MULTIMODAL TERMINAL AT TONGI, DHAKA, BANGLADESH

BY

KAISER HAMID

ID# 07208008

Seminar II

Submitted in the partial fulfillment of the requirements

for the degree of Bachelor of Architecture

Department of Architecture

BRAC University

Spring 2012

ACKNOWLEDGEMENT

I would like to express my deepest gratitude for this thesis project to the head of the Department of Architecture Dr. Fuad H. Mallick who is always been the greatest guide in this journey. I would also like to express my thanks to Dr. Zainab Faruqui Ali who inspired us to think critically in every step of the way.

I would like to thank the most helpful person who was with us for a very long time, “Shakil Ahmed Shimul” and friends who consulted me in every possible about every tiny difficulty that I have faced.I also have to express my appreciation especially to Kafi Bhaiya [Kafi Newaz Khan, BU] and Fariah apu [Fariah Sharmin Akbar, BU] who made it possible for me to design a proper solution for the project. Also I must thank the people who helped me to draw the finishing of this prolonged project; Raihan, Nishad, Jesan, Abonti, Turjoy and Faysal.

And nonetheless, I would like to thank my Parents for backing me up in every step of the way and for inspiring me to give my best shot. It is because of them and by the blessing of Almighty Allah I have managed to come this far today.

Kaiser Hamid

[07208008]

Department of Architecture

BRAC University.

Spring, 2012.

ABSTRACT

This paper is a report for the general background study to the specific mission development of the thesis project, titled under Multimodal terminal. The selected site of the suggested project is at Tongi beside Dhaka-Mymensing highway and river turag. It is suggested project, which will be undertaken at the government construction level to help ease the high demanding traffic system and to shift the public mass in the north of the capital city at the river border. As there are many mode of transportation option is available for the public, it is believed and also observed in developed countries that multiple modes of transport provided and designed together works better than stand alone system. As the project site is crossed over by multiple routes of transport modes, it is planned to design a multimodal terminal there.In this thesis project through series of background study, site study, case study the detailed program was developed and based on the program through trail and error the design started to develop.

Chapter I

1.1 Introduction

The development of transport is a must for the growth of a country. With the increasing population, industrialization and urbanization, any nation demands easy access and transport facility to be more efficient in every possible way. In a country like ours, which is lagging behind so far, a transport station has a lot of scope to work with.

It is unquestionably true that among all the different modes of transportation, road transport is the handiest and one that can reach almost all places, functioning entirely on its own within an area, without having to depend on rail, river or air transport. On the other hand neither air nor can river transport function independently, without the support of road transport, for the obvious reason is that none of these can reach every roadway corners leading to every houses, farms, market places and offices. The ultimate roadway transport as a capillary circulation is the most for our daily movements. Developed country have realized the importance of this capillary circulation; hence they have improved and are still improving the road transport to reinforce the over all national economy. Long distance transport by air, ship and railway must be strongly supported by the good roadway transport.

This vast transportation problem in our country may be greatly reduced by developing a good and efficient road transport and communication system, which will carry both men and goods to all parts of the country. But this is quite a difficult and highly expensive in a reverie country. Bridging of many road gaps are costly and are quite difficult to construct on the soft soil. On the other hand vehicles on road have been greatly increasing and would continue to increase. Along with it an improved roadway system and terminal junctions are of dire requirement, for a safe an efficient function of the road transportation.

1.2 Background

Dhaka, as the capital of Bangladesh is expanded to the north so increasing the population. Business, communication, road network are the major issue of Dhaka. The centre of gravity of downtown transportation activities is gradually shifting north to Jaydevpur and eastward. There is three inter district bus terminal and one major launch terminal serve the total communication. But they are far away from the northern side of the Dhaka. That’s why Bangladesh government proposed a multimodal terminal in Tongi. A multimodal facility/terminal can be defined as a place where interface occurs between transportation systems. In a passenger terminal, people enter the facility by one mode of access (e.g. on foot, riding a bicycle, by car, by bus or train, etc.) and leave by another means. This particular project is proposed for the passenger service with the combination of water taxi and bus terminal at the northern out skirt of Dhaka.

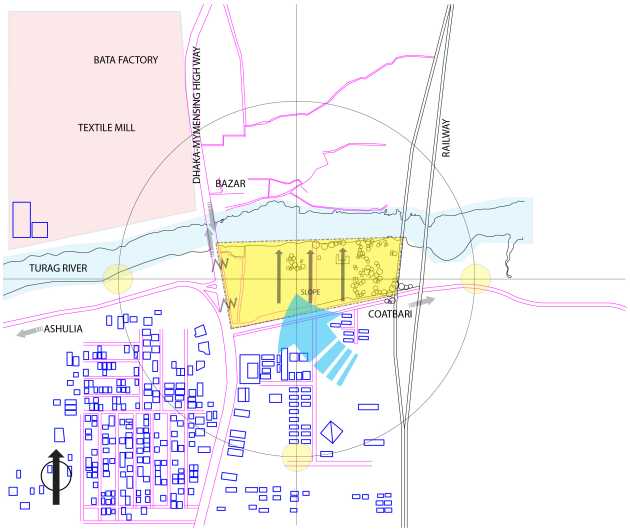
There are many advantages to this multimodal terminal, including; supporting and enhancing transit usage, facilitating transfer between modes, clarifying the regional

transit network, increasing transportation options, taking advantage of efficiencies, creating a destination and gateway, and supporting economic and urban development.

1.3 Site

1.3.1 Location

The site is just beside the Turag River, and the Tongi Bridge. The total site area is 31 acres. Only railway has own property. Govt. has a plan to acquire the rest of the land. Tongi to Kotbari connection has just beside the southern side of the proposed area. Heavy garments and metal workshops are available here. There are some residential plots. [Figure 1 to the right, by author]



1.3.2 Reason for choosing this site

Logically it is the best location for building a multimodal terminal. It is in a very significant location so that it can work as a public hub rather then being a mare terminal. It is touched by Dhaka Mymensing Highway, Turag river and the same time railway. With the existing amount of land that the transport commission owns right now it is possible to build a world-class multimodal terminal.

- Accessibility
- Rider ship demand
- Modes served
- Proximity to free way interchanges
- Access from adjacent streets
- Proximity to other major destinations
- Quality of pedestrian environment and access

1.4 Space program

1.4.1 River Port

Public Area

Information booth	200	sft
Tickets counter	800	sft
Passenger lounge	10000	sft

Concourse for passengers		4000	sft
Baggage Carousal		500	sft
Cafeteria		1000	sft
Washroom		400	sft
Admin office			
General section		200	sft
Port office room		200	sft
Duty officer		400	sft
Security room		200	sft
Control room [signal and radio]		400	sft
Marine Engineers room		500	sft
Draftsman and typist		200	sft
Washroom		400	sft
Parking area			
Cars		4000	sft
	NET	23400	sft

1.4.2 Bus Station

Public Area			
Information booth		200	sft
Tickets counter		800	sft
Passenger lounge		10000	sft
Concourse for bus		30000	sft
Concourse for passengers		4000	sft
Baggage Carousal		500	sft
Cafeteria		1000	sft
Washroom		400	sft

Admin office

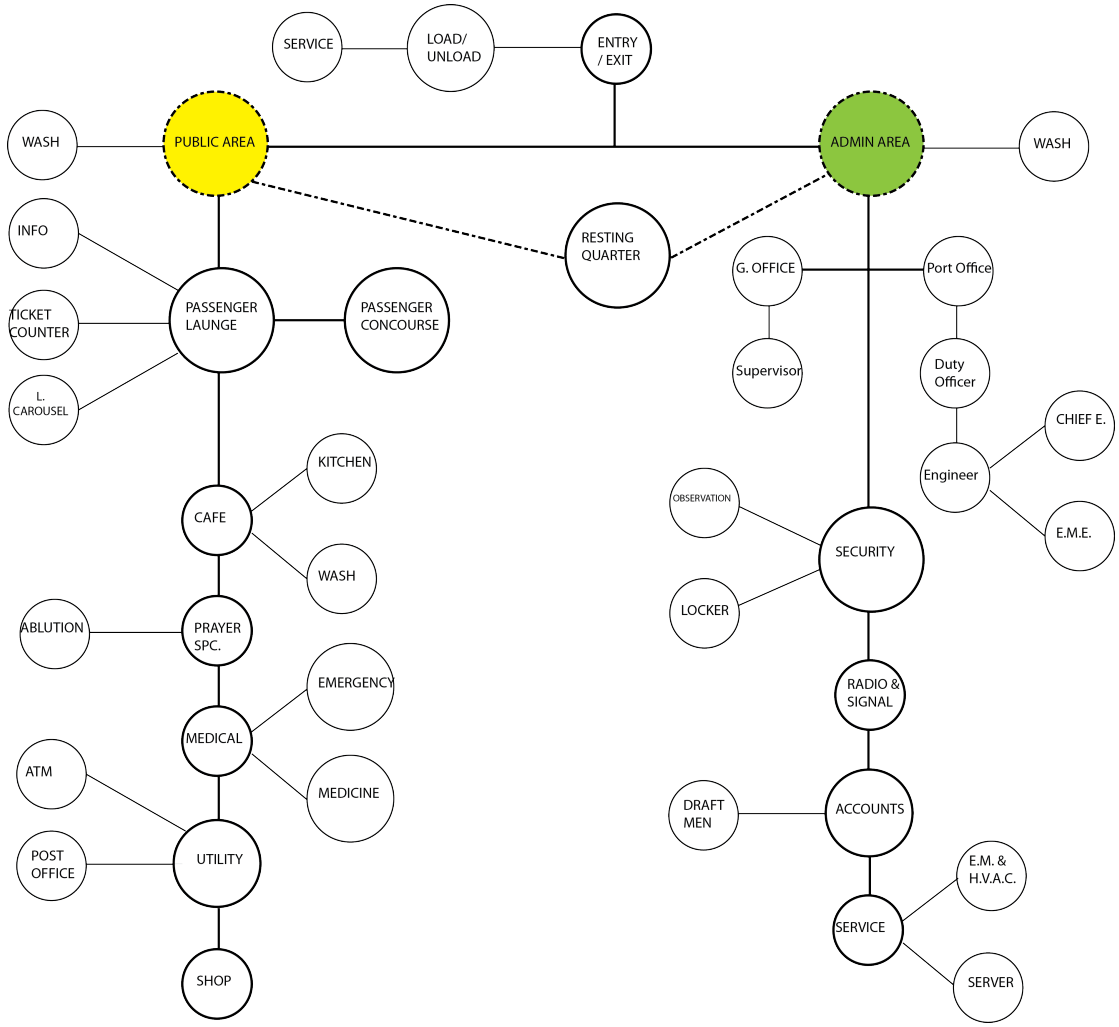
Admin office		300	sft
Supervisors room		200	sft
Security room		200	sft
Control room [signal and radio]		400	sft
Washroom		400	sft

Parking area

For bus		24000	sft
Other Vehicle		4000	sft
Workshop and Servicing		2000	sft
	NET	78400	sft

1.4.3 Other Facilities

Medical centre		1200	sft
Prayer space		2500	sft
Post office, ATM booth, Souvenir shop		1500	sft
Resting Quarter [20 compartments]		3000	sft
	NET Total	110000	sft



[Figure 2 Relationship diagram of program, Source: author]

1.5 Conclusion

The center of importance of business district transportation activities is gradually shifting north and eastward of the capital. A new interchange will provide to the proposed eastern bypass, which is planned for the area just a few blocks east of the site. The Maymensingh -Dhaka highway linking downtown with the airport and with the proposed circular waterway planned for the greater Dhaka city (currently under implementation)

Chapter II

2.1 Introduction

The total traffic system of the greater Dhaka city and authority thought there should be a multimodal terminal at the northern end of the Dhaka city. Three times they proposed two sites, one is near the Tongi Bridge and another is near the Estema place. The selected site is near the Tongi Bridge and it has a great opportunity. First reason the site is just beside of the main highway from airport to Maymenshingh. Another site is little bit far away from the highway.

