of shops, shop sizes, shop patterns, and lack of electricity, water, gas, toilet, and tube well facilities indicate the inappropriateness of physical structures and the inappropriateness of those structures has led to irregularities in the bazaar. The aim of this research is to solve this problem by using the general structure connection model based on the system theory for physical structures.

Fig: irregular pattern of shops

Fig: vulnerable structure

1.5.4.PART 4: TREND OF CHANGES:

For several years Bangladesh's economic development has been gaining great appreciation from the world media. In the fiscal year 2020-21, Bangladesh's per capita income increased by 8% over the previous year to $2,227. There are also noticeable changes in the trend of the bazaar economy. It is recommended to study the changing pattern of trends in redesigning other bazaars. It is evaluated that the number of shops has gradually increased within 10 years. The proposed shop number in the future has to be determined with this gradual change after analyzing the economical transaction volume, the demand for shops, and the trend of changes, the proposed shop number has been fixed.

the year

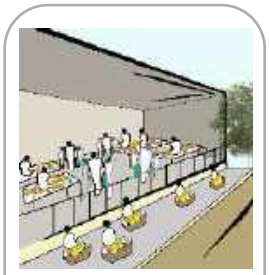
2000

the year

2010

the year

2020

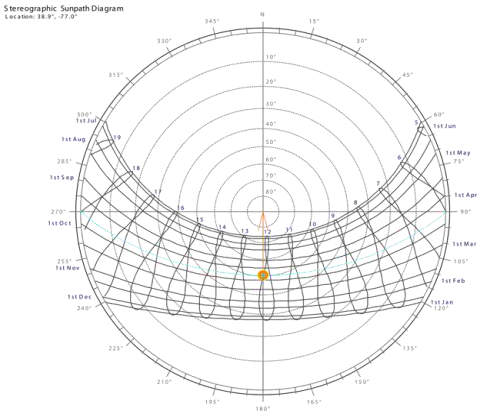


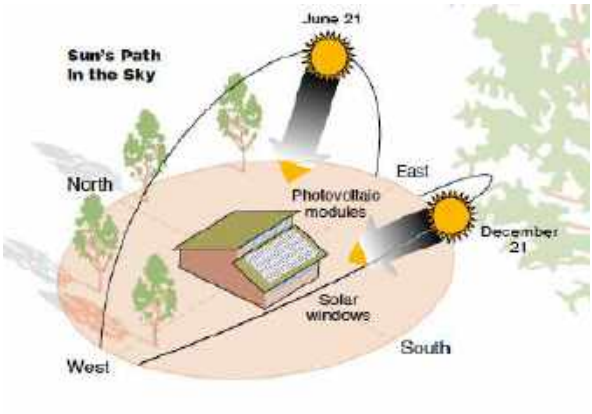
the year

2040

1.5.5. Part 5: CLIMATIC CONSIDERATIONS

Buildings are constantly subject to several climatic and environmental elements. From wind, sunlight, temperature, rain, and other factors, buildings across different contents interact uniquely with the different elements of their surrounding climate. Because of this, bazaar design and construction methods vary from one place to another to accommodate different challenges. The purpose of the climatic study is to facilitate an increase in the energy efficiency of buildings to support the sustainability of development outcomes for the future economy.





1.5.6. Part 6: DEMAND GAP

To foster a bazaar economy, it's really important to create jobs and employment opportunities through a competitive business environment, increase human capital and build a skilled labor force, build efficient infrastructure, and establish a policy environment that attracts private investment. Developing a women's corner, a display center for young entrepreneurs will help to foster a future bazaar economy.

Fig: women zone in the bazaar

1.6. EXISTING PROBLEMS IN THE BAZAAR:

1.6.1. CIRCULATION:

Enough circulation space can hardly be found to control human and traffic mobility. During the monsoon, these fragile roads become muddy. The roads are so dilapidated that anyone hardly finds a spot to land his feet firmly. Consumers face extreme suffering because of the irregular pattern of circulation.

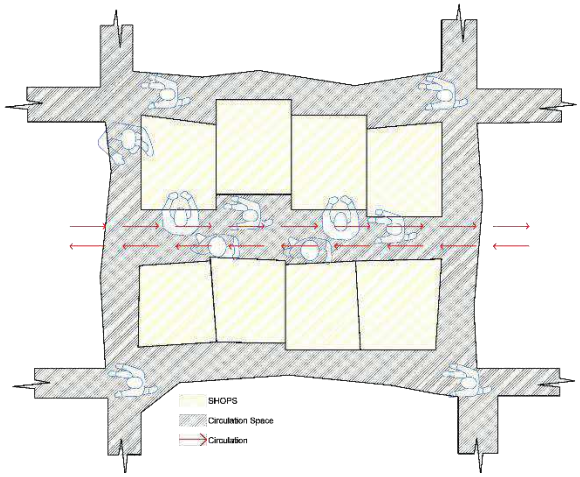


Fig: circulation pattern in existing bazaar

- Irregular circulation pattern.
- circulation width 3'-5'

1.6.2. LOADING-UNLOADING:

Hundreds of trucks, pickups, rickshaws, autos, and vans carry goods to the bazaar every day. The existing roads are too narrow for loading & unloading. There are big potholes somewhere in the road. Again, somewhere or the pitch of the road has risen and the appearance of the skeleton has come out. There is a danger of water accumulating in the hole again. Local people are the victims of extreme suffering. The inadequate width of roads is the main cause of traffic congestion in these places.

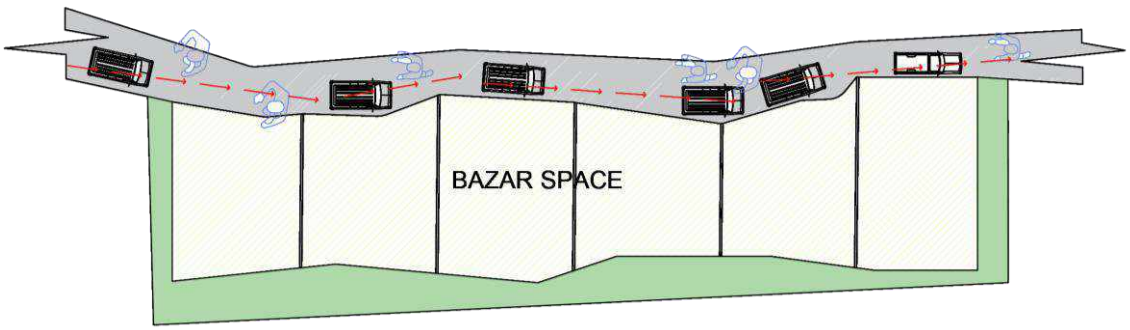


Fig: roads are too narrow for loading and unloading which creates traffic congestion

1.6.3. PARKING:

Parking poses a serious challenge to vehicle owners as there is a huge lack of parking facilities across the bazaar area. This only leads to illegal parking on the streets, intensifying thereby the already aggravated traffic gridlock on the bazaar roads. many vehicles remain parked on roads, causing congestion. Due to the parking of vehicles on roads and footpaths, pedestrians are forced to walk on the road. Pedestrians walking on the road lead to road capacity being reduced, even more, causing traffic chaos and congestion.

Fig: present scenario of parking in existing bazaars

1.6.4. FUNCTIONAL SEGREGATION:

The existing bazaars face several problems such as poor infrastructure, lack of modern machines and equipment, poor process flow for products, etc. that lead to the ineffective market linkage between the producer and the buyer.

The bazaar zoning is so Scattered. Dry markets and wet markets are not separated. The dry market is also not organized. Here regularity is not maintained in shop types and as a result, people face problems while shopping.

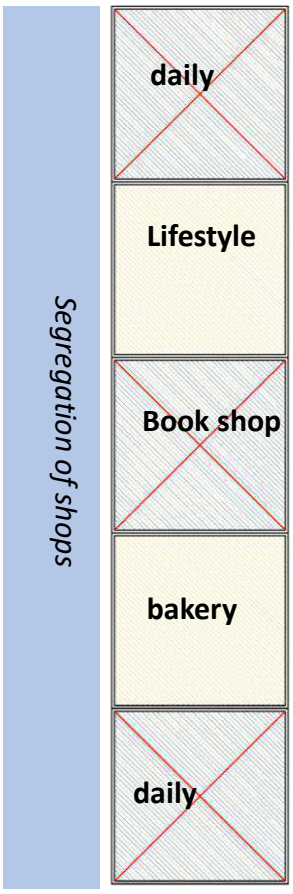


Fig: pattern of shops in existing bazaars

1.6.5. PHYSICAL STRUCTURE:

Inadequate infrastructure is a vital thing that distinguishes rural markets. The infrastructure centers like cemented streets, warehouses, communication systems, and financial facilities are insufficient in rural bazaars. In maximum bazaars, there is no permanent rain and sun-protected shade. The condition of existing shades is so poor. the market is not environmentally sustainable as most of them do not have a toilet, water supply, electricity, and gas facilities.

Local businessmen and retailers choose periodic haat days to show their products to capture the attention of the target audience for larger periods. It's a part of advertising which plays an important role in the bazaar business. But in existing bazaars, a center trading place or display center is not present for local businessmen and young entrepreneurs. Women's and men's corners are not separated. The existing bazaars are not facilitated with some value-added functions such as sorting grading space, packaging space, storage, and cold storage.


Fig: present situation of bazaar infrastructure

Wearhouse facilities in form of go-downs are not available in most of the market. Due to a lack of storage space in the markets, farmers are bound to sell their produce on the same day or within 24 hours so that the product does not waste. This leads to lower price realizations which in turn is a loss in revenue for both farmers and arotdars (less commission).

though the present go down's rent is so high, the condition is so poor and these are not maintained properly that not only hampers the product condition but also decreases the product value. Banking, mobile banking, input shop facility, info center, and space for agro workshops are missing in the current bazaar system.

The absence of a mechanism for the proper flow of goods was observed inside the market premises. Unloading, sorting, grading, and auctioning of goods were found to occur all at the same place leading to a lot of confusion for the buyers and commotion inside the marketplace.


Fig: present situation of bazaar infrastructure

1.6.6. WASTE MANAGEMENT & DRAINAGE:

Waste management is very significant for Rural Hat bazaar. The constant hustle and bustle of the Bazaar result in a lot of waste. Larger rubbish trucks cannot get through the narrow alleys, so disposal is organized differently.

The waste generates from rural haat bazaars is both raw organic waste and dry waste which rotten quickly and creates an unhygienic environment in the market. Fish and vegetable vendors and food stalls are major sources of organic waste and wastewater. The collection of waste from internal roads, parking spaces, and corridors interrupts the general activity of the market. But if the waste is not removed quickly, it will create odor, insects, germs, etc.


Fig: the unhygienic environment in the existing bazaar

Lack of coordination among the bazaar management committee is responsible for the maintenance of the drainage systems. Available surface drains are mostly clogged with solid waste, particularly plastic products that do not disintegrate. Consequently, the drainage systems do not function meaningfully. water-logging is one of the after-effects of unplanned drainage design, and unless checked and corrected soonest, the problem will deteriorate at a faster pace in bazaars. It is not good for the quality of products and also creates problems in the loading/unloading of products from and within the markets. Drainage systems are mostly cleared only once a year which is so harmful to the environment. In this regard, a suitable solution may be providing a permeable pavement along both sides of the pavement along with a proper drainage system so that a sustainable & effective drainage system can be achieved.


Fig: unhygienic drainage system

fig: water clogging during rainy season

1.7. LOCAL DEMAND AND POTENTIALITY:

Over the years the major reason behind the changing culture of shopping is due to changes in consumer patterns, demands, and expectations. before the main attraction of growth, centers were groceries merged with retail shops. As time progressed, the demand for consumers started to change. Nowadays, Bazar is a mixed-use district, with high streets and existing malls in the surrounding plots. To cope with the growing malls are now also being merged with nearby transportation facilities. The future of shopping facilities will be an experience rather than just a market that will incorporate public plazas, entertainment facilities, retail facilities, and recreation all at once.

fig: inclusiveness in future bazaar

In the past, public life was produced in open spaces such as streets, today is produced through public centers especially bazaars are becoming a function of socially re-gained public spaces. Nowadays, shopping and traditional markets cultures are changing, these changes are also felt in rural culture. In recent years, rural areas experience a significant change in trade places, acquainted with a number of large bazaar spaces, bazaar tradition, which had an important part of the rural identity, has shifted to shopping malls that were newly formed. The main purpose of the study is to examine the change in trade culture and shopping-trade places in rural where is known as trade identity. This study indicates how the transformation and appropriation of shopping areas as public spaces are taking place socially and spatially in the diverse and contrasting settings of the rural bazaar.

CHAPTER -2 : CASE STUDIES

SHIMULBAK BAZAAR,

SHUNAMGANJ

Bazaar type: Collection center

2.1.1. SITE LOCATION:

Location: Shimulbak, South Shunamganj.
Area: 33615 sqft

2.1.2. SITE ENFORCEMENT:

COMMUNICATION SYSTEM:

Shimulbak union is one of the popular Places located in Dakshin Shunamjang, Sylhet. Most of the roads in this union are unpaved and navigable. The whole communication system is conducted in 4 ways:

- Kacha road
- semi pucca road
- paved road
- waterway

The site is situated at Ladarbari village on the bank of the Neari River. The loading-unloading system of the bazaar is conducted by road and waterway. A 20' wide bridge over the Nerai river connects the area with Ganiganj.

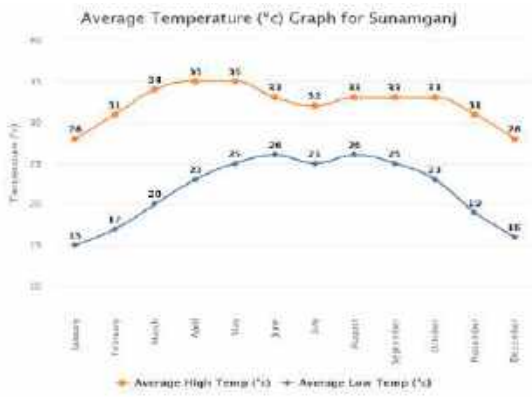
USERS AND STRUCTURE PATTERN:

The area of Shimulbak is almost 38.61km². The population density of this area is 755km² and the annual population change is .73%. According to the 2011 census, about 29,147 people live in this place who directly use this bazaar. People from other unions also come here to sell and buy agricultural products. About bazaar is surrounded by agricultural land. The average building height in this area is 3m-6m. the maximum structure is semi-pucca. Here the semi-shaded spaces of residences are used as bazaar spaces.

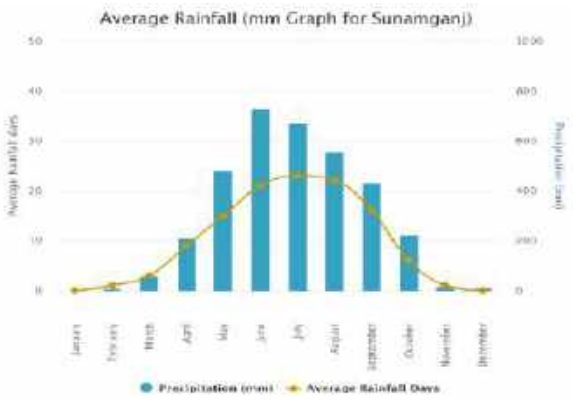
CLIMATE:

Latitude	25.080624
Longitude	91.421356

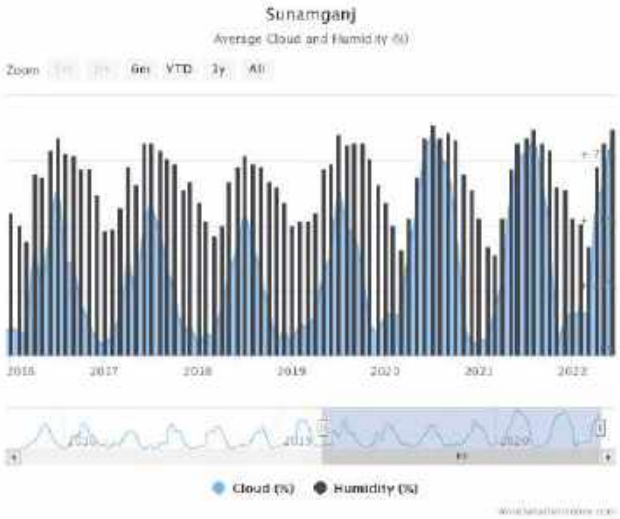
From July to November due to flood tide, these areas go under deep water and look like seas with the erosive water surface. During wind storms, these waves reach up to1.5 m in height. So, the climate is a big challenge to designing any built form in this area.



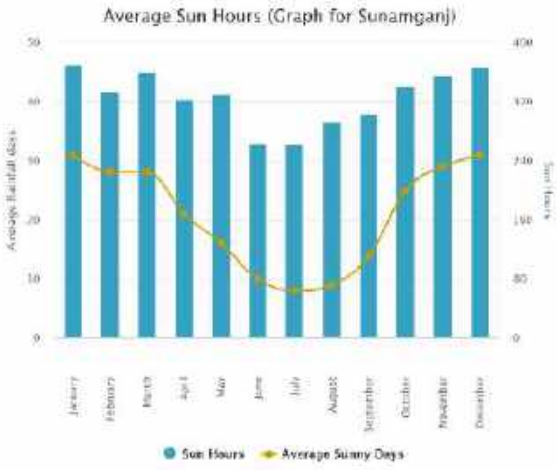
Monthly Average Temperature



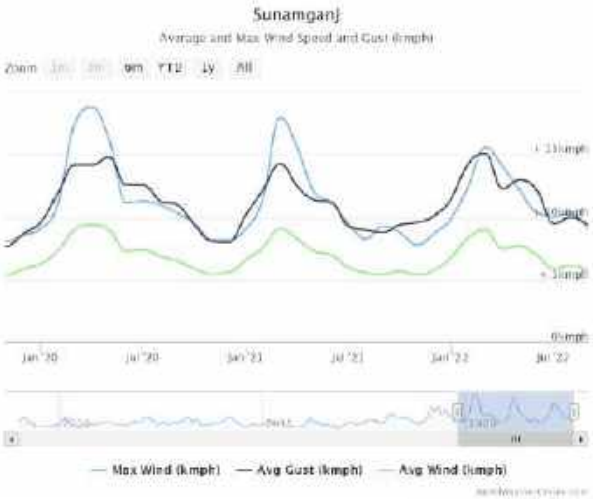
Monthly Average Rainfall



Cloud and humidity



Monthly average sun hours and days



Monthly average wind speed

Hottest Month	July (29 °C avg)
Coldest Month	January (19 °C avg)
Wettest Month	August (377.4 mm avg)
Windiest Month	April (6 km/h avg)
Annual precip.	2134.5 mm (per year)

Weather by CustomWeather, © 2022

Quick climatic info

2.1.3. PROPOSED PROGRAMME:

EXISTING PROGRAMME:

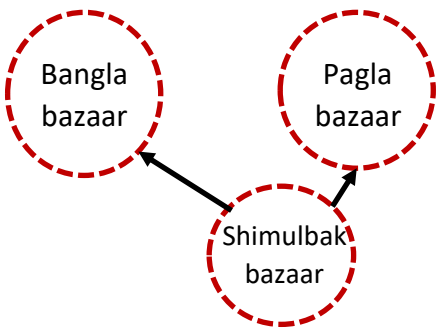
Lamb, chicken, retail, grocery, fruits, vegetables, fish, duck

PROPOSED PROGRAMMES:

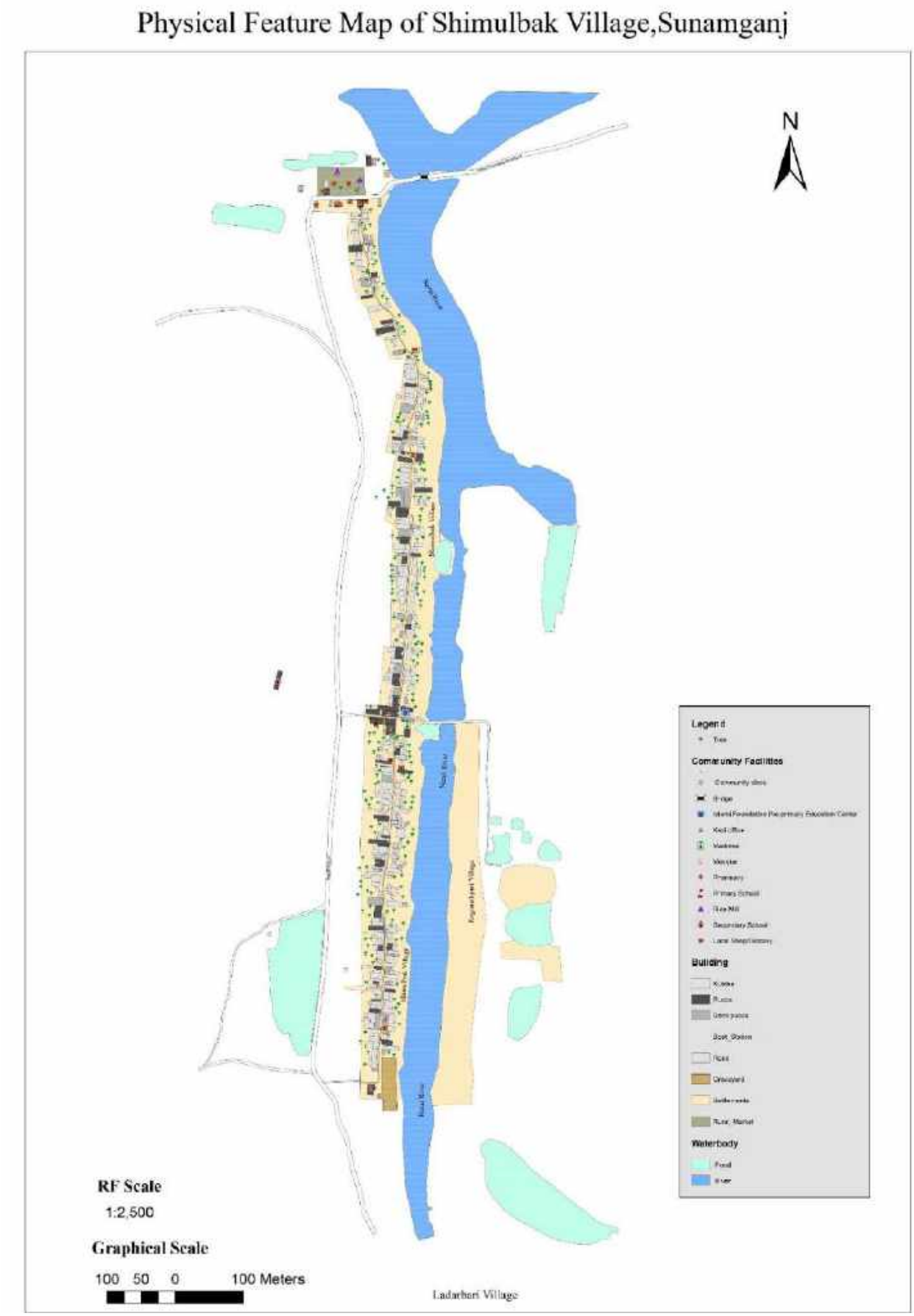
Wet market	Lamb, chicken, retail, grocery, fruits, vegetables, fish, duck
dry market	Retail shop, tailor, beauty shop, cloth store, computer shop, electrical shop, mobile shop, medicine, food and beverage, mobile banking
Value additional function	Toilet, info corner, admin, display space, prayer space
Circulation	internal 25' road for loading unloading ,Space for loading and unloading, 30% circulation for people, proper pedestrian
Waste management	Trickling filter, Rainwater harvesting, Solar panel

2.1.4.DESIGN CONCEPT:

Shimulbak bazaar is very small in scale. The hawors and beels of Shimulbak support major subsistence and commercial fisheries and most of the people of that area do their livelihood by chicken farming and selling eggs. The main concept of designing this collection center is to foster the local economy of that bazaar by providing some value additional functions to it so that it cannot only fulfill the local demand but also contribute to the adjacent growth centers such as Bangla bazaar and Pagla bazaar.



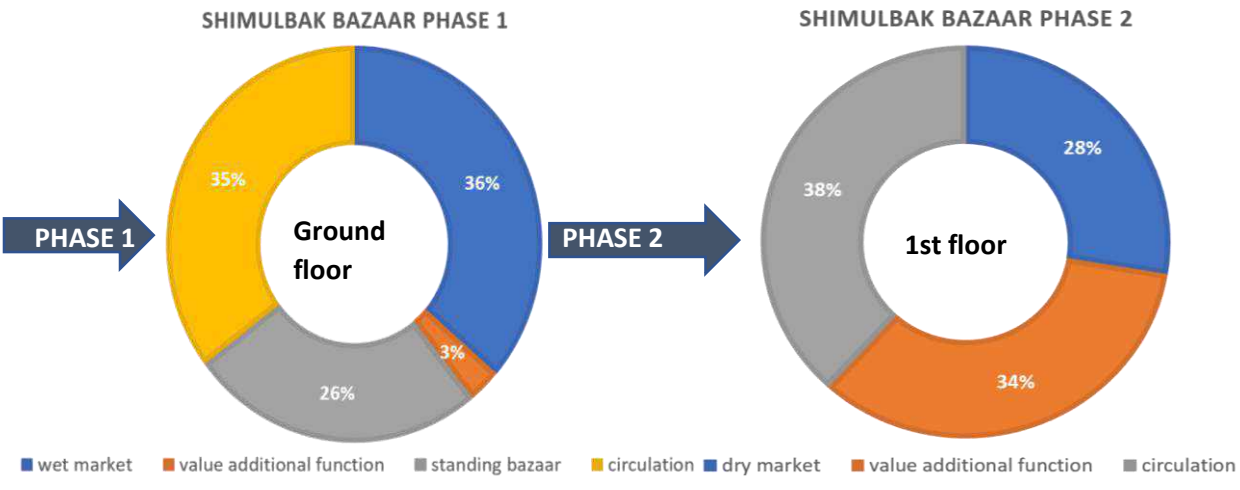
2.1.5. EXISTING ZONING OF SHIMULBAK BAZAAR:

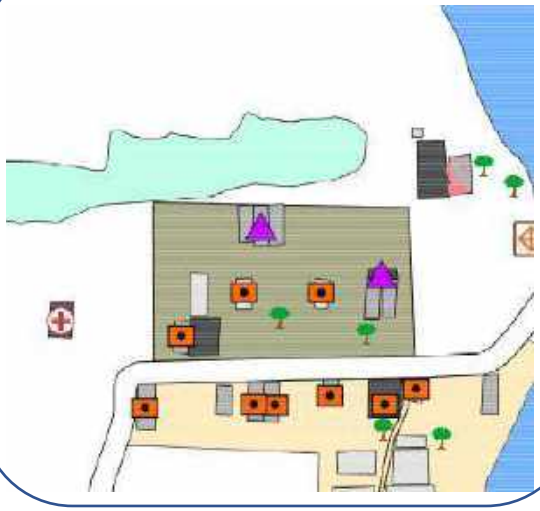


2.1.6. DESIGN PHASES:

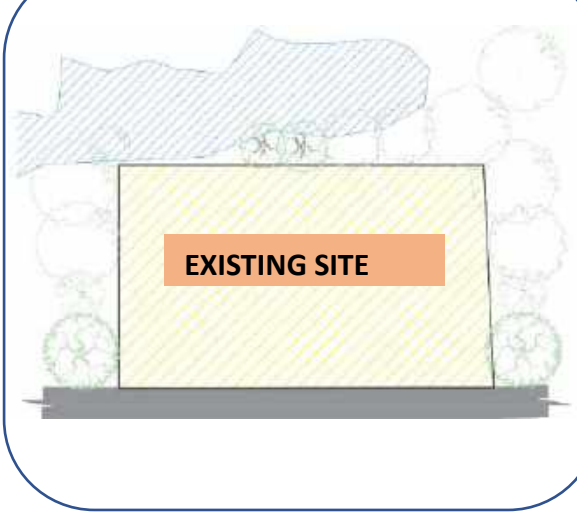
The whole construction process will be carried out in phases in accordance with the concept of phase-wise development. Consequently, the existing functions will be considered in 1st phase based on the future development prediction. Furthermore, the value-added functions will be added in the second phase.

BAZAAR NAME: SHIMULBAK BAZAAR, SHUNAMGANJ						
phase	**floor**	**function type**	**functions**	**shop number**	**area (sqft)**	**percentage**
PHASE 1	**Ground Floor**	wet market	chicken, fish,beef/lamb,fruits,	32	3128	36%
		standing bazaar			2198	26%
		value additional function	toilet		245	3%
		circulation			3044	35%
				total=	**8615**	
PHASE 2	**1st Floor**	dry market	craft shop, household, mobile banking, food shop, tailor, medicine, beauty shop, stationary, cloth, bookshop, mobile shop, computer shop, electrical	13	1614	28%
		value-additional functions	admin, prayer space,info corner, display space		1991	34%
		circulation			2234	38%
				total=	**5839**	

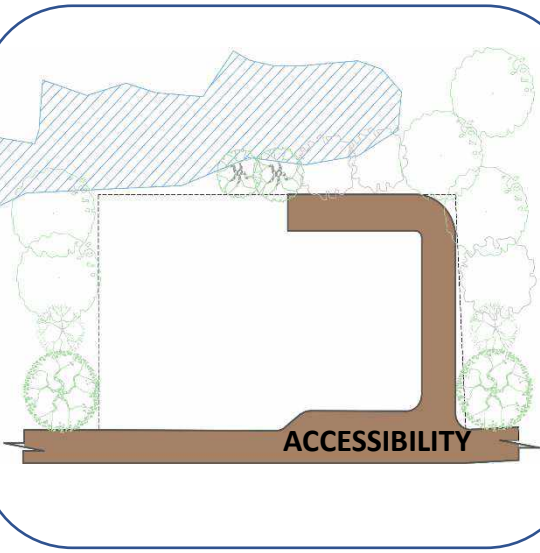




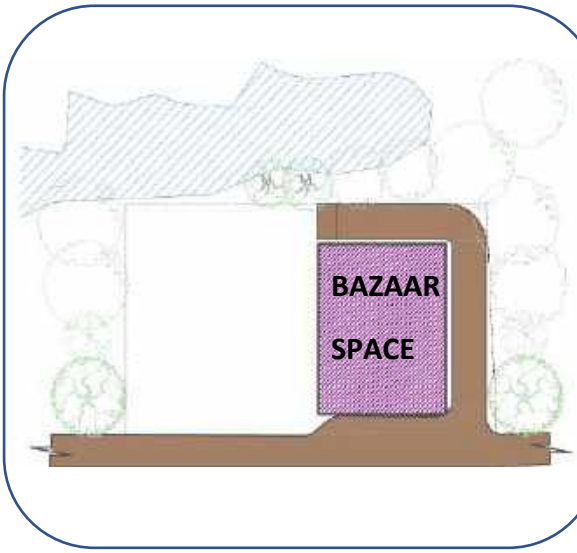
Site map



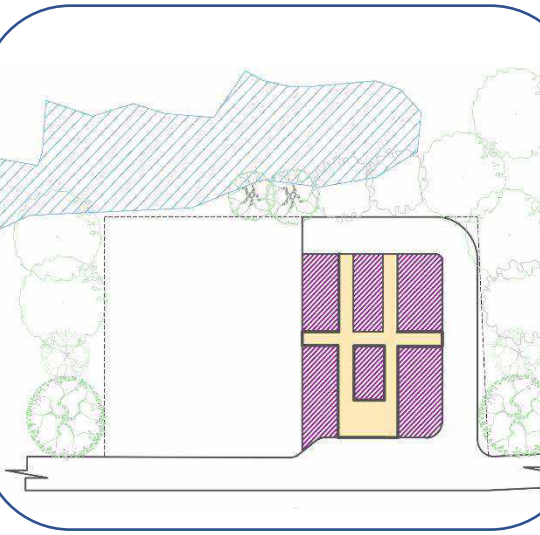
Existing site



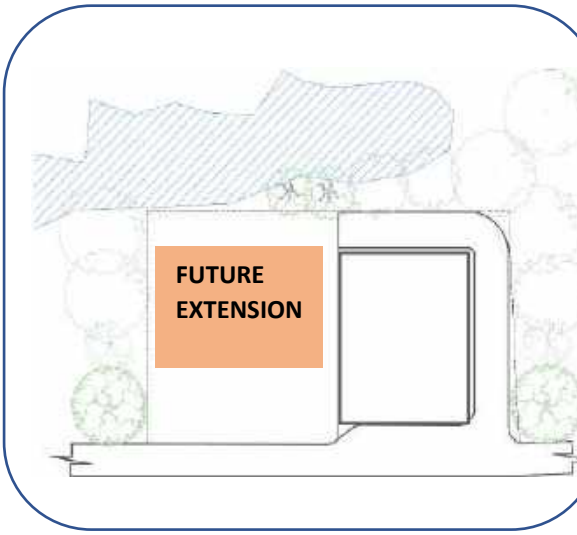
Proposed internal road for loading unloading



Proposed bazaar space



circulation



Space kept for future extension

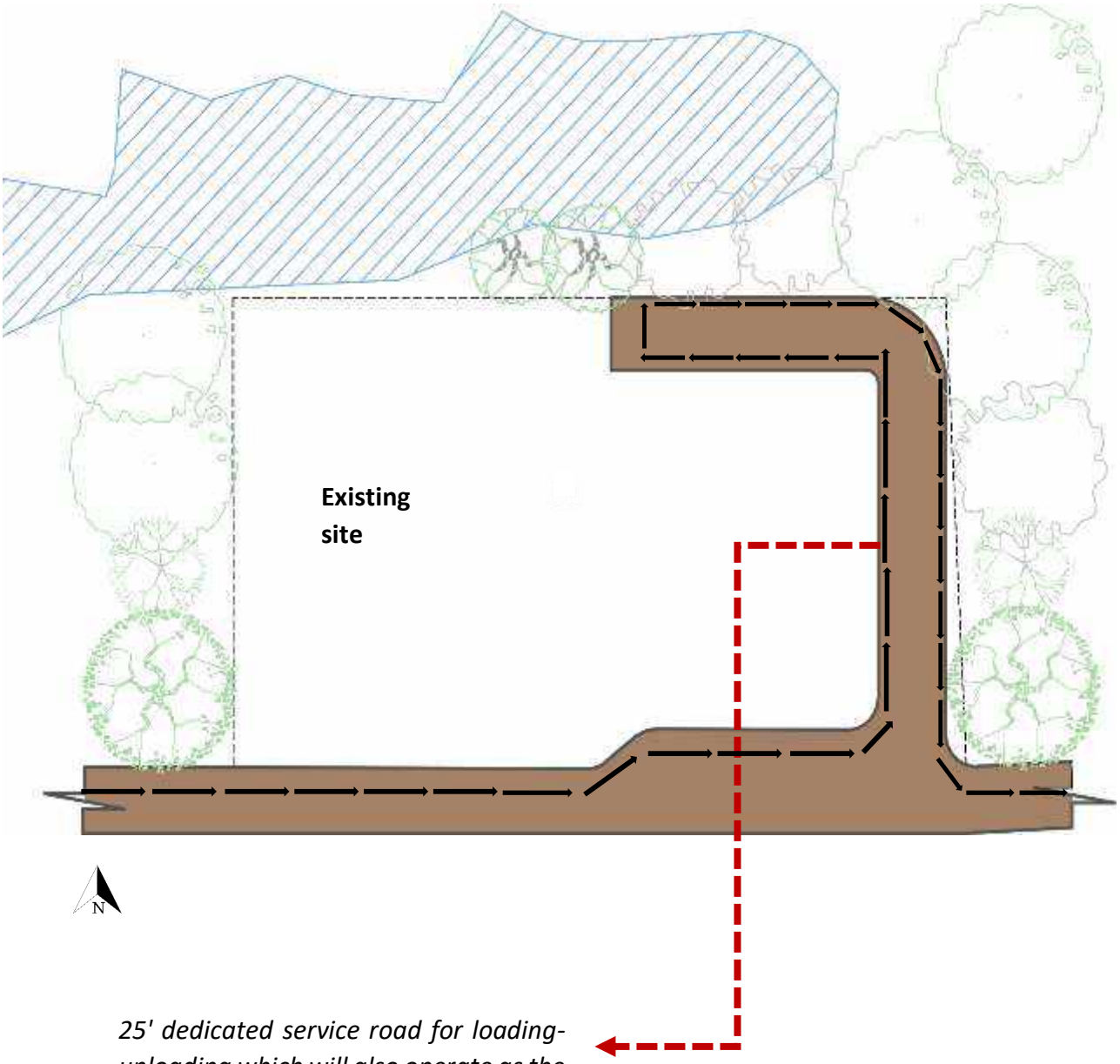
2.1.7. PROPOSED DESIGN:

CIRCULATION:

While designing the bazaar, the main focus was to ensure proper circulation for people, vehicles, and loading and unloading. An internal 25' dedicated service road for loading-unloading has been developed. Wide verticle circulation has been designed to ensure visibility on the 1st floor.

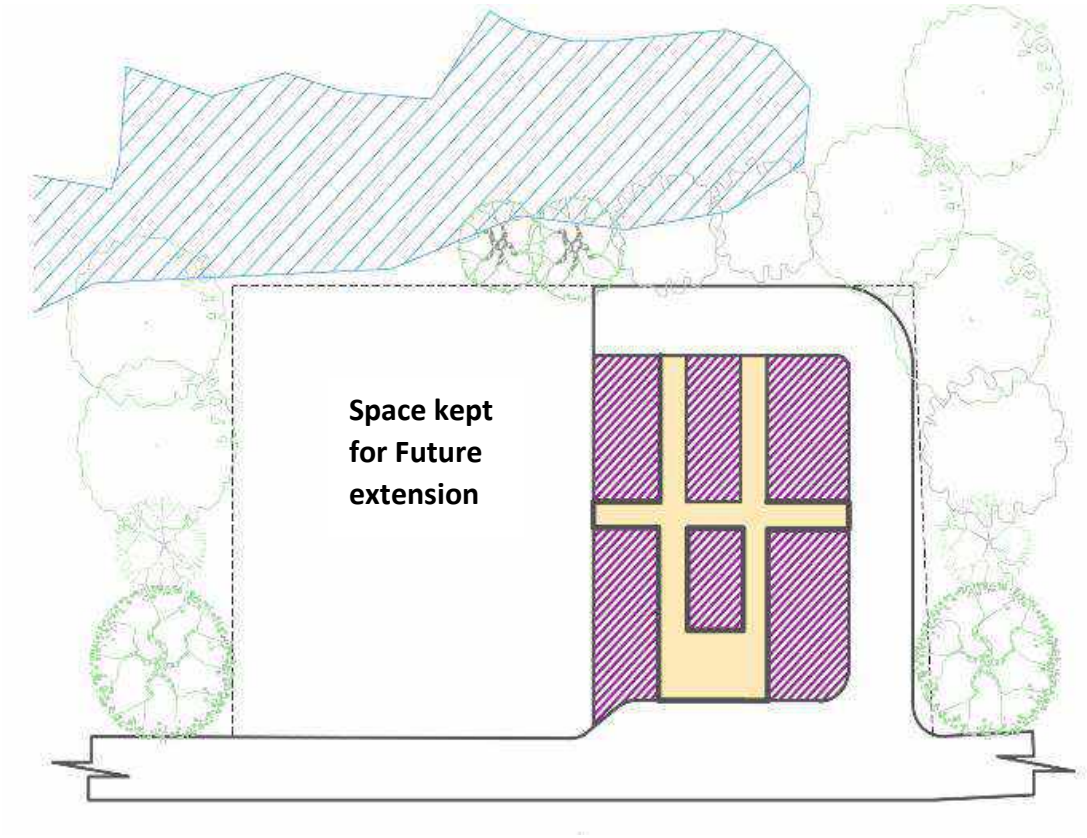
The circulation of shops is designed in a grid pattern. The corridors are 8' wide.

CIRCULATION FOR LOADING AND UNLOADING:



25' dedicated service road for loading-unloading which will also operate as the fire safety road.

CIRCULATION FOR USERS, LABORERS, AND TROLLEY:



corridors used for users, laborers, and trolleys are 8' wide

ZONING:

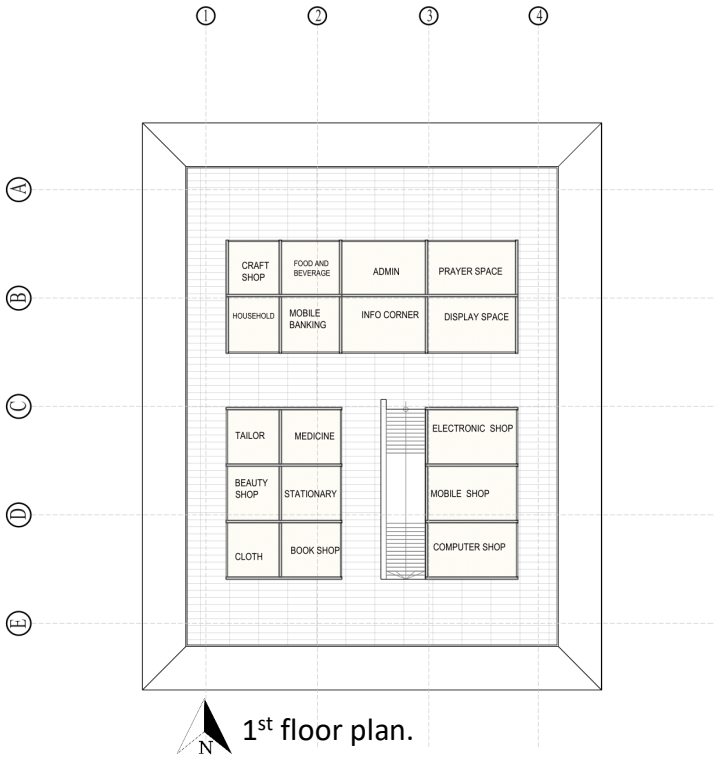
In the first phase, the wet market is designed on the ground floor which has 36 shops. An architectural solution has been proposed for shops following the existing bazaar schematic and morphology where the sellers can not only sit ergonomically but also experience the traditional feeling. A separate zone for the vegetables, fruits, fish, meat, poultry, and grocery shops has been designed considering ample natural light and ventilation with waste and water disposal possibilities. Enough display and storage space for the vendors has been provided.

A space has been kept for a standing bazaar. The shop size of the wet market is 10' x 10'.

A portion of the site has been kept for future extension to extend the bazaar horizontally and vertically.

A place has been kept for waste management. The bazaar is facilitated by waste management facilities and a dumping zone. The trickling filter is used to recycle the polluted water, making the bazaar environmentally sustainable.

- Internal road area:4509 ft^2
- Space kept for Future extension area:17568 ft^2
- Build area:14452 ft^2
- Pave area: 1489 ft^2



1st floor plan.

The first floor is proposed for future value additional functions in the second phase such as toilet, info corner, admin, display space, prayer space, food and beverage, medicine, mobile banking, retail shop, tailor, beauty shop, cloth store, computer shop, electrical shop, a mobile shop. A total of 13 shops have been designed on the 1st floor.

2.1.8. SUSTAINABILE FEATURES:

RAINWATER HARVESTING:

- Rainwater harvesting each year in Shimulbak bazaar:
  A x R x C
  = 800 m^2 x 3.2m x .85
  = 2176 m3

[here,
A=area
R=average yearly rainfall data
in the area in m
C= co-efficient]

SOLAR CAPACITY:

Per panel size: 2.8mx1.2m =3.36m^2

- highest Solar capacity in Shimulbak bazaar per day
  A x C x S
  =223 m^2 x .6 x 120/1000
  = 16 kw

[here,
A=area of bazaar roof
C= area reduction co-efficient
S=solar energy consumption, considering 80% efficiency (W/ m^2)]

Total shop =47 nos
Suppose,
each shop has 2 lights and 1 fan.
So, the shops have total 94 lights and 47fans.
The power consumption of each light is 30W & each fan is 200W.

Option 1(For DC):

- Total solar power consumption of lights (94x 30) =2820 W =2.82 kW/per day
- Total solar power consumption of fans (47 x 200) =9400W=9.4kW/per day
- Total solar power consumption in Shimulbak bazaar = (2.82+ 9.4) kW/per day
  = 12.22 kW/per day
- required area of solar panel = (12.22x1000)/120= 101.8 m^2 [*considering 80% efficiency]*

Option 2 (For AC):

A 130A solar battery is required to store 0.4kW solar energy which is produced by a 3.36m^2 solar panel.
Daily availability of solar power in Shimulbak Bazaar = 16 kW

- So, required Battery = (130/0.4)x16= 5200A = 40 nos 130A
  Daily demand of solar power in Shimulbak bazaar= 12.22 kW
- Daily serving hour from the required battery = (12x40x130)/(12.22x1000)= 5 hour

Option 3(for AC & DC):

Total solar power consumption in Shimulbak bazaar = 12.22 kW/per day

- Required battery for AC after using DC is = (130/0.4) x (16-12.22) = 12285A
  = 10 nos 130A
- Daily serving hour from the Required Battery after using DC
  =(12x10x130)/(12.22x1000)
  = 1 hour

2.1.9. 3D IMAGES:

3d image -1 : FRONT SIDE OF THE BAZAR

3d image -2 : PERESPECTIVE VIEW OF SHIMULBAG BAZAR

3d image -3

3d image -4

BANANA BAZAAR, CHALAKCHAR NARSHINGDI

Bazaar type: Collection center, special bazaar

2.2.1. SITE SELECTION:

Location: Chalakchar, Narshingdi
Site area: 1731 sqft

2.2.2. SITE ENFORCEMENT:

In Narshingdi, Monohordi Upzilla is a large banana-producing belt *(*Chalakchor is a union of Monohordi*)*. Bananas are cultivated roughly on a thousand hectares of land each year, yielding 30 thousand metric tons of bananas in this zone. Bananas are grown on approximately 250 to 300 acres of land at the Chalkchor Union.

- Major variety 'Sagor Kola' (Amritosagar variety)
- Bananas are traded in an open field (OTC) near the connecting highway. It's leased land from the government, and the open space is quite a distance from the main market (roughly half a kilometer)
- Approximately 1000 to 1500 farmers congregated in this location for banana trading, while 200 to 250 buyers/paikars from various districts came in to trade bananas. Major buyers come from Dhaka and Sylhet divisions.

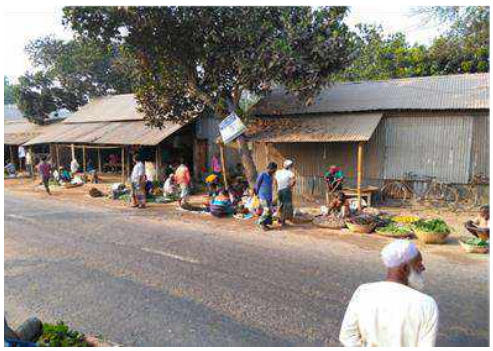
2.2.3. MAJOR FINDINGS:

The existing situation of the banana bazaar
Shed size: 15' x 40'
Height: 10'

2.2.4. SITE IMAGES:







2.2.5. PROBLEM ANALYSIS:

- Poor shed structure
- No dedicated road for Loading −unloading
- Poor pedestrian access
- No Fire Safety
- Unhygienic environment
- No toilet, parking, waste management facilities
- No grading and sorting system
- No storage system

2.2.6.PROGRAMS:

EXISTING PROGRAMS:

Storage\go down
Display space

PROPOSED PROGRAMS:

Wet market	Display space and shops
Value additional function	Processing and packaging, Sorting and grading space, storage, admin, toilet
Circulation	Space for loading and unloading, 30% circulation for people,25' internal road for loading unloading
Waste management	Trickling filter, Rainwater harvesting, Solar panel

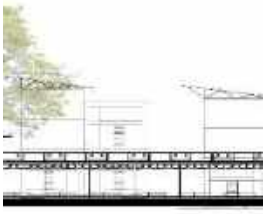
2.2.7. DESIGN CONCEPT:

Banana is the core product of this bazaar. Chalakchar Banana bazaar is active from 5 a.m.- 9 a.m. Rarely a few people come after the bazaar time. So, the space remains inactive after the bazaar time. If the retailers do not sell within 2 to 3 working days, they must count the loss as banana is a perishable product. The main concept of designing this bazaar is to accelerate the scope of local business and young entrepreneurship by adding some value to additional functions and creating a dedicated shed to attract the pikers.

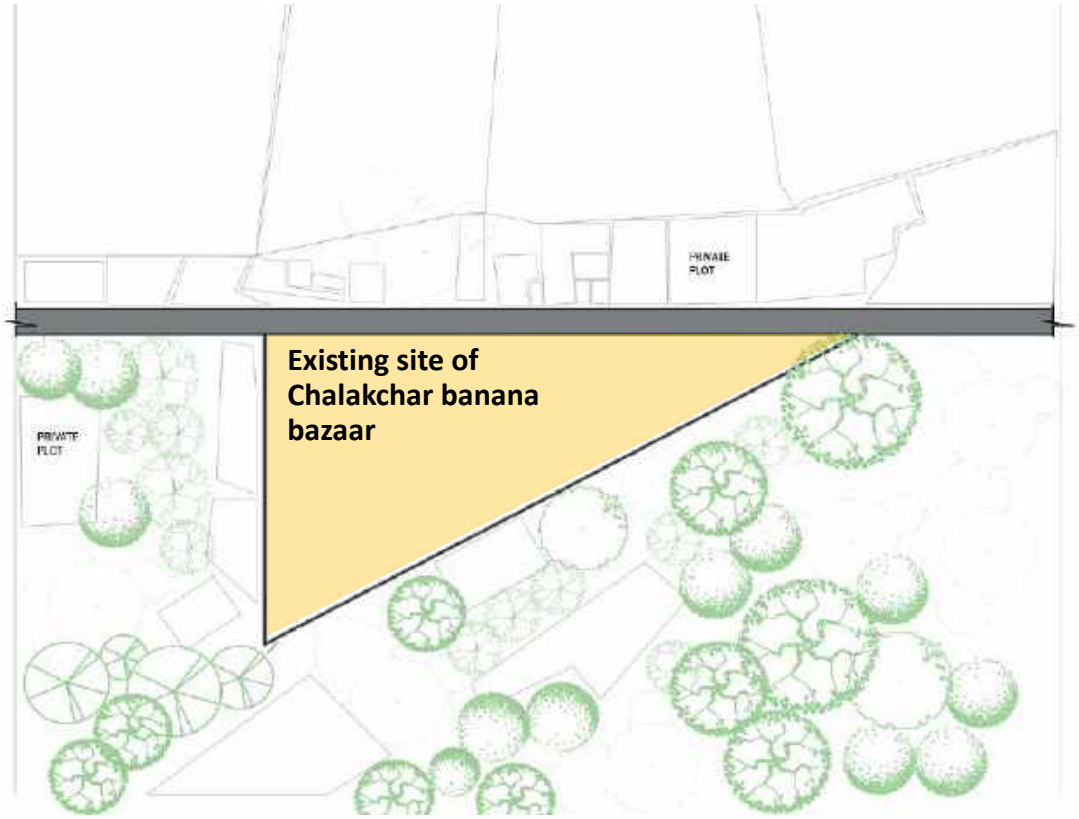
Value additional functions

- Sorting –grading space
- Space for processing and packaging
- Storage
- communication

Accelerate the scope of local business and young entrepreneurship

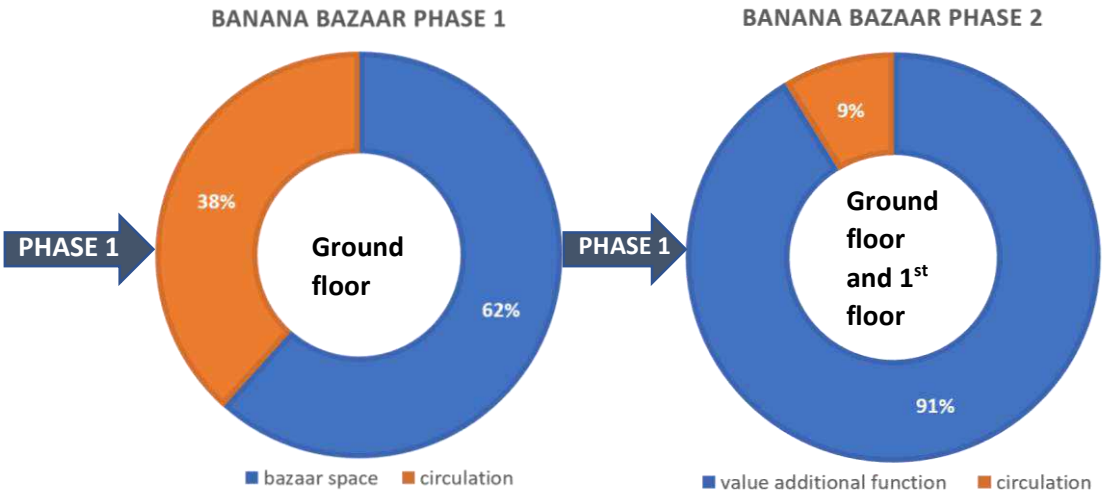


Dedicated bazaar shed to attract the outside piker



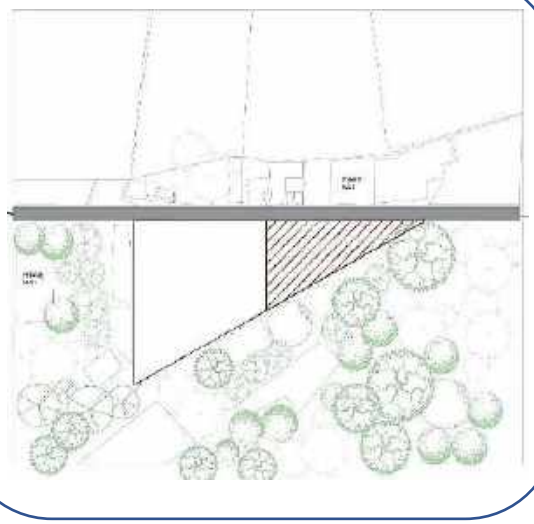
2.2.8.DESIGN PHASES:

BAZAAR NAME: CHALAKCHAR BANANA BAZAAR LOCATION: CHALAKCHAR, NARSHINGDI						
phase	**floor**	**function type**	**functions**	**shop number**	**area (sqft)**	**percentage**
PHASE 1	**Ground Floor**	wet market	bazaar space	80	4000	62%
		circulation			2491	38%
				total=	**6491**	
PHASE 2	**Ground Floor**	value- additional functions	sorting - grading space, toilet		1549	91%
		circulation			149	9%
				total=	**1698**	
	1st Floor	value- additional functions	storage, office		1583	91%
		circulation			149	9%
				total=	**1732**	

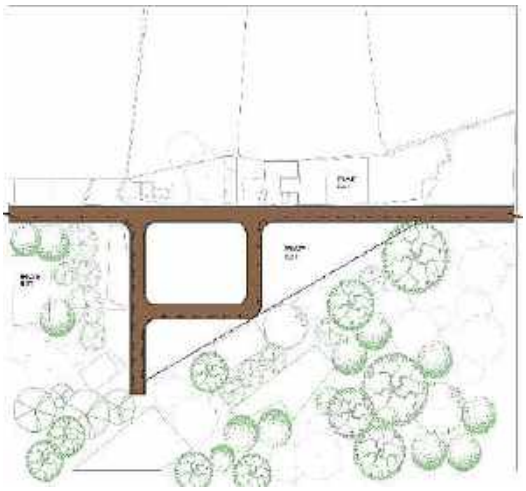


Site map

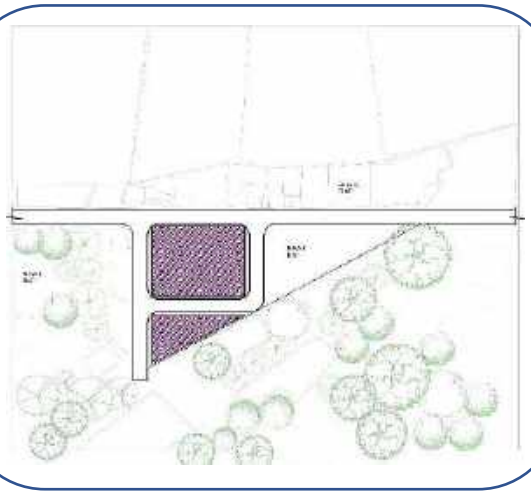
Existing site



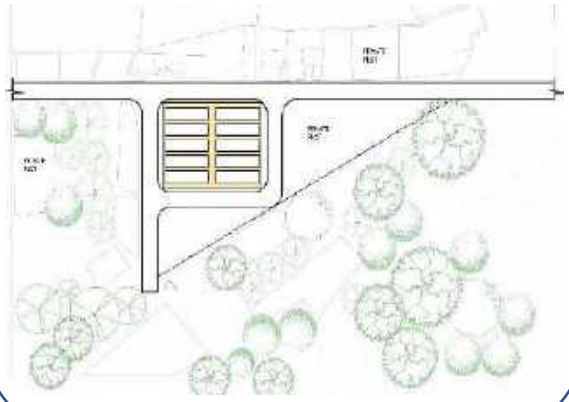
Private plot



Proposed road for loading-unloading



Proposed bazaar space



circulation

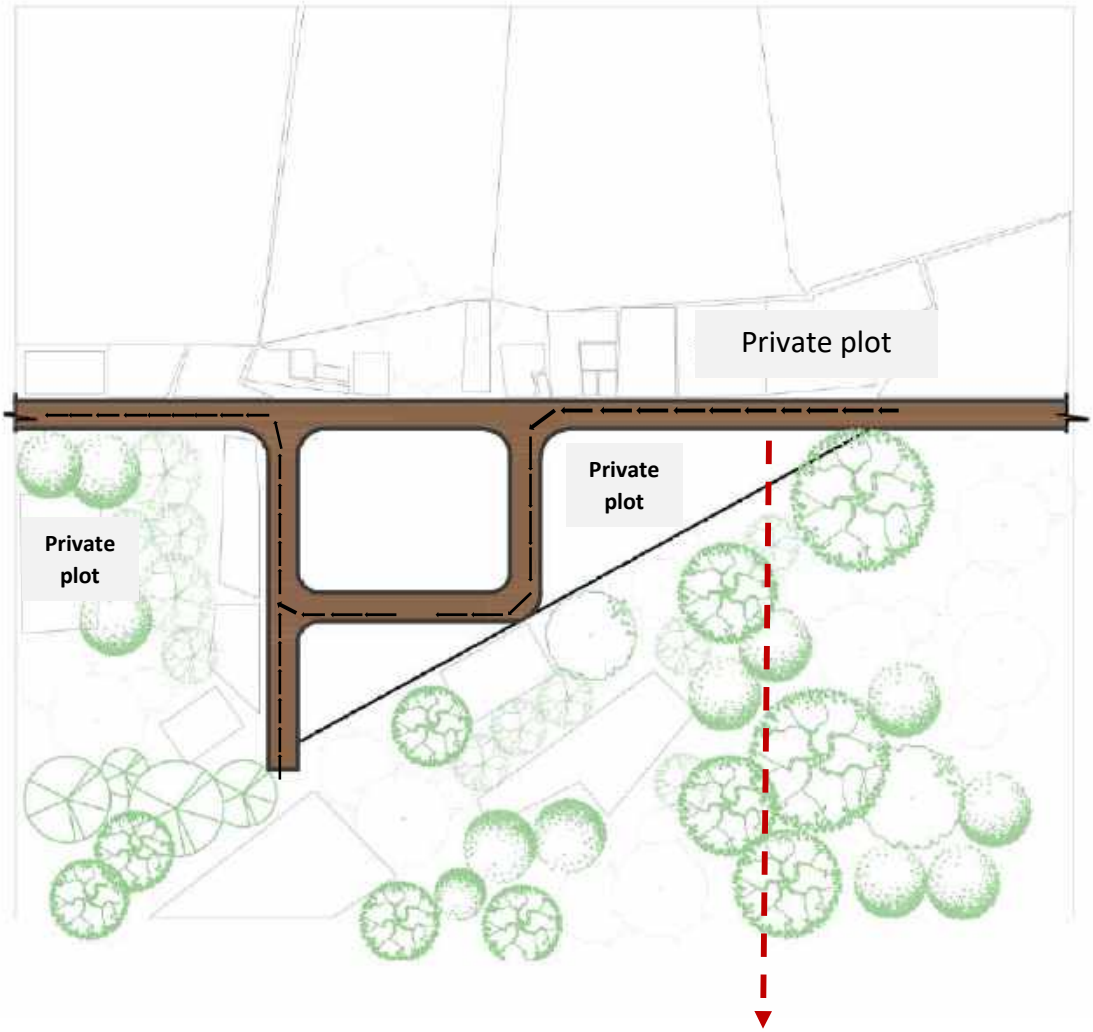
2.2.9. PROPOSED PLAN:

CIRCULATION:

CIRCULATION FOR LOADING AND UNLOADING:

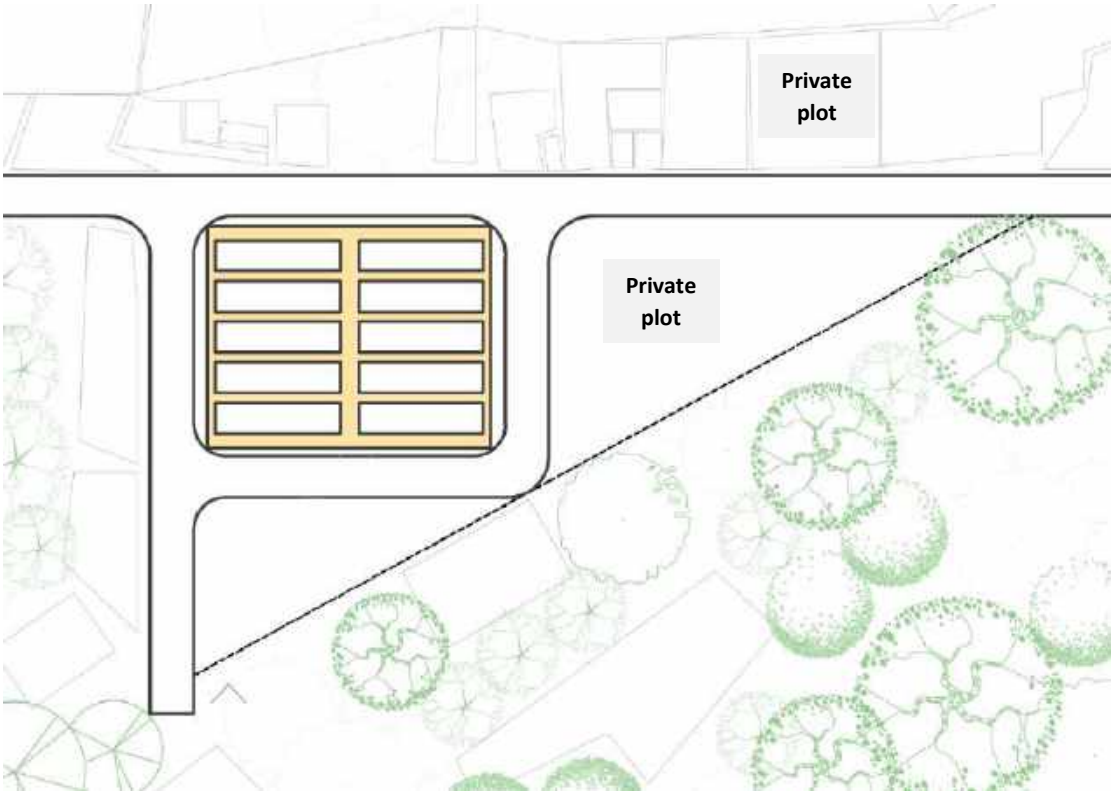
While designing a bazaar, the first work is to solve proper and easy circulation space for people, vehicles, and loading and unloading. The bazaar area is always crowdy with people and vehicles that cause traffic jams. To minimize this problem, it is very important to separate the public and service roads to ensure easy public movement and control mobility. Clear circulation for the people and easy loading-unloading for the vehicles has been achieved properly in this design.

Wide circulation spaces have been developed for easy and clear public movement. An internal 25' dedicated service road for loading-unloading has been developed that will also operate as the fire safety road.



25' dedicated service road for loading-unloading which will also operate as the fire safety road.

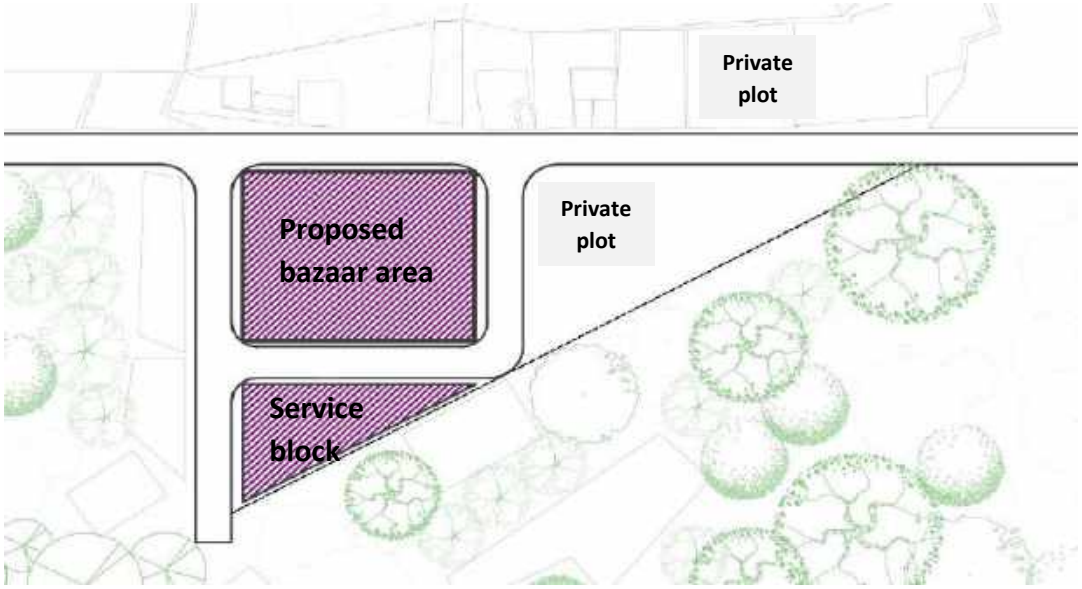
COLLATION FOR USERS, LABORERS, AND TROLLEY:

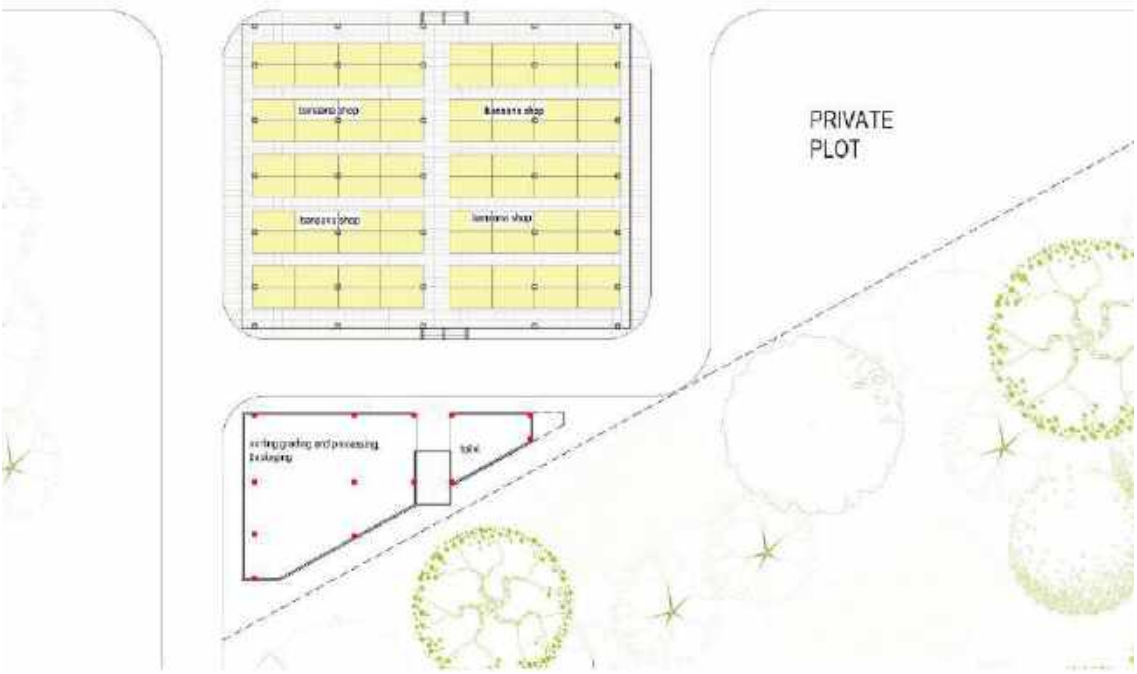


The central corridor is 6' wide and corridors used for users, laborers, and trolleys are 3' wide

ZONING:

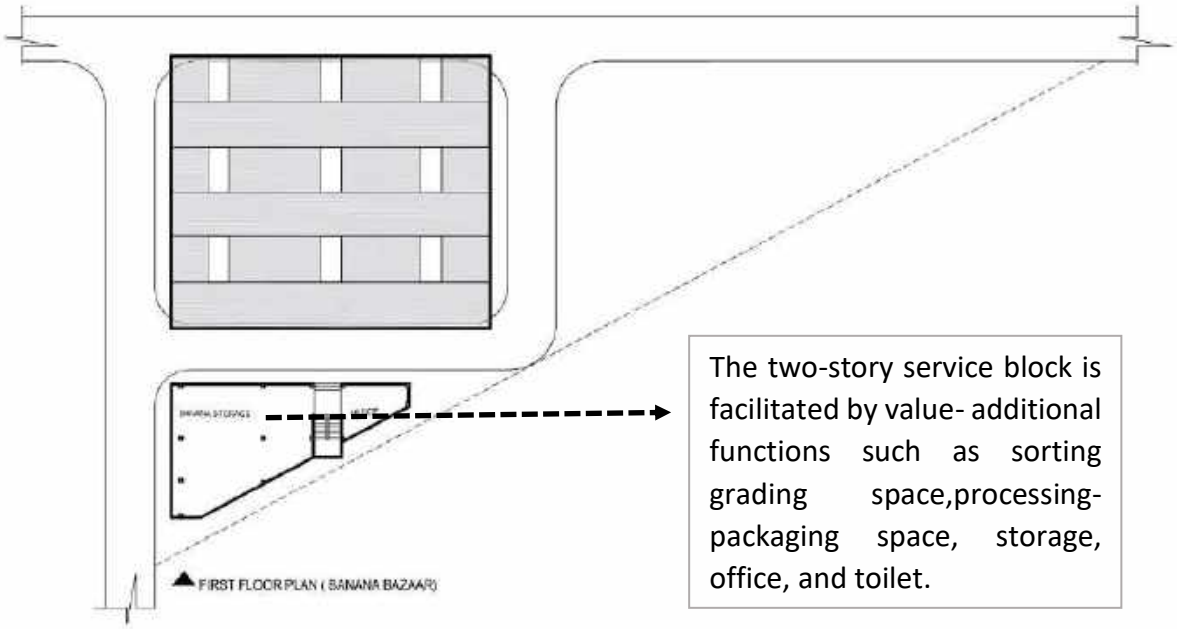
The bazaar space is divided into two blocks. The selling-buying activity takes place under the single-story shed. A total of 80 shops have been placed in this space. The circulation of shops is designed in a grid pattern. The central corridor is 6' wide and corridors used for users, laborers, and trolleys are 3' wide. The vendors can sit ergonomically in the shops.