2.2 Site

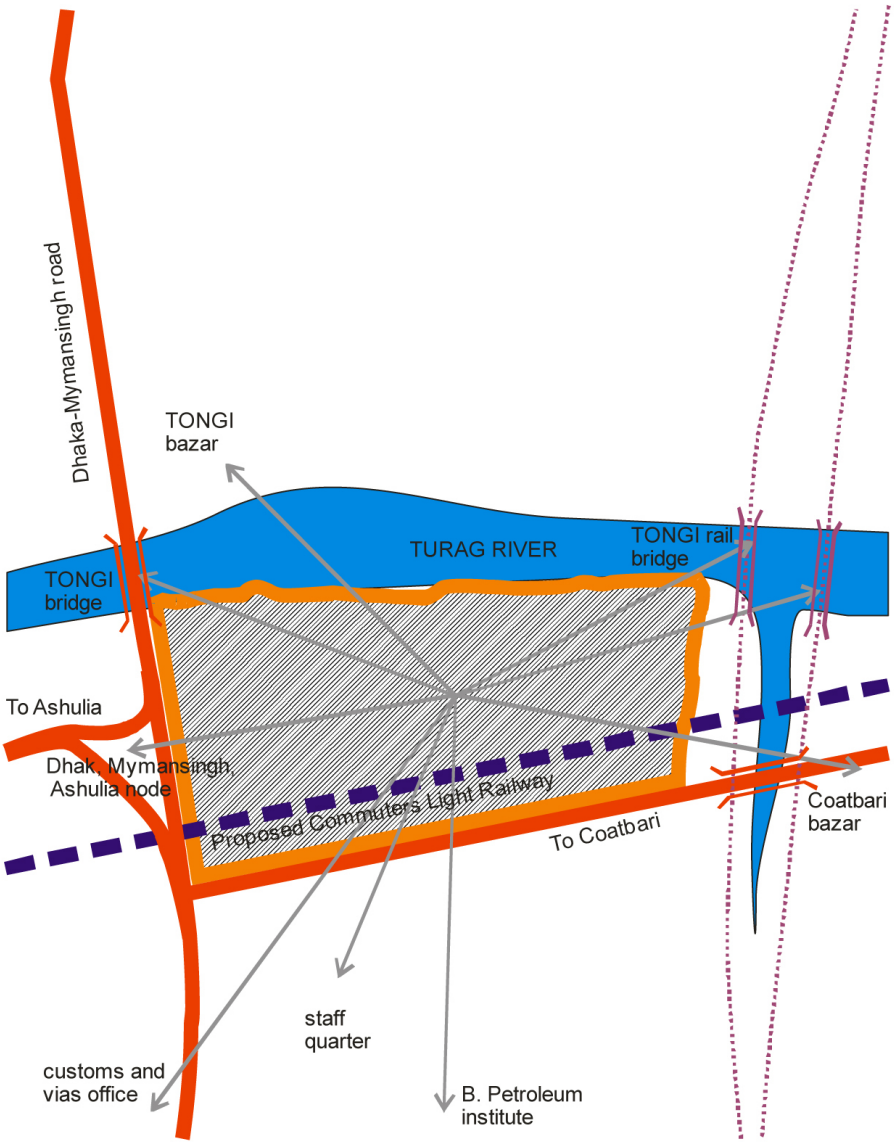


Figure 3 Site analyses [source: author]

Figure 4 Satellite Image [source: Google Earth; Jan 03,2012]

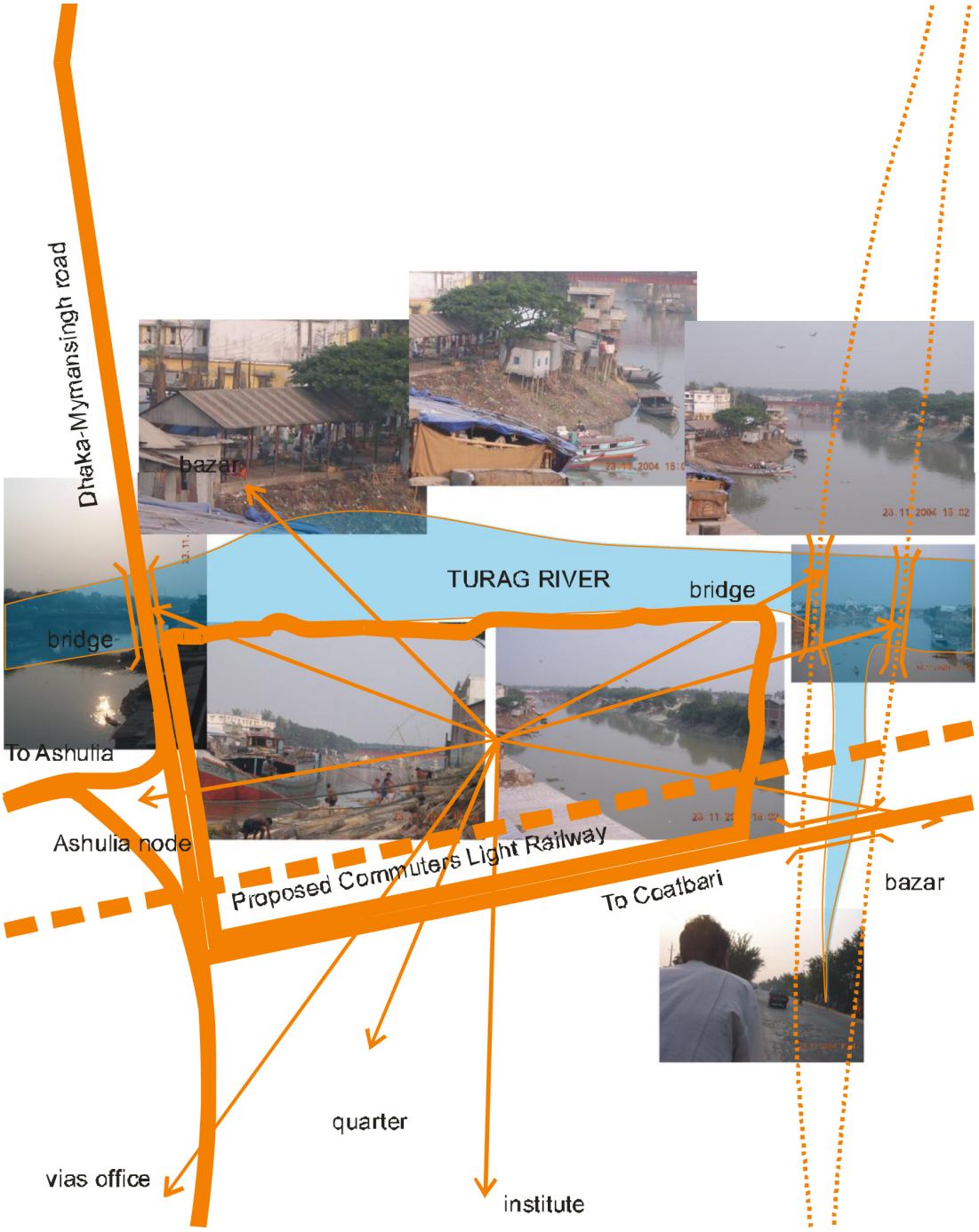


Figure 5 Site and Surrounding [source: author]

Figure 6 Photograph of the site edges [by author]

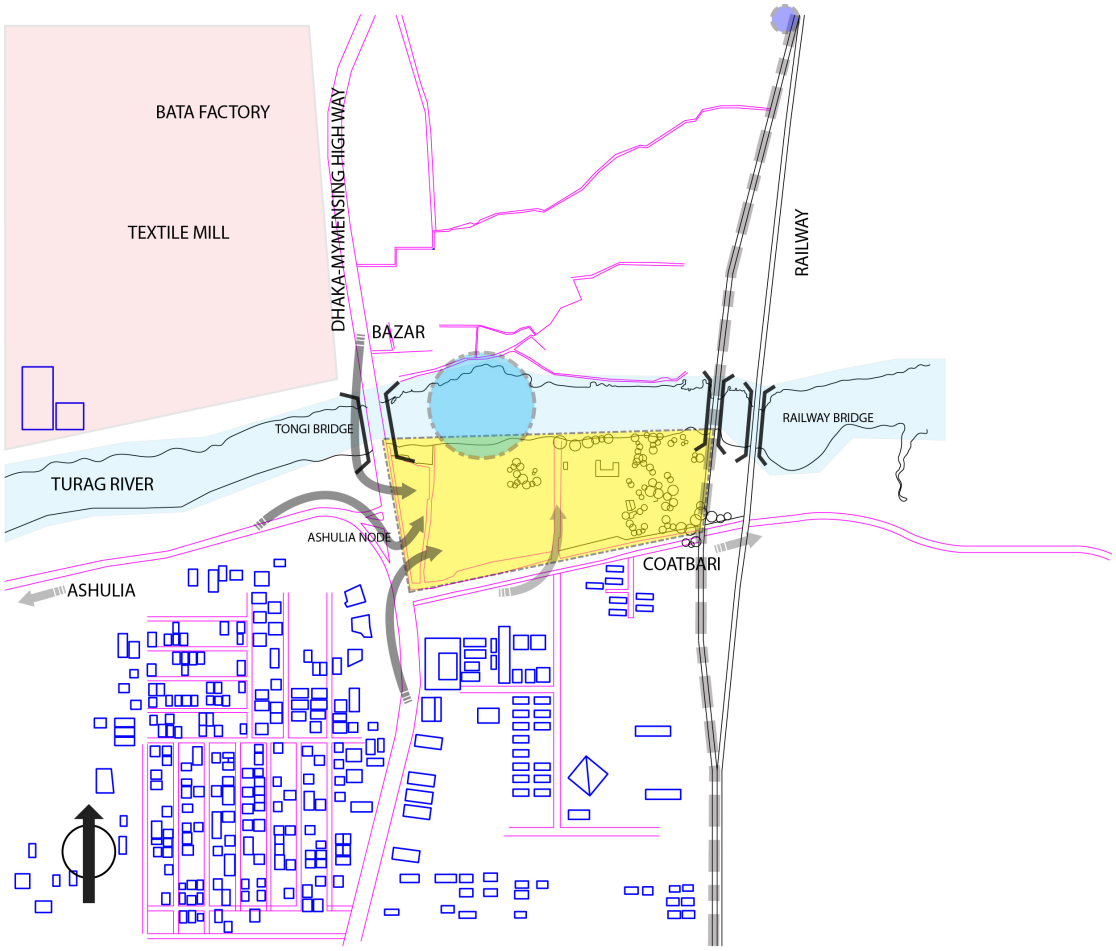


Figure 7 Traffic frequencies around the site [source: author]

2.2 Utility and Services

Electricity:
Electricity supplied by P.D.B. is available at the site; it has a supply voltage of about 220 and 440 volts at 50 cycles. The breakdown and fluctuation of voltage is a normal case in Dhaka and is a case of consideration.