Ground Floor Plan

Bazaar space build area: 17331 ft^2	Pave area: 2326 ft^2
Service space build area: 6458 ft^2	internal road area: 5032 ft^2



The two-story service block is facilitated by value- additional functions such as sorting grading space,processing-packaging space, storage, office, and toilet.

2.2.10. SUSTAINABILITY OF STRUCTURE:

RAINWATER HARVESTING:

- Rainwater harvesting each year in Chalakchar banana bazaar:
  A x R x C
  = 600 m^2 x 2.148 m x .85
  = 1095m^3

[here,
A=area
R=average yearly rainfall data
in the area in m
C= co-efficient]

SOLAR CAPACITY:

Per panel size: 2.8mx1.2m =3.36m^2

- highest Solar capacity in Chalakchar banana bazaar per day
  A x C x S
  = 600 m^2 x .6 x 120/1000
  = 43 .2 kw

[here,
A=area of bazaar roof
C= area reduction co-efficient
S=solar energy consumption, considering 80% efficiency (W/ m^2*)]*

Total shop =80 nos
Suppose,
each shop has 1 light and 1 fan.
So, the shops have a total of 80 lights and 80 fans.
The power consumption of each light is 30W & each fan is 200W.

Option 1(For DC):

- Total solar power consumption of lights (80x 30) =2400 watt =2.4 kW/per day (DC)
- Total solar power consumption of fans (80 x 200) =16000watt=16kW/per day (DC)
- Total solar power consumption in Chalakchar banana bazaar = (2.4+ 16) kw/per day
  = 18.4 kw/per day (DC)
- so, required area of solar panel = (18.4x1000)/120= 153.3 m^2 *[considering 80% efficiency]*

Option 2 (For AC):

A 130A solar battery is required to store 0.4kW solar energy which is produced by a 3.36m^2 solar panel.
Daily availability of solar power in Chalakchar banana Bazaar = 43.2 kw

- So, required Battery = (130/0.4) x43.2= 14040A = 108 nos 130A
  Daily demand of solar power in Chalakchar banana bazaar= 18.4 kw
- Daily serving hour from the required battery = (12x108x130)/ (18.4x1000) = 9 hour

Option 3(for AC & DC):

- Total solar power consumption in Chalakchar banana bazaar = 18.4 kW/per day
- Required battery for AC after using DC is = (130/0.4) x (43.2-18.4) = 8060A
  = 62 nos 130A
- Daily serving hour from the Required Battery after using DC=(12x62x130)/ (18.4x1000)
  = 5 hours

2.2.11. STRUCTURE AND MATERIAL:

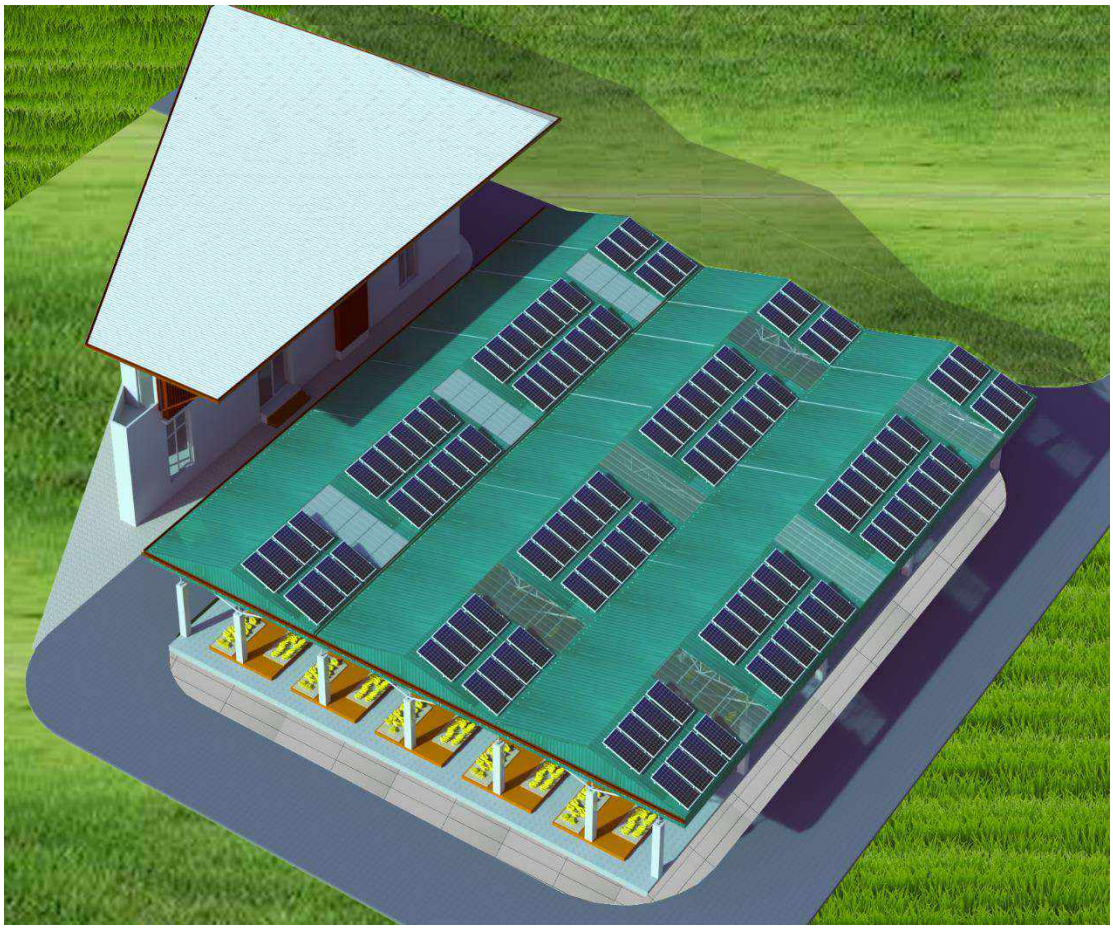
The service block of the bazaar is constructed by a post-lintel system. Concrete floors, RCC columns, and a steel roof are proposed to build the service block. The walls are made of bricks with plaster and color. The single-story building is constructed with a steel roof. The steel roof is supported by steel truss members.

2.2.12. 3D IMAGES:

3D VIEW-1

3D VIEW-2

3D VIEW-3



3D VIEW-4

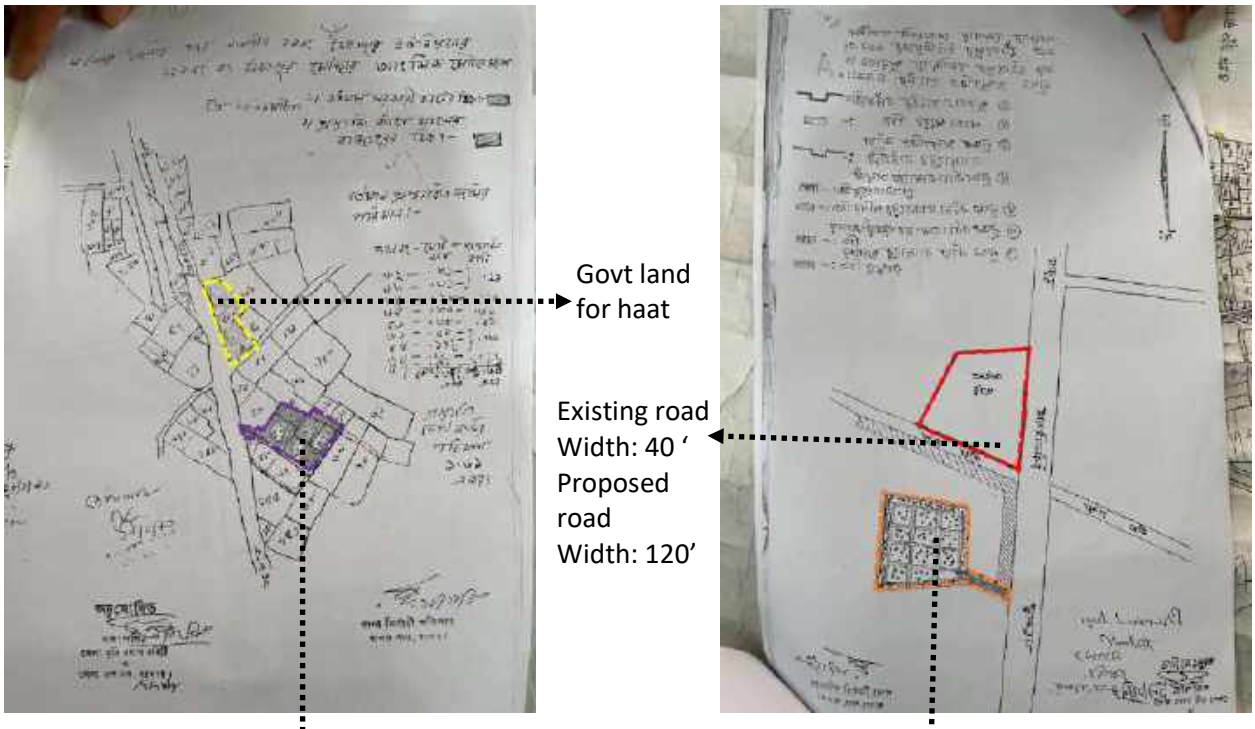
SHATMILE BAZAAR, JESSORE

Bazaar type: Collection center, special bazaar

2.3.1. SITE SELECTION

Location: Shatmile barinagar bazaar, Jessore

site area: 1.4 acre



- Location: adjacent to jhinadah highway, Jessore (govt. land)

2.3.2. SITE ENFORCEMENT:

COMMUNICATION SYSTEM:

Shatmile Bazaar is a marketplace in the Khulna division. Shatmile bazaar is connected with the Jessore-Jhinaidah highway. rickshaws, bicycles, CNG, vans, auto rickshaws, etc. are used for loading and unloading. The whole loading and unloading procedure take place in an open space under rain trees. The communication system of this district is very good.

USERS AND STRUCTURE PATTERN:

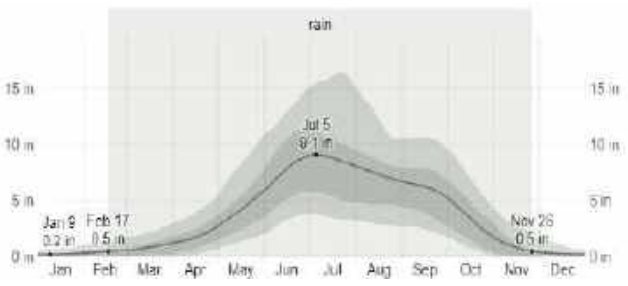
The area of Jessore is almost 435.22 km^2. The population density of this area is 1,700/km^2 and according to the 2011 census, about 742,898 people live in this place who directly use this bazaar. People from 8 unions also come here to sell and buy vegetables.

The bazaar is surrounded by private land and infrastructure. The average building height in this area is 6m-12m. the maximum structure is permanent.

CLIMATE:

Latitude	23.25202
Longitude	89.1653°

Average High and Low Temperature in Jessore



Average Monthly Rainfall in Jessore

2.3.3. MAJOR FINDINGS

- Type of product: both wholesale and retail
- Wholesale: vegetables

- Loading unloading of goods and vegetables
- Almost 50 trucks come here every day for loading unloading

- The bazaar is getting smaller because of the construction of 6 lane highway
- Haatday: Sunday, Thursday (104 haats in each year)
- Rent: on haat day: 50-70 tk
- Yearly rent: 600-800 tk
- Shop number: vegetables-96,fish - 80, grocery-250,cloth-25,hawkers-15,shoe, 6-7, chicken-6
- Aarot-12

- weight measuring instruments are used to measure the weights of vegetables

- Farmer's market is used as parking which is a weakness of this site

- Perforated jute and plastic bags are used to protect the vegetables from damage and maintain the air circulation
- A group of people related to the product packaging business

- The rain trees work as a canopy which provides natural shades to the sellers and spaces

2.3.4. POTENTIALITIES:

- To build a shade area for the sellers for monsoon season

- Improve the storage and packaging system

- weight measuring instruments should be modernized

- Multiple entry- exit for loading unloading and proper circulation

2.3.5. S.W.O.T ANALYSIS:

S	• Biggest wholesale vegetable market • Better transportation and position • Adjacent to the main road	**W**	• Waste management challenge • No toilet, storage, cold storage facilities • Loading unloading creates Traffic Hazard
O	• Potentiality for business • Employment opportunities • can become a landmark	**T**	• Tight land • Space created for Value added functions can reduce the existing functional area • Surrounded by private land

2.3.6. PROGRAMS:

EXISTING PROGRAMS:

- Display space
- aarot

PROPOSED PROGRAMS:

Wet market	aarot
Value additional function	Processing and packaging, Sorting and grading space, storage, transitional storage, admin, toilet, display spacefor young entrepreneurs, info corner, input shops, offices, agro workshop
Circulation	Space for loading and unloading, 30% circulation for people,25' internal road for loading unloading
Waste management	Trickling filter, Rainwater harvesting, Solar panel

2.3.7. DESIGN CONCEPT:

Shatmile-Barinagar in Jessore is renowned for its extensive vegetable cultivation and as one of the country's largest vegetable marketplaces. It is known as a "vegetable village." It is a special commodity-driven collection center that serves as the region's flagship wholesale vegetable market. The concept of designing this bazaar is to create this bazaar as a modern regional and export hub that accelerates the scope of young entrepreneurship and meets future demand.

Meeting the growing demand

Create a modern regional hub

Create an export hub

Increasing input business

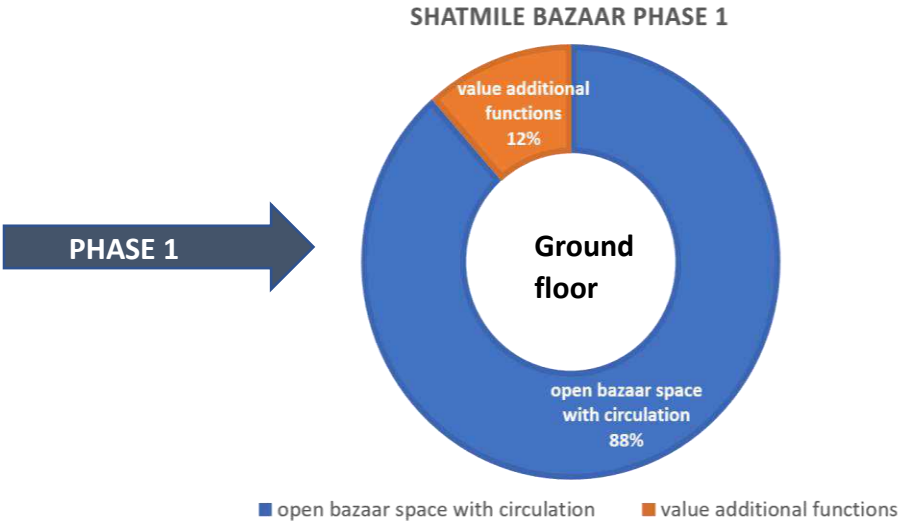
Proper storage system

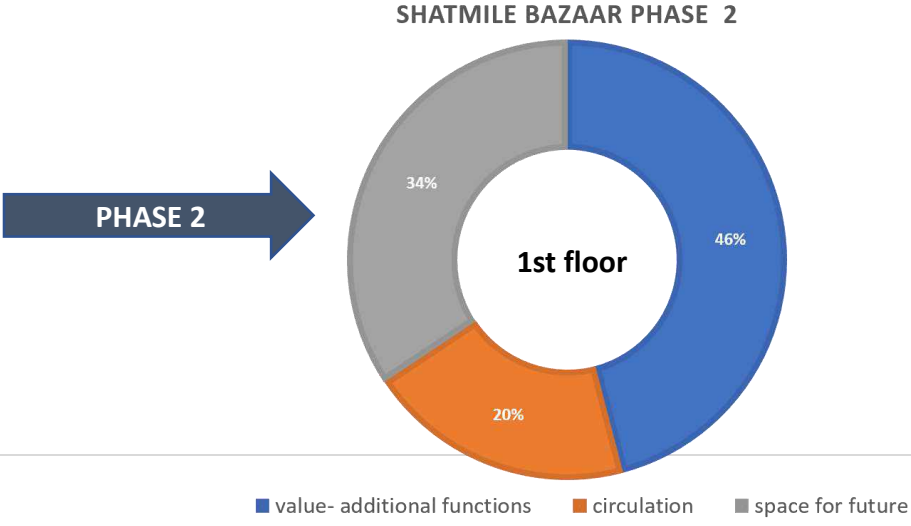
Accelerate the scope of young entrepreneurship

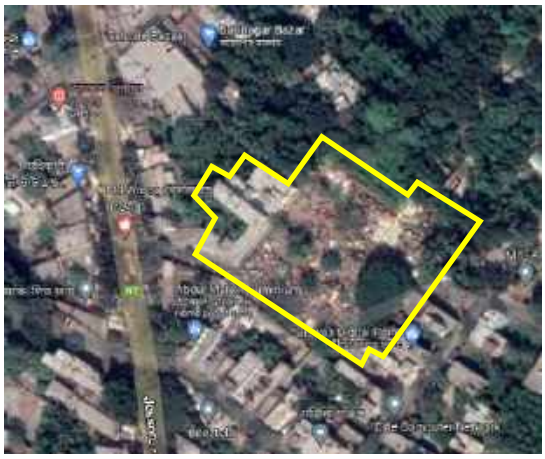
key design concept of Shatmile bazaar

2.3.8. DESIGN PHASES:

BAZAAR NAME: SHATMILE BAZAAR LOCATION:JESSORE,KHULNA						
phase	**floor**	**function type**	**functions**	**shop number**	**area (sqft)**	**percentage**
PHASE 1	**Ground Floor**	open bazaar space with			34310	88%
		value additional function	toilet, sorting grading , processing packaging,transitional storage , storage		4483	12%
				total=	**38793**	
PHASE 1	**1st Floor**	value-additional functions	office, info corner,input shop, display space,agro workshop, display center for young entrepreneurs		7293	46%
		circulation			3133	20%
		space for future extension			5453	34%
				total=	**15879**	





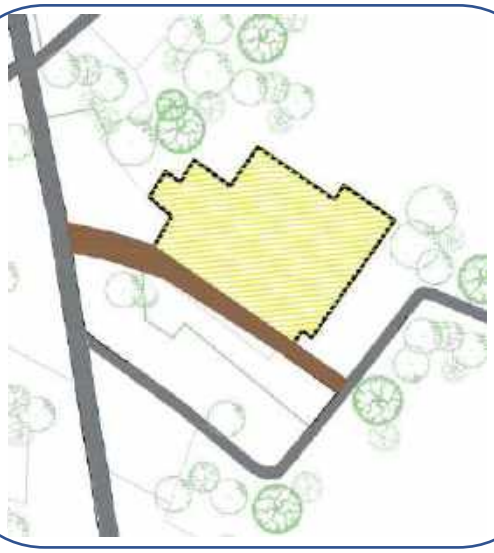


Site map

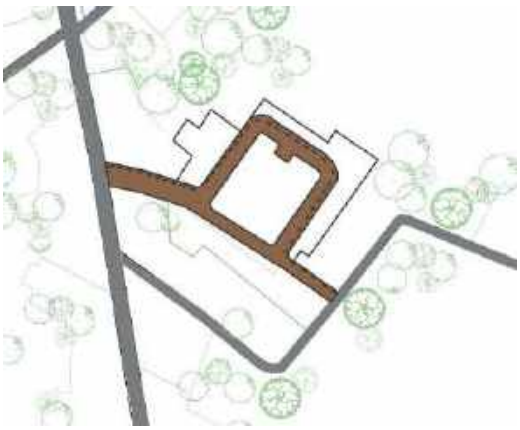
Public private land

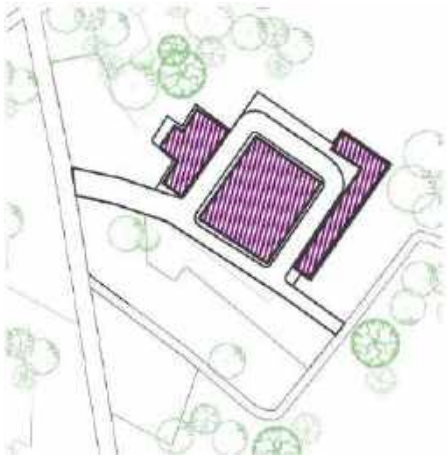
circulation

Existing Site



Proposed connecting service road

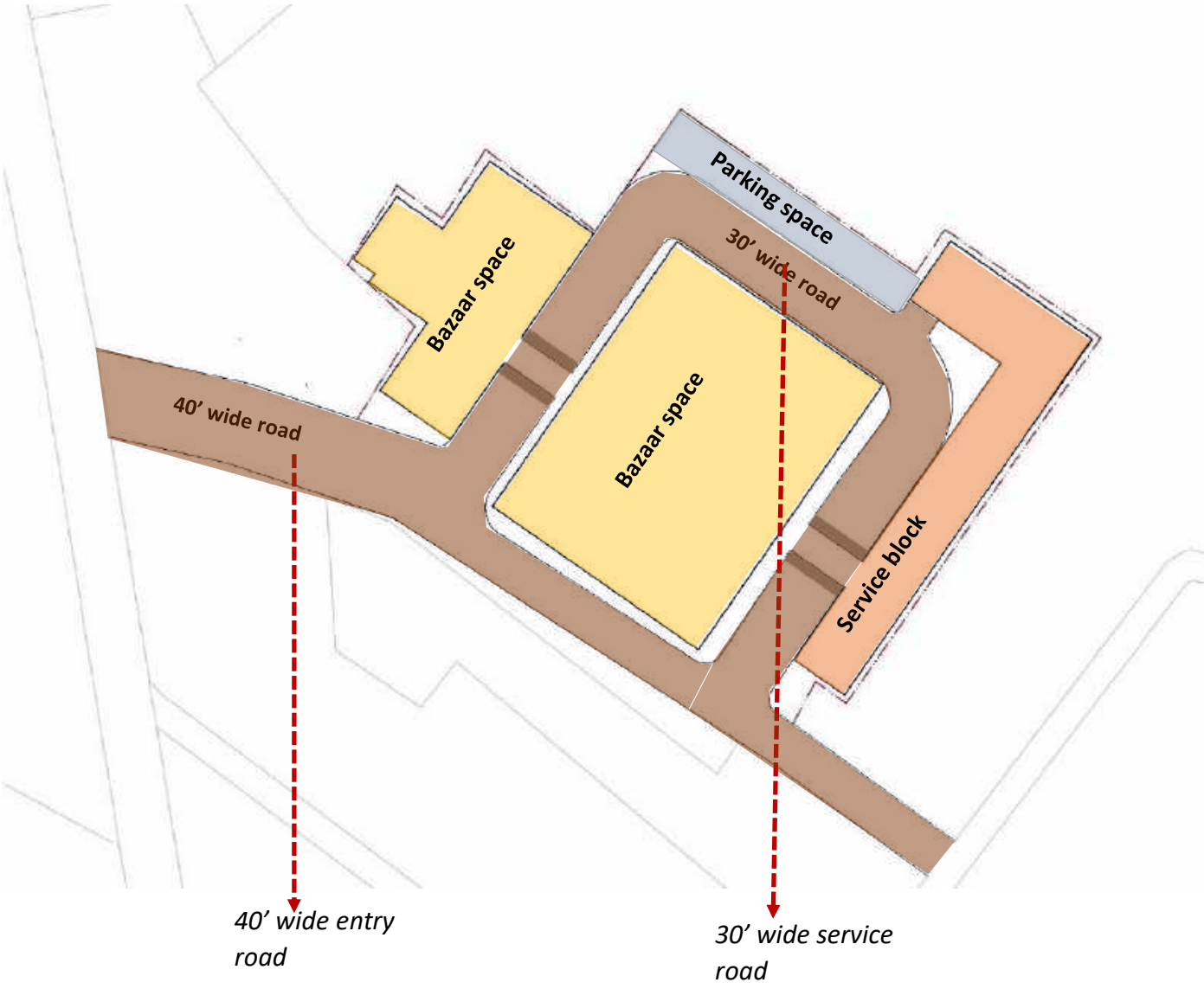




2.3.9. DESIGN SOLUTIONS:

CIRCULATION AND ZONING:

CIRCULATION FOR LOADING AND UNLOADING:



The existing entry road is too narrow (12') which is also used for loading and unloading. So, it has been proposed to be 40'wide.

A circular transport path which is 30' wide has been developed for loading-unloading. Separate ramps have been designed for labor.

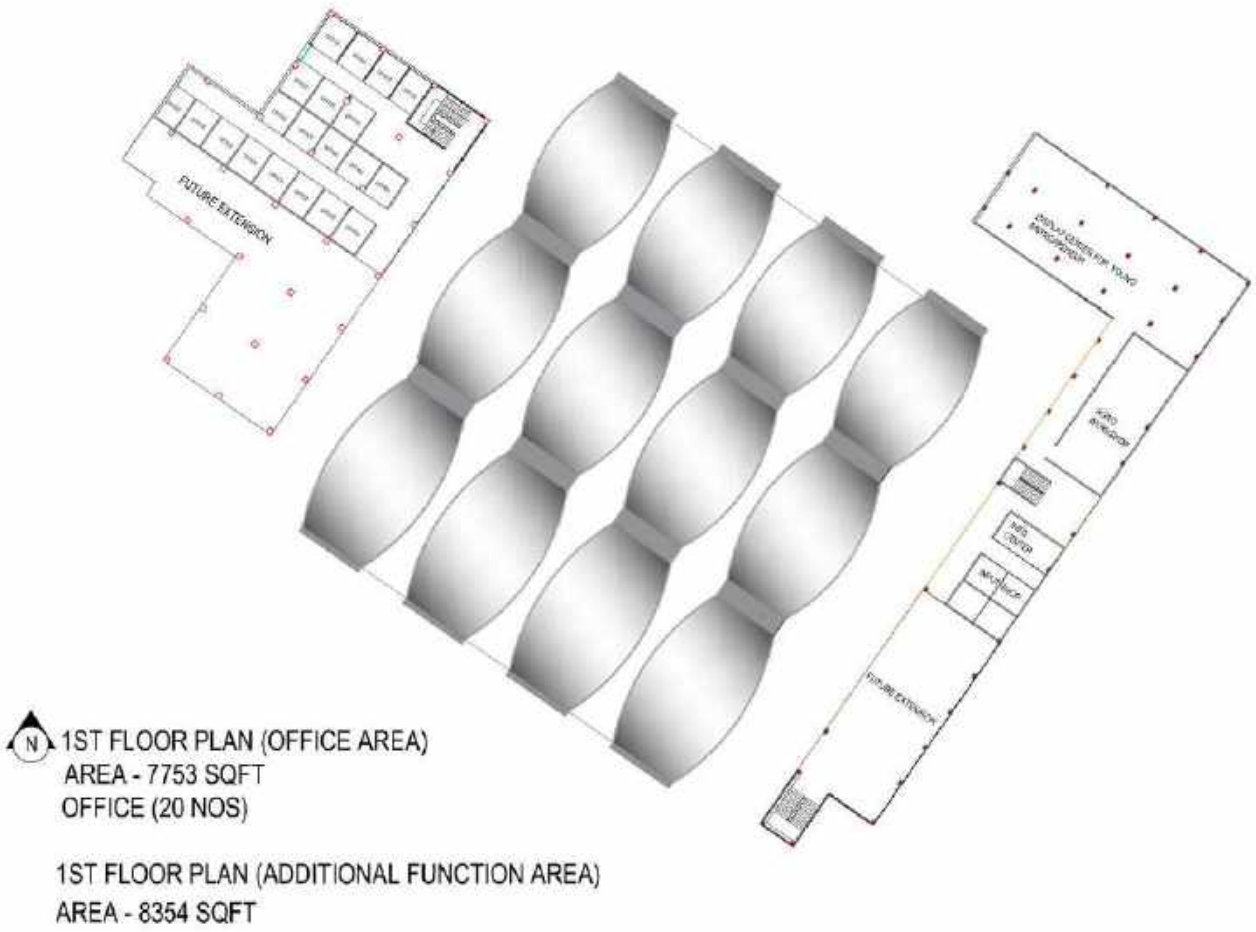
Since there was no space for parking, the area was used for dealing with heavy traffic jams, especially during loading- unloading time. To minimize this situation, a truck stand has been proposed.

ZONING:

The concept of redesigning the Shatmile bazaar was to redevelop this bazaar maintaining the parallel change of people's choice that meets future innovation as well as preserving the history and tradition of the bazaar. There was a concern to develop a bazaar space that is sustainable not only for the environment but also for the local users of this place. This project has been developed through multiple phases.

An "aarot' must have easy communication with the main road. Products from different areas come to aarot for a shorter time and are then distributed into different local bazaars. So aarot should be kept within reach of hand to ensure immediate loading unloading and swift delivery. The aarot space has been designed closely attached to the service road.

The bazaar is facilitated by waste management facilities and a dumping zone. Organic and non-organic waste is collected at night. A dedicated zone has been provided where organic waste can be composed with a rotator. Surface collectors collect wastewater, which is then cleaned by a trickling filter before being discharged into the river. This will significantly contribute to the bazaar being an environmentally sustainable commercial zone in the future.



On the ground floor, the service block is facilitated with sorting grading space, storage, office, and toilet. The first floor is facilitated with an info corner, agro workshop, display space for future extension, and offices. A space has been kept for future extension.

2.3.10. SUSTAINABILE FEATURES :

RAINWATER HARVESTING:

- Rainwater harvesting each year in Shatmile bazaar:
  A x R x C
  = 2456 m^2 x 1.75m x .85
  = 3653 m3

[here,
A=area
R=average yearly rainfall data in the area in m
C= co-efficient]

SOLAR CAPACITY:

Per panel size: 2.8mx1.2m =3.36m^2

- highest Solar capacity in Shatmile bazaar per day
  A x C x S
  =489 m^2 x .6 x 120/1000
  = 35.21 kw

[here,
A=area of bazaar roof
C= area reduction co-efficient
S=solar energy consumption, considering 80% efficiency (W/ m^2)]

Suppose,
For per 100 ft^2 area 2 lights and 1 fan have been used.
So, the bazaar space has total of 50 lights and 25fans.
The power consumption of each light is 30W & each fan is 200W.

Option 1(For DC):

- Total solar power consumption of lights (50x 30) =1500 W =1.5 kW/per day
- Total solar power consumption of fans (25 x 200) =5000W=5 kW/per day
- Total solar power consumption in Shatmile bazaar = (1.5+ 5) kW/per day
  = 6.5 kW/per day
- required area of solar panel = (6.5x1000)/120= 54.1 m^2 *[considering 80% efficiency]*

Option 2 (For AC):

A 130A solar battery is required to store 0.4kW solar energy which is produced by a 3.36m^2 solar panel.
Daily availability of solar power in Shatmile Bazaar = 35.21 kW

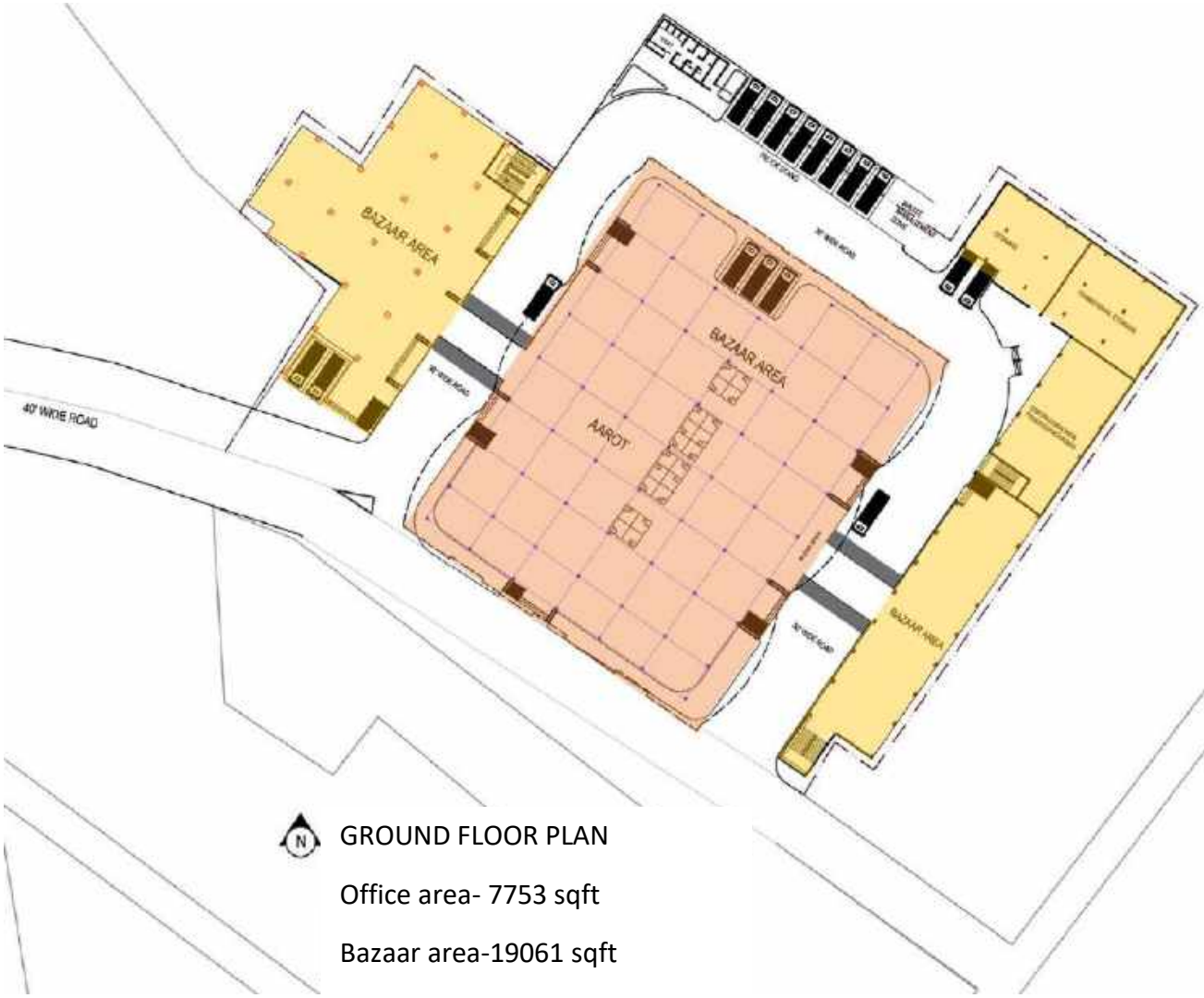
- So, required Battery = (130/0.4) x 35.21= 11443A = 88 nos 130A
  Daily demand of solar power in Shatmile bazaar= 6.5 kW
- Daily serving hour from the required battery = (12x88x130)/ (6.5x1000) = 21 hour

Option 3(for AC & DC):

Total solar power consumption in Shimulbak bazaar = 6.5 kW/per day

- Required battery for AC after using DC is = (130/0.4) x (35.21-6.5) = 9330A
  = 71 nos 130A
- Daily serving hour from the Required Battery after using DC
  - =(12x71x130)/ (6.5x1000)
  - = 17 hour

2.3.11. STRUCTURE ANALYSIS:



GROUND FLOOR PLAN

Office area- 7753 sqft

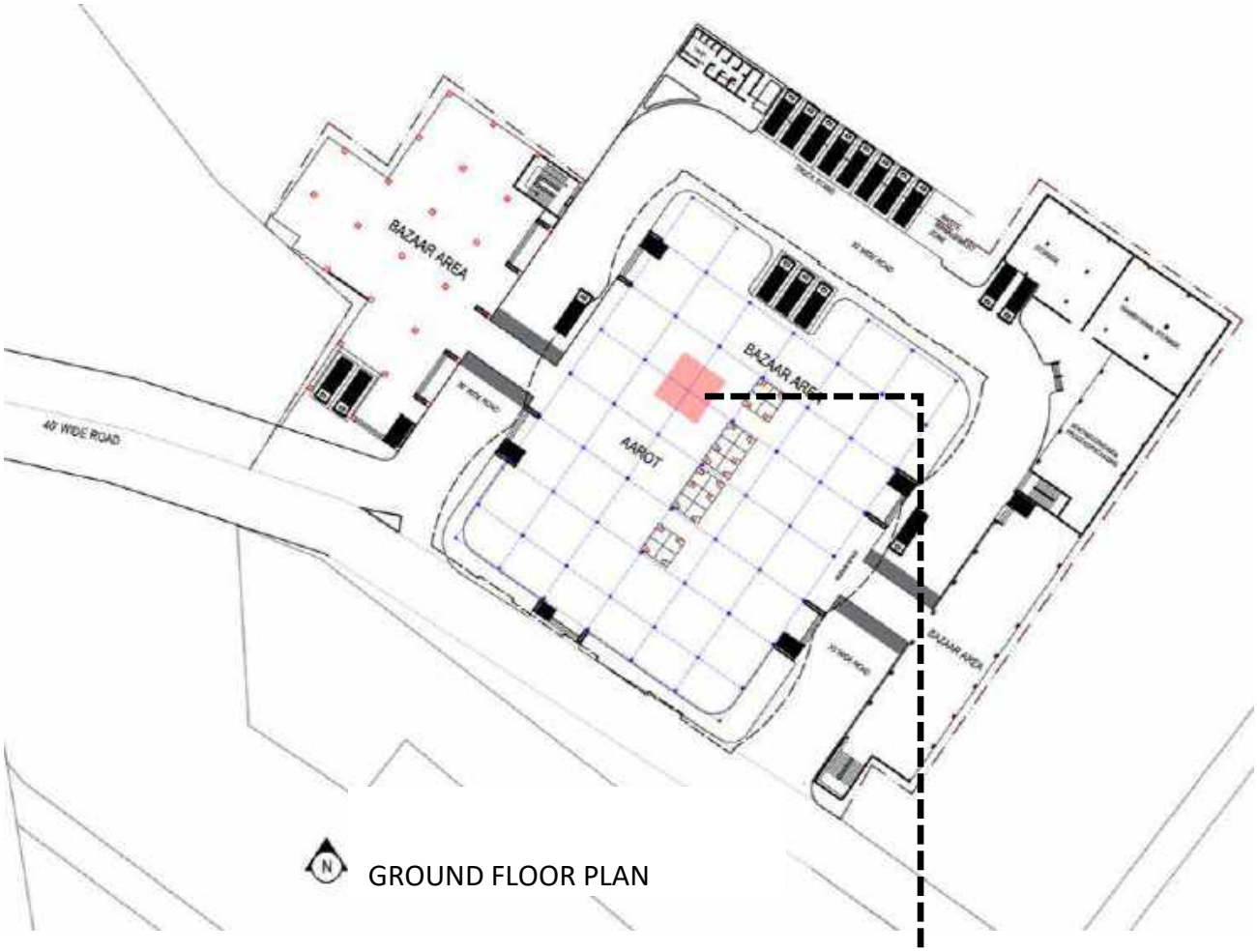
Bazaar area-19061 sqft

Additional functional area: 8354 sqft

Steel column

R.C.C column

- the steel members occupy the less functional area.
- Steel members can easily be reused
- In steel structures, cantilevers can be formed easily.
- in low height buildings, steels members can be repaired easily
- The construction period is short for the steel structure
- Natural ventilation and airflow can be ensured properly by the steel-structured roof

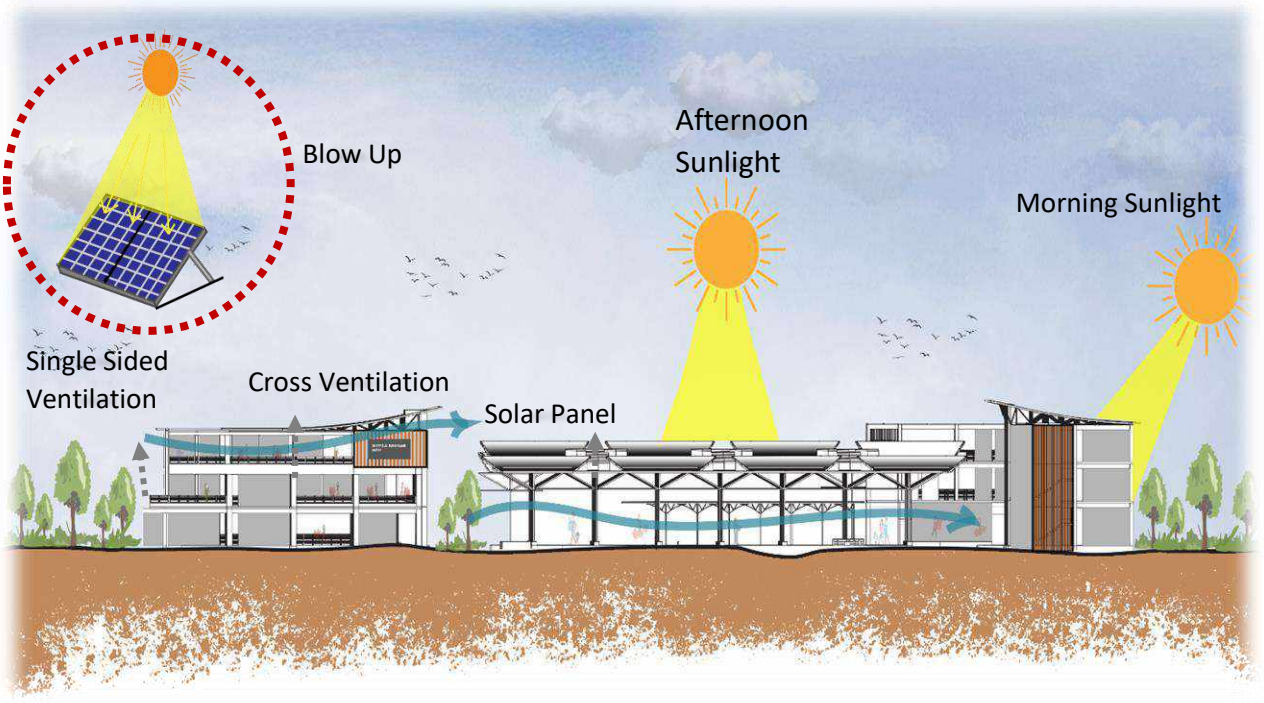


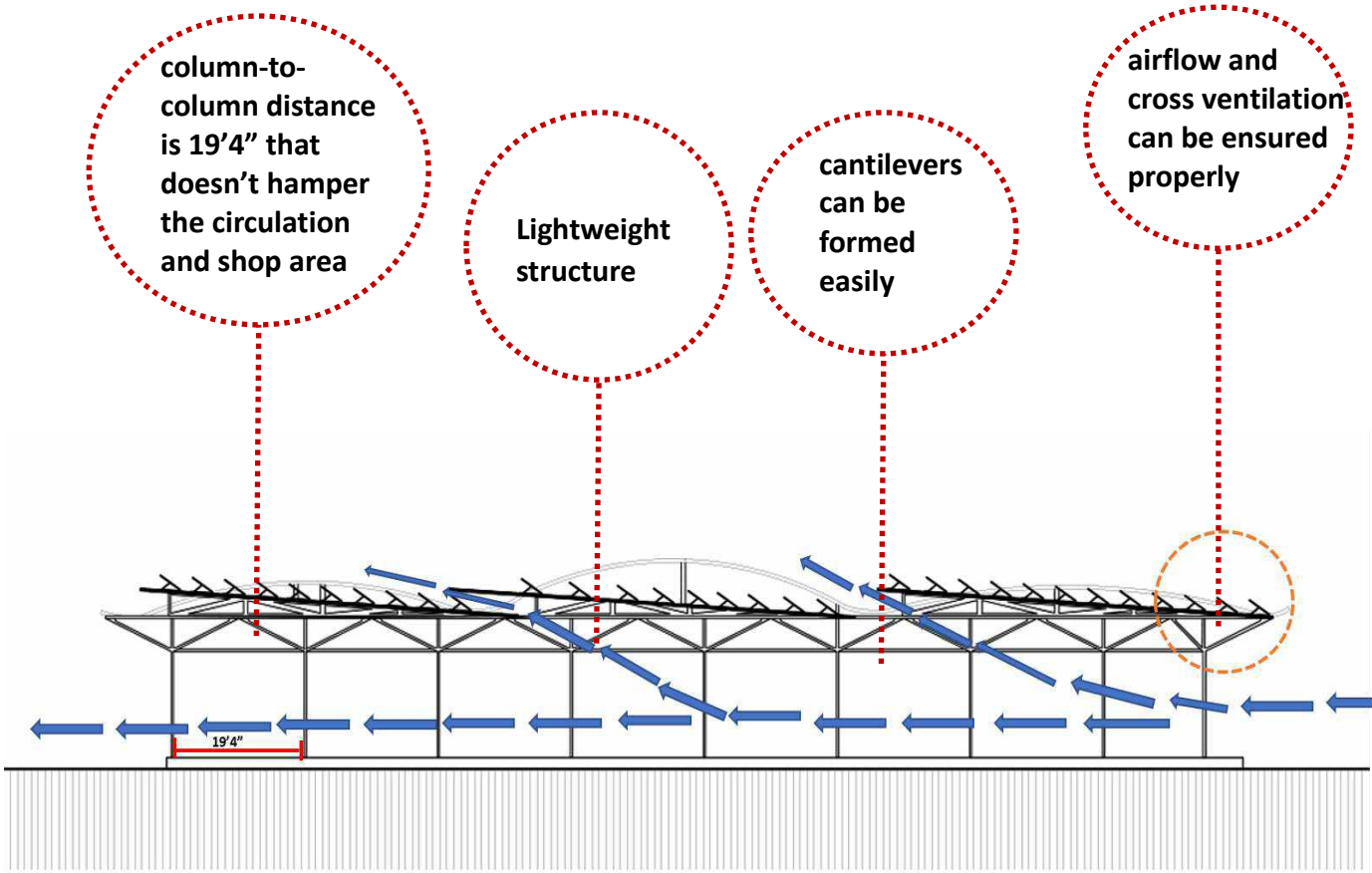
GROUND FLOOR PLAN

COLUMN WITH LOADED AREA (20' X 20' =400SQFT)

- For 20' span, in steel Structure, the column size is 8"x8" and the column-to-column clear distance is 19'4.

SECTION OF SHATMILE BAZAAR WITH STEEL COLUMN:





Section through north-south direction

2.3.12. 3D IMAGES

3D VIEW-1

3D VIEW-2

3D VIEW-3

3D VIEW-4

3D VIEW-5

3D VIEW-6

3D VIEW-7

3D VIEW-8

GAZIRHAT BAZAAR, SHATKHIRA

Bazaar type: special bazaar

2.4.1. SITE LOCATION:

Location: Shatkhira, Khulna, adjacent to Jessore - Shatkhira road
Site area: 1.46 acre

2.4.2. SITE ENFORCEMENT:

COMMUNICATION SYSTEM:

Gazirhat Union Parishad can be reached by road from Dighlia upazila of Khulna district through Beleghat and Kamargati Khewaghat. Also, from Khulna, Rupsar Jail Khana can be reached by bus through Khulna to Kalia road.

Gazirhat fish market is situated on the bank of the Madhumati River. The site is far away from the main road. rickshaws, vans, autorickshaws, and pickups are used for loading and unloading. Main roads are in poor condition which causes water clogging during the monsoon season. The main road is 15' wide which is connected to a secondary 10' wide road. That secondary road leads to the main site.

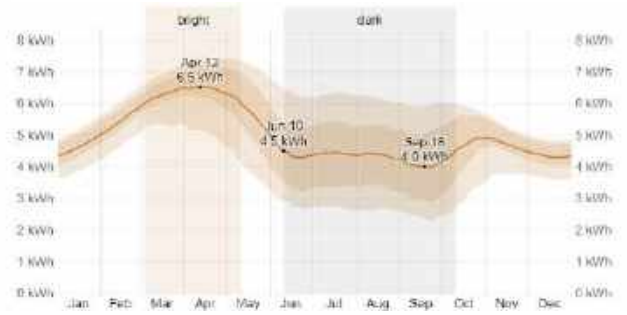
USERS AND STRUCTURE PATTERN:

The area of Gazirhat is almost 26.35 km². The population density of this area is 737.4/km² and the annual population change is -1.6%. According to the 2011 census, about 19,433 people live in this place who directly use this bazaar.

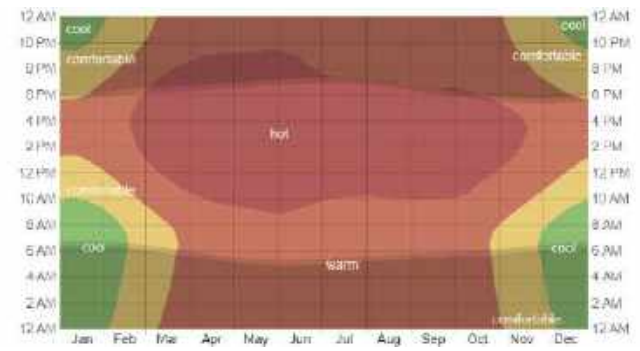
About 50% portion of this bazaar is surrounded by commercial structures. The average building height in this area is 3m-6m. the maximum structure is semi-pucca.

CLIMATE:

Average Hourly Temperature in Sātkhira



Average Monthly Rainfall

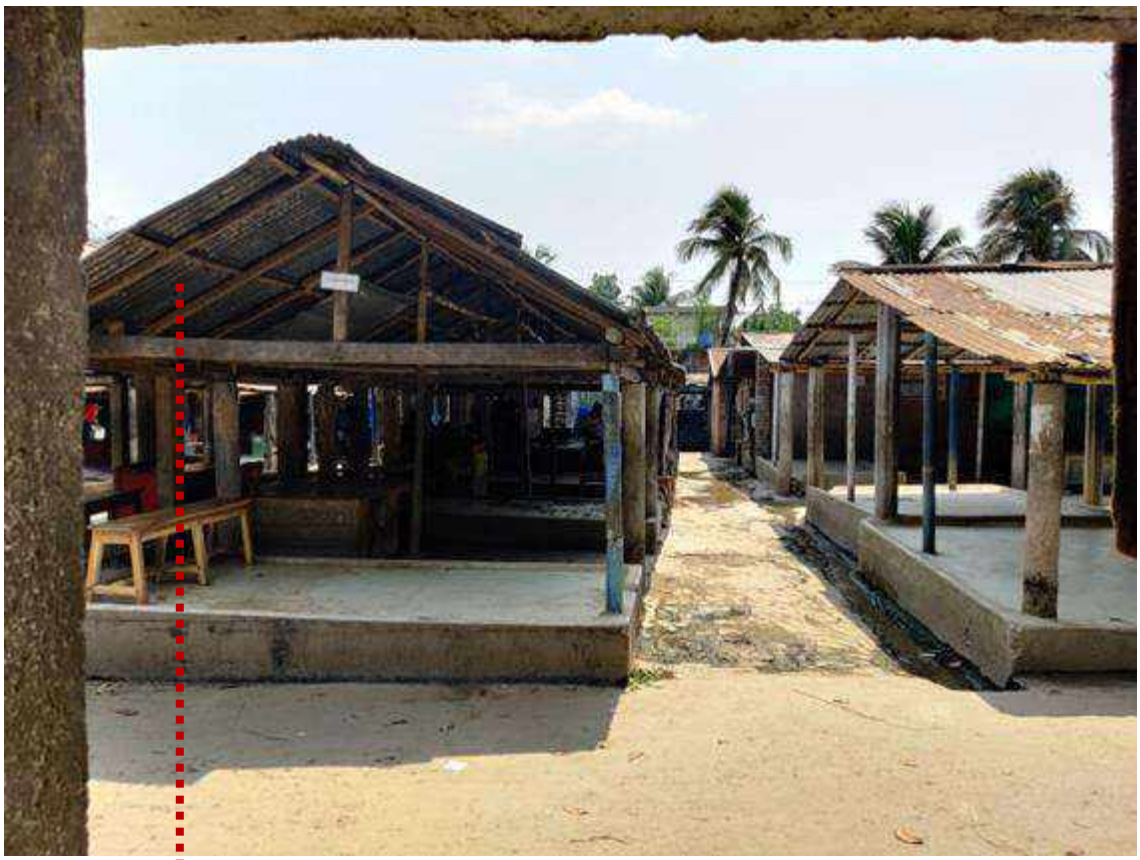


Average Water Temperature

Average Daily Solar Energy

2.4.3. MAJOR FINDINGS:

- Type of product: both wholesale and retail
- Wholesale: fish
- Main entry of the market



Existing shades for fish market

- Shop size: small: 3'\4', medium: 4'\8', large: 8'\10'
- Rent (per day): small shop: 10 tk, medium shop:15 tk, large shop: 20 tk
- Total businessmen: 1000
- Monthly income: retail: 20,000-25,000 tk
- Yearly income: 1,50,000 tk- 3,00,000 tk
- The market was established in 2008
- Loading, and unloading: morning, afternoon
- Peak hour: Morning
- MMC: Gazirhat bazaar shomiti
- Main season: April -February
- Fishes come from nolata, parulia, debhata, shatkhira
- Shop number: vegetables-20,fish - 100, grocery-23,fruit-10,ice grinding : 5
- Cost of each ice chunk: 130tk, for grinding it costs 160-180tk

2.4.4. PROBLEM ANALYSIS:

- **Dilapidated structure**

- **There is a one tube well that is used as main water source**

- **Sorting and grading platform condition is so poor**
- **No generated system for waste**

- **no toilet facilities and poor drainage system**

2.4.5. S.W.O.T ANALYSIS:

S	• Biggest fish market • Situated on the bank of madhumati river	**W**	• Narrow roads for loading unloading • No toilet, storage, cold storage facilities • Vulnerable structure
O	• Potentiality for become business hub • Employment opportunities	**T**	• Tight land • Surrounded by private land

2.4.6. PROGRAMMES:

EXISTING FUNCTIONS:

Fish shop, Packaging shop, Ice griding shop, Toilet

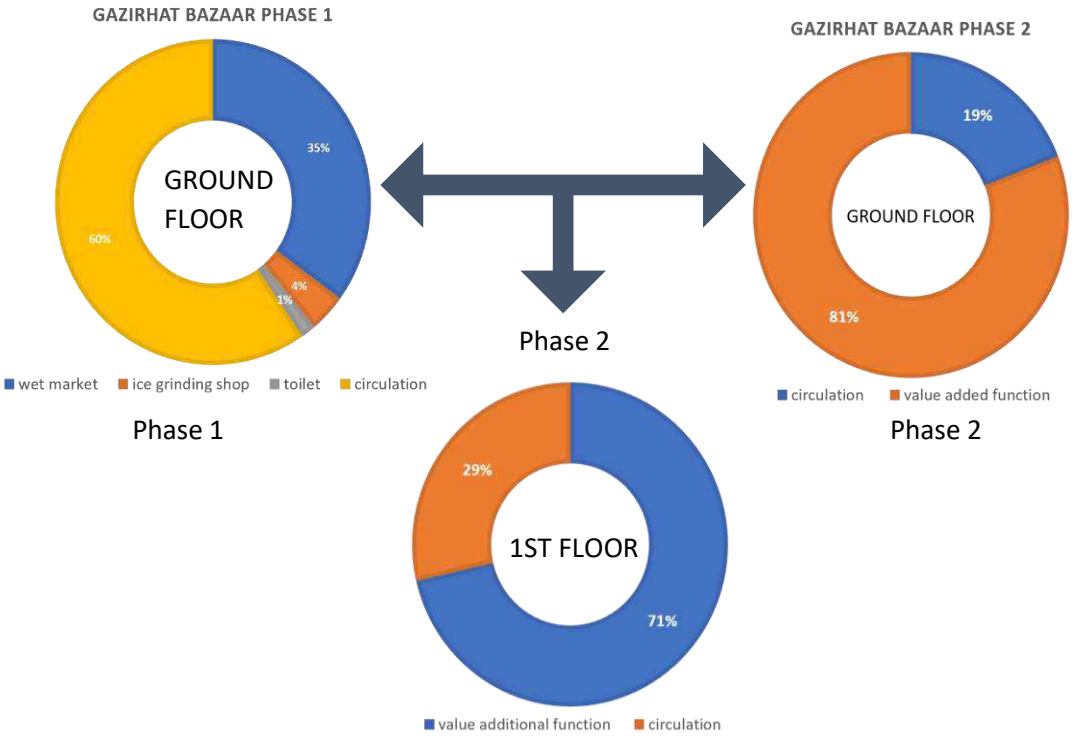
PROPOSED FUNCTIONS:

Wet market	Fish shop**,**Griding shop**,**Packaging shop**,**Toilet
Value additional function	Depo, Ice factory, Cold storage, Transitional storage, Sorting grading, processing, packaging space, Input shops, Restaurant,Display center for the young entrepreneur,info corner, office,admin
Circulation	Space for loading and unloading, 30% circulation for people,25' internal road for loading unloading
Waste management	Trickling filter, Rainwater harvesting, Solar panel

2.4.7. DESIGN PHASES:

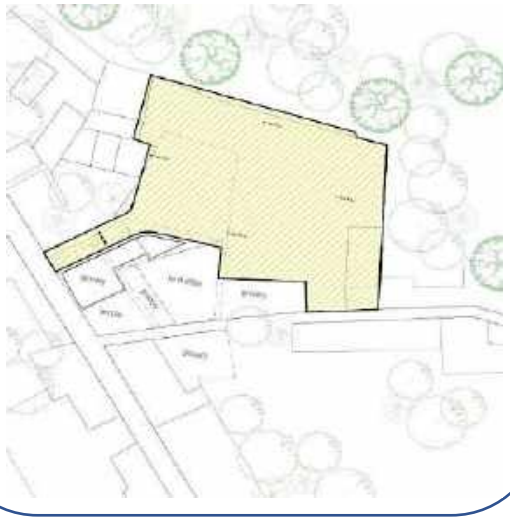
Gazirhat Bazar is a well-known fish wholesale market (Baghda & Golda) in Sathkhira's Debhata Upzilla. The main concept of the design is to make an export hub by adding some value- additional functions.

BAZAAR NAME: GAZIRHAT BAZAAR LOCATION: SHATKHIRA, KHULNA						
phase	**floor**	**function type**	**functions**	**shop number**	**area (sqft)**	**percentage**
PHASE 1	**ground floor**	wet market	fish shop	181	8784	35%
		ice grinding		8	947	4%
		toilet			385	1%
		circulation			14918	60%
				total=	**25034**	
PHASE 2	**ground floor**	value additional function	depo, sorting, grading, processing, and packaging space, transitional storage, cold storage, ice factory		8089	81%
		circulation			1911	19%
				total=	**10000**	
	1st floor	value additional function	display space for young entrepreneurs, info center, management office, input shop, restaurant		3997	71%
		circulation			1600	29%
				total=	**5597**	

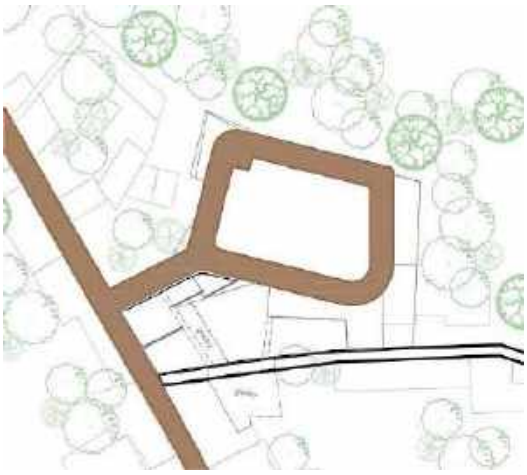


Site map

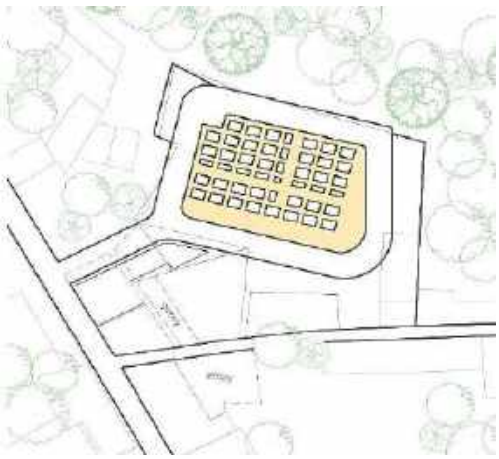
Public private land



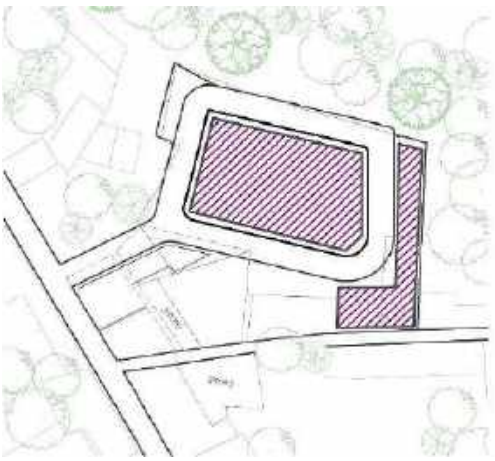
Existing Site



Proposed connecting service road



circulation



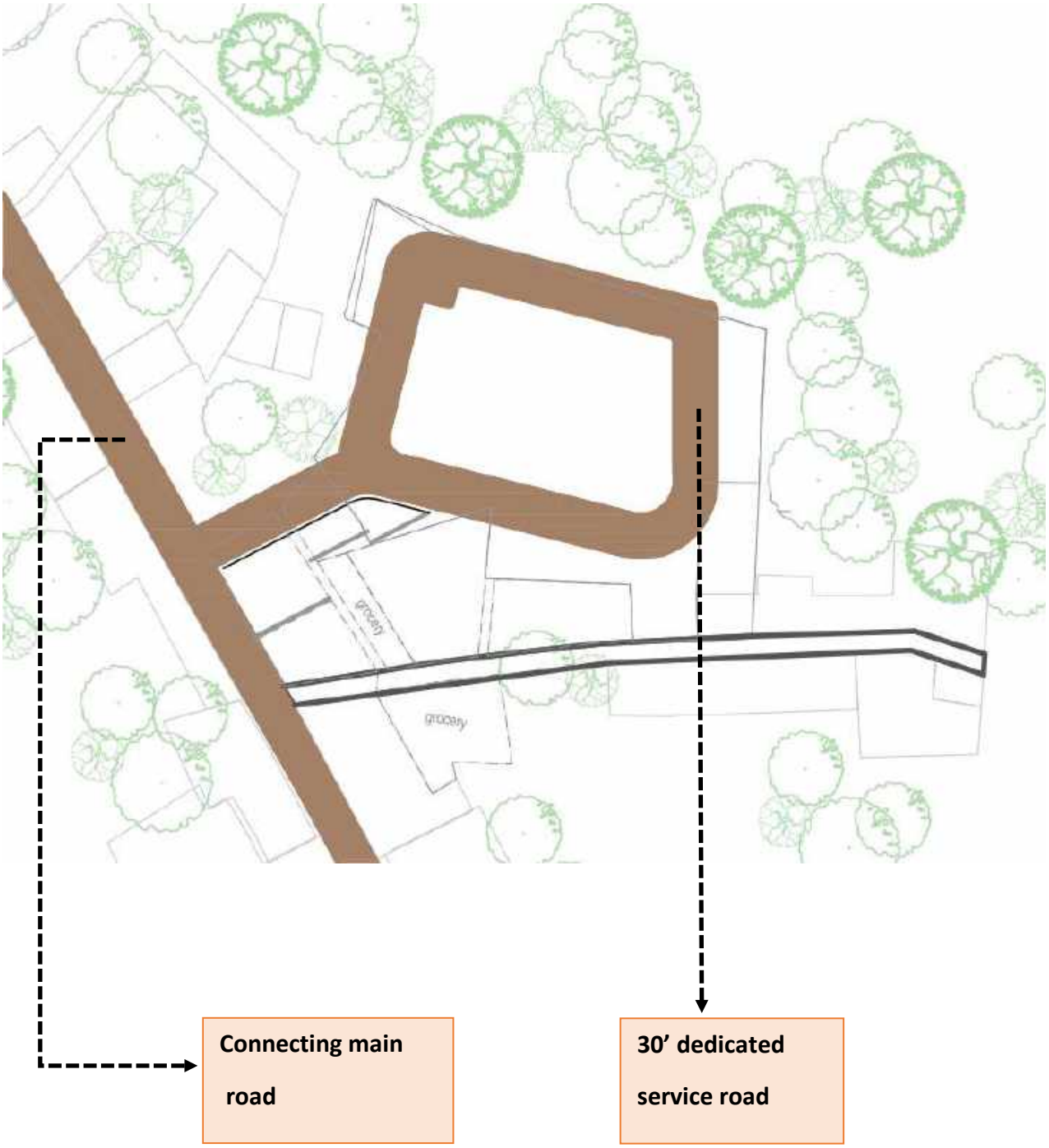
Proposed bazaar area

2.4.8. DESIGN SOLUTIONS:

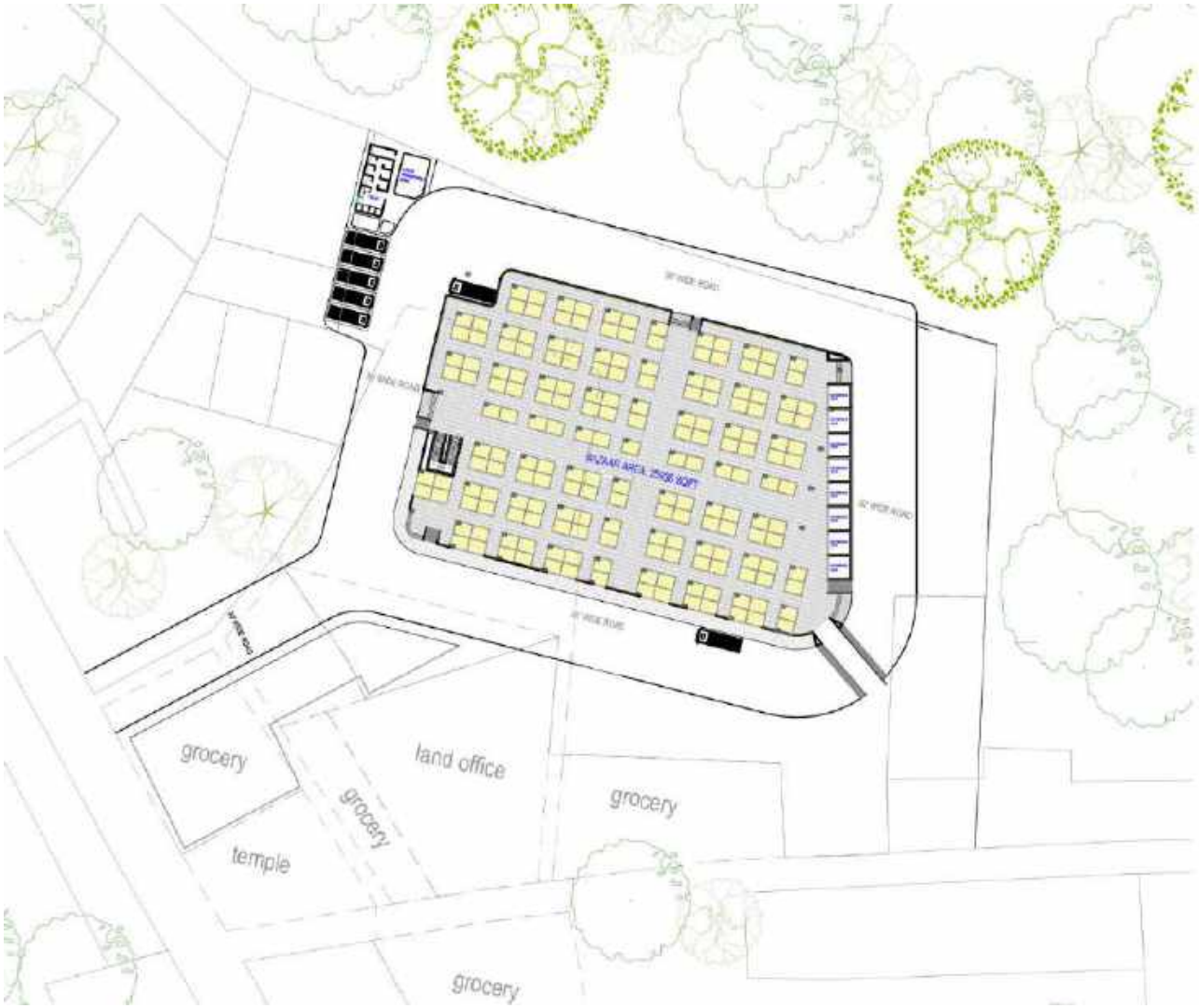
CIRCULATION:

In this bazaar plan, the main focus was to create a dedicated road for clear circulation and easy loading-unloading. The main road is extended to 30' which leads to the main entry and internal service road.

An internal 30' dedicated service road for loading-unloading has been developed. Separate ramps have been designed for labor.



ZONING:



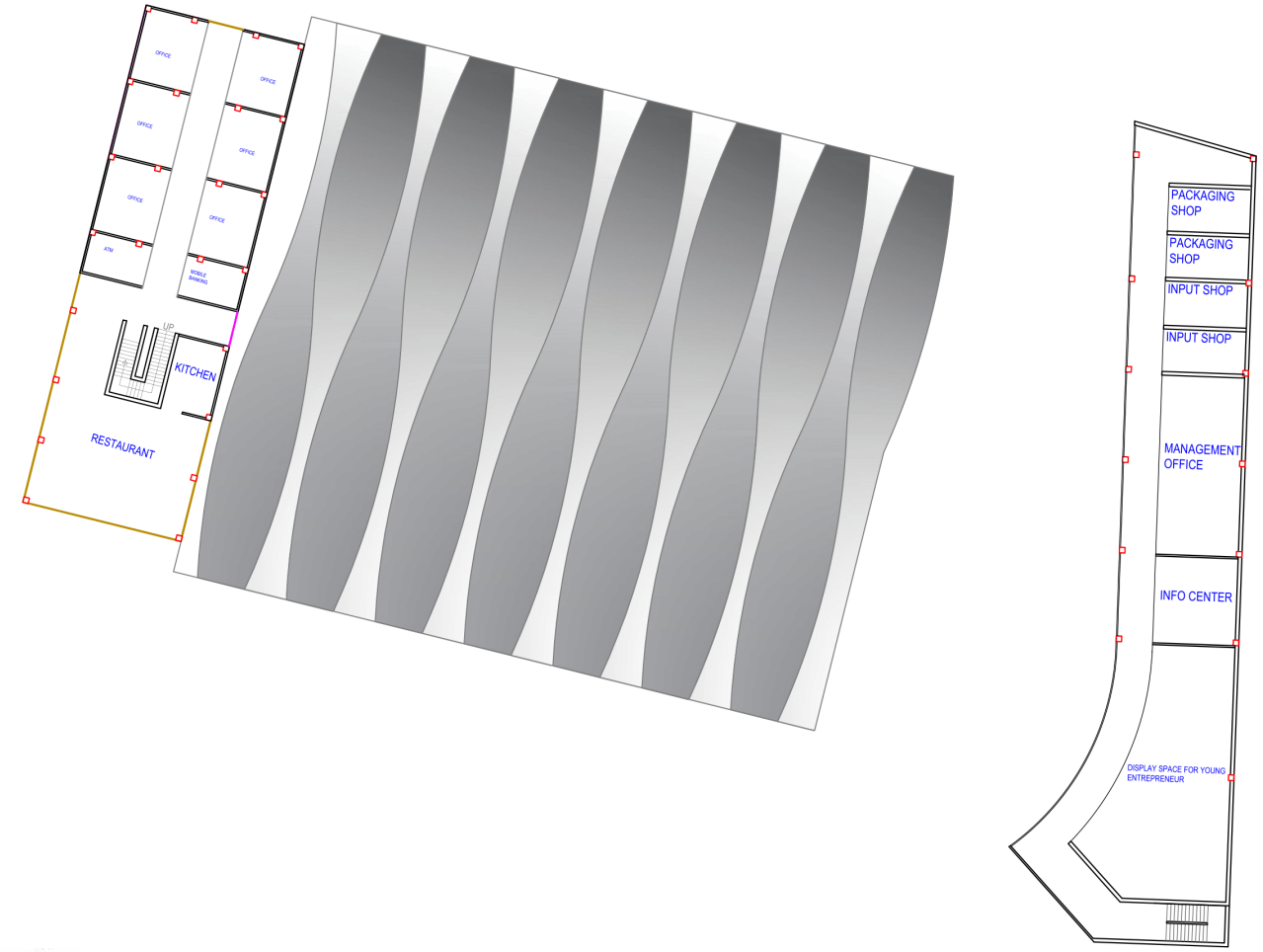
Ground floor plan

Service area: 10397 sqft
Internal road area: 27852 sqft
Pave area: 3698 sqft

There are two separate blocks for the bazaar area and services. The bazaar/ aarot area has 183 shops. The circulation of shops is designed in a grid pattern. The shops are divided into 4 clusters. Each cluster has separate entries and ramps.