Water supply:
Water supplied by WASA is also available at the site; it has an efficiency of supplying Water u to 25' high. So in order to supply water over the first floor, booster pumps have to be used. The supply by WASA is not very dependable and hence is better to provide
Individual storage tanks for regular use and this should be considered in design process.

Gas:

Gas pipeline network covers northern and western side of the site.

Sewer:
Sewer pipeline runs all along the peripheral roads of the site. There is no problem in the layout patterns on the now proposed road on the southern side though a sewer line is needed.

Telephone & Telex:
Telephone and Telex connection is available in the site.

Drainage:
The site is enjoying the greater Dhaka under ground drainage system. So the site is not facing the problem of any stagnant water.

2.3 Physical characteristics

Topography:
The topography of this area is almost flat and subjected low laying area. There has no great variation in this area from topographic view.

Flood level:
It is a low laying area subjected to flood during the monsoon period and after. The average depth below the level of the top of the flood control embankment is approximately 7 meters.
Earth filling is going on to the site to raise the area in present.

Microclimate:
Bangladesh is situated in the tropical belt, where the climate is indeed the determinant of the design form. In total the climatic variation all over the country is uniform. Hot wet summer and relatively dry cool winter with fairly marked seasonal variation characterize the climate of
Bangladesh. There are distinct seasons; summer (March to May) Monsoon (June to October) and winter (November to February) The Dhaka city is located almost literally on the topic of cancer and its climatic environment is characterized by typically tropical monsoon climate with heat humidity and abundant rainfall.

Temperature:
Temperature titled normal constitutes daily extremes averaged for one-month period. The highest temperature of summer season may go up to 110 deg F, and minimum temperature may go down to 86 deg F. In winter the temperature may fall down to neighborhood of 38 deg F with maximum of 85 deg F.

Climate data for Dhaka													
Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Average high °C (°F)	25 (77)	29 (84)	33 (91)	35 (95)	35 (95)	33 (91)	32 (90)	32 (90)	31 (88)	31 (88)	28 (82)	26 (79)	31 (88)
Average low °C (°F)	14 (57)	19 (66)	24 (75)	27 (81)	29 (84)	28 (82)	27 (81)	27 (81)	26 (79)	25 (77)	18 (64)	15 (59)	23 (73)
Precipitation mm (inches)	10 (0.4)	20 (0.8)	58 (2.3)	142 (5.6)	257 (10.1)	358 (14.1)	401 (15.8)	318 (12.5)	287 (11.3)	234 (9.2)	30 (1.2)	8 (0.3)	2,123 (83.6)

Figure 8 Temperature of Dhaka [Source: BBC Weather report]

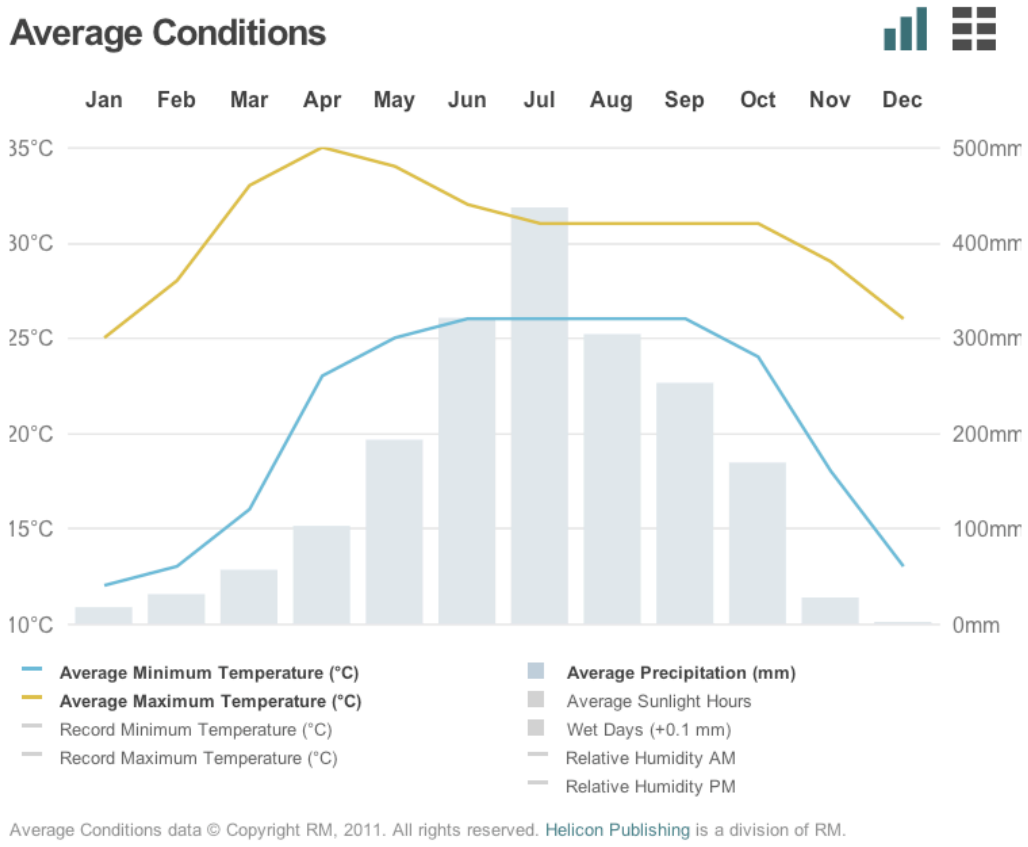


Figure 9 Graphical representations of the data [source: BBC Weather report]

2.4 SOWT Analysis

2.4.1 Strength:

- Surrounded by Turag river, railway track and Dhaka- Mymensing Highway
- Accessibility
- Rider ship demand
- Proximity to free way interchanges
- Access from adjacent streets
- Proximity to other major destinations
- Quality of pedestrian environment and access

2.4.2 Opportunity

- Turn into an important hub for Dhaka city
- Modes of transport served
- Ease public transport
- Link with the surrounding towns
- Peripheral transport around Dhaka
- Transport hub also as a civic space

2.4.3 Weakness

- Flood affect
- River transport almost die in the winter season

2.4.4 Threats

- Deal with a huge amount of population
- Demand of space
- Future expansion is near impossible
- Service change with seasonal change

Chapter III

3.1 Introduction

A terminal is a place where a person or thing is assigned to stand. It can also work as a transport hub for mass population. The development of terminal is though not very clearly recorded in the history; most people believe it originated as the same time of the development of public transport. A terminal can be a connecting point for distance districts of different means of transport. Then again one terminal can be featured with different means of transportation together [also known as Multimodal terminal].

3.2 History

The transport process for public hire are as old as the first ferries, and the earliest public transport was water transport system as on land, people walked or rode on different animal in group or even alone. The origin of Ferries is found in Greek mythology. Corpses in ancient Greece were buried with a coin underneath their tongue to pay the ferryman “Charon” to cross the river of soul.
Some historical forms of public transport are the stagecoach, traveling a fixed route from coaching inn to coaching inn, and the horse-drawn boat carrying passengers in exchange of money, which was a feature of the European canals from their 17thcentury origins.
The omnibus, the first organized public transit system within a city, appears to have originated in Paris, France, in 1662, although the service in question failed after a few months of death of its founder.
The first passenger horse-drawn railway was opened in 1806 between Swansea and Mumbles. In 1825, George Stephenson built the Locomotion for the Stockton and Darlington Railway, northeast England, which was the first public steam railway in the world.

3.3 Typology of Transport Terminal

a. Airport terminal, a building at an airport
b. Bus terminal, a bus station
c. Container terminal, a facility which handles shipping containers and cargo
d. Ferry terminal, a docking facility for passenger, train and/or auto ferries
e. Freight terminal, a freight station
f. Shipping terminal, a sea port or a dock or a berth
g. Marine terminal, a sea port or a dock (maritime) or a berth
h. Terminal station, a station at the end of a railway line.

3.4 Project specific description

3.4.1 Bus Terminal

A bus terminus [last point of stop] is a designated place where a bus or coach starts or ends its scheduled route. The terminus is the designated place that a timetable is timed from. A terminal can be located at bus stations, interchanges, bus garages or simple bus stops. A terminal can both start and stop at the same place, or may be in different locations for starting and finishing a route. A terminal also may or may not correspond with the use of bus stands.

3.4.1.1 Size of terminal

For operational reasons and passenger convenience, bus terminal will often be grouped together in major core locations. In the majority of cases, at least one, and often both terminal of a route will be specific stops in bus stations. Large bus operators may also designate the terminal of several routes to be their bus garage, where the legal terminus is which may be just outside or nearby. For the purposes of mixing of different public transport modes, terminal may also be located in a transportation hub or 'interchange'. Minor terminal may be a simple bus stop or loop in a residential street and may be used by very few or just one route.

3.4.1.2 Operational considerations

While it may be of prime importance to the passenger, the location of a bus terminal may be made for reasons other than convenience of passengers.

Competitive interests

In rare cases, where the bus operator is commercially detach from the bus station owner, the bus company may choose to terminate services outside the station, so as not to sustain usage charges. Additionally, counter to the idea of integration, competing bus operators may use different locations as intermediate terminal, to discourage passenger’s use of competitor’s services.

Turning

A factor in the location of a terminus is how to turn the bus around to start the route in the other direction, which may be difficult in areas where road space is an issue, or the road layout prevents U-turns. This does not apply for true circle routes, where buses simply operate permanently in the clockwise or anti-clockwise direction. A terminal often includes reversing/run-around space, negating the turning issue.

Layover

Another consideration about the location of a terminus can be the need to layover, before resuming in service.

In busy locations, such as main streets or bus stations, allowing the bus the space to layover may not be appropriate, and the bus may have to run out of service to a

quieter layover point, before returning to the terminus to start the route again.
To allow layover at a terminus, many routes run through busy centre terminating either side in quiet terminal, where a bus can layover without causing an obstruction. In the one stop case, this can cause problems for passengers when an apparently in service bus parks on a bus stop with the doors closed, waiting until the timetabled departure time, or when an arriving bus is not forming a departing service.
Layover time is the instant built into a schedule between arrival at the end of a route and the departure for the return trip, used for the recovery of delays and preparation for the return trip.

Driver change
Terminus location may be positioned to allow driver changes, although this may be less of a factor than the location of the bus garage. Centrally located terminal may be more convenient for driver changes. Some operators operate pool cars to allow drivers to drive to and wait at a quiet terminus, swapping the car with the bus when it arrives.

3.4.1.3 Types of bus terminal

One stop
Many routes avoid the need to accommodate turning by having the end of the route form a small circuit as an official part of the route. The terminus is designated as one stop on this circuit, with the bus starting and finishing in the same orientation. This is often necessary in many town centers with one-way traffic systems.
Space permitting, the terminus may be a purpose built run-around Bus turnout, which allows the bus to change direction simply by entering and leaving the turnout.
In rare cases, to allow a one-stop terminus, routes may be arranged to start and finish at the same terminus, with buses arriving as one scheduled route, and leaving as a different route. This can also be done to allow a formal mid point to split up a long route, reducing the knock-on effect of delays.