The central corridors are 15' wide to ensure the loading and unloading of fish and the secondary corridors are 8' wide to ensure clear public movement. The vendors can sit ergonomically in the shops. Ice grinding shops have been placed adjacent to the shops. The corridors have been designed with ample light and ensure natural ventilation.

A space has been kept for waste management and parking on the ground floor.



1st floor plan

On the ground floor, the service block is facilitated by sorting grading, packaging processing space, storage, toilet, depo, and ice factory.

The first floor will be built in the second phase

of construction. The 1st floor of the east block is facilitated with some value-added functions such as an input shop, packaging shop, management office, info corner, and display space for young entrepreneurs.

The 1st floor of the west block is facilitated with offices and restaurants.

Solar panels have been placed on the roof to make the bazaar energy efficient and a system of rainwater harvesting can be generated to fulfill the water demand in the dry season.

2.4.9. SUSTAINABILITY OF STRUCTURE:

RAINWATER HARVESTING:

- Rainwater harvesting each year in Gazirhat bazaar:
  A x R x C
  = 2343 m^2 x 1.7m x .85
  = 3,385 m3

[here,
A=area
R=average yearly rainfall data in the area in m
C= co-efficient]

SOLAR CAPACITY:

Per panel size: 2.8mx1.2m =3.36m^2

- highest Solar capacity in Gazirhat bazaar per day
  A x C x S
  =2343 m^2 x .6 x 120/1000
  = 168 kw

[here,
A=area of bazaar roof
C= area reduction co-efficient
S=solar energy consumption, considering 80% efficiency (W/ m^2)]

Total shop =208 nos
Suppose,
each shop has 2 lights and 1 fan.
So, the shops have a total of 416 lights and 208 fans.
The power consumption of each light is 30W & each fan is 200W.

Option 1(For DC):

- Total solar power consumption of lights (416x 30) =12480 watt =12.5 kW/per day
- Total solar power consumption of fans (208 x 200) =41600watt=41.6 kW/per day
- Total solar power consumption in Gazirhat bazaar = (12.5+ 41.6) kW/per day
  - = 54.1 kW/per day
- so, required area of solar panel = (54.1x1000)/120= 450.8 m^2 [*considering 80% efficiency]*

Option 2 (For AC):

A 130A solar battery is required to store 0.4kW solar energy which is produced by a 3.36m^2 solar panel.
Daily availability of solar power in Gazirhat Bazaar = 168 kW

- So, required Battery = (130/0.4)x168= 54600A = 420 nos 130A

Daily demand of solar power in Gazirhat bazaar= 54.1 kW

- Daily serving hour from the required battery = (12x420x130)/(54.1x1000)= 12 hour

Option 3(for AC & DC):

Total solar power consumption in Gazirhat bazaar = 54.1 kW/per day

- Required battery for AC after using DC is = (130/0.4) x (168-54.1) = 370175A
  = 284 nos 130A
- Daily serving hour from the Required Battery after using DC
  =(12x284x130)/(54.1x1000)= 8 hour

2.4.10. 3D IMAGES:

3D VIEW-1

3D VIEW-2

3D VIEW-3

3D VIEW-4

3D VIEW-5

3D VIEW-6

3D VIEW-7

3D VIEW-8

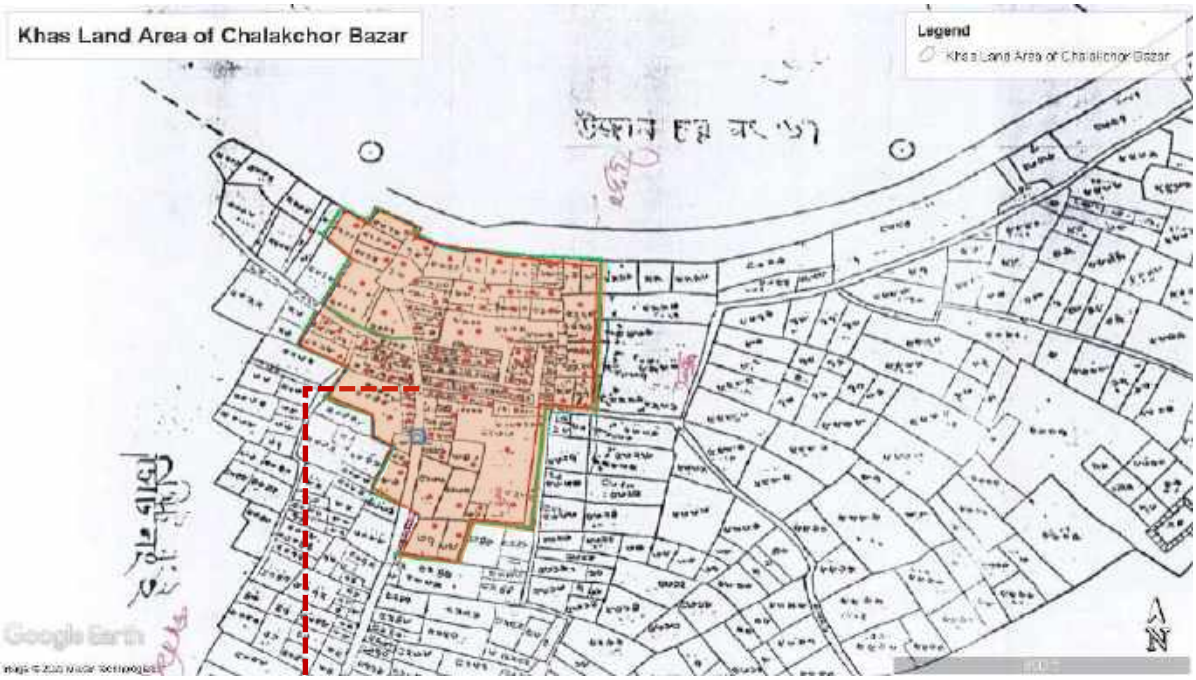
CHALAKCHAR BAZAAR, NARSHINGDI

Bazaar type:
Growth center

2.5.1. SITE LOCATION:

Location: Chalakchar, Narshingdi
site area: 254 acres

Site boundary



Availability of lands

The highlighted boundary indicates the periphery of Govt. land

2.5.2. SITE ENFORCEMENT:

SIGNIFICANCE OF THE BAZAAR:

The Chalakchar Bazaar of Chalakchar Union is a traditional and oldest bazaar. It's a historical bazaar that was established in the British period. People come from far and wide to this bazaar. It works as a connecting bridge between 7 unions named Charmandaria, Lebutola, Barachapa, Khidirpur, Krishnapur, Kachipara, Chandanbari. This market has a lot of reputation. From here many vegetables, bananas, betel leaves, and different types of products are taken to different districts of Bangladesh.

COMMUNICATION SYSTEM:

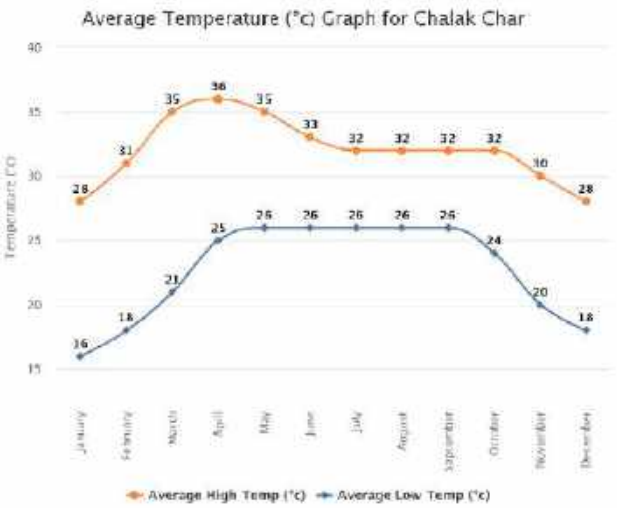
Chalakchar Union is connected to the main road to Narsingdi. Ordinary rickshaws, bicycles, CNG, vans, autorickshaws, etc. are used within the union enter to the bazaar. Rickshaws were formerly the main means of transportation in the area. Main roads are often in good condition during the monsoon season as water does not accumulate in the area for necessary drainage. Narshingdi-Chalakchar road works as the site's main entrance, which is 15' wide, and the internal roads are 6'-8'.The communication system of this district is very good. It is only one hour's distance from Dhaka. Waterway communication is also very good as lots of rivers flow through Narsingdi.

USERS AND STRUCTURE PATTERN:

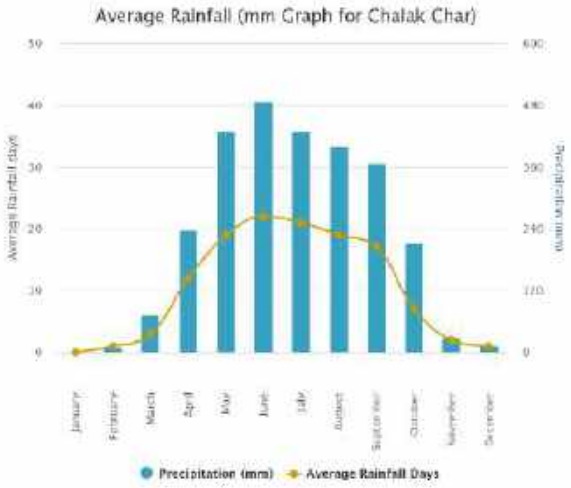
The area of Chalakchar is almost 9.899 km². The population density of this area is 1,962/km² and the annual population change is .73%. According to the 2011 census, about 19,421 people live in this place who directly use this bazaar. People from other unions also come here to sell and buy agricultural products. About 50% portion of this bazaar is surrounded by agricultural land. The average building height in this area is 6m-12m. the maximum structure is permanent except for the bazaar and most of the buildings are residential in 500m catchments.

CLIMATE:

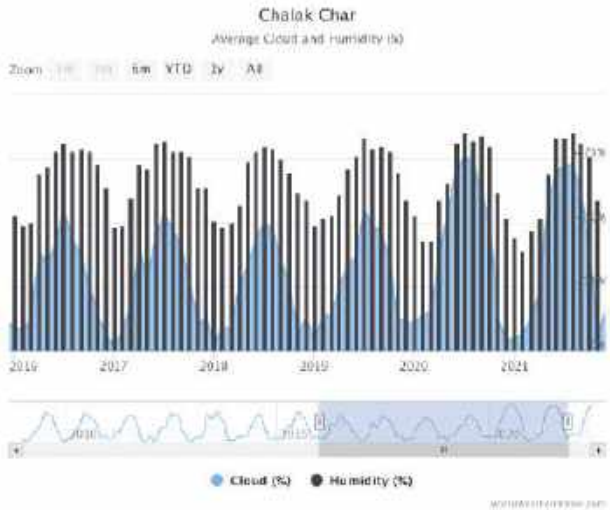
Chalak Char Bazar Latitude:	24.189013
Chalak Char Bazar Longitude:	90.730117



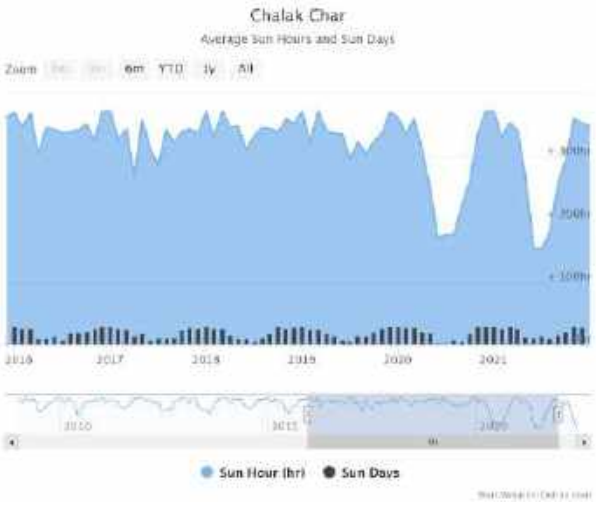
Monthly average temperature:



Monthly average rainfall:

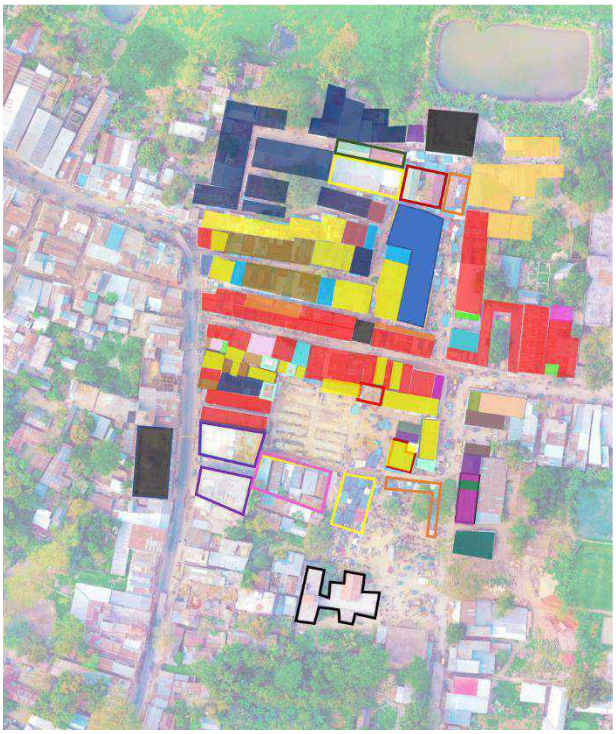


Cloud and Humidity graph from 2016-2021



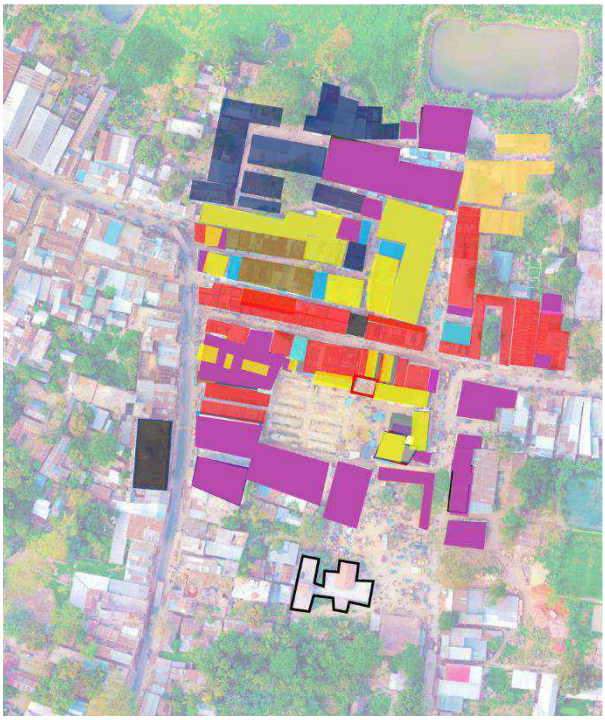
Sun hour graph from 2016-2021

2.5.3. MAJOR FINDINGS:



EXISTING ZONING

- STORAGE\GODOWN
- HOTEL
- MOSQUE
- PHARMACY
- GROCERY
- FERTILIZER SHOP
- JEWELRY
- PHONE
- TEMPORARY CLOTH STORE
- PERMANENT CLOTH AND ACCESSORIES STORE
- SPICE STORE
- TAILOR
- PARLOUR
- SANITARY
- COSMETICS
- ROD-CEMENT
- WOOD
- CONFECTIONARY
- GLASS
- HARDWARE
- LIBRARY
- TOILET
- STATIONARY
- POULTRY
- PACKAGING STORE
- BETEL LEAF
- FISH
- AAROT
- VEGETABLES
- MEAT
- BHUMI OFFICE
- UNION PARISHAD OFFICE
- BIG MARKET

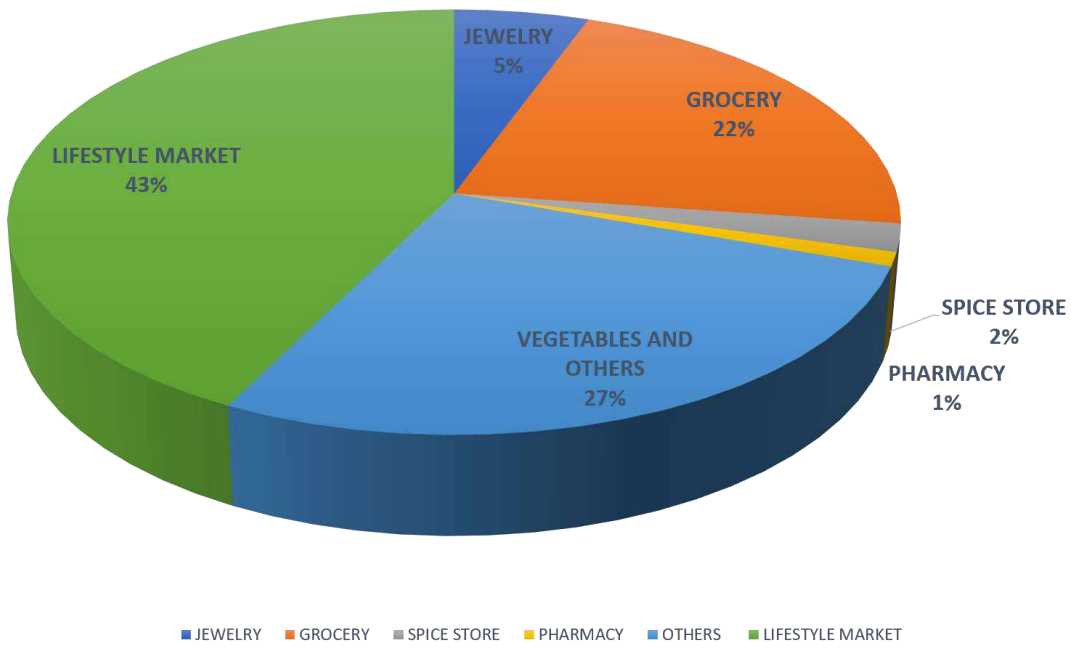


NUMBER OF SHOPS

LEGEND	SHOP TYPE	NUMBER OF SHOPS
	PERMANENT CLOTH AND ACCESSORIES STORE (LIFESTYLE MARKET)	161
	JEWELRY	21
	GROCERY	82
	SPICE STORE	8
	STORAGE\GODOWN	8356 SQFT
	PHARMACY	4
	VEGETABLES AND OTHERS	102
	TOTAL SHOP	378

The bazaar has a total 378 number of shops. The average sizes of small shops are 3'/3', medium shops are 5'/7' and large shops are 10'/15'. The peak hour of this bazaar is from 9 a.m. to 3 p.m.

RATIO OF SHOPS:



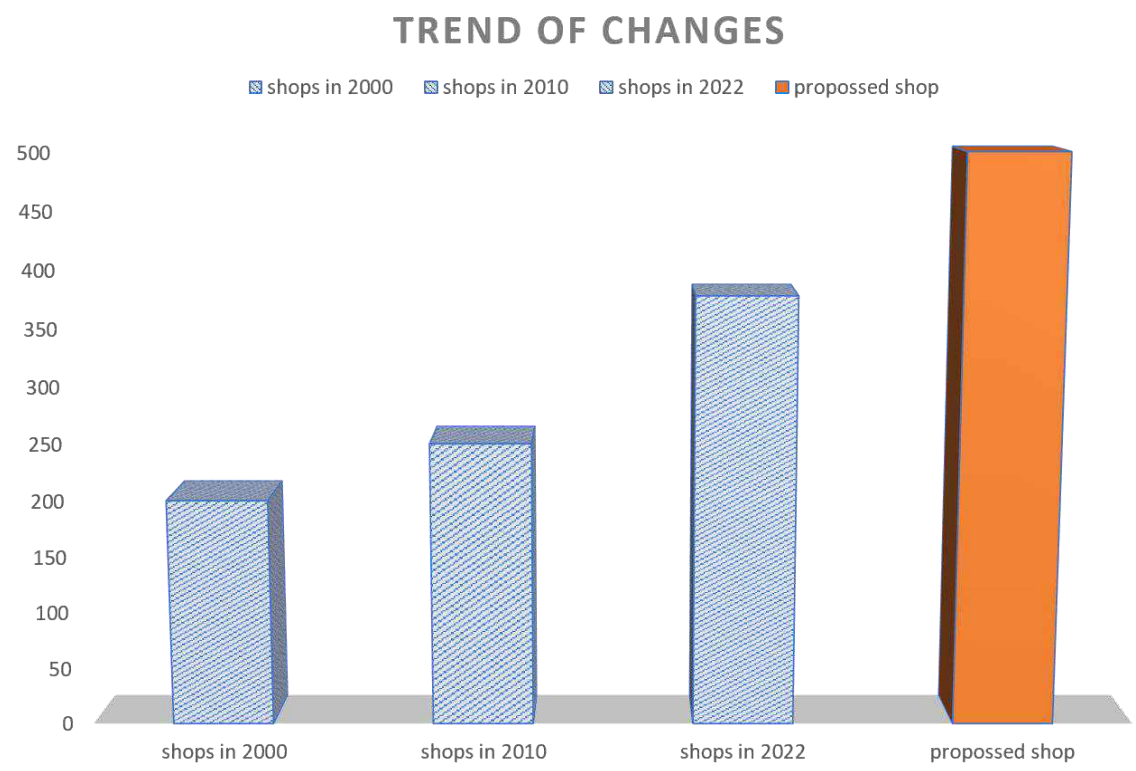
RETAIL MARKET INFO:

JEWERLY	CLOTH STORE	RETAIL AND GROCERY STORE
• Total shops: 21 • Private land • Products and jewelry come from narshingdi shadar • Shop size: 8'x12' (average) • Businessmen:21 • Yearly rent: 30,000-50,000 tk • Monthly expense: 5,000 tk • Monthly income: 6000 tk	• Total shops: 107 (permanent) • Mixed use land (govt and private) • Cloths and goods come from narayanganj, keraniganj, mirpur, gausia. • Shop size: 10'x12' (average) • Monthly rent: 5000,7000 tk • Monthly expense: 7,000 tk • Monthly income: 20,000 tk	• Total shops: 400 (approximate) • Mixed use land (govt and private) • Cloths and goods come from Dhaka, Monohordi, Voirab • Monthly rent: 4000,5000 tk • Monthly income: 15k-20k tk • Loading – unloading is done at goru bazaar

TREND OF CHANGES:

Chalakchar bazaar is a retail market except for the kacha bazaar. The haat day is on Monday. About 800 businessmen and 150 laborers are related to this bazaar. In 2000, the number of retail shops was 200 and wholesale shops was 50. In 2010, the retail part increased to 250 and the wholesale part increased to 100. At present in 2022, the bazaar has a total of 373 shops. So, the number of shops has gradually increased within this short period. The proposed shop number in the future design is 500. After analyzing the economical transaction volume, the demand for shops, and the trend of changes, the proposed shop number has been fixed.

The annual rent of small shops is 2000 tk, medium shops are 5000 tk and large shops are 10,000 tk. The bazaar has no water, gas, or tube well facilities



MANAGEMENT:

Chalakchar bazaar is Registered by The Ministry of Local Government, operated by the market management committee, and run by a lease system. An agreement is signed between the land owner and the businessmen. The annual lease of the bazaar is 7,25000 taka + 20% vat.

2.5.4. PROBLEM ANALYSIS:

- Unplanned functional structure
- Loading −unloading system is poor
- Creating Traffic Hazard
- Poor pedestrian access
- No Fire Safety
- Unhygienic environment
- Structural vulnerability
- No toilet, parking, or waste management facilities
- No grading and sorting system
- No pattern of shops
- No storage system

- Poor Drainage system and unhygienic environment
- Unplanned temporary functional structure

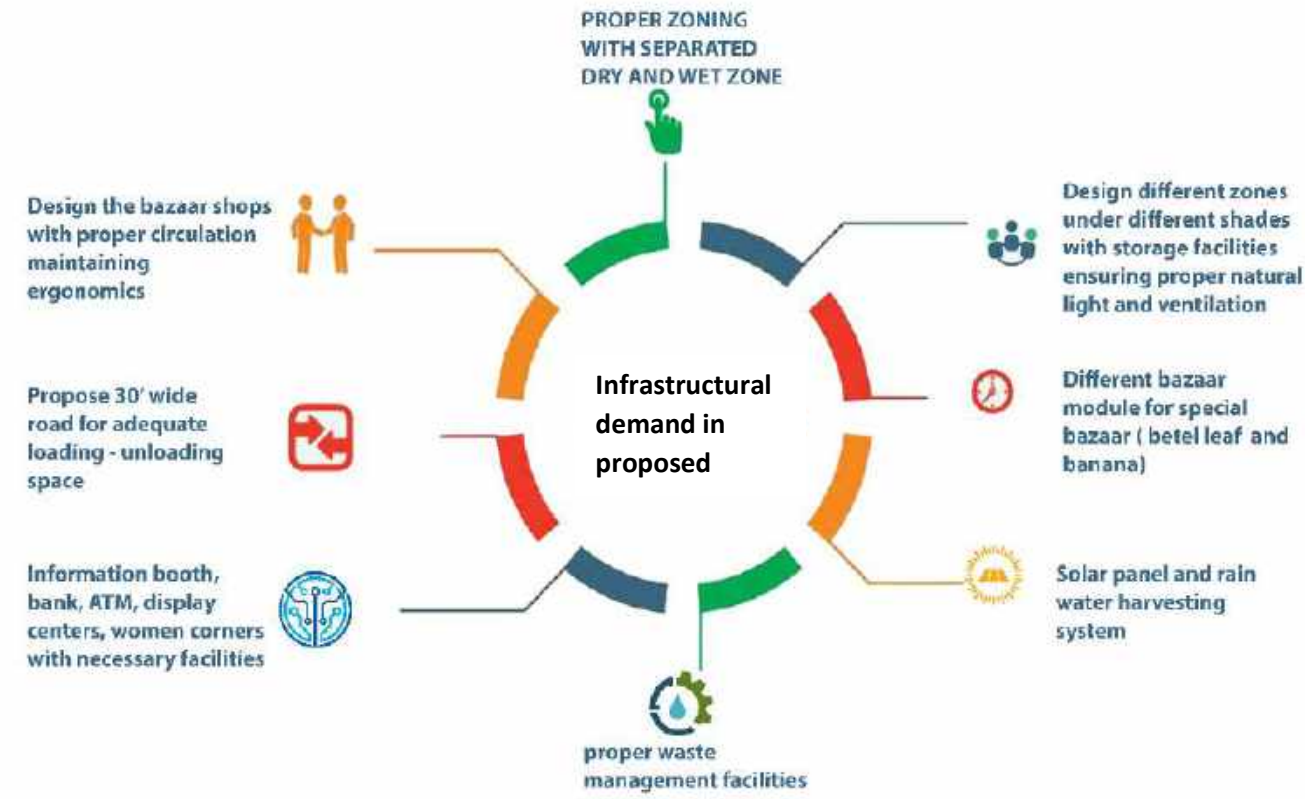
- Pavements become muddy and slippery during rainy season
- Poor condition of pavements

- The bazaar has no personal storage. They use storage in rent which is 2 km away from the bazaar. The Front side go down rent is 8000 tk and the Back side go down rent is 2000 tk
- No proper place for grading and sorting
- No space for slaughtering

2.5.6. S.W.O.T ANALYSIS:

S	• Meeting place of seven unions • Better transportation and position • Proposed future pilot village • Large land area
W	• Unplanned functional structure • Waste management challenge • No toilet, storage, cold storage facilities • Loading unloading creates Traffic Hazard
O	• Potentiality for business • Employment opportunities • Land sharing system
T	• Loosing of productivity • multiple types of bazaars in one place

2.5.7. INFRASTRUCTURAL DEMAND IN PROPOSED DESIGN:



2.5.8. PROGRAMS:

EXISTING PROGRAMS:

- Storage\go down
- Hotel
- Mosque
- Pharmacy
- Grocery
- Fertilizer shop
- Jewelry
- Phone
- Temporary cloth store
- Permanent cloth and accessories store
- Hardware
- Library
- Toilet
- Stationary
- Poultry
- Packaging store
- Betel leaf
- Fish
- Aarot
- Vegetables
- Cosmetics
- Spice store
- Tailor
- Parlor
- Sanitary
- MEAT
- Bhumi office
- Union Parishad office
- Big market Wood
- Confectionary
- Glass
- Rod-cement

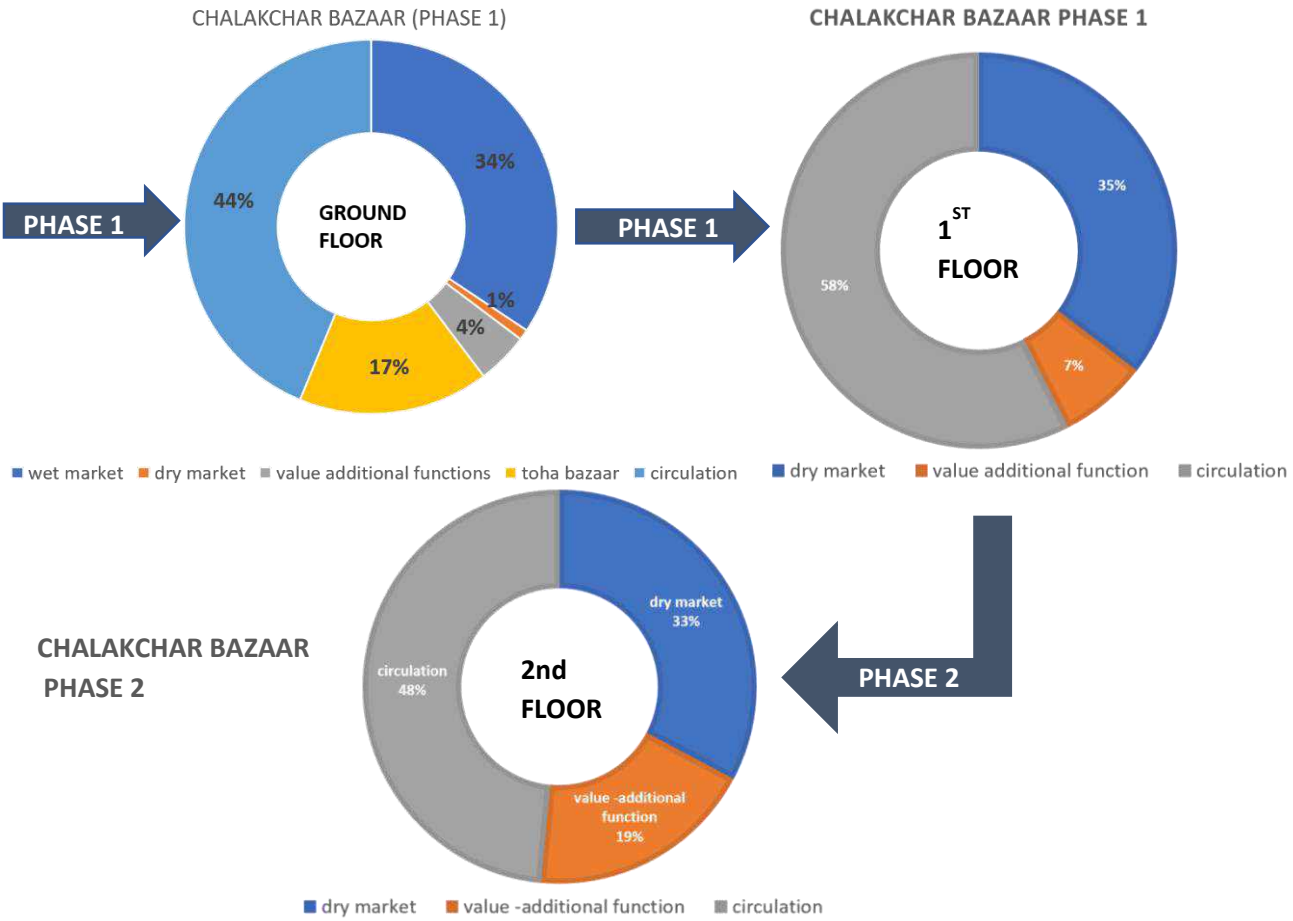
PROPOSED PROGRAMS:

Wet market	Fruit ,vegetable market,Betel leaf ,Fish market,Meat market,Poultry,Aarot,Open space for cattle
Dry market	Hotel, storage, Pharmacy, Grocery, Fertilizer shop, Jewelry, Phone, Temporary cloth store, Permanent cloth, accessories, Spice store, Tailor, Parlor, Sanitary, Cosmetics, Rod-cement, Confectionary, Glass, Library, Stationary, Household activities, Electric shop, computer shop, mobile banking, bank, handcraft
Value additional function	Horti grading, sorting space,Space for packaging,,Horti storage,dairy ,Cooler,Depo,Fish cutting and processing space,toilet,agro workshop, Office, Digital display space, Info corner, agro workshop
Circulation	Space for loading and unloading, 30% circulation for people,25' internal road for loading unloading
Waste management	Trickling filter, Rainwater harvesting, Solar panel

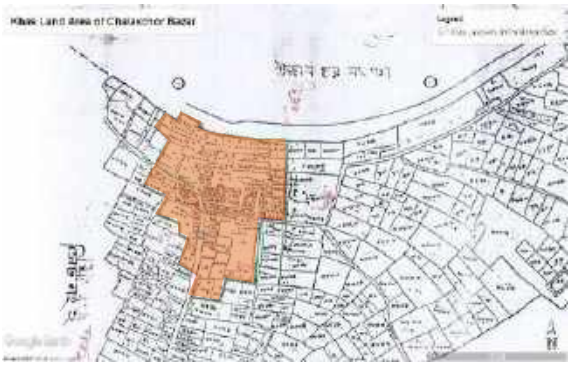
proposed total shop: 500

2.5.8. DESIGN PHASES:

BAZAAR NAME: CHALAKCHAR BAZAAR LOCATION: NARSHINGDI						
phase	**floor**	**function type**	**functions**	**shop number**	**area (sqft)**	**percentage**
PHASE 1	**Ground Floor**	wet market	fruits, fish, poultry, meat, dry fish, vegetables,betel leaf,aarot	119	15080	34%
		value- additional functions	slaughtering house,wet storage , ice factory,fish cutting, and processing area, vegetables and fruits storage sorting and grading space,vegetable processing and packaging space cold storage , toilet,hotel, packaging shop		2360	5%
		toha bazaar			7245	17%
		circulation			19222	44%
				total=	**43907**	
	1st Floor	dry market	cloth, grocery	70	12023	35%
		value- additional fu	dry storage, toilet		2457	7%
		circulation			19516	58%
				total=	**33996**	
PHASE 1	**2nd floor**	dry market	cloth, electrical shop, mobile banking, e-commerce, book shop, stationary	58	9800	33%
		value- additional functions	toilet, agro workshop, management office, space for young entrepreneurs		5607	19%
		circulation			14503	48%
				total=	**33996**	