Two stop
As opposed to a one-stop arrangement, some routes that need to reverse direction at a terminus will start and finish in different stops, and the pair of stops locations forms the terminus. This necessitates running the bus out of service along other streets in order to position in the bus for the reverse direction. In the UK this is often achieved by locating the terminus near a roundabout.
In this case, the arrival point can be designated as a 'set down only' stop, where passengers are not permitted to board.

3.4.2 Water vehicle port

Port locations are selected to optimize access to land and navigable water, for commercial demand, and for shelter from wind and waves. Ports with deeper water are rare, but can handle larger, more economical ships. Since ports throughout history handled every kind of traffic, support and storage facilities vary widely, may extend for miles, and dominate the local economy. Some ports have an important military role.

3.4.2.1 Type of Port

I. A fishing port is a port or harbor for landing and distributing fish. It may be a recreational facility, but it is usually commercial. A fishing port is the only port that depends on an ocean product, and depletion of fish may cause a fishing port to be uneconomical. In recent decades, regulations to save fishing stock may limit the use of a fishing port, perhaps effectively closing it.

II. A "dry port" is a term sometimes used to describe a yard used to place containers or conventional bulk cargo, usually connected to a seaport by rail or road.

III. A warm water port is one where the water does not freeze in wintertime. Because they are available year-round, warm water ports can be of great geopolitical or economic interest.

IV. A seaport is further categorized as a "cruise port" or a "cargo port".

V. Additionally, "cruise ports" are also known as a "home port" or a "port of call". The "cargo port" is also further categorized into a "bulk" or "break bulk port" or as a "container port".

VI. A cruise homeport is the port where cruise-ship passengers board (or embark) to start their cruise and disembark the cruise ship at the end of their cruise. It is also where the cruise ship's supplies are loaded for the cruise, which includes everything from fresh water and fuel to fruits, vegetable, champagne, and any other supplies needed for the cruise. "Cruise home ports" are a very busy place during the day the cruise ship is in port, because off-going passengers debark their baggage and on-coming passengers board the ship in addition to all the supplies being loaded

VII. A port of call is an intermediate stop for a ship on its sailing route, which may include up to half a dozen ports. At these ports, a cargo ship may take on supplies or fuel, as well as unloading and loading cargo. But for a cruise ship, it is their premier stop where the cruise lines take on passengers to enjoy their vacation.

VIII. Cargo ports, on the other hand, are quite different from cruise ports, because each handles very different cargo, which has to be loaded and unloaded by very different mechanical means. The port may handle one

particular type of cargo or it may handle numerous cargoes, such as grains, liquid fuels, liquid chemicals, wood, automobiles, etc. Such ports are known as the "bulk" or "break bulk ports".

-Direct source: Wikipedia/ports

CHAPTER IV [CASE STUDY]

4.1 Introduction

The following project is a combination a bus station and a launch terminal. To understand how it works one has to study how these work individually.There are already three big bus terminal and one launch terminal exist in the larger Dhaka city. Gabtoli and Saydabad bus terminal has lot of problem even the Mohakhali bus terminal has also some problem. On the other hand Shadarghat is only launch terminal for the Dhaka city. So it has a great passenger pressure and has no proper system. But keeping in consider that all of them built in the time when the population explosion was not foreseen and proper management was not was designed.

4.2 Home Example

4.2.1 Mohakhali Bus Terminal

Mohakhali bus terminal is relatively new terminal then the Gabtoli bus stand. It serves the north and the north-east region of the Dhaka. Approximately 200 bus can stay here at once and the mohakhali bus terminal operates more than 900 buses in whole daylong and the ticket counter is more flexible then the other bus terminal. There are no luxury bus services here to serve the north people. The quality of bus is average. But the main problem is outer circulation because it is connected to the moghbazar -banani road. So at time of crossing it may cause a heavy traffic jam. Maximum ticket counter is inside the main terminal building and the administration and union office is the second floor of the building. There are also waiting room and dressing room inside the building. Passenger car parking facilities is very poor but near the bus terminal there is an inter-city bus stand.

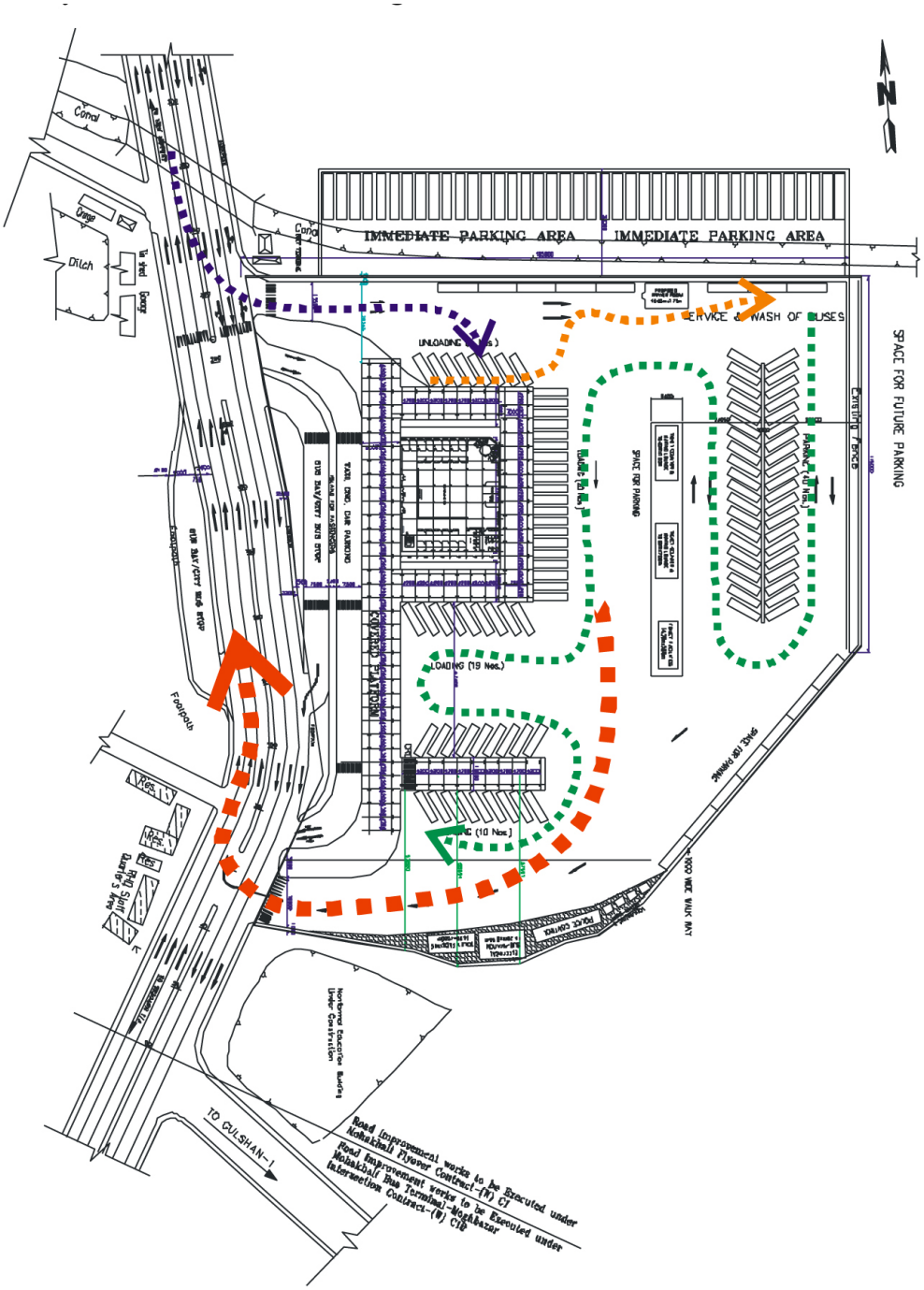


Figure: 4.1 Circulation of bus in the Mohakhali Bus Terminal

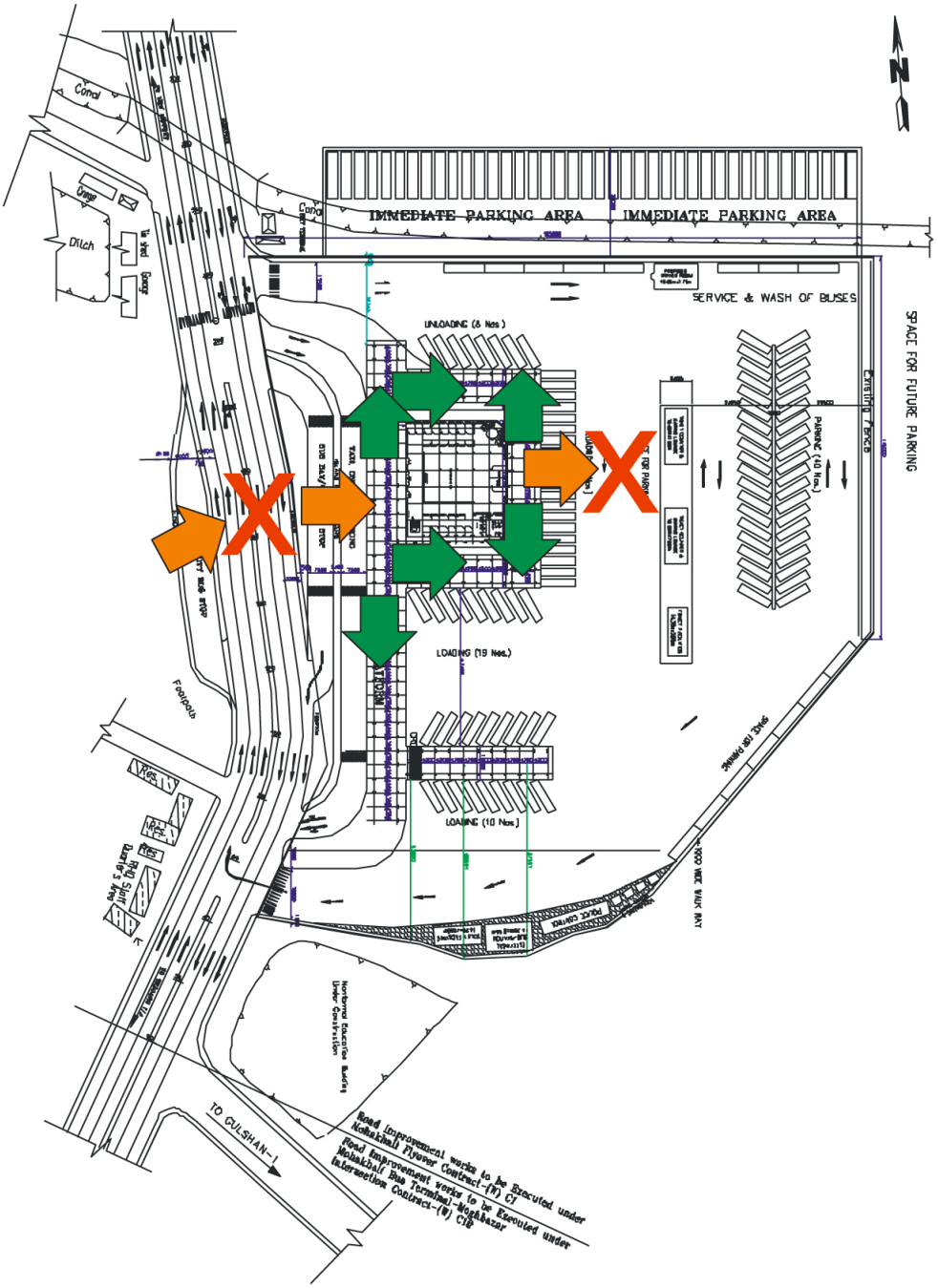


Figure 4.2 Circulation of Passenger in Mohakhali Bus Terminal

4.2.2 Sadarghat Launch Terminal

Sadarghat Launch Terminal is a large "ghat" in Dhaka. Located on the banks of the Buriganga, River, it is also referred to as Sadarghat Port. It stands a little left in front of the Ahsan Manzil. One of the largest river ports in the world, it is the main port and dock of Dhaka. It was built as a place for landing boats, launches and even ships coming to Dhaka.