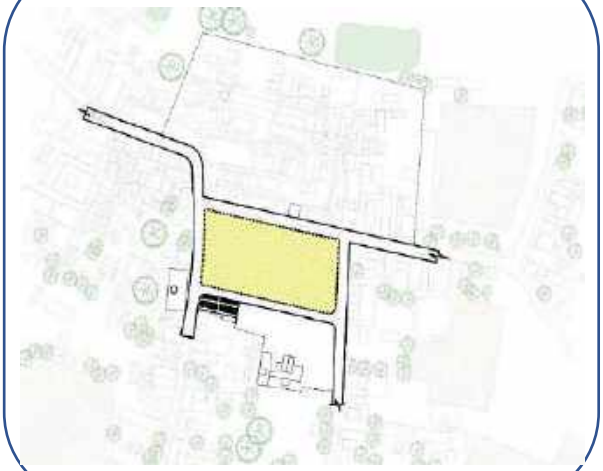


Site map

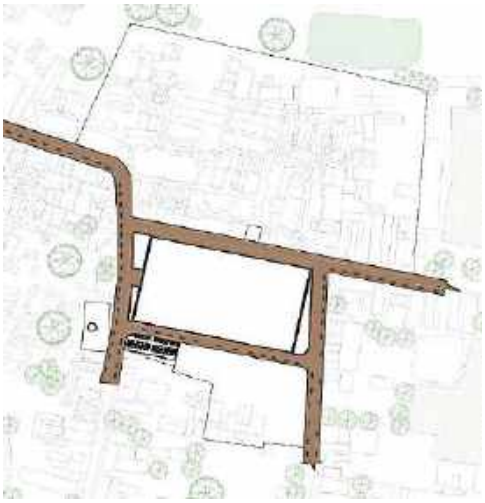


Khas land

Public private land

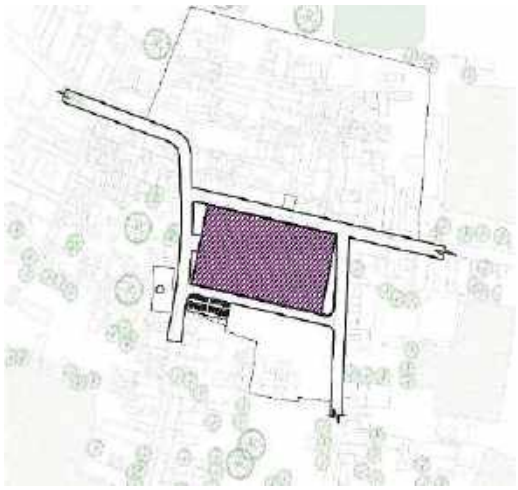


Existing Site



Proposed internal service road

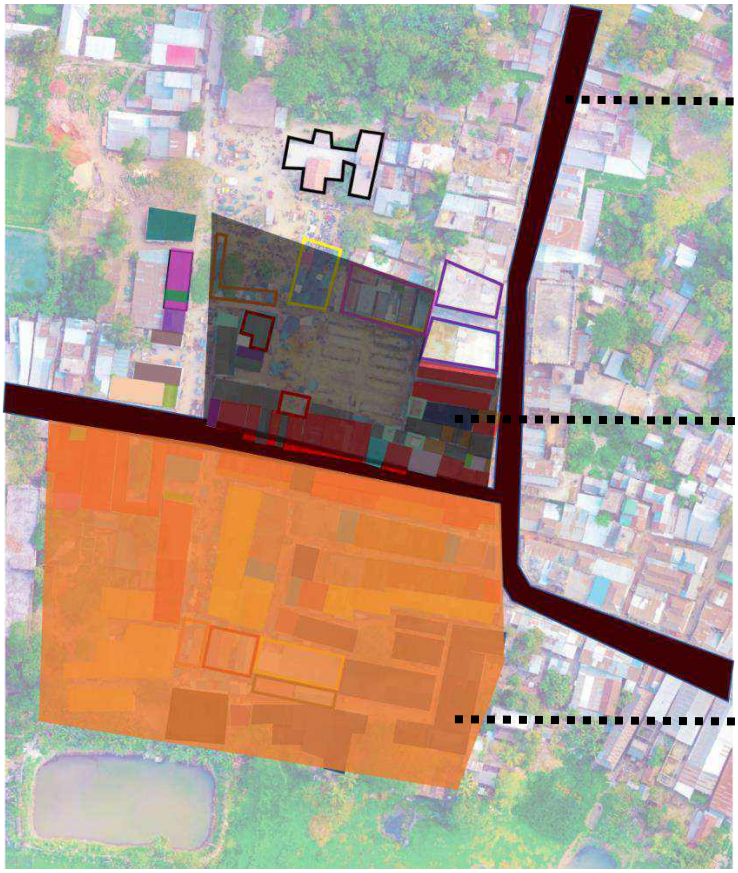
circulation



Proposed bazaar space

2.5.9. DESIGN SOLUTION:

APPROACHED ROAD AND ZONING:



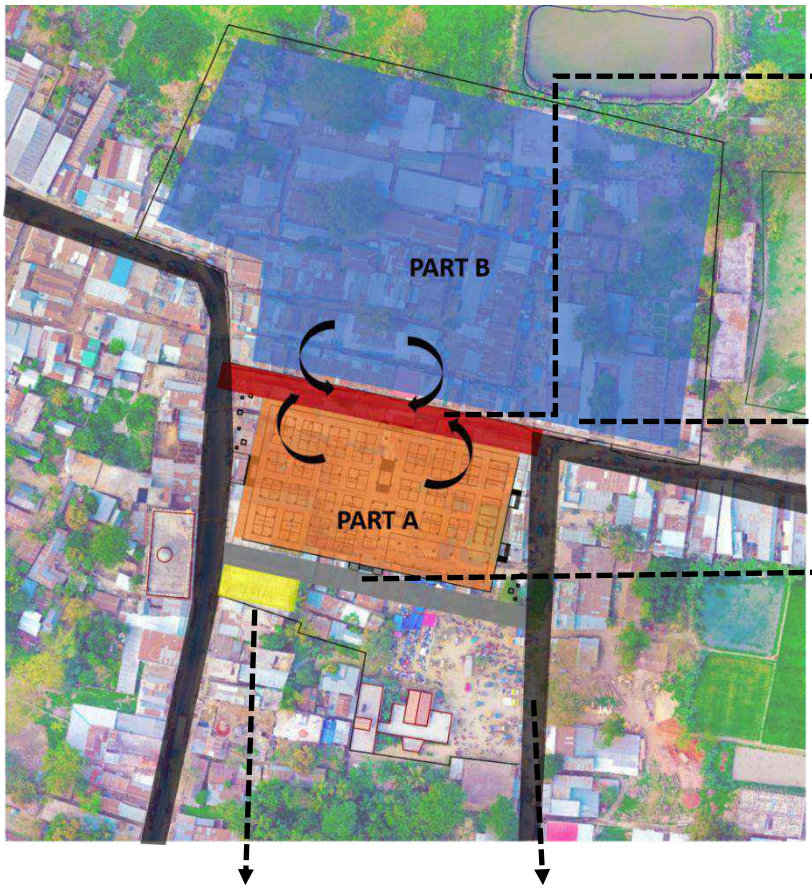
PRESENT CONDITION:




- Narrow circulation
- Streets are so liner
- The roads do not have proper width to ensure loading and unloading
- The pavements are in poor condition
- Pavements do not have proper width

PROPOSED SOLUTION OF CIRCULATION:

Each road is proposed to be 25ft to ensure proper circulation and loading -unloading



Connecting pathway. It will also work as the connecting road Between part a and part b

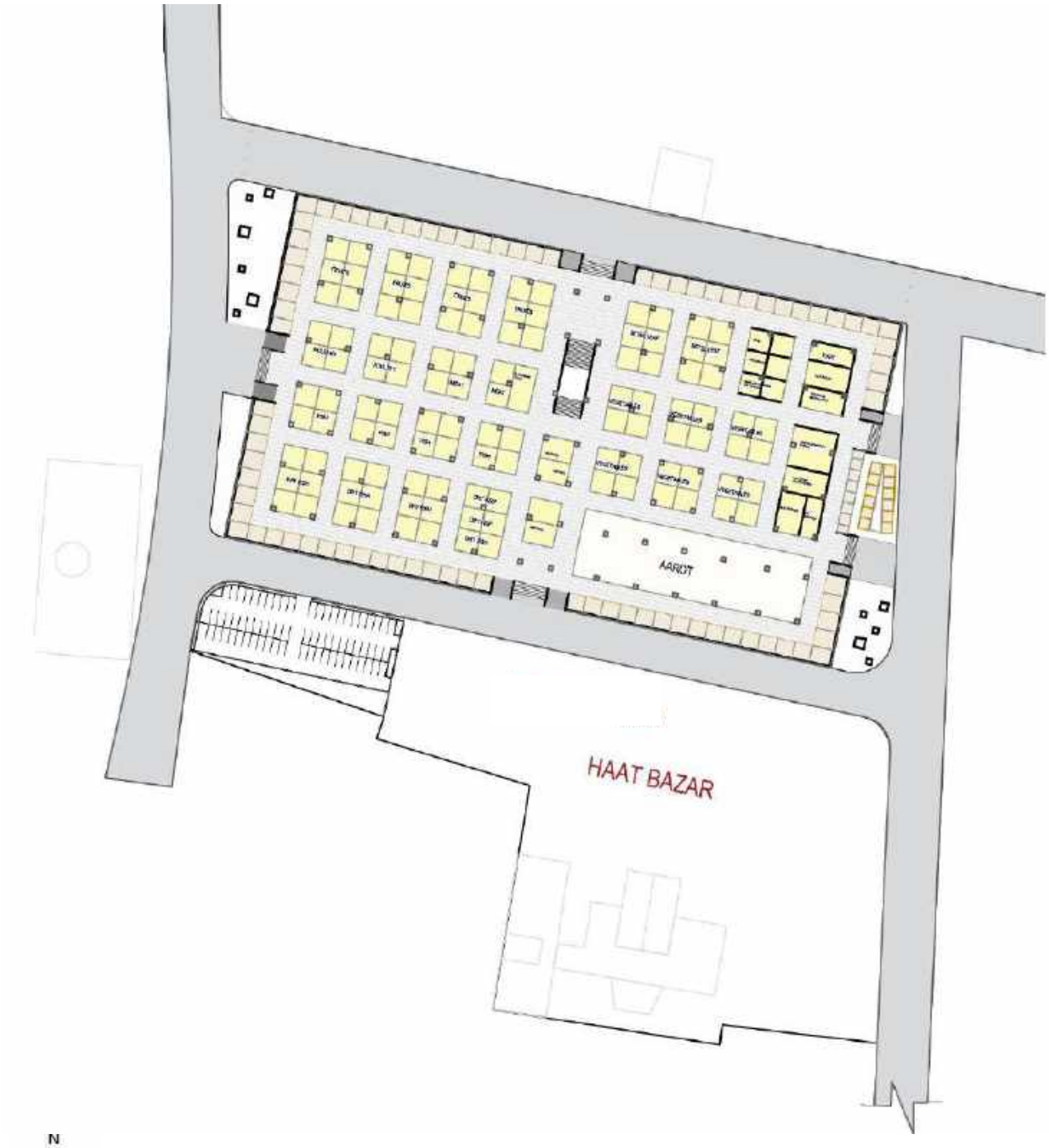
Kacha bazaar

25' wide inner road for Loading unloading

Miscellaneous parking

25' wide road for Proper vehicle access

PROPOSED PLAN:



Ground floor plan

Build area: 43907 ft^2	Internal road area: 5831 ft^2
Pave area:6846 ft^2	Total shop: 109

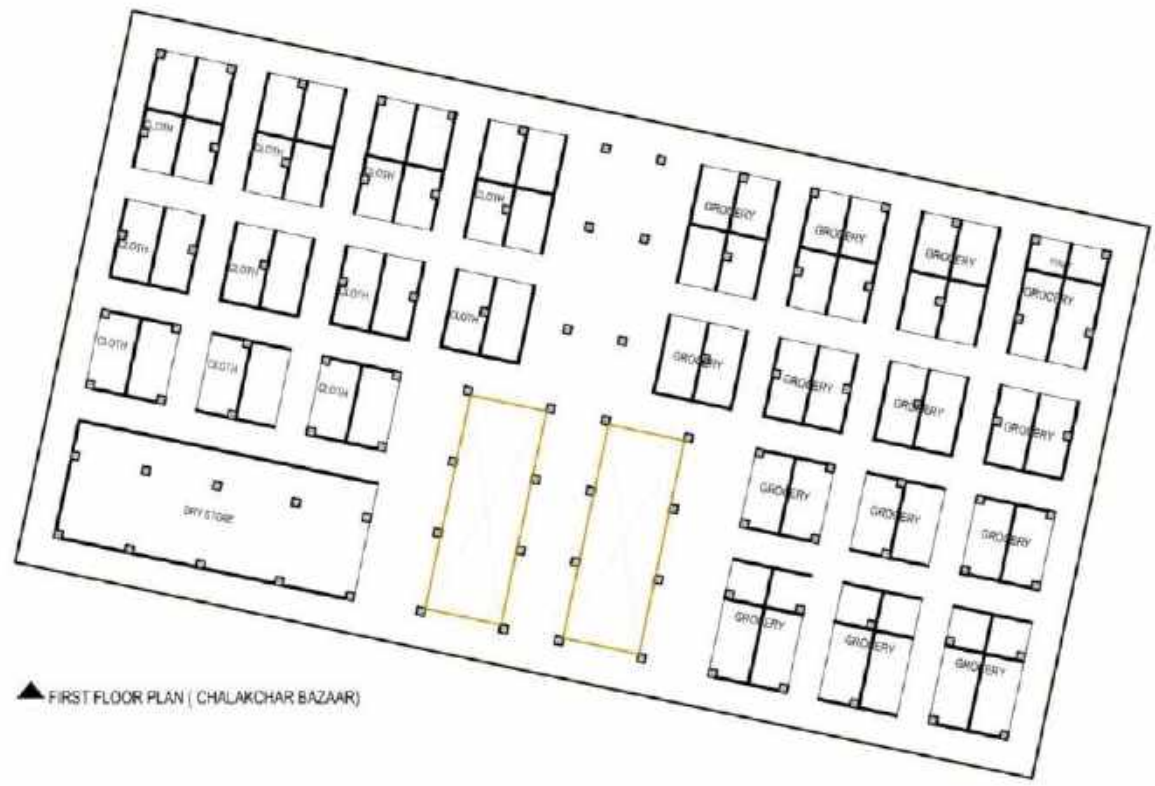
The 1st phase of design includes the ground floor and the first floor. In the master plan, the priority was to ensure clear circulation for the people and easy loading-unloading for the vehicles. Multiple entry-exit paths and wide circulation spaces have been developed for easy and clear public movement.

Hundreds of trucks, pickups, rickshaws, autos, and vans carry goods to the market every day. The existing service road is too narrow (15') for loading and unloading. So it has been proposed to be 25' wide. An internal 25' dedicated service road for loading-unloading has been developed that will also operate as the fire safety road. Separate ramps and a van stand have been designed for labor.

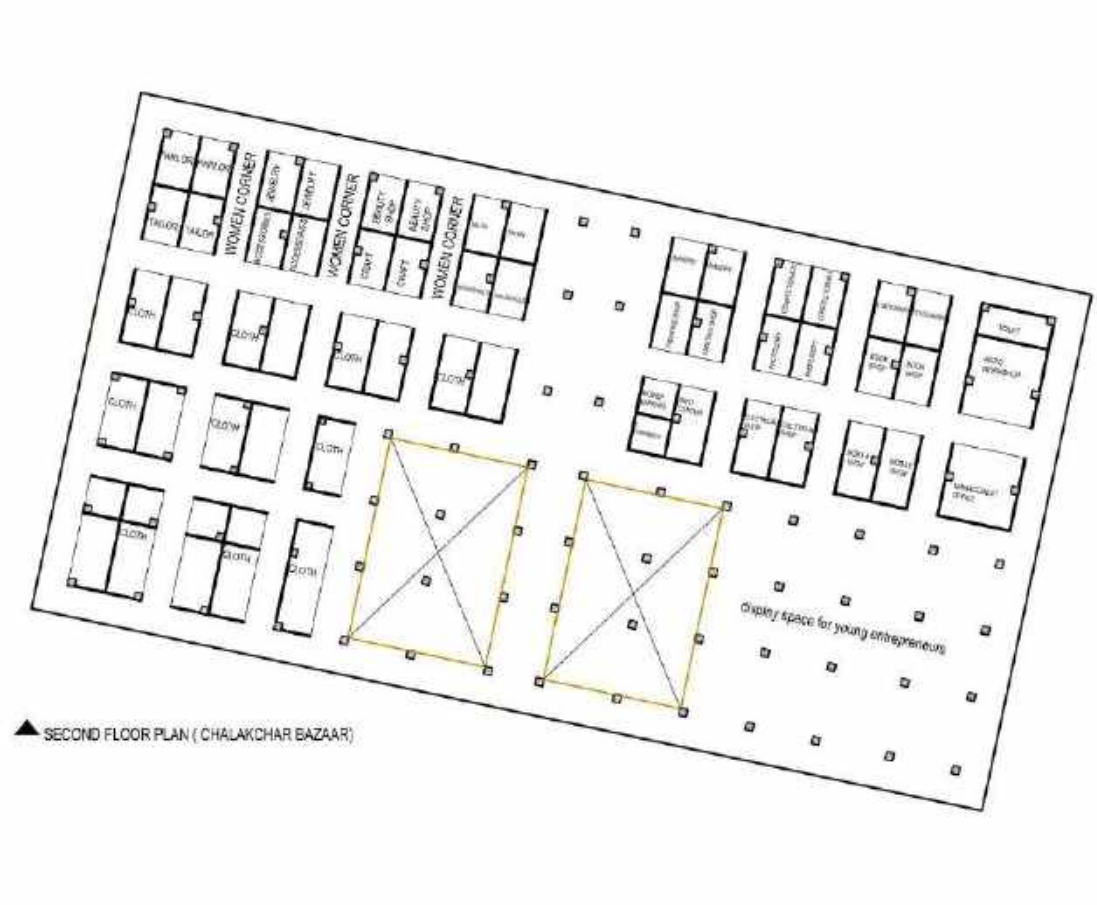
Since there was no space for parking, the area was used for dealing with heavy traffic jams, especially during loading- unloading time. To minimize this situation, parking for miscellaneous use has been provided. Sellers of the toha bazaar created a chaotic situation inside the bazaar. A dedicated zone for toha bazaar has been developed under sheds in the periphery of the bazaar. A space has been kept for waste management adjacent to the parking space.

The wet zone and dry zone are divided by floors. The wet zone is positioned on the ground floor. The service zone is also situated on the ground floor, facilitated by a toilet, sorting grading, processing, packaging space, and cold storage.

The wet zone has a total of 113 shops. The shop size of the wet market is 10' x 10'.



FIRST FLOOR PLAN (CHALAKCHAR BAZAAR)



The dry zone is situated on the 1st and 2nd floors. The 1st floor has a total of 70 shops and the second floor has 54 shops.

The first floor with wide corridors for each block is designed in this non-air-conditioning market to attend to the huge buyer and their flows. The double-height spaces provide huge openness, natural light, and ventilation to the bazaar.

In the second phase, the second floor is facilitated by the agricultural workshop, info center, and management office. An open display space has been kept for young entrepreneurs to show their products.

2.5.10. STRUCTURE AND MATERIAL:

The building process involves the use of local materials and the participation of local people in construction work. The bazaar is constructed by a post-lintel system. This type of structure supports a large amount of weight, thus allowing buildings to rise higher than one story. Concrete floors, RCC columns, and steel roofs are proposed to build the whole market. The steel roof is supported by steel truss members. The walls are made of simple traditional bricks with plaster and color. Outside perforated steel shades create a decorative and aesthetic ambiance.

2.5.11. SUSTAINABILE FEATURES :

RAINWATER HARVESTING:

- Rainwater harvesting each year in Chalakchar bazaar:
  A x R x C
  = 3353 m^2 x 2.148 m x .85
  = 6121 m3

[here,
A=area
R=average yearly rainfall data in the area in m
C= co-efficient]

SOLAR CAPACITY:

Per panel size: 2.8mx1.2m =3.36m^2

- highest Solar capacity in Chalakchar bazaar per day
  A x C x S
  =3353 m^2 x .6 x 120/1000
  = 241.42 kw

[here,
A=area of bazaar roof
C= area reduction co-efficient
S=solar energy consumption, considering 80% efficiency (W/ m^2)]

Total shop =237 nos
Suppose,
each shop has 2 lights and 1 fan.
So, the shops have total 474 lights and 237 fans.
The power consumption of each light is 30W & each fan is 200W.

Option 1(For DC):

- Total solar power consumption of lights (474x 30) =14220 watt =14.2 kW/per day
- Total solar power consumption of fans (237 x 200) =47400watt=47.4kW/per day
- Total solar power consumption in Chalakchar bazaar = (14.2+ 47.4) kW/per day
  - = 61.6 kW/per day
- so, required area of solar panel = (61.6x1000)/120= 513.3 m^2 [*considering 80% efficiency]*

Option 2 (For AC):

A 130A solar battery is required to store 0.4kW solar energy which is produced by a 3.36m^2 solar panel.

- Daily availability of solar power in Chalakchar Bazaar = 241.42 kW
- So, required Battery = (130/0.4)x241.42= 784615A = 603 nos 130A

Daily demand of solar power in Chalakchar bazaar= 61.6 kW

- Daily serving hour from the required battery = (12x603x130)/(61.6x1000)= 15 hour

Option 3(for AC & DC):

- Total solar power consumption in Chalakchar bazaar = 61.6 kW/per day
- Required battery for AC after using DC is = (130/0.4) x (241.42-61.6) = 584415A
  = 449 nos 130A
- Daily serving hour from the Required Battery after using DC
  =(12x449x130)/(61.6x1000)
  = 11 hour

2.5.12. 3D IMAGES:

3D VIEW-1

3D VIEW-2

3D VIEW-3

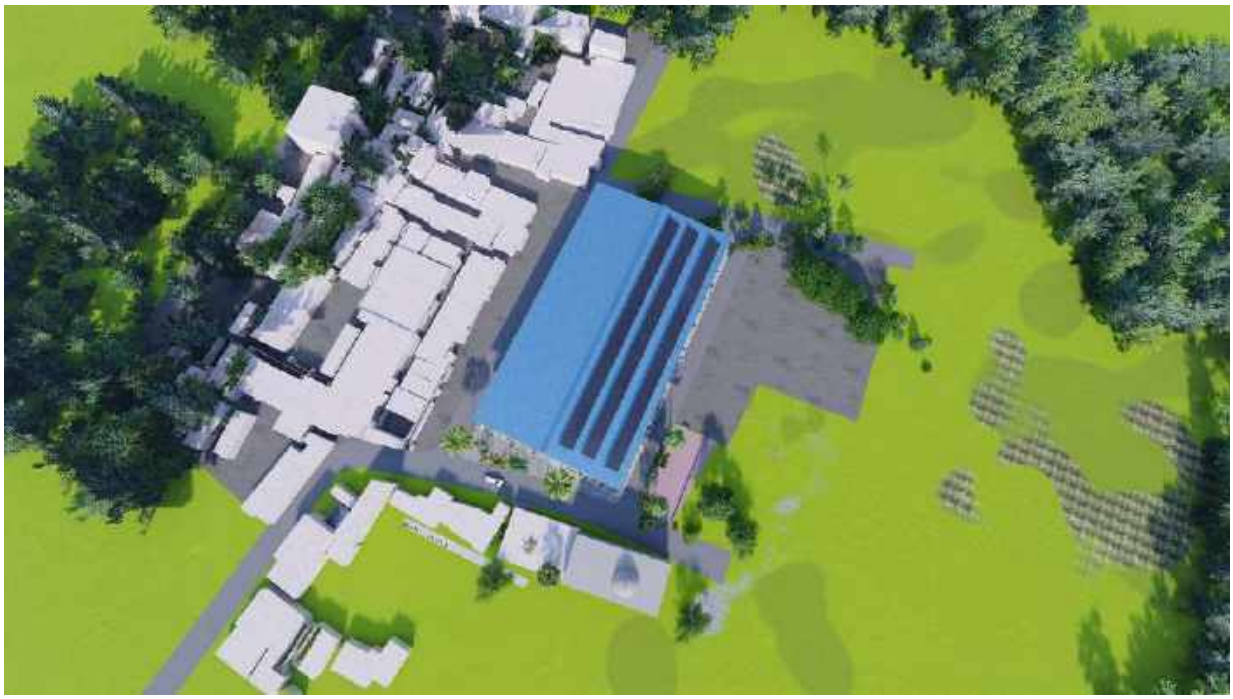
3D VIEW-4

3D VIEW-5

3D VIEW-6

3D VIEW-7

3D VIEW-8



3D VIEW-9

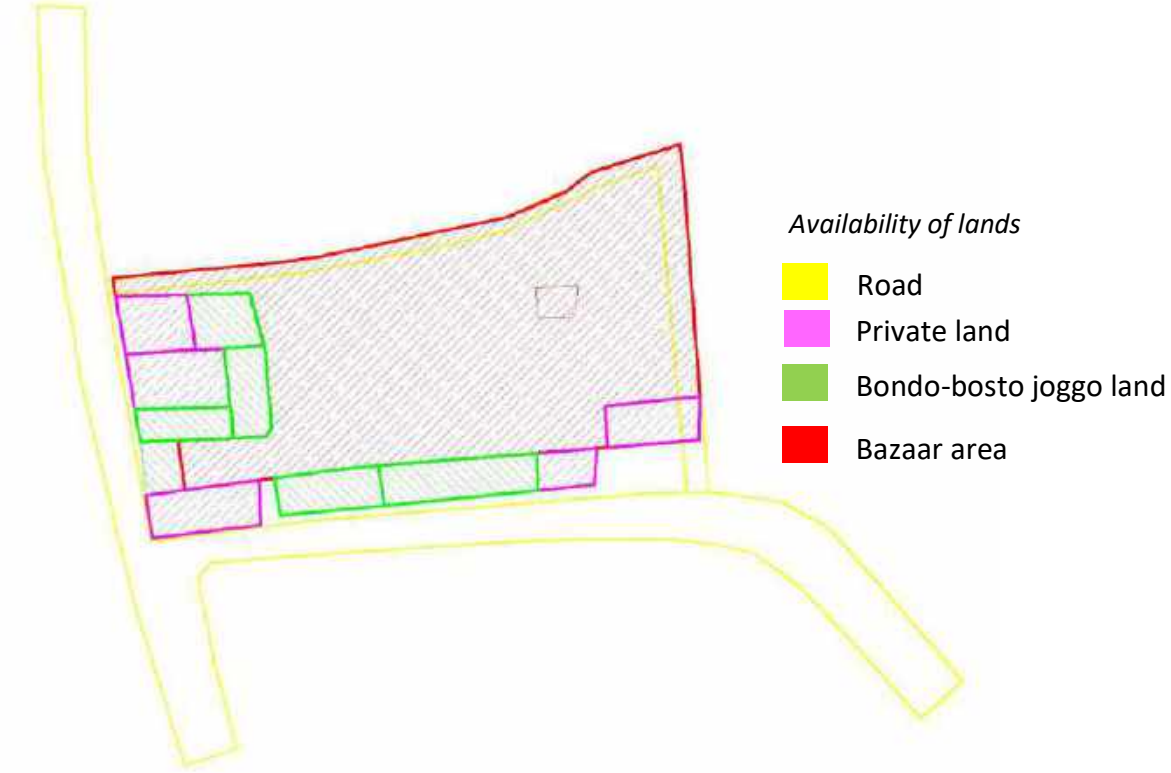
3D VIEW-10

ABU TORAB BAZAAR, MIRSHARAI

Bazaar type:
Growth center

2.6.1. SITE SELECTION:

Location: Mirsharai, Chittagong
Area:0.5 acre



The site is surrounded by four roads. The central portion is used for the main activity. 90% of the lands are government lands and the remaining lands are private lands.

2.6.2. SITE ENFORCEMENT:

SIGNIFICANCE OF THE BAZAAR:

It is the meeting place between 6 unions and roughly 60,000 people use this market to fulfill their daily needs This market is located next to the economic zone's main road, and Mirsarai economic zone is approximately six and a half kilometers away. It takes about 10 to 15 minutes to get there. The size of this market is growing over time. In the future, this market will serve as an important commercial hub for the Mirsarai Economic Zone.

COMMUNICATION SYSTEM:

Abu torab bazaar is about 300 years old. It is possible to use all types of vehicles to communicate with the site from the district headquarters. The distance which is 80 km can be moved at any time. CNG has to be used in most cases to communicate from upazila to all union parishads. The site is far away from the main road. Maximum agricultural products come from the nearby areas like 6 no. Ichakhali, 13 no. Shaher Ali, 9 no. Mirsharai.

USERS AND STRUCTURE PATTERN:

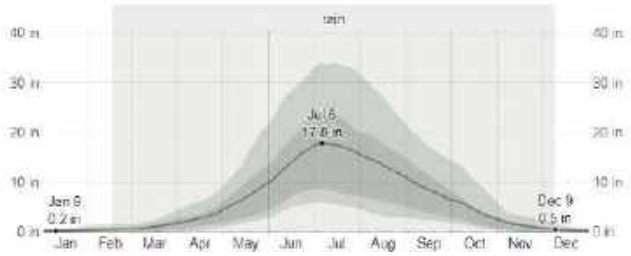
The area of Mirsharai is almost 460.8 km². The population density of this area is 865.3/km² and the annual population change is 0.77%. According to the 2011 census, about 398,716 people live in this place who directly use this bazaar.

The bazaar is situated in 2 unions. The average building height in this area is 3m-9m. the maximum structure is permanent except for the bazaar.

CLIMATE:

Latitude	22.773039
Longitude	91.559612.

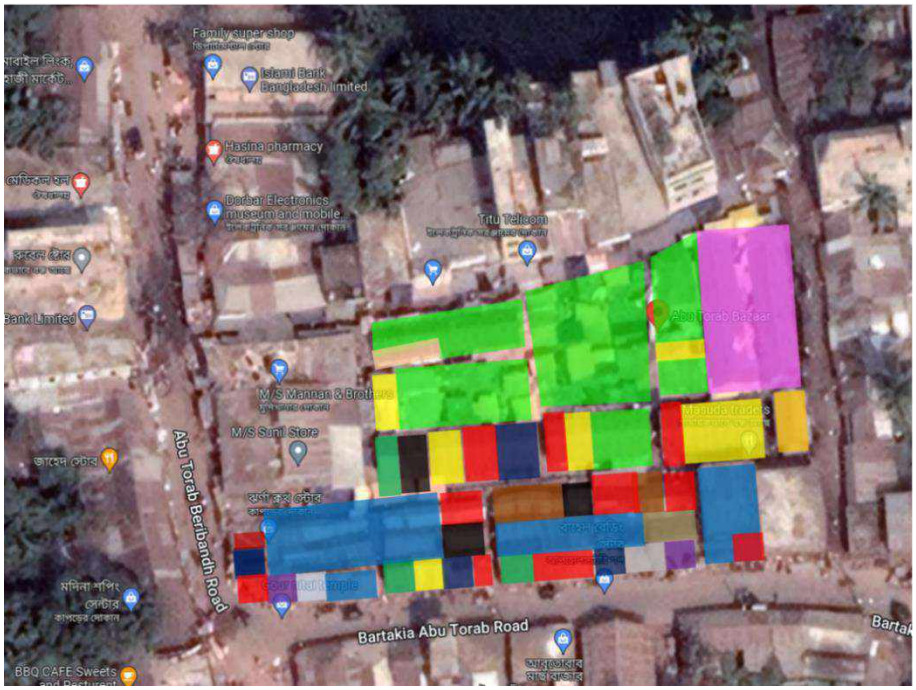
Average High and Low Temperature in Chittagong



Average Monthly Rainfall in Chittagong

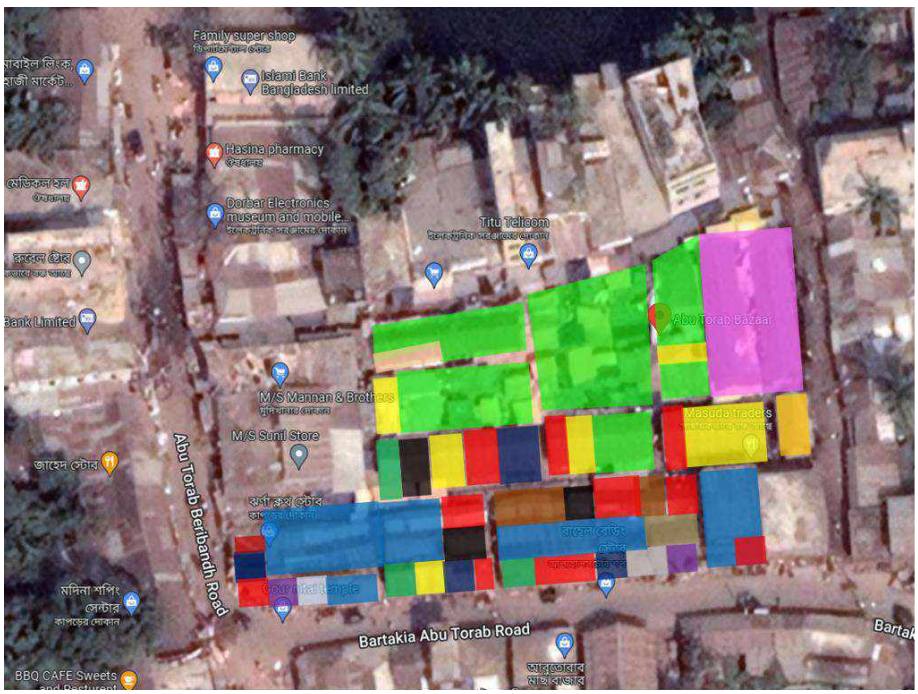
2.6.3. MAJOR FINDINGS

EXISTING ZONING:



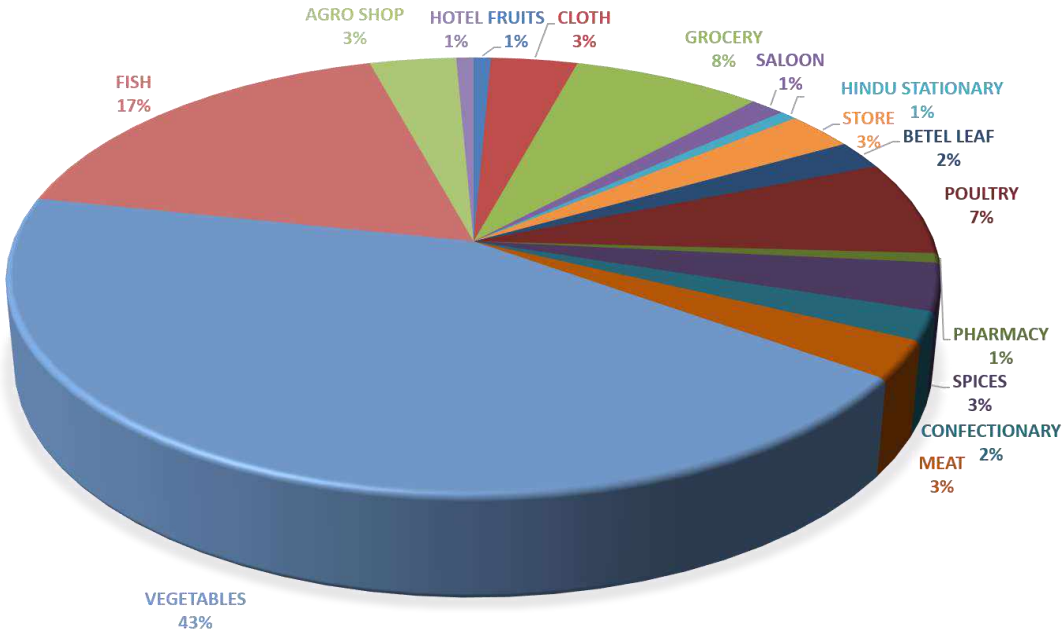
NUMBER OF SHOPS:

The bazaar mainly serves two purposes. It's basically a retail market but wholesale is also a part of it. The bazaar has total 143 number of shops. The average sizes of small shops are 5'/5', medium shops are 7'/10' and large shops are 12'/15'.