According to officials at the terminal, an average of 30,000 people use the terminal for departure and arrival every day, each paying Tk 2.50 for entrance. About 200 large and small passenger launches depart and arrive at the terminal every day.

Landside communications consist of road constricted by commercial activities related to market stalls, materials in ramsit, etc. There is no public transit to terminal area. Nearest city bus service is located at Victoria Park, nearly 0.5km away. The railway station is about 4km away. The Dhaka airport is distance of about 25km.

The majority of passengers using the terminal the predominant method of land transportation is cycle rickshaw while auto rickshaws (cng), tempos & some horse drawn carts are used. Many passengers also arrive on foot.

There is a very small (700 sq.m.) parking area at the terminal complex but no other off-street parking in the immediate vicinity.

On the waterside a significant number of passengers arrive by crossing the river in small country boats. Fright arriving or living on cargo vessels in larger lots is unloaded separately from the passenger embarkation areas and transferred onwards by land & water. Freight transferred in small quantities is mainly head-carried on or off the vessels by means of the passenger gangways.

The prime public transit system from the new passenger terminal for destinations in Dhaka is expected to be the river itself through circular waterways.

The Dhaka Narayanganj railway passes about 800m to the east of the proposed terminal site .at present railway station at Gandaria, at about 3 km, and Fotullah, at 2km distance. There is future potential for a rail spur close to the terminal, so that a rail shuttle train could run from the terminal through important areas of Dhaka & so to the Zia international airport.

The 3 long distance bus terminals in the greater Dhaka area are termini for routes to destination remote from Dhaka & each terminal serves destinations in certain general directions. This site is relatively close to the mutual terminal near Dhaka Demra road serving the east & south-east of Bangladesh. The other two terminals Tongi & Gabtoli, is considerable distance north of the site. Urban bus services could be readjusted to the demands of a new passenger terminal at the site.

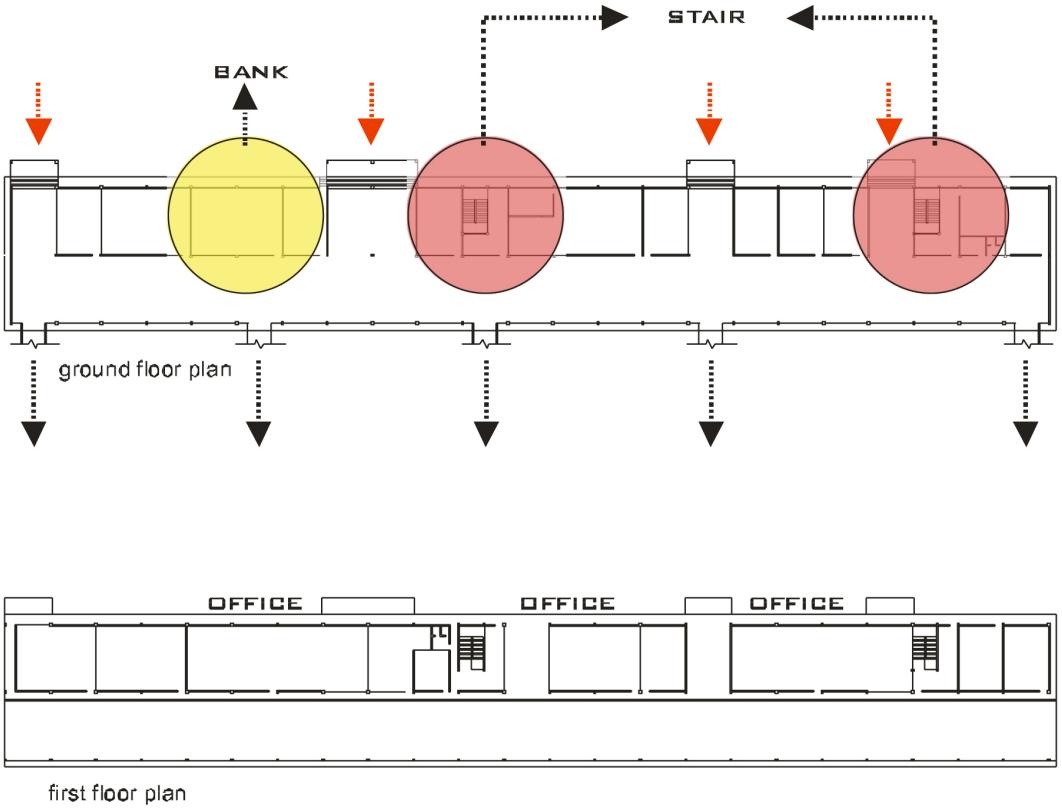


Figure 4.3 Plans of Sadarghat Launch Terminal [building]

The terminal building approx. 180m (590ft.) Long, connected to a long floating landing stage by series of steel gangways. The floating landing stage consists of a series of steel pontoons connected end to end &kept in position by bridle rings around vertical steel piles located behind the pontoons. This Arrangement of the landing stage is move-up and down with the tidal and seasonal water level changes. The main landing stage is 300m long (12 pontoons) & is served by six gangways.

The main passenger terminal building is two storey reinforced concrete and masonry Structure. The main floor includes two entries with ticket windows, waiting and prayer rooms, restaurant, police post, bank and post office. General circulation hall has full length of the building with outlets of six gangways leading to the stage. There are offices on both the lower and upper floors for the administrative purposes of BIWTA.

4.3 Overseas Example

4.3.1 STATION 20

Location: New Metro Station 20 on Metro Line 1 in Sofia, Bulgaria Competition 2011
Size GFA: 2,430 sqm

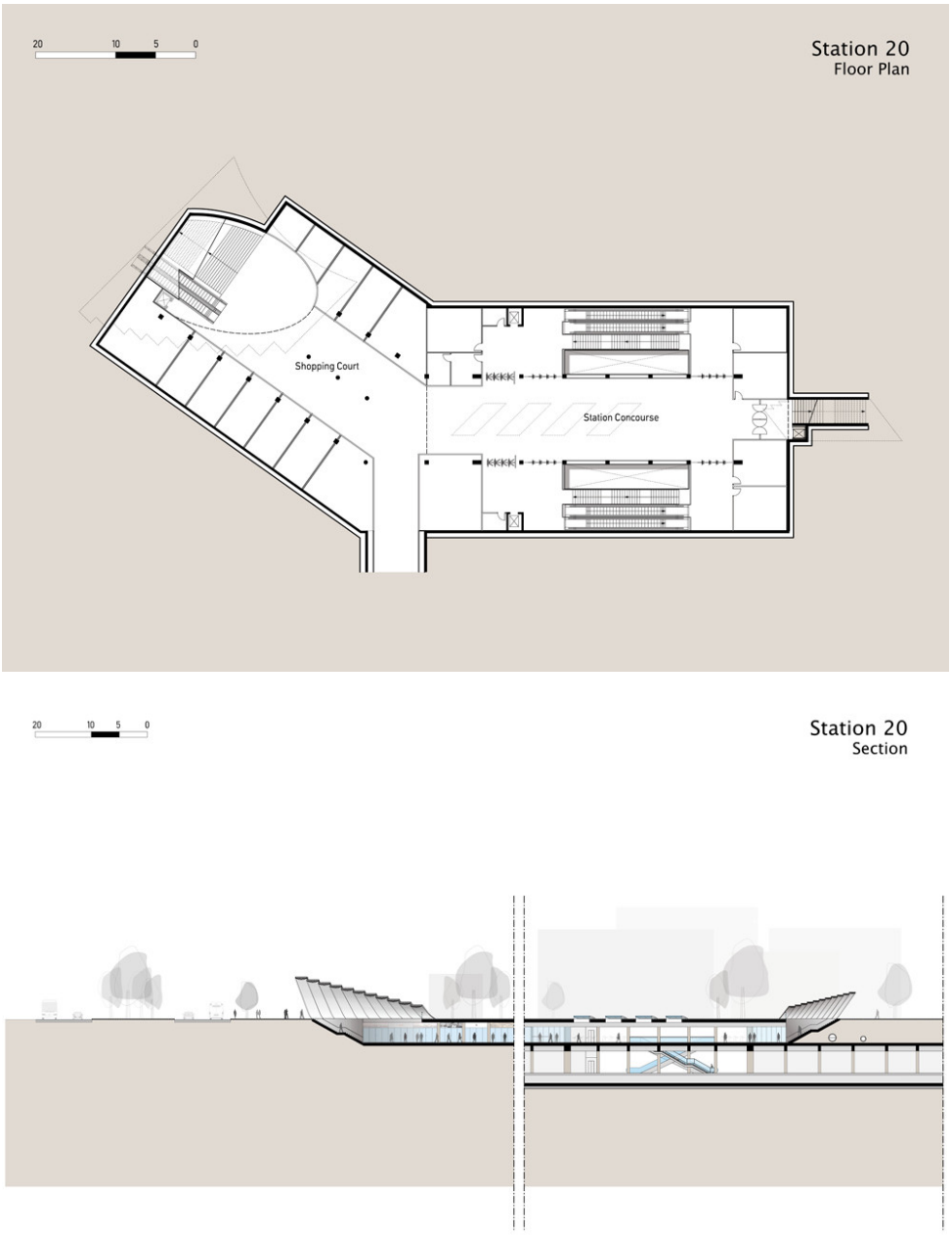
Acting as a primary metro connection between Sofia's city center and the airport, and the hub of a major commercial redevelopment plan, the design of Station 20 site seeks to establish clear pathways, form active connections and harmonies architecture and landscape.

Site

The sites linear structure is inspired by the pattern and scale of the neighboring high-density housing blocks of the Druzhba residential quarter. The angular direction of the landscape reflects the natural structure of the site boundary, generating a visual language that informs the division of public spaces and creates pathways, guiding pedestrian flow to and from the station.

Architecture

Main entry to Station 20's underground concourse level is accessed via a vast corner plaza, providing a public space for circulation between the station services and the existing bus service infrastructure. The sweeping canopy of the entrance hall emerges out of the landscape as a wave, simultaneously pulling the structure up as it pushes the plaza down into the ground to meet with the level of the concourse. Finely cast steel elements with a non-flammable canvas lining stretched underneath, create an elegant structure and a glowing interior, achieved through concealed and



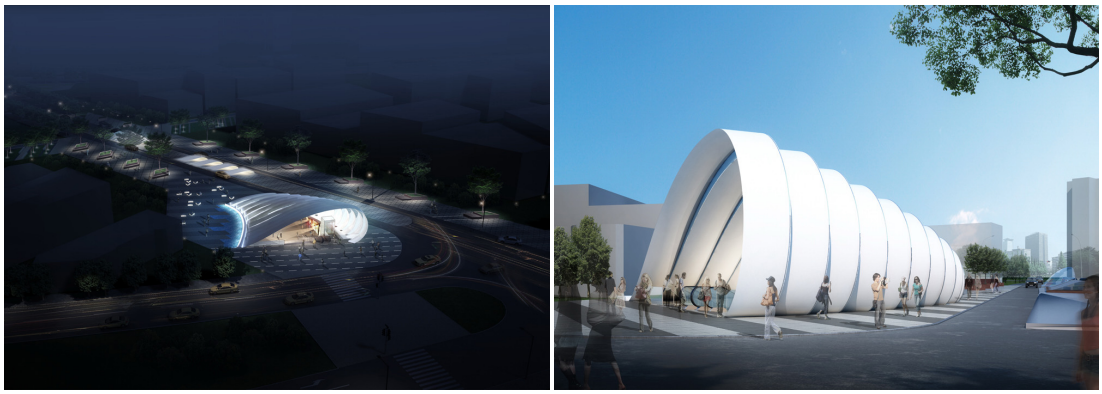


Figure 4.4 Drawing and photograph of station 20 [source: plusmood.com]

4.3.2 Newport Station / Grimshaw
Location: Newport, Wales, England.

Grimshaw, in association with Atkins, are redesigning Newport Station as part of a citywide regeneration masterplan by Newport Unlimited. As Newport is the first city reached by passengers between England and Cardiff, the station is a highly visible structure. Network Rail were keen that the new station should provide a striking civic building that would provide a gateway opportunity not only to Newport, but to Wales herself.

Newport is bisected by the railway tracks. As a result, each half of the city has developed its own character. Grimshaw's design embraces this divide, creating two major new concourses. The North Concourse will be on the civic side of the city and focus on the needs of commuters. The South Concourse, on the commercial side, will be for connecting travellers, daytrippers and tourists. Each terminal's function is reflected in the distribution of ancillary facilities around the station.

Ticket facilities and platform access are split equally between the two terminals. All the main facilities at both terminals are housed in continuous ETFE and aluminium clad spirals. The spiral form of the station mirrors the journey taken within and helps to ease traffic flow by guiding the passenger from ground level up to the connecting bridge and back down onto the platforms. The use of an ETFE wrap over a steel structure not only creates a very bright and airy space but also, due to the lightness of the material, means the building requires a minimal support structure. This brightness of space is compounded by the inclusion of an oculus at the peak of each building, which doubles as a compression ring to secure the structure.

The old station had a single terminal at the end of elongated platforms and many passengers entering and exiting trains are faced with a long walk to and from the concourse. There was also very little provision for disabled access across the tracks. Therefore, the terminals and their connecting bridge have been positioned relative to the trains stopping positions, easing access and offering stronger connections to the city. Pedestrian routes surrounding the station are also being upgraded.

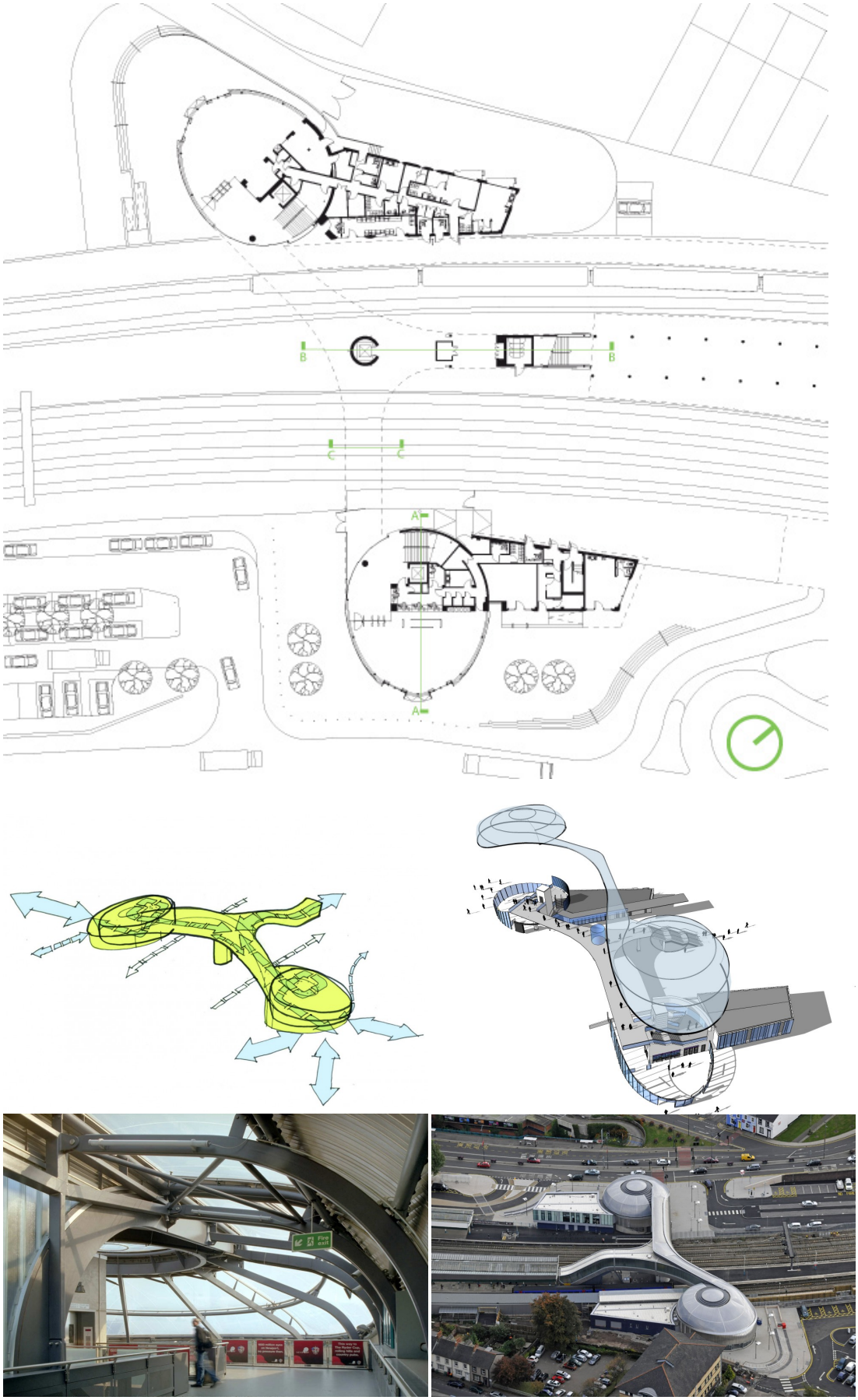


Figure 4.4 Newport Station, England [source: plusmood.com]

CHAPTER V

5.1 Introduction

Multimodal terminal has a complex function. Two different type of terminal has to be accommodated into one site. Each terminal has its own requirement and it has its own demand. For example, launch terminal has a big freight and loading unloading area, which are totally different characteristics from the bus terminal. The terminal has to have a big common lobby, because a huge number of people will be gathered here. Another consideration is for bus terminal, every day a large number of buses will be leave the terminal and reach the terminal. So program development is a crucial thing for a multimodal terminal.

5.2 Traffic Considerations

A Multi modal terminal will generate considerable vehicular and bus traffic on daily basis. Existing bus activity at the present North Terminal will be relocated to the MMT facility and transfer operations will become what increased due to expanded transit service. A detailed traffic impact study at intersection level of detail will be an integral part of a later phase of this project.

5.2.1 Intercity bus service considered in this proposal

Destination	Service	Frequency	Sit	Bus/Hour
Mymensing				
1	Shoukhin	20min	42	3
2	United	25min	40	2.4
3	Nirapad	20min	40	3
4	Duranta	20min	40	3
TANGAIL				
1	Jhotika	15min	52	4
2	Binimoy	20min	50	3
3	Dhaleshwari	20min	45	4
4	Nagarpur Exp	15min	45	2.4
5	High Choice	20min	48	3
Jamalpur				
1	Mukti	25	40	2.4
2	Mahanagar	20	40	3
3	Sharishabari Exp.	20	30	3

Source: Terminal Union Office,
Mhakhali Bus Terminal

5.2.2 Typical Water vehicle considered running in the river Turag

Name	Length	Width
O.T. Satkania	118'	17'
M.V. Chhoya	124'	21'
M.V. Garehera	64'	18'
M.V. Prince Awlad	118'	28'
M.V. Vella	77'	21'
M.V. Speed	87'	22'
M.V. Sadlil	80'	18'

Source: Sadarghat launch terminal

5.3 Program development

A terminal comprises of many different functions to serve the public mass. Many of these programs stand together forming a complex situation to simplify the vehicular and public situation, circulation and any other interrelation between them.

5.3.1 Ticket counter

Ticket counter is very important part of a multi modal terminal. Because a huge number of people will leave and coming to the city. First of all the position of the ticket counter should be in a very appropriate location. Then people can easily see the counter and get the ticket easily. The number of the both bus and launch terminal ticket counter is determine by the number of people passing by the terminal. We can also determine the population by the route of buses and launches and their number. There are already existing three big bus terminals and one major launch terminal, so it can also help us to determine the passenger limits and the number of the ticket counter. And we can use minimum 25 ticket counter for the inter district bus terminal and 5 for the launch terminal and two for the water taxi. Already we have 30 intercity bus service which will touches the terminal so we have to accommodate 30 ticket counter for the inter city bus service.

5.3.2 Parking area for the passenger

A huge number of parking is required for the passenger. The people who will leave the Dhaka by bus or launch, they must have a large baggage and the internal traffic system is not improved so some time thy have a need to wait here. Same thing happened for the people who will reach the Dhaka. Taxi and C.N.G station is also required into the program.

5.3.3 Passenger concourse

There will be arranging a large space for the passenger concourse. Approx. There is 1, 00,000 people will be over here in everyday. So the passenger concourse is protected from weather overhead canopy. And the area should be uninterrupted and we have to make sure the arrival passenger and the departure passenger cannot mix up into the concourse area. The concourse area of the launch should be bigger then the bus, Capacity of the launch is much bigger then the capacity of the bus.

5.3.4 Toilets

Large number of toilets is required for the terminal. The placement of the terminal should be strategic. It should be well located and convenient to the waiting room. Separate toilets for men and women are to be provided. Women lounge should be large enough for a coach, verity chairs. Number of the fixers depends on the size of the terminal. Though the multimodal terminal is a large terminal so it should have two or clustered toilet section for convenient for the passenger.

5.3.5 Freight

Tongi is very strategic location. It is the northern end of the Dhaka city so every day huge number of cargo will reach the terminal to serve the Dhaka. Vegetables, sands, and many other goods are coming from cargo. Basically the cargo facilities only for the launch terminal and it should have huge storage device. Loading and unloading area is also very important. Large number of trucks and lorry should have parking facilities.