TOTAL SHOP : 143

RATIO OF SHOPS:



TREND OF CHANGES:

In 2000, the number of retail shops was 100. in 2010, the number increased to 130. At present in 2022, the bazaar has a total of 143 shops. However, it is evaluated that within this period, the number of shops has gradually increased by about 43%. But the number of businessmen is almost fixed. From 2000-2022, Abu Torab bazaar has 474 voters. Among them, 150 businessmen have their shops in the govt. land. The average monthly rent of small shops is 3k, medium shops are 6k, and large shops are 10k. About 15 laborers are related to the bazaar. The bazaar has electricity, water, gas, and tube well facilities.

CIRCULATION:

The bazaar is surrounded by 4 roads. The major entry road is 12' wide that leads to the main site. The southern road is used for loading and unloading and is 10' wide. The north-east roads are used for light vehicles and pedestrian access. The internal roads have irregular shapes and widths.

Most products are delivered in the morning. The bazaar gets over crowdy during the morning and afternoon.

Existing road analysis

2.6.4. PROBLEM ANALYSIS:

- Traffic hazard and loading –unloading problem
- Temporary and vulnerable shades

- Roads and pavements become muddy and slippery during the rainy season. Heavy rainfall causes water clogging

- Environmentally sustainable

- No cold storage facility

- Poor drainage system

- No sorting grading place in vegetable market

2.6.5. S.W.O.T ANALYSIS:

S	• Huge capacity of storage and warehouse • Easy access from EPZ • Surrounded by three major roads	
W	• Water clogging • Scattered zoning • Drainage • Circulation	• loading -unloading • Tapped growth pattern • No discipline • Surrounded by private land
O	• Demand of shops from consumers • Demand of selling products • Multi-sectoral shops	• Support service • Generate women's employment and entrepreneurship
T	• Surrounded by private land • Horizontal expansion	

2.6.6. POTENTIALITIES:

ISSUES TO BE ADDRESSED IN THE DESIGN PROPOSAL	• Phase wise development • Ergonomically solved display system • Circulation with grid pattern • information center and display space for young entrepreneurs. • Ensuring Storage system • Place value- additional functions • improvement of drainage system • Sorting grading, processing facility • Slaughtering space for meat • fire safety

2.6.7. PROGRAMS:

EXISTING PROGRAMS:

- Fruits
- Cloths
- Grocery
- Saloon
- Hindu stationary
- Store
- Betel leaf
- Poultry
- Confectionary
- Meat
- Vegetables
- Fish
- Agro shop
- Hotel

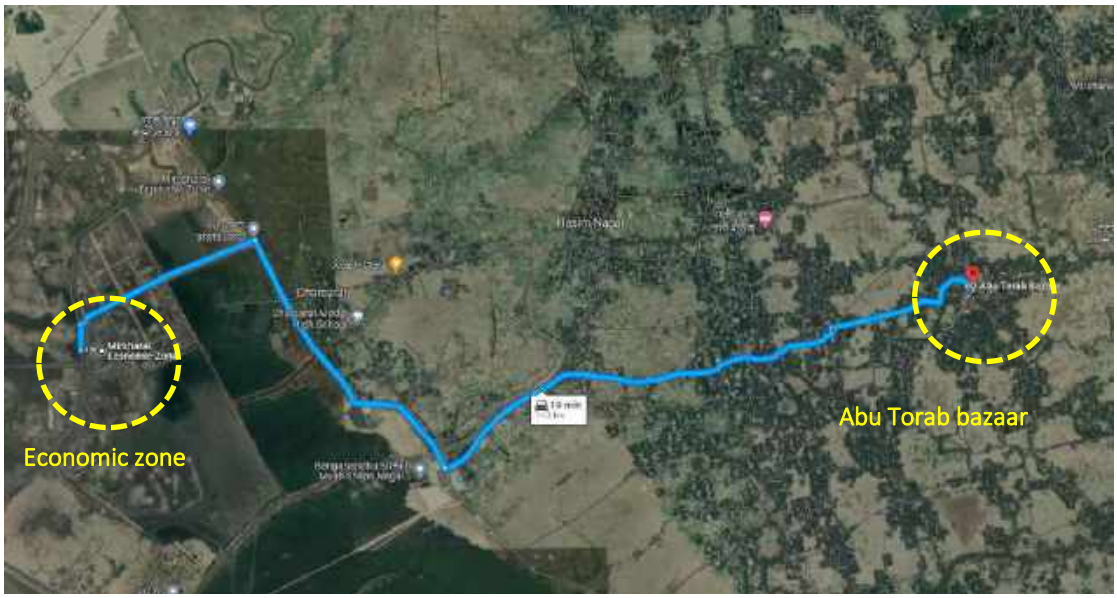
PROPOSED PROGRAMS:

Wet market	Fruit ,vegetable market,Betel leaf ,Fish market,Meat market,Poultry
Dry market	Agro shop, Spices, Grocery, Cloth, Mobile banking, E-commerce, Info center, Packaging materials, Electrical shop, Hardware, Medicine, Computer shop, Mobile shop, Stationary, Household products,Bookshop, Shoe, Jewelry, Confectionary, Parlor, Tailor, Accessories, Beauty shop, Craft, Gym, Food shop
Value additional function	horti grading, sorting space,space for packaging,,horti storage,dairy ,cooler,depo,fish cutting and processing space,toilet,agro workshop, office, digital display space, info corner, agro workshop, food court
Circulation	Space for loading and unloading, 30% circulation for people,25' internal road for loading unloading
Waste management	Trickling filter, Rainwater harvesting, Solar panel

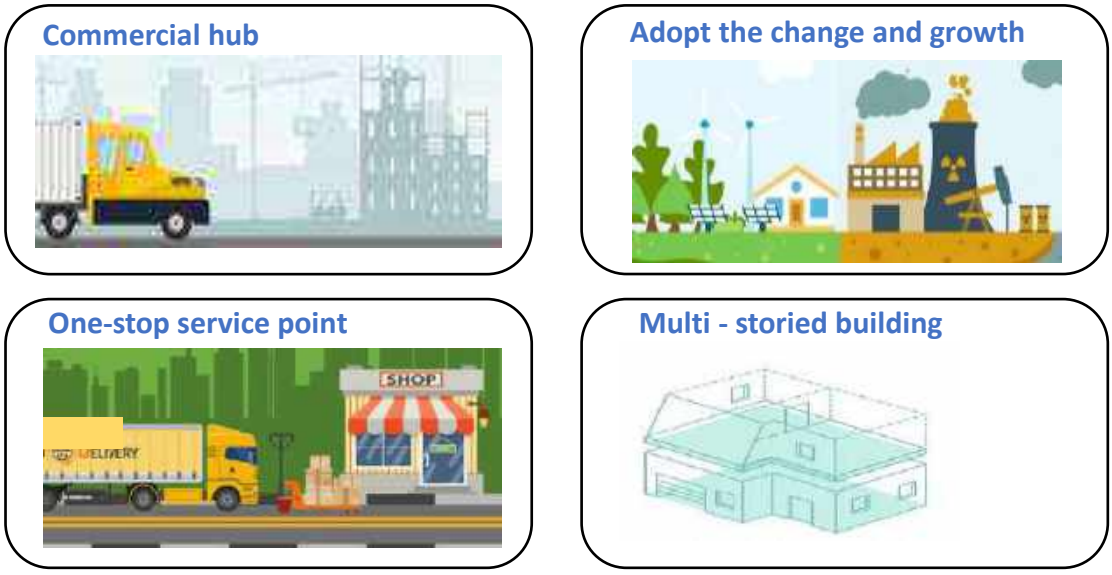
Proposed number of shops: 500

2.6.8. DESIGN CONCEPT:

Abu torab bazar is a historical growth center. It was established in British period. The bazaar is about 300 years old. This market is one of Mirsarai upazila's oldest and largest. More than 2000 people regular visit in this market. This is strictly a retail market. This market is located next to the economic zone's main road. Mirsarai economic zone is approximately six and a half kilometers away. It takes about 10 to 15 minutes to get there. It's a meeting place between 6 unions and roughly 60,000 people use this market to fulfill their daily need.



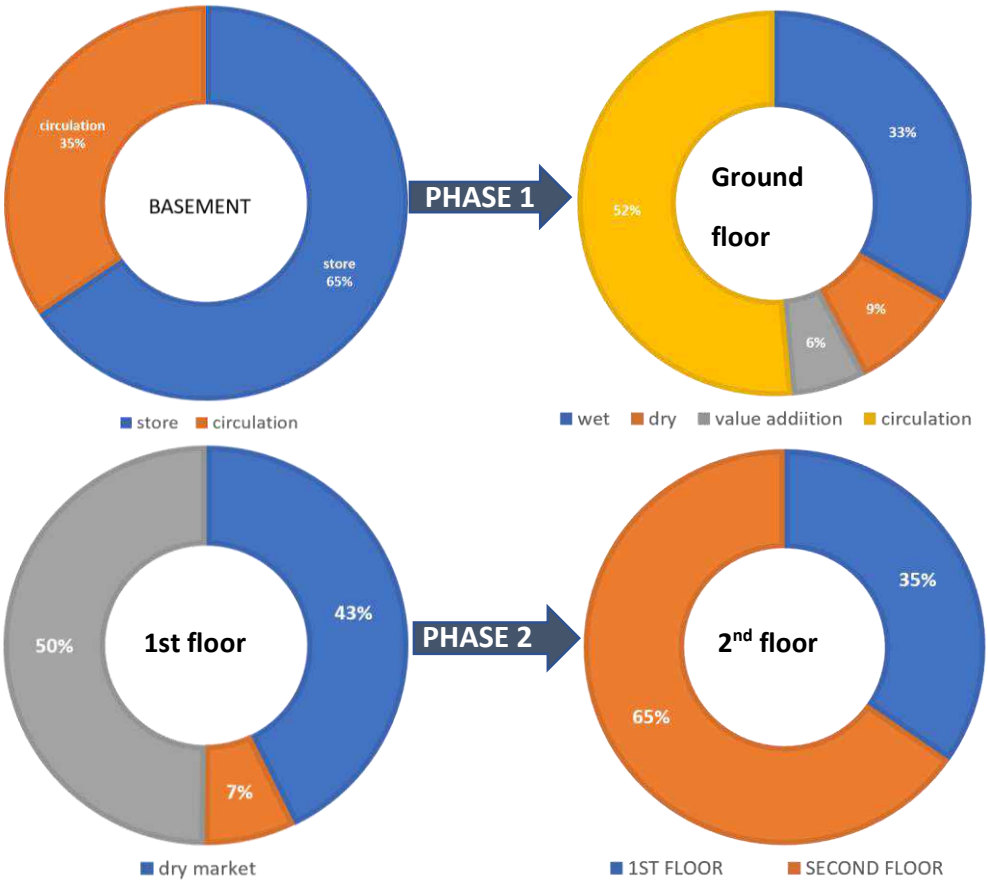
About 3 million people will be migrated here with a new 'lifestyle'. As the size of this market is growing over time, In the future, it will serve as a commercial hub for the Mirsarai Economic Zone. market centers' infrastructure and service capacity must be multiplied to adapt to the change and growth. The concept of designing this bazaar is to combine the design in a multi-storied building to accommodate various types of business.



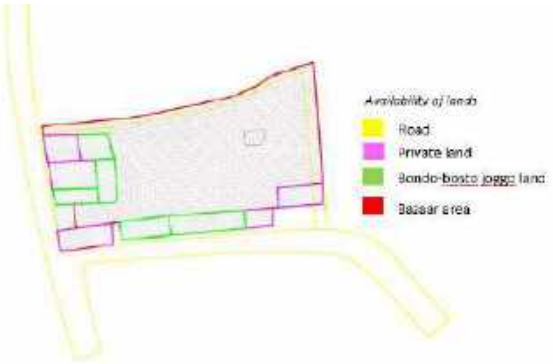
Key concept of Abu torab bazaar design

2.6.9. DESIGN PHASES:

BAZAAR NAME: ABU TORAB BAZAAR LOCATION: MIRSHARAI, CHITTAGONG						
phase	**floor**	**function type**	**functions**	**shop number**	**area (sqft)**	**percentage**
PHASE 1	**basement**	store			9389	65%
		circulation			4948	35%
				total=	**14337**	
	ground floor	wet market	vegetables, betel leaf, fruits,poultry, fish, meat	158	7698	33%
		dry market	agriculture, , spices	34	2064	9%
		value additional function	processing zone for vegetables, slaughtering house, toilet,store, service corner		1416	6%
		circulation			11842	52%
				total=	**23020**	
	1st floor	dry market	medicine, computer shop, mobile shop, stationary, household products, bookshop, jewelry, shoe, confectionary, parlor, tailor, accessories, beauty shop, craft, hardware, electrical shop, cloth, mobile banking, e-commerce, packaging materials	50	6286	43%
		value additional fur	info center		1080	7%
		circulation			7265	50%
				total=	**14631**	
PHASE 2	**2nd floor**	wmone corner, managemnt office			7817	
		food court , display center for youmg entrepreneurs			14918	



Site map

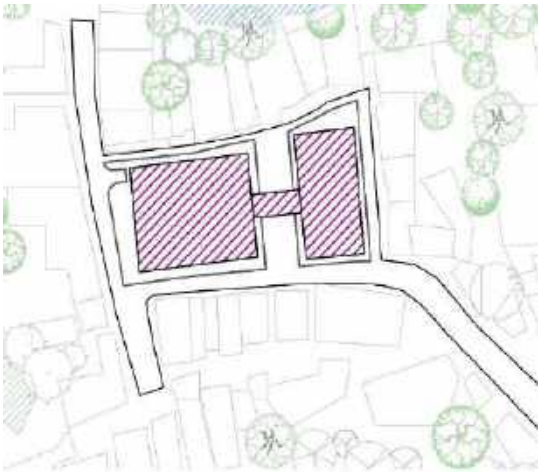


Public private land

Existing Site

Proposed internal service road

circulation



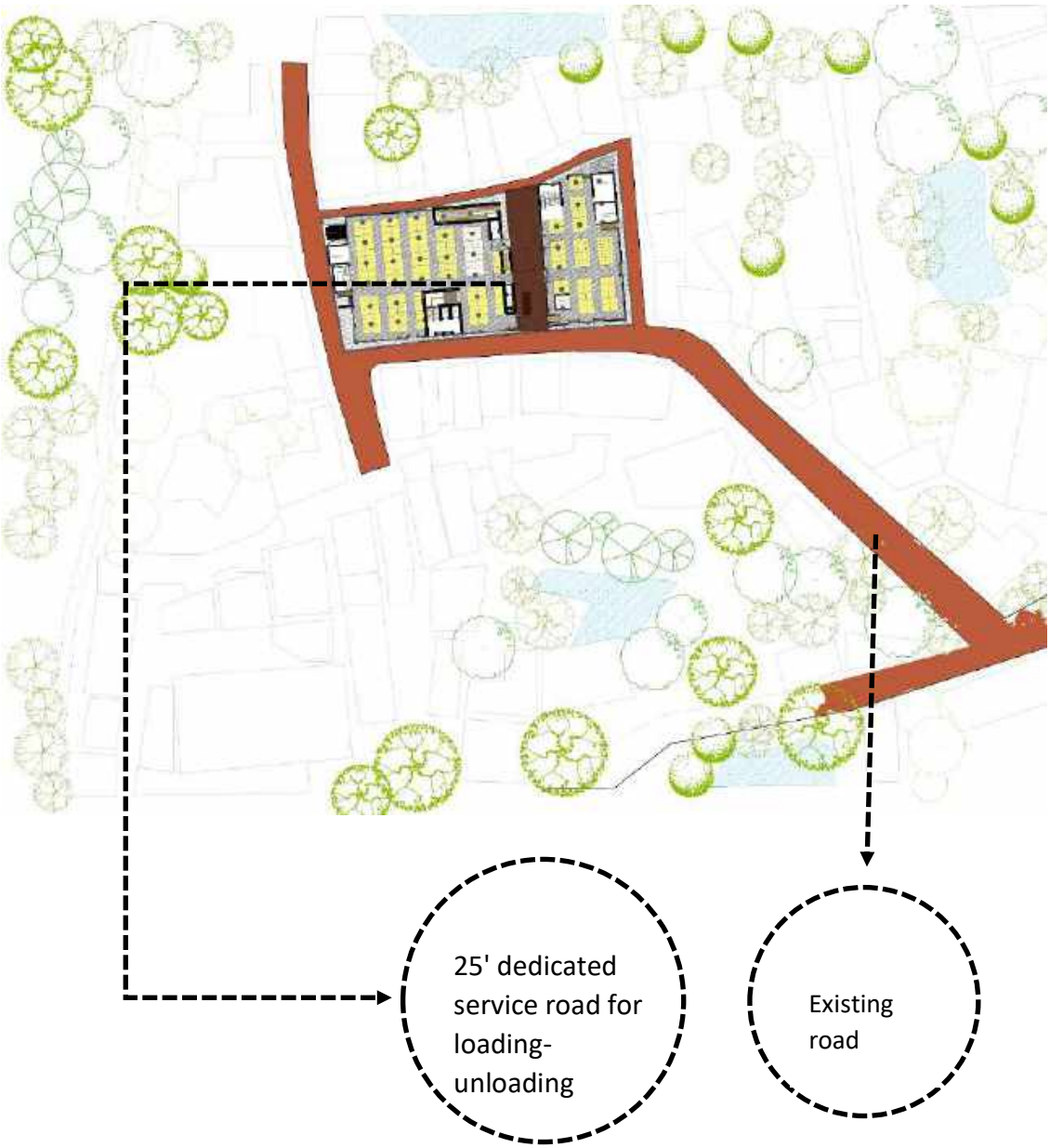
Proposed bazaar space

2.6.10. DESIGN SOLUTION:

CIRCULATION:

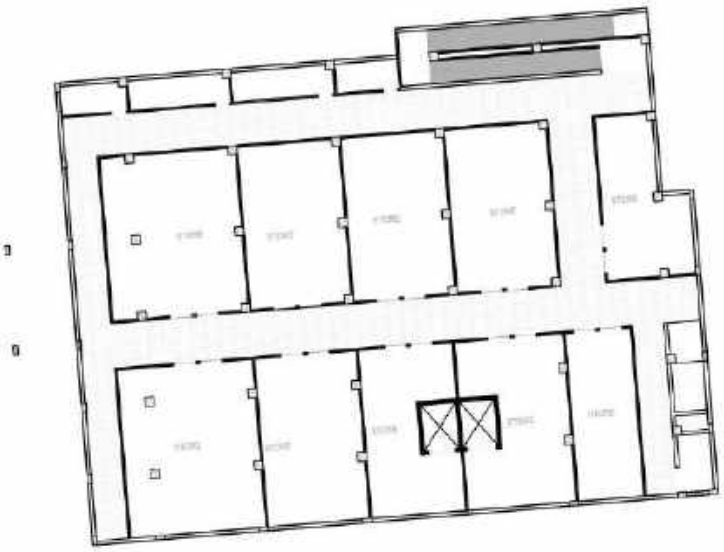
In the master plan, the priority was to ensure clear circulation for the people and easy loading-unloading for the vehicles. Multiple entry-exit paths and wide circulation spaces have been developed for easy and clear public movement.

The existing service roads are too narrow for loading and unloading. So, An internal 25' dedicated service road for loading-unloading has been developed that will also operate as the open trade center. Sellers of the toha bazaar created a chaotic situation inside the bazaar. This open trade center can be used for the sellers of toha bazaar. Separate ramps and cargo lifts have been designed for labor.



ZONING:

A semi basement has been proposed for stores and service functions.

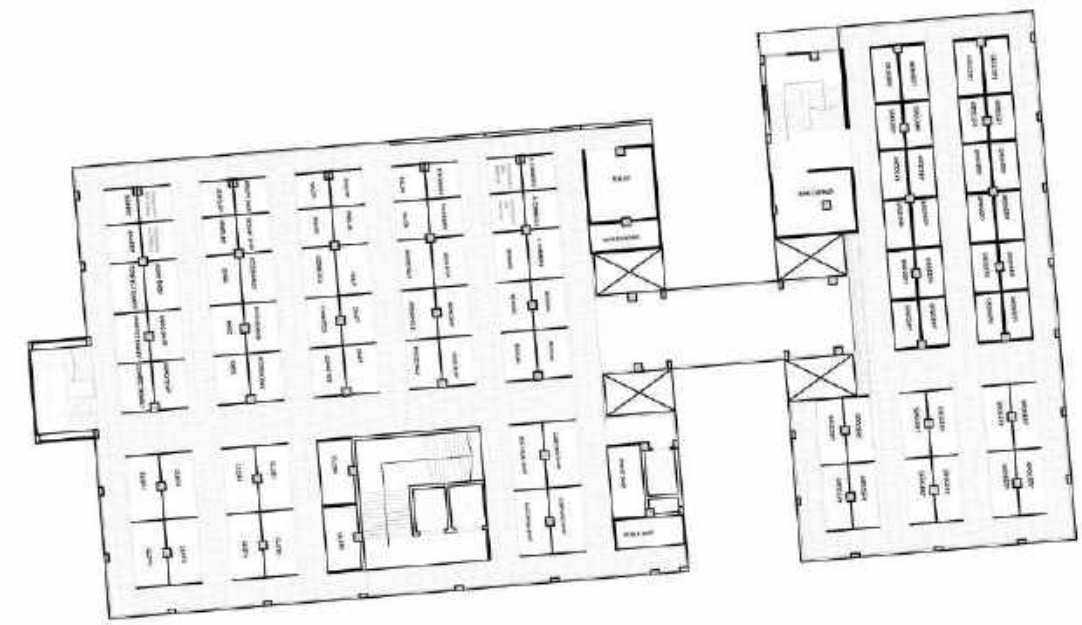


BASEMENT PLAN (ABU TORAB BAZAAR)

The wet zone and dry zone are divided by floors. The wet zone is positioned on the ground floor. The service zone is also situated on the ground floor which is facilitated by sorting grading, processing, packaging space, and slaughtering house. The wet zone has a total of 181 shops.

A separate core has been designed to divide the wet and dry zone.

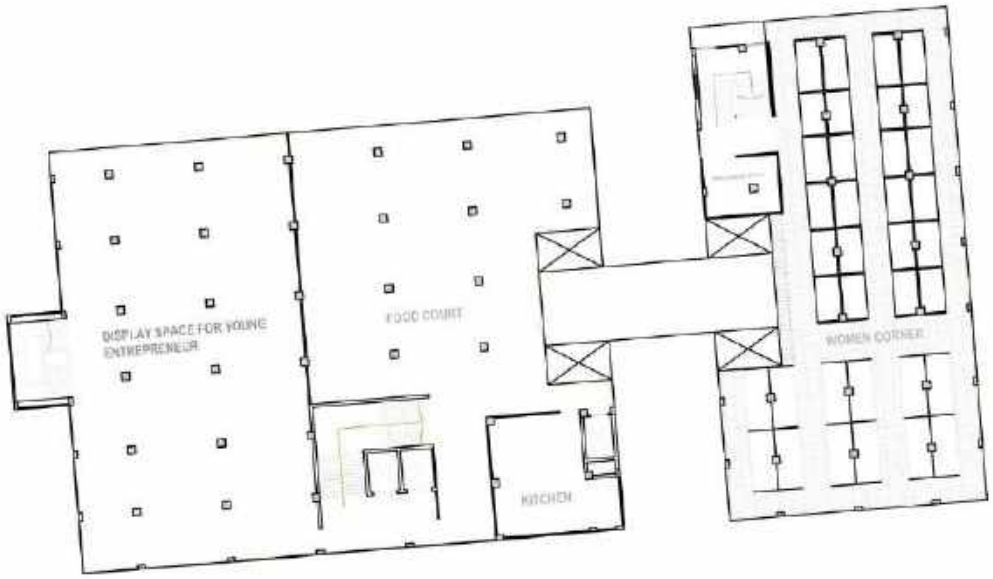
Ground floor plan



FIRST FLOOR PLAN (ABU TORAB BAZAAR)

The dry zone is situated on the 1st floor. The first floor has a total of 87 shops. The circulation of shops is designed in a grid pattern. The first floor is also facilitated with some value-added functions such as a lifestyle market, cloth store, shoe, accessories, beauty shop, jewelry, parlor, salon, computer shop, mobile shop, mobile banking, electrical shop, etc.

The central corridor is 10' wide and the other corridors are 7' wide. The first floor with wide corridors for each block is designed in this non-air-conditioning market to attend to the huge buyer and their flows. The second floor is facilitated by an open food court, kitchen, display center for young entrepreneurs, and management office.



SECOND FLOOR PLAN (ABU TORAB BAZAAR)

2.6.11. SUSTAINABILITY OF STRUCTURE:

RAINWATER HARVESTING:

- Rainwater harvesting each year in Abu Torab bazaar:
  A x R x C
  = 2208 m^2 x 2.89m x .85
  = 5423 m3

[here,
A=area
R=average yearly rainfall data in the area in m
C= co-efficient]

SOLAR CAPACITY:

Per panel size: 2.8mx1.2m =3.36m^2

- highest Solar capacity in Abu Torab bazaar per day
  A x C x S
  =2208 m^2 x .6 x 120/1000
  = 158.98 kw

[here,
A=area of bazaar roof
C= area reduction co-efficient
S=solar energy consumption, considering 80% efficiency (W/ m^2)]

Total shop =238 nos
Suppose,
each shop has 2 lights and 1 fan.
So, the shops have total 476 lights and 238 fans.
The power consumption of each light is 30W & each fan is 200W.

Option 1(For DC):

- Total solar power consumption of lights (476x 30) =14280 watt =14.2 kW/per day
- Total solar power consumption of fans (238 x 200) =47600watt=47.6kW/per day
- Total solar power consumption in Abu Torab bazaar = (14.2+ 47.6) kW/per day
  - = 61.8 kW/per day
- so, required area of solar panel = (61.8x1000)/120= 515m^2 [*considering 80% efficiency]*

Option 2 (For AC):

A 130A solar battery is required to store 0.4kW solar energy which is produced by a 3.36m^2 solar panel.
Daily availability of solar power in Abu Torab Bazaar Bazaar = 158.98 kW

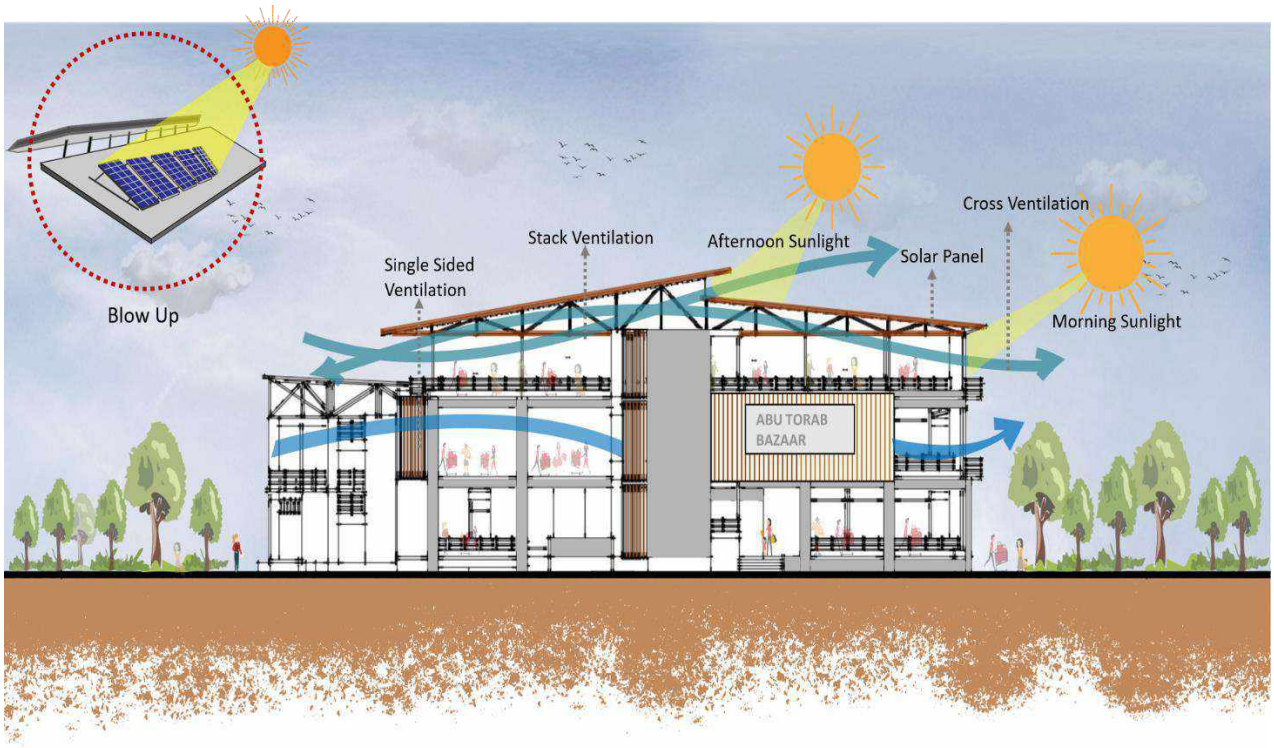
- So, required Battery = (130/0.4) x158.89= 51639A = 397 nos 130A
  Daily demand of solar power in Abu Torab bazaar= 61.8 kW
- Daily serving hour from the required battery = (12x397x130)/ (61.8x1000) = 10 hour

Option 3(for AC & DC):

Total solar power consumption in Abu Torab bazaar = 61.8 kW/per day

- Required battery for AC after using DC is = (130/0.4) x (158.98-61.8) = 315825A
  = 242 nos 130A
- Daily serving hour from the Required Battery after using DC
  =(12x242x130)/ (61.8x1000)
  = 6 hours

2.6.12. NATURAL VENTILATION IN ABU TORAB BAZAAR:



2.6.13. 3D IMAGES:

3D IMAGE-1

3D IMAGE-2

3D IMAGE-3

3D IMAGE-4

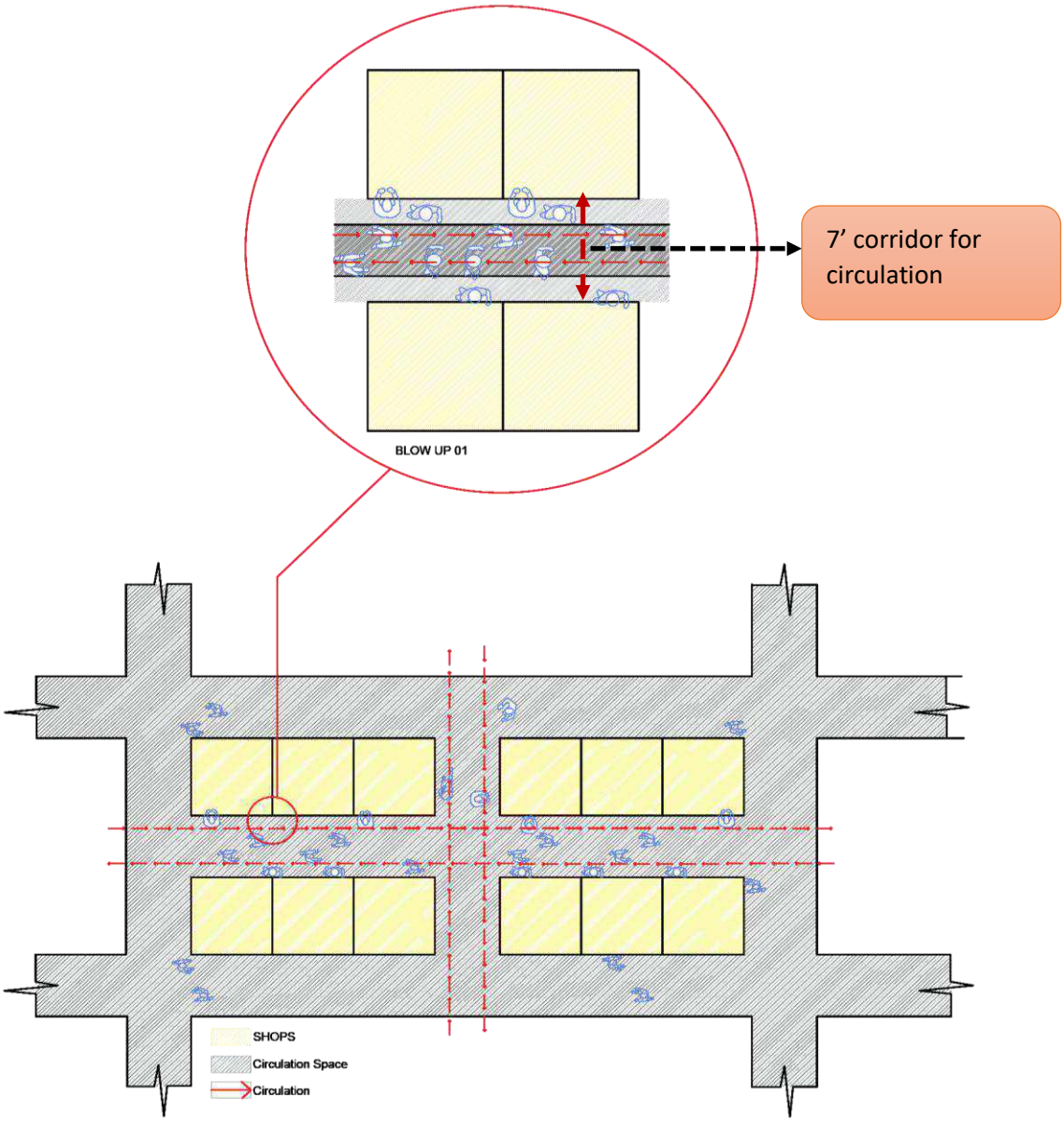
CHAPTER -3

3.1. PROTOTYPE DESIGN GUIDELINES:

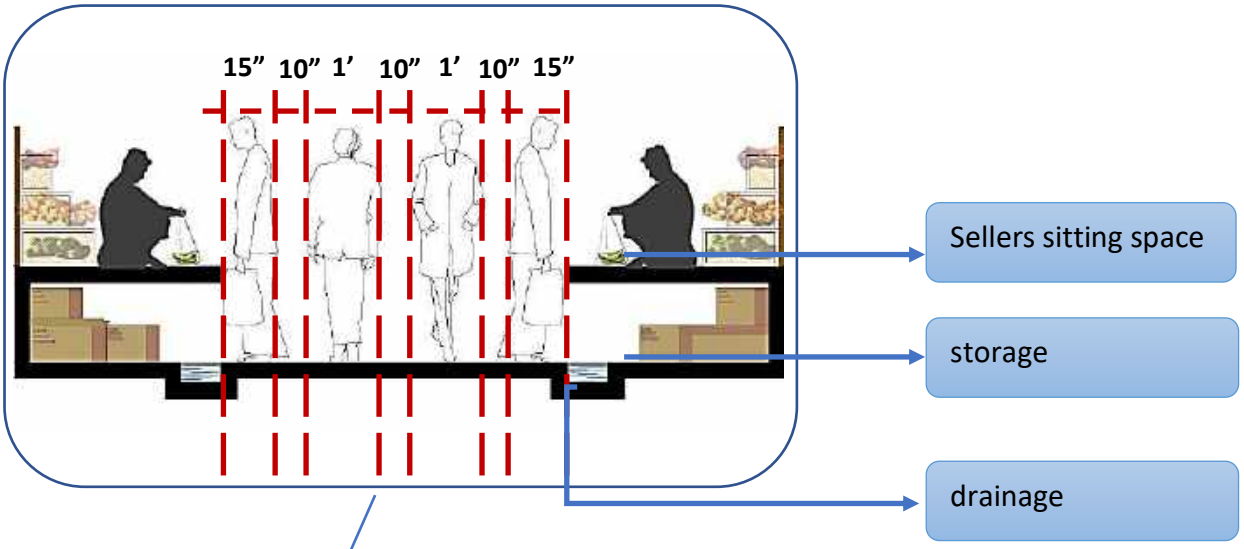
KEY POINTS OF PROPOSED DESIGN CONSIDERATIONS:

3.1.1. CIRCULATION & LOADING UNLOADING:

- Multiple entry-exist is preferable to ensure easy movement for the public and control mobility.
- A dedicated circular road has to be proposed for loading and unloading. The minimum width of the road has to be 25'.
- Separate ramps and stairs have to be designed for labor.
- The corridors have to be a minimum 7' wide to ensure public movement and circulation.