5.3.6 Restaurant

Multimodal terminal should have a centre restaurant and some small food court. It should have some shops including food shops. The centre food court or restaurant should have a 300 to 400 seating capacity and it should have a launch and dinner facilities. Location of the restaurant is also very important and convenient. It should have a big kitchen area and kitchen should have a big storage, cooking area and a pantry and wash area. The employ of the restaurant should have a accommodation.

5.4 Space program for Multimodal Terminal At Tongi

5.4.1 River Port

Public Area

Information booth	200	sft
Tickets counter	800	sft
Passenger lounge	10000	sft
Concourse for passengers	4000	sft
Baggage Carousal	500	sft

Cafeteria		1000	sft
Washroom		400	sft
Admin office			
General section		200	sft
Port office room		200	sft
Duty officer		400	sft
Security room		200	sft
Control room [signal and radio]		400	sft
Marine Engineers room		500	sft
Draftsman and typist		200	sft
Washroom		400	sft
Parking area			
Cars		4000	sft
	NET	**23400**	**sft**

5.4.2 Bus Station

Public Area			
Information booth		200	sft
Tickets counter		800	sft
Passenger lounge		10000	sft
Concourse for bus		30000	sft
Concourse for passengers		4000	sft
Baggage Carousal		500	sft
Cafeteria		1000	sft
Washroom		400	sft
Admin office			
Admin office		300	sft

Supervisors room	200	sft	
Security room	200	sft	
Control room [signal and radio]	400	sft	
Washroom	400	sft	

Parking area

For bus	24000	sft	
Other Vehicle	4000	sft	
Workshop and Servicing	2000	sft	
NET	**78400**	**sft**	

5.4.3 Other Facilities

Medical centre	1200	sft	
Prayer space	2500	sft	
Post office, ATM booth, Souvenir shop	1500	sft	
Resting Quarter [20 compartments]	3000	sft	
NET Total	**110000**		**sft**

5.5 Conclusion

The pregame is prepared by following the standards. The final area design though differs a little according to design decisions and requirement as it developed bit by bit.

Chapter VI

6.1 Introduction

After analyzing the program the decision was made to provide large open space for the public circulation, because about a hundred thousands people would use the terminal every day and there are two different type of transportation system under a roof. But the passenger category and the overall characteristics are totally different from the each other. So it was a great challenge to create a common circulation lobby for different flow of passenger as well as creating connections between them and there are two other functions, which are water transport and inter city bus connection with the main terminal building. Freight area should be secured, so it should have another entry but the fright must have the connection with the terminal building. And it was another great concern to create an easy bus communication for the inter city transportation and the passenger can find the bus counter easily. It was intentional to influence the people to use the rapid bus transportation system as a part of the mass transportation system.

6.2 Design Development

When the design process was started my first and foremost goal was to find an easy solution for solve the circulation loop. Though the look and the geometry of the master plan was another major concern. Terminal building should be open naturally ventilated. Therefore considering our climate, the design has to be friendly to its users. The idea was to gain less heat during summer and warmer in winter, cross breeze ventilation form south to north and naturally illuminated in each and every corner.

6.2.1 Phase 1

At the first phase after study and analysis we were asked to make and schematic on the site. The schematic was only based on required square feet area regardless of the individuality of projects and idea or concept. This exercise was done to understand the ratio of selected site and the requirement of build area.

Figure 6.1.1 Schematic at ground level

Figure 6.1.2 Schematic at upper level

6.2.2 Phase 2

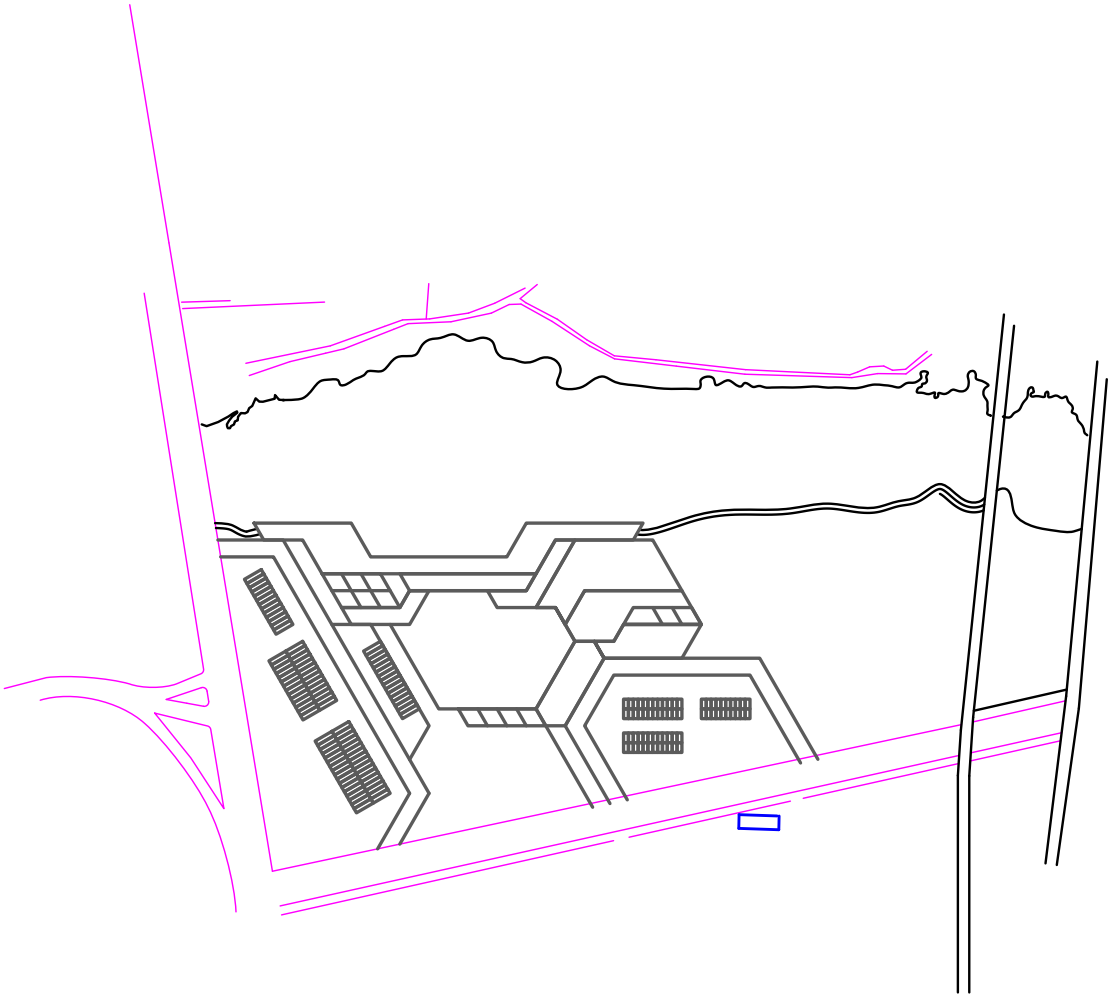


Figure 6.2 schematic plan at ground level

This phase is basically the same as phase 1. But this time we tried to marge with idea and geometry. According to this layout, passenger circulation is from southwest side. The bus circulation is from southeast to northeast. And obviously the water vehicle runs in the river from east to west.

6.2.3 Phase 3

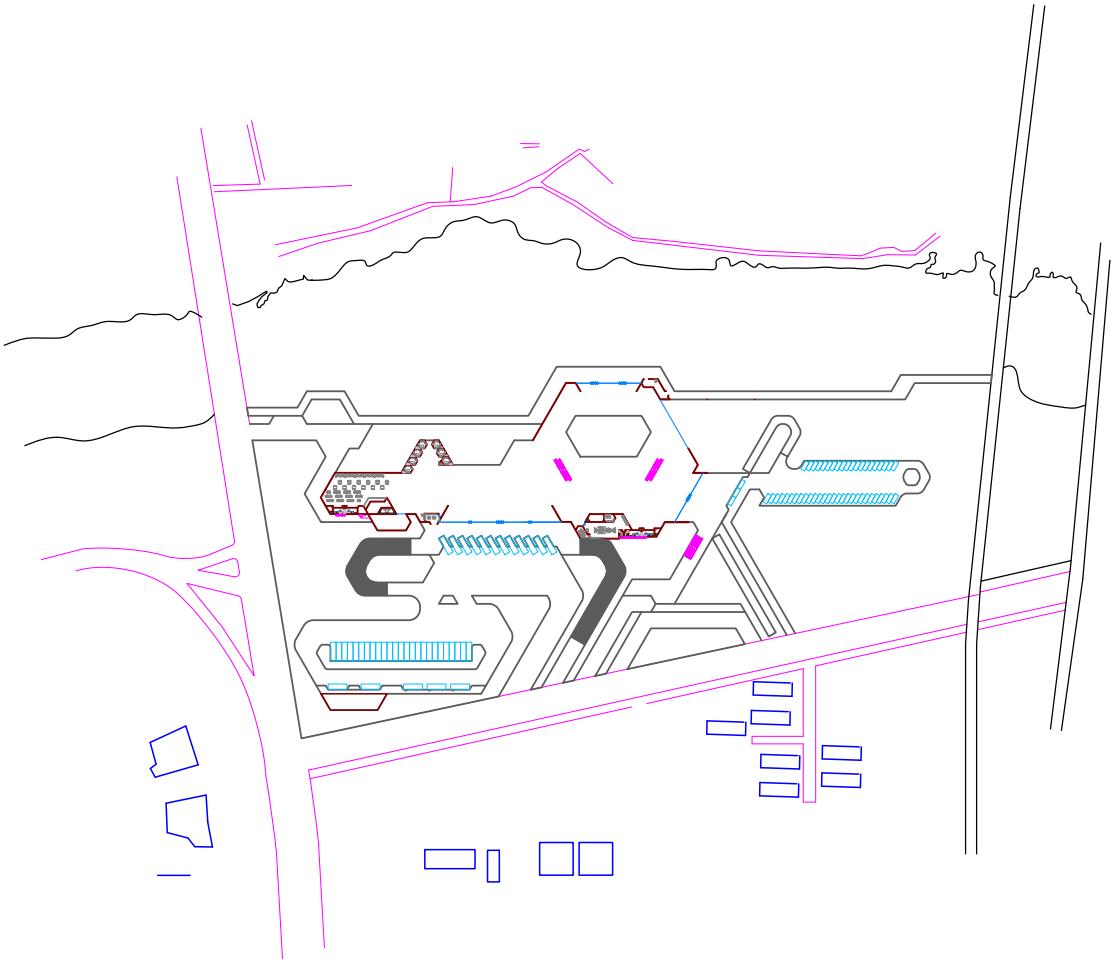


Figure 6.3 Plan developments [ground floor]

On the base of schematic, this plan was developed. Here the river service remained the same but inter city bus service was relocated from direct connection from the highway. As it was not a last end destination, the parking for bus was reduced. Along with that, city service bus was introduced in the passenger entry level. Rest of site was dedicated to landscaping.

6.2.4 Final phase

The third phase had some major issues with the circulation system that was designed. Rather then contributing to ease the traffic mass, it added more pressure on the node and the whole traffic system. The design had to be sorted out radically to keep the ideas intact but eradicate the newly arising problems.

Figure 6.4: Grand floor plan

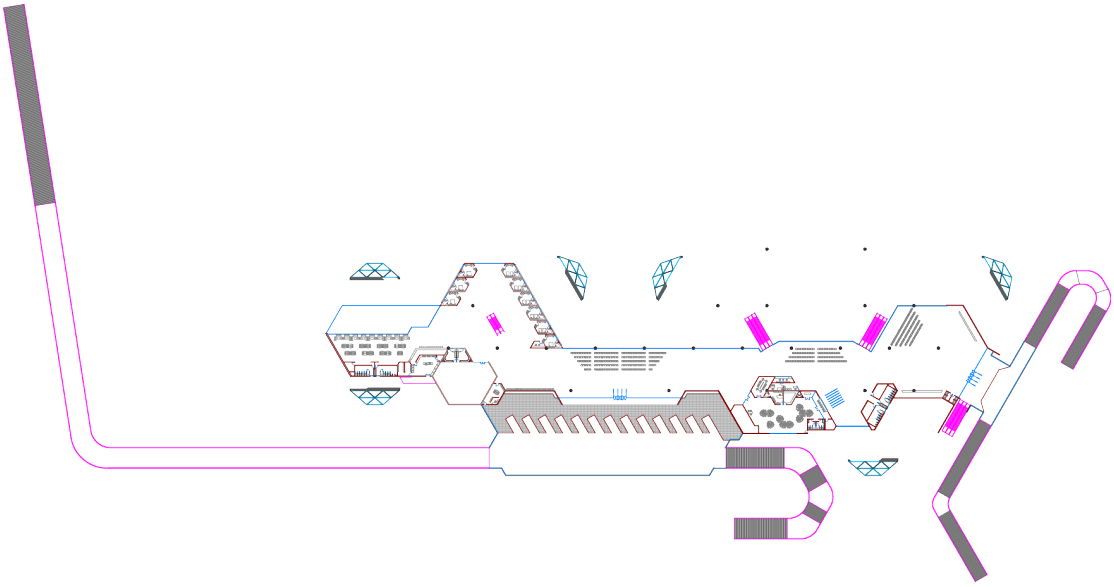


Figure 6.5: First Floor Plan

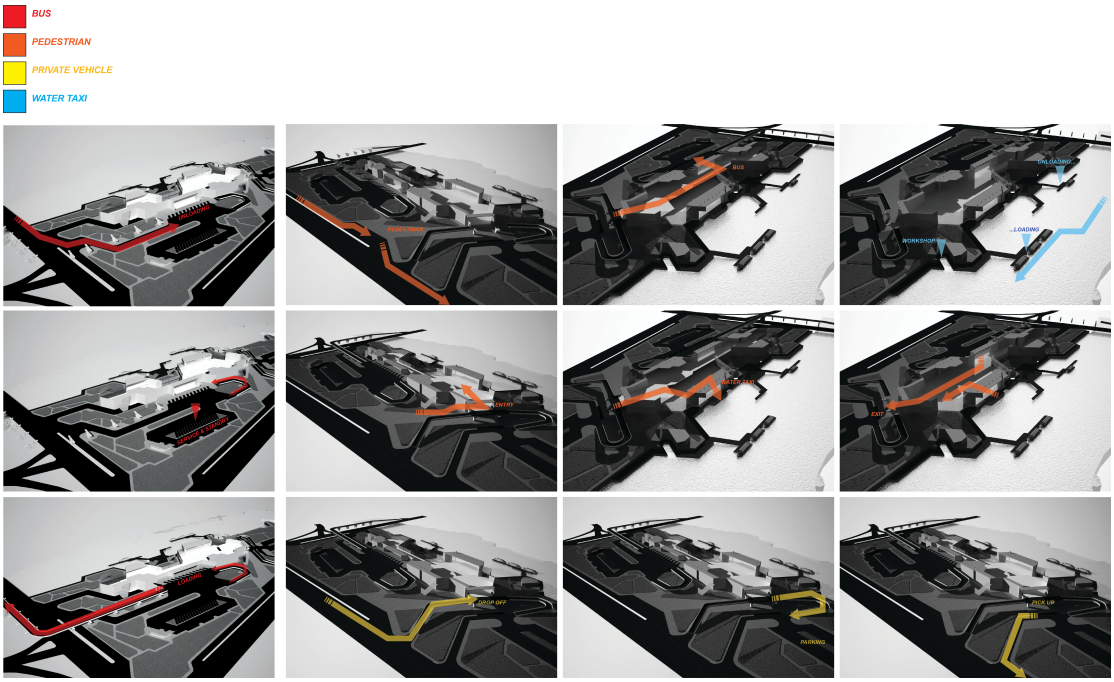


Figure 6.6: Mass Circulation in the project

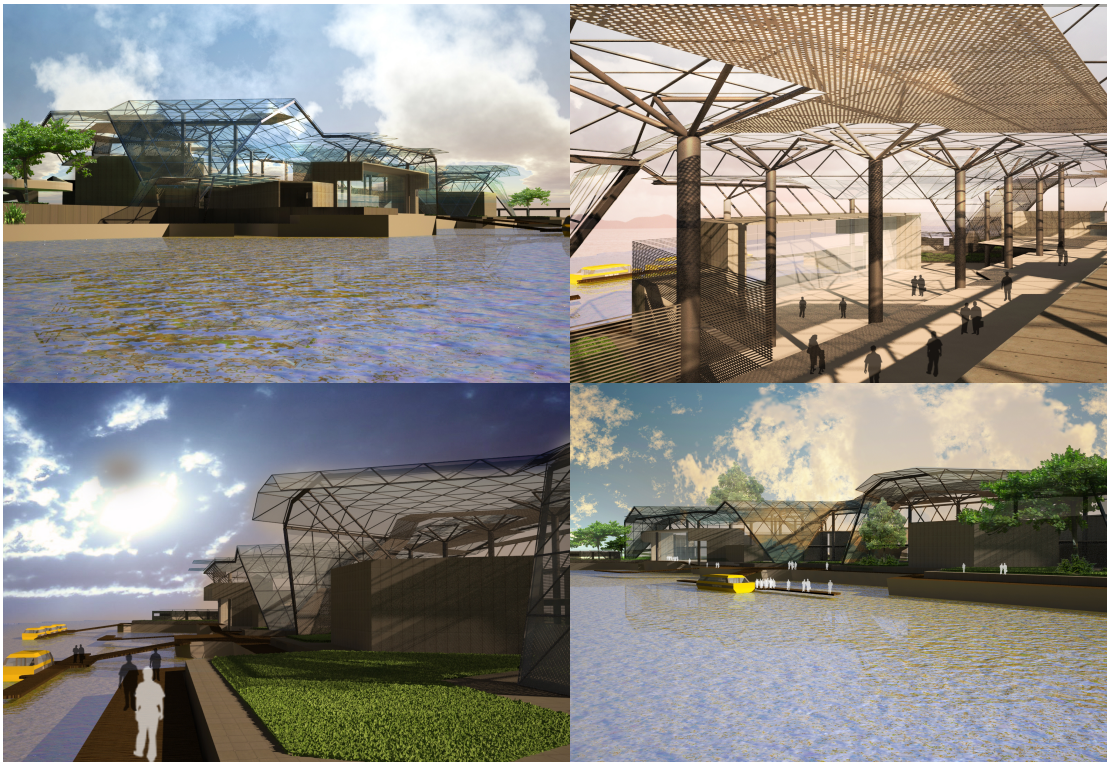


Figure 6.7: 3d Render view

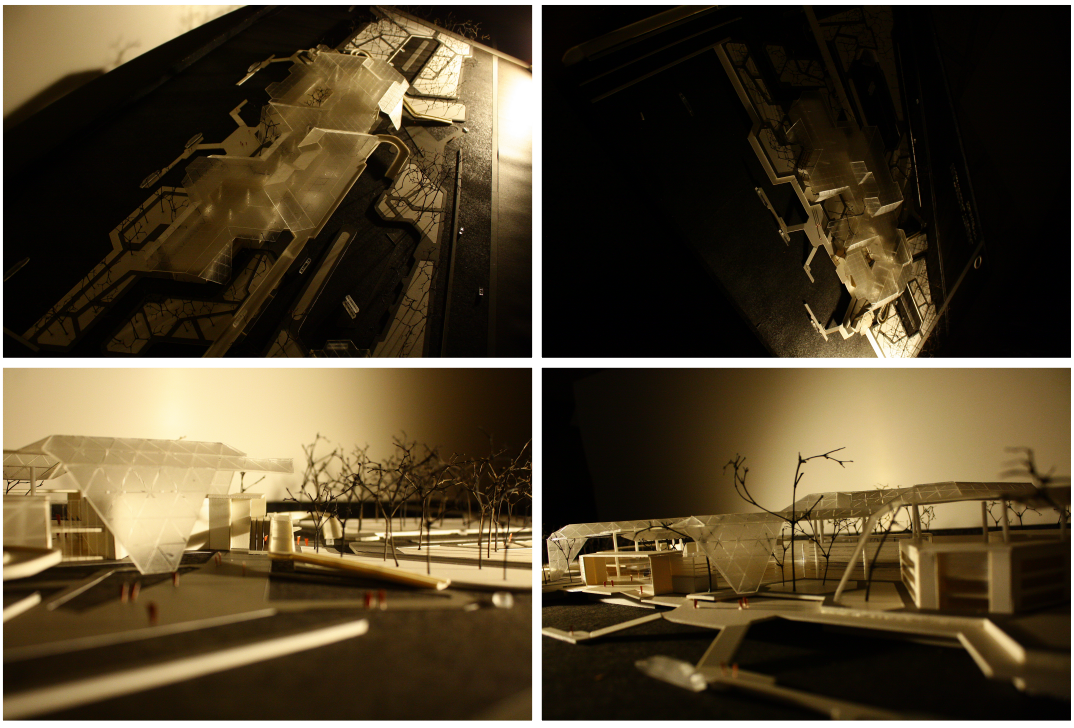


Figure 6.8: Model Photograph

6.3 Conclusion:

Designing a terminal is very lengthy process. One may have a very good understanding of terminal and vision of its appearance. But it still requires many trail and error approach to design it. With proper guidance, technical support and up to date knowledge, one can come up with the best possible solutions. And in that process one cannot forget to think about sustainability, safety and economic issues that the project can impact on the existing site.

References:

1. Md. Musa Ahmed, student of "Bangladesh University of engineering and technology", Thesis paper-2004.
2. Kafi Newaz Khan, Student of BRAC University, Thesis Paper 2008.
3. Transystem Inc. website [Accessed on: jan31, 2012: 22:32] URL: http://www.transystems.com/Home/Markets/Transit-and-Passenger-Rail/Multimodal-Terminals.aspx
4. Google Inc. website [Accessed: multiple times]
5. Google Image search [Accessed: Multi]
6. Wikipedia.com/terminal [Accessed on: jan12,2012]
7. Wikipedia.com/port [Accessed on: jan13, 2012]
8. Oxford dictionary
9. BBC Weather report [Accessed on Jan 17, 2012. 5:53]
10. Mahakhali Bus Terminal, Register office
11. Sadarghat Launch Terminal, Register Office
12. http://Plusmood.com [Accessed on Feb 02,2012]