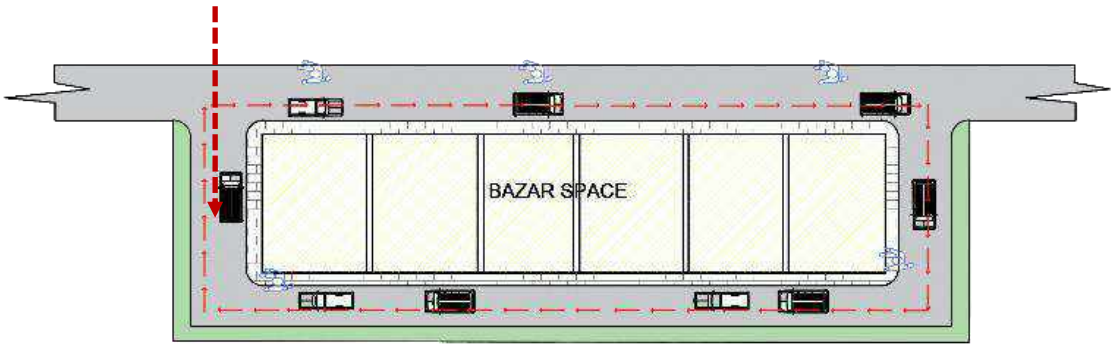


Circulation plan



Circulation section

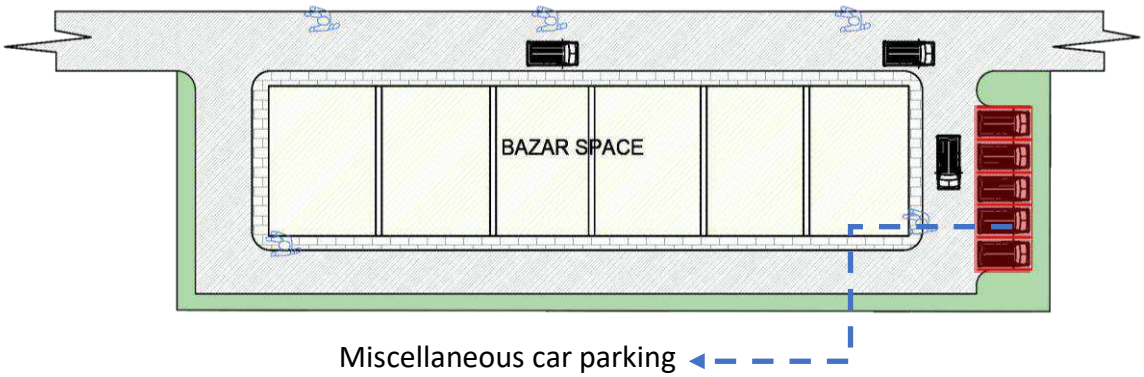
- Circular transport path
- 25' wide dedicated internal service road for loading unloading



Internal service road plan

3.1.2. PARKING:

- bazaar area is always crowdy with people and vehicles that cause a traffic jam. To minimize this problem, a parking zone should be designed.
- There are two types of parking in the market. short-term and long-term.
- Space required for parking:
  Truck: 5'/10'6"
  Pickup:5'/7'6"
  Van:4'/5'



3.1.3. ZONING:

- The wet zone and dry zone should be separated. The zones will be designed cluster block-wise. The fruit zone and vegetable zone should be in front of the road for frequent access for passersby. the meat zone, fish zone, and poultry section should be hidden and placed at the back portion to avoid odors. proper waste management has to be ensured for the wet zone.
- The Same type of markets should be placed together
- An "aarot' must have easy communication with the entrance and service road. Products come here all day long and stay for a shorter period. So aarot should be kept at a minimum distance to ensure immediate loading unloading and swift delivery.
- The shops must be designed in a grid pattern where sellers can sit ergonomically and their activities do not hamper users' circulation and movement.

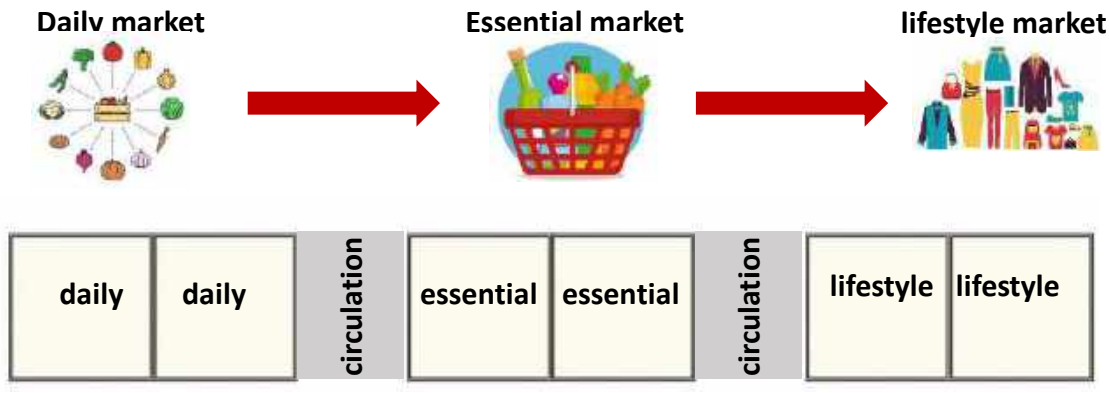


Fig: Bazaar zoning

3.1.4. CLUSTERING AND CONSOLIDATION:

The business center and the volume of bazaars tremendously increased horizontally in the last five years which indicates the importance of the growth centers in the rural area. A lot of space is lost because of horizontal expansion. Traders can't make any permanent structure due to few govt. binding rules. It's really important to focus on clustering and consolidation of functions and turn the entire bazaar into a compact structure where the wet market can take place on the ground floor, the dry market on the 1st floor, and other value-added functions on the upper floors.

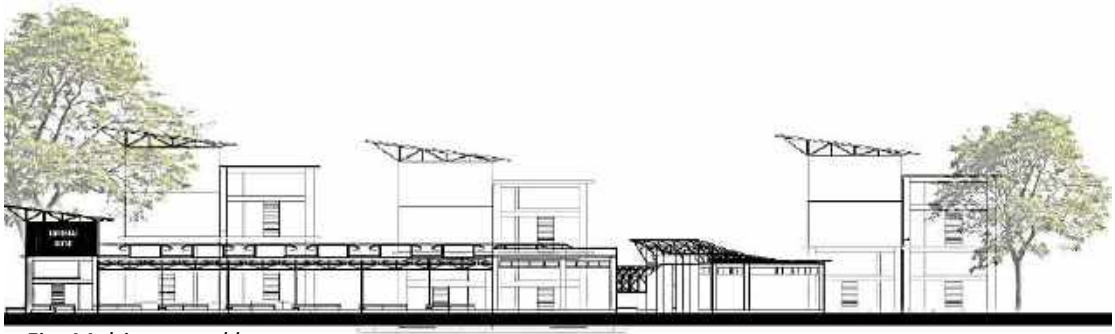
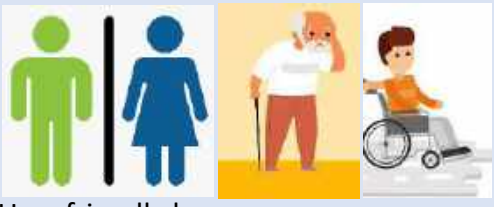


Fig: Multi storeyed bazaar

3.1.5. INCLUSIVENESS:

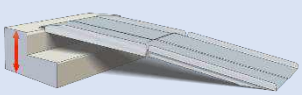
Earlier bazaar space was only utilized by male users. Nowadays, people of all ages and classes use the bazaar. The proposed design should be inclusive of all ages and gender. separated ramps, a lift lobby, and a hygienic toilet can also invite grown-up and differently able people to the bazaar.

Stalls and shops everything from fruits and vegetables to colorful garments and handmade jewelry can also be run by women. Women also shoulder the responsibility of supporting their families. Lack of security and opportunity have stopped the women from doing business at bazaars. A women's zone is a must-need in the proposed design.



User friendly bazaar

Hygienic public toilet



Ramps, lift lobby

Women corner

3.1.6. STRUCTURAL FEATURES:

For multiple story and service blocks:

The building process will involve the use of local materials and the participation of local people in construction work. The bazaar will be constructed by a post-lintel system. This type of structure supports a large amount of weight, thus allowing buildings to rise higher than one story. Concrete floors, RCC columns, and steel roofs are proposed to build the multiple-story buildings and service blocks. The steel roof is supported by steel truss members. The walls are made of simple traditional bricks with plaster and color

For single shed structure:

in a single shed bazaar, a steel structure has been proposed to make the bazaar cost-efficient. The steel members occupy fewer functional areas. Steel members can easily be reused. In steel structures, cantilevers can be formed easily. In low-height buildings, steel members can be repaired easily. The construction period is short for steel structures. Natural ventilation and airflow can be ensured properly by the steel-structured roof.

3.1.7. VALUE-ADDED FUNCTION:

- The service zone of every market must be equipped with a spacious landing station which includes washing, sorting, grading, and packaging space in preparation for export and transit to regional markets.
- Every market must have well-equipped cold storage to full fill local demand and specially to increase export opportunities.

- Transitional storage facilities are needed to help buyers and sellers to reduce the wide fluctuation of prices between peak and lean seasons

- A well-maintained slaughtering house in the meat market.

- This market has to be established as a one-stop service point for the farmers where farmers can avail of 360-degree services and products from the markets
    - Facilities for input shops
    - Information centers
    - Other vertical services like space for various packaging materials

- Toilets, restaurants, women's corners, display centers for young entrepreneurs, and an open trade center for farmers are also needed to foster the rural economy.

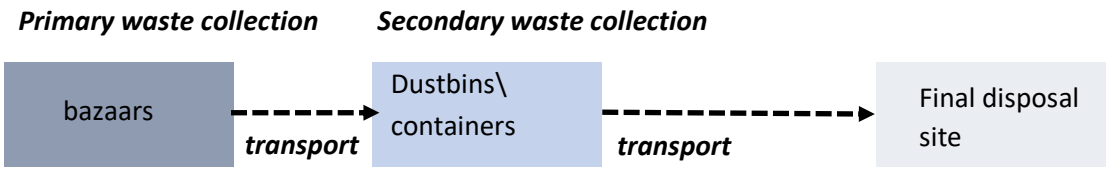
3.1.8. SUSTAINABLE FEATURES:

WASTE MANAGEMENT FACILITIES:

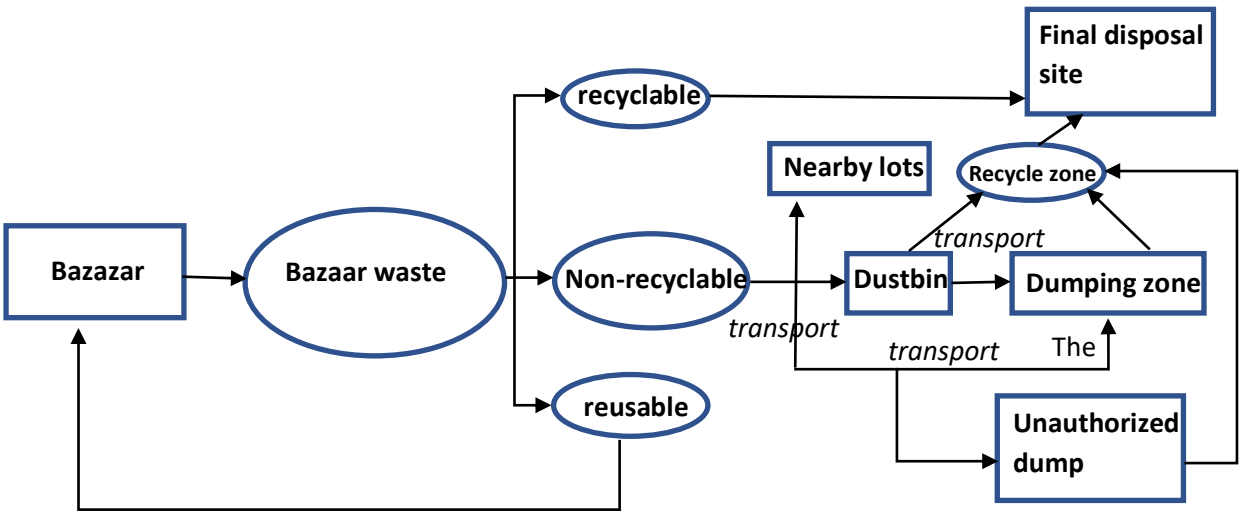
There are also notable differences in the quantities and composition of waste obtained from bazaars. Generally following 3 types of waste are produced in the bazaar area:

- Non-organic waste
- Organic waste
- Wastewater

Non-organic waste is collected by containers or dustbins and taken to the final disposal site through transport. This whole procedure is operated by the bazaar management committee. (MMC)

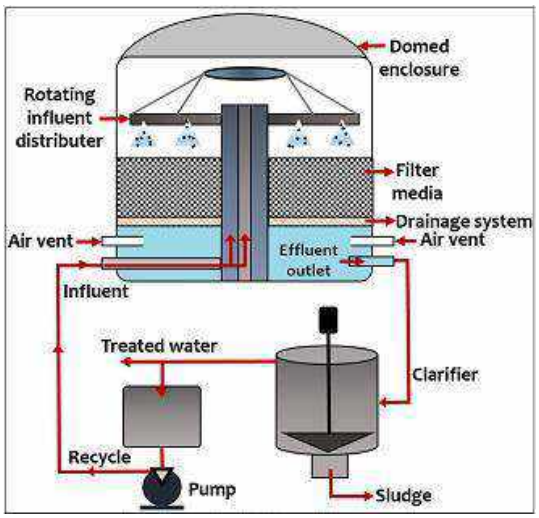


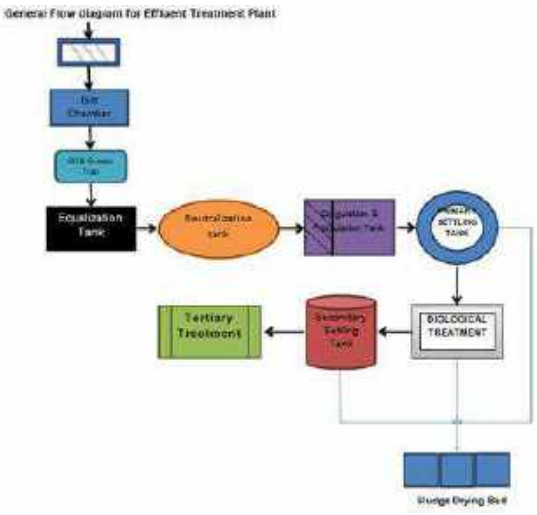
In the case of ***organic wastes***, reuse and recycling are done in a dedicated waste composting space. The organic waste is composed of a rotator and then recycled for further use.



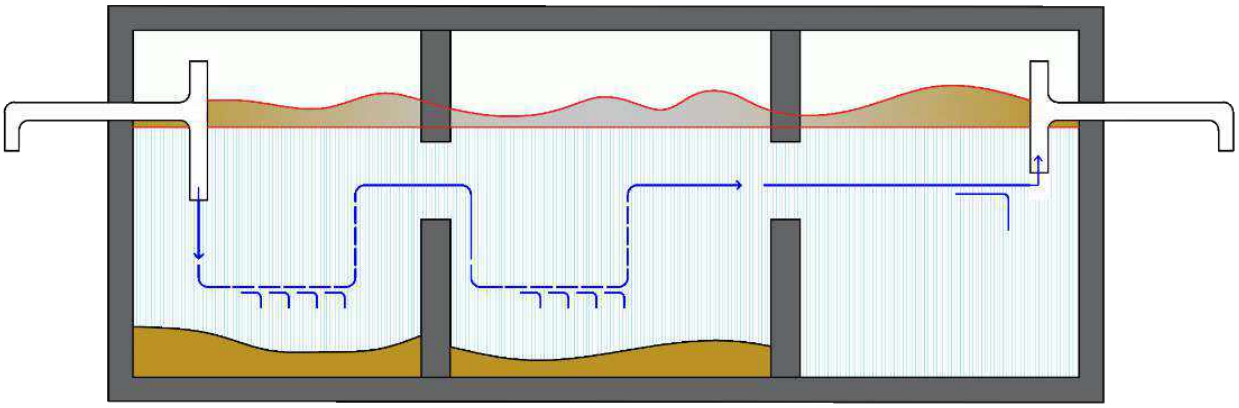
Waste collection diagram

The wastewater generated in the bazaar is collected by the surface collector and then recycled by the trickling filter. A trickling filter uses filtration, adsorption, and assimilation for the removal of contaminants from wastewater.





Design of trickling filter unit

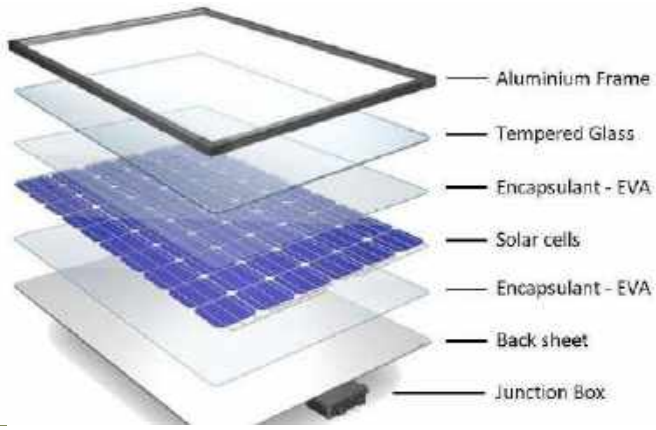


Section of underground waste management

SOLAR PANEL:

Solar panels are used to convert light from the sun into electricity that can be used to power electrical loads. It collects renewable energy in the form of sunlight and convert that light into electricity which can then be used to provide power for electrical loads.

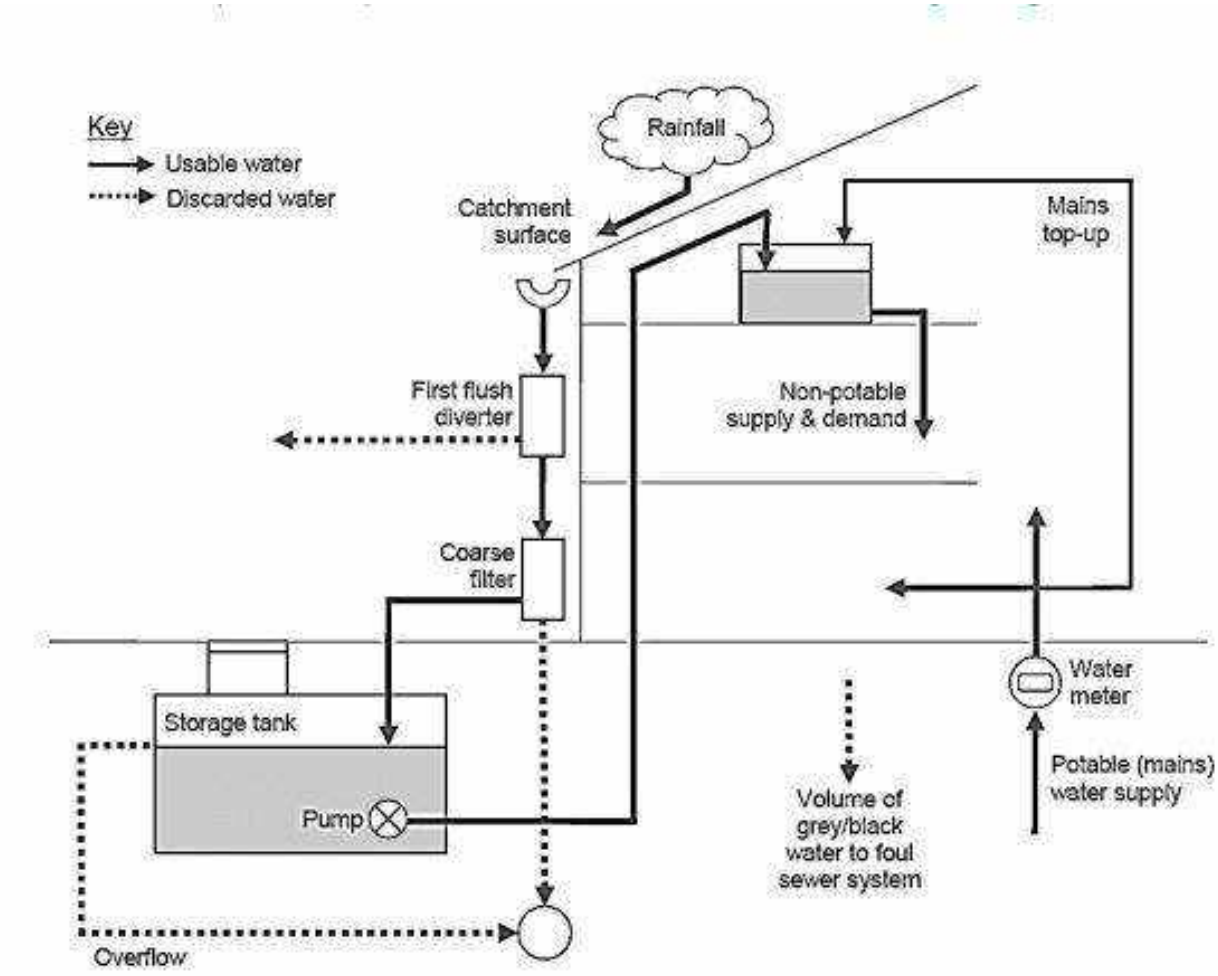
- Solar power reduces your monthly bills.
- Solar panels clean up our air.
- diversify energy sources, improve efficiency, and save money.
- less expensive



Solar panels

RAINWATER HARVESTING:

Rainwater harvesting is an innovative technique utilized to harvest rainwater from roofs and other above surfaces to be stored for later use. Rain-harvested water can be used for garden and crop irrigation, watering livestock, laundry, and flushing toilets. Bangladesh receives around 2,200 millimeters (mm) of rainfall per year on average. Most places receive at least 1,500 mm of rainfall each year, but some, such as the northeastern border regions, receive up to 5,000 mm. Rainwater, as an alternative to fresh groundwater, is a viable solution for market operation and cleaning in the Bangladeshi context. There are two types of rainwater harvesting methods: rooftop rainwater harvesting and surface rainwater harvesting. Rainwater harvesting in markets provides both financial and resource savings. Market rain harvesting systems are classified into four types: roof-top rainwater collection systems, wet systems, dry systems, and green roof systems. Rooftop rainwater harvesting systems are regarded as the most practical rainwater harvesting technology for the market since they contribute to mitigating storm runoff and, depending on the design, maximum rainfall may be captured by this system. A typical rainwater harvesting system for markets consists of five components mainly the Roof surface and gutters, Debris Screens/ Leaf Catcher, Down Pipe or Downspouts, Roof Washers, and First Flush Diverters, Tanks/Storage Containers. Figure 1 depicts the components of the rainwater harvesting systems in markets.



Another advantage is that it saves money. The reasons driving the growth of the worldwide rainwater harvesting system market may be ascribed to consumers' growing awareness of the need of conserving freshwater volume across regions. One of the key driving reasons for the growth of the global rainwater harvesting system market is the increasing demand for rainwater harvesting systems from farmers and farming operations. As a result, rainwater collecting and storage have become a reliable option for them. However, significant market constraints include the high price of installing a rainwater harvesting system, which impoverished farmers cannot afford. Furthermore, a minimal annual maintenance cost is necessary for the rainwater collecting system to work well which is affordable from the Bangladeshi market's perspective.

CHAPTER -4: MAINTENANCE

4.1. OPERATION MANAGEMENT OF MMC:

Though the bazaar is operated by the market management committee, there is no organizational structure of MMC. They do not perform their job well and they are only there to collect revenue. An active trade committee should be formed to pay emphasis on improving market facilities. Following rules and regulations should be followed by MMC to operate bazaar and growth centers:

4.1.1. ACCESSIBILITY:

MAIN ENTRY:

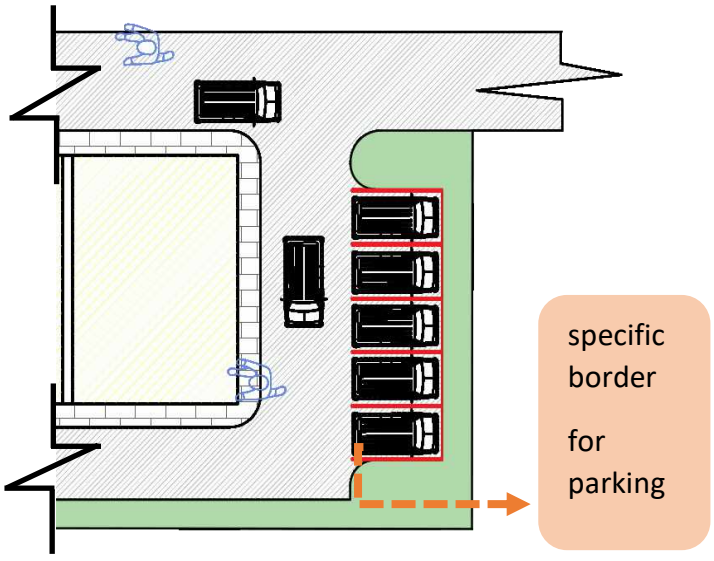
1. The markets have multiple entries which are busy throughout the day. These entries need to be kept unobstructed. No goods can be placed in the middle of entries. The market management committee has to strictly generate rules to keep the entries obstacle free to ensure clear public movement.
2. Signboards should be placed next to the entries to aware people.

VERTICAL CIRCULATION:

1. Trash can't be thrown anywhere in the elevator, lobby, or stairs.
2. Goods and products cannot be kept on stairs and lobby.
3. If someone throws garbage on the stairs, lobby, or lift, he/she will have to pay fine and a rule has to be issued by Market Management Committee in this regard.
4. Signboards should be placed next to the stairs to aware people.

ROADS AND PARKING:

1. Miscellaneous parking space should be kept and specific border has to be provided for each vehicle in parking area.
2. No parking will be allowed on footpaths.
3. Signboards should be placed next to the footpath and parking to aware drivers.



4.1.2. CIRCULATION:

1. Keeping goods in circulation space creates difficulty in the movement of people and labor. It also causes difficulties in loading- unloading and the movement of goods. So, a rule has to be issued by MMC to keep a clear circulation space for people and laborers.
2. No goods and raw vegetables can be kept in the place of circulation and human movement.
3. If someone keeps goods in circulation space, he/she will have to pay fine.
4. Signboards should be placed next to the shops and corridors to aware businessmen and sellers.

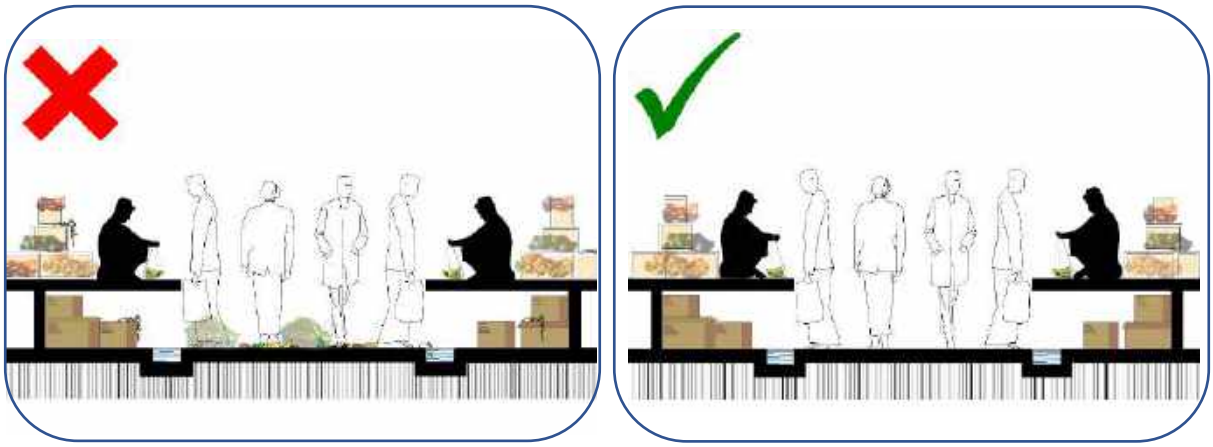


Fig: circulation guidelines

4.1.3. DRAINAGE MANAGEMENT:

1. Non-organic materials, polyethene, and plastic cannot be thrown on drains.
2. There will be dustbins on stairs, shops, and corridors to dispose of waste.
3. If any part of the drain is broken, it must be fixed.
4. If there is any dirt on the drain, a stick has to be used to clean it.
5. Drains must be cleaned once a year.

4.1.4. SOLID WASTE MANAGEMENT:

1. Organic waste has to be thrown in the dumping zone and daily collected by the people deployed by MMC.
2. There will be separate dustbins for metal, tin, and plastic waste. The non-organic garbage has to be thrown there.
3. A system has to be provided to recycle non-organic waste.
4. If the dumping zone becomes inactive, a space has to be made where the garbage can be thrown.

4.1.5. FLOOR CLEANING:

Traditionally, wet markets in Bangladesh have NCF floors. The cracks in NCF may support bacterial growth. Therefore, high standards of maintenance are required for hygienic floor surfaces. Some cleaners have to be deployed for cleaning purposes. The wet zone has to be cleaned twice a day.

Fig: cleaning guidelines

4.1.6. SOLAR PANEL CLEANING:

1. Clean solar panels are going to deliver a much higher energy output than dirty panels will. Without regular cleaning, dirt, dust, and bird droppings can accumulate on the protective glass of the solar panels, which will gradually decrease the amount of sunlight that the solar cells receive every day. So, Solar panels should be cleaned every 7 days.
2. MMC will provide soft, non-abrasive sponges or cloths to the cleaners to clean away dirt from solar panels.

4.1.7. MAINTENANCE OF RAINWATER HARVESTING SYSTEM:

1. The market management committee has to generate a group to check if individual system components are functioning properly, observe storage volume, and monitor water usage.
2. Monthly inspections of the gutter and roof is mandatory to remove all materials, especially organic matter is necessary to maximize water quality.
3. Downspouts should be regularly inspected for debris, loose hardware, and obstruction to flow.
4. Monthly cleaning is suggested, depending on the volume of debris encountered.
5. Tanks should be inspected monthly or more often if a debris screen or first flush The device has been repaired, broken, or clogged.

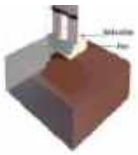
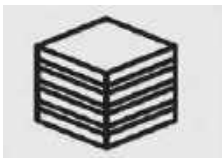
CHAPTER -5: DEVELOPMENT OF DESIGN GUIDELINE

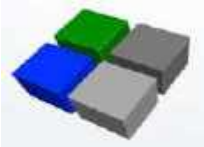
5.1. HAAT-BAZAAR DESIGN MANUAL:

The study assignment has concentrated object to understand the user needs, potentialities and sustainable features that can ensure the productivity, employment opportunities, influences young regional agro-entrepreneurship and based on some sites analysis a few design have been drawn as reference. Each Hat-Bazar and Growth-Centers of Bangladesh have some individual uniqeness and context. Site context and demand perspective have created the charecteristics of individual bazar. Hat-Bazar has been growing by following users informal choices not any guided reference and for that the benefits are not garnered rather creating many odds. A Bazar Development Design Guideline has enormous importance for ensuring appropriateness of all the develoment works in Bazar.

Future extensive study is required for developing future haat-bazaar design manual and the following considerations shall be priotized as the key components to further indepth study:

	Land use map	The land use pattern of the bazaar, catchment area, surrounding analysis, govt. land and private property ratio, building height, building storey, and the manner of utilization of land, including its allocation, development, and management have to be determined.
	Accessibility	Multiple entry-exit paths have to be designed to control huge traffic and public movement. The Service road which is used for loading and unloading has to be separated from the public road.
	Circulation	The circulation space has to be clear, regular, and free of obstacles. The shops should be designed in a grid pattern. Ramps, core, and lift lobby should be designed for differently able persons. The width of vertical circulation should be determined based on the number of users.

	Loading-unloading	An internal dedicated service road should be designed which has to be a minimum of 25' wide.
	Parking	Short-term parking space gives shoppers the opportunity to make a quick "stop and go" purchase, a tremendous boost to businesses. Long-term parking stands kept for truck and pickups can reduce traffic congestion.
	Basement	The height of the ground floor above the street level should be a minimum. between 300mm and 450mm. The plinth height should be such that water does not rise during floods.
	Plinth level	The floor height should be minimum12' to ensure proper natural ventilation, lights, and comfortable movement of users. Low floor height can create a closed, damp environment.
	Floor height	In a single shed bazaar, steel structures should be used as steel members can easily be reused and repaired. The multiple-story bazaars can be constructed by a post-lintel system.
	Structure	Building material signifies structural existence. It demonstrates the presence of aesthetic sense in a design, and hence, defines the practicability of the structure. Local, low-priced building materials should be used in bazaars.
	Building material	The dry zone and wet zone must have to be separated. A similar type of shops should be kept together. value additional functions must have to be kept.

	Functional order	The dry zone and wet zone must have to be separated. A similar type of shops should be kept together. value additional functions must have to be kept.
	Women entrepreneurship	Women's zone should be designed in the bazaar to accelerate women's entrepreneurship, where they can boost economic growth with their innovation, creativity, and productivity.
	Opportunities for young entrepreneurs	To foster a bazaar economy, it's really important to create jobs and employment opportunities for young entrepreneurs. some value additional functions in bazaars can significantly contribute to solving the employment problems of young rural people.
	Natural ventilation	Natural ventilation reduces odor, and delivers fresh air to interiors, ensuring safe, healthy, and comfortable working conditions for users. During drier and hotter climates, natural ventilation avoids heat buildup. Natural ventilation also provides natural daylight. Utility bills naturally go down when natural ventilation is ensured.
	Waste management	Space must have to be kept in the bazaar for waste management. A system can be developed to recycle nonorganic waste. A space for a dumping zone can be kept to collect nonorganic waste.
	Sustainable features	The bazaar should include some sustainable features such as energy efficiency, renewable energy generation, and water efficiency. solar panels should be installed because solar energy creates pure, clean, and renewable power from the sun. The storing of rainwater during the monsoon season is important for the purpose of using it during periods of water scarcity.

	Future extensions	Space should be kept for horizontal and vertical extension of the bazaar in the future.
	MMC operation	MMC operation guidelines have to be formed and maintained strictly.
	MMC guideline	Formation of the MMC working committee to improve service quality and maintenance. Improve better functionality of the MMC members through knowledge transfer and capacity building for managing the day-to-day operation and market management
	Revenue collection	To ensure efficient maintenance, a separate revenue model of the facilities must be made to justify the investment.

CONCLUSION:

The Design Study of Hat-Bazar and Growth-Center has aim to identify the requirements that can support the factors of economical prosperities of rural Bangladesh. The study is a set of findings of users' necessities, incorporation of probable features for solving the present shortcomings and to showcase some examples that can develop a prototype design strategy for collection centers, special bazaars and growth centers in distinctive circumstances and improve construction and management strategies for the effective provision of supporting infrastructure.

The study is an initiation of understanding the present state of Hat-Bazar and Growth-Centers which are required extensive attention in terms of infrastructural development for influencing catalyst factors of socio-economical of regional area. The study has found the enormous vivid evidences of importance in fresh structural development to accommodate the present and future opportunities.

References: