Cox's Bazar Railway Station

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ABSTRACT

The objective of this paper is to put forward the complete design process of the Cox's Bazar Rail Station during the design studio. The Railway Station will be built by 2022 and is currently unbuilt. The proposed design of the Cox's Bazar Railway Station and the other proposed railways stations along this route are done by SMEC. The design process started with site analysis and also program analysis. The programs given by the railway authority demanded a rail station which was of international standard. The Cox's Bazar Railway Station is a project which should have been built a long time back because a place such as this demanded a mode of transport which made it easier for people to reach it.

ACKNOWLEDGEMENT

I am ever grateful to the Almighty for giving the strength to withstand all that I have gone through till now, for all the ups and downs in life which has made me the person I am today. I am thankful to my parents whose endless prayers have brought me this far. I would also like to thank my design instructors Professor Fuad H. Mallick, Dr. Iftekhar Ahmed, Abul Fazal Mahmudun Nobi for guiding me throughout my design. I am grateful to my brother Cyrus S. Khan for everything I have learned from him and everything he has done for me. Thank you Kazi Sumaiya Saifee for being for being such a good soul. I would like to thank my friends Sanjida, Salima, Akash, Rafid, Fariha, Momo, Sumaiya, Mazbah and Farah for being there by my side throughout all these years. Lastly, I am greatly thankful to Naimun, Seiam, Nusrat, Mahfuz, Amana, Suprova, Saba, Sumaiya, Faroque and Nitol for their endless support.

INTRODUCTION

Trains have been used as a mode of transport for a very long time. Trains have not only been used as mode of transportation for people, but also for transport of goods for business purposes. Ever since the invention of the steam engines during the Industrial Revolution, trains have developed more and more. Railway stations just like trains have also developed throughout time. Rail station are places, where thousands of people pass through every day. Modern day rail stations don't only cooperate railway functions, but also ancillary facilities like shopping, commercial, etc. Trains as a mode of transport started during the British period in our country. People use trains to move from one part of the country to another. Although many places are still not reachable attempts are being taken to make them reachable by train.

In our country, many attempts are being taken to improve the system of transportation by train. One of the many attempts is the construction of the double gauge rail track from Dohazari to Cox's Bazar.

Cox's Bazar sea beach is renowned as the longest stretch of uninterrupted beach in the world. As a result of it a great attraction for tourists. Many other tourist attractions are also present around the place like Ramu Pagoda, Saint Martin's Island. There are other tourist destinations like Nilgiri and Bandarban.

Chapter 1: Background of the project

Numerous attempts were taken before for the construction of the rail track and the stations. For instance, feasibility tests were conducted during the time of the British government, the Pakistani government and also by the Japan Railway Technical Service in 1971 but no further attempts were made. (Khan, 2016). Finally deals were signed in 2011 and the construction of the Cox's Bazar Rail station is expected to be finished by the year 2022. Currently, the land acquiring process is being carried out.

Cox’s Bazar Rail Station is a very important project because it will strengthen the connection along North to South Routes of Bangladesh.

1.1 Project specifications

Project brief:

Name of the project: Cox's Bazar rail Station

Client: Bangladesh Railways

Location: Hazipara, Cox's Bazar, Chittagong

Site area: 12 Arce

1.2 Aims and objectives of the project

- To design a rail station this is of an international standard.
- To allow easy transition of passengers at the shortest time
- To accumulate other supporting functions along with the rail station

1.3 Functions and programs required for the project

- Rail station
- Shopping
- Commercial space
- Multipurpose Hall
- Hotel
- Parking facilities

1.4 Problem statement

To reach Cox's Bazar, the only mode of transport is by plane or bus or other private vehicles. Train services are also available, but only till Dohazari of Chittagong, after which one has to take a different mode of transport in order to reach Cox's Bazar.

1.5 Rationale of the project

Construction of the rail track will enable easier accessibility for people from any other parts of Bangladesh to Cox's Bazar. Along the rail track nine stations will be built which are among which cox’s Bazar rail station will be the last.

The Cox's Bazar rail station will allow a better communication from the rest of the country to Cox's Bazar. The total time required to travel to Cox's Bazar would be reduced. The client of the project is Bangladesh Railway. The train station will have facilities like shopping, restrooms, convention halls, etc. turning into an architecture which is thought to merge with the expected future commercial and other developments in the surrounding the area.

The construction of the rail track from Dohazari to Cox's Bazar will later help for another direct connection from Moheskhali deep-sea port and also have another connection with Myanmar. The train station will open up many doors which might come with an advantage for people both in Cox's Bazar and people coming there and also for business sectors.

Fig 1.5.1: Time taken to travel from Dhaka

Chapter 2: Literature Review:

“Railway stations of the nineteenth century have been long called the cathedrals of the Industrial Revolution.” (Wood, 2001)

Every day thousands of people travel across the country by trains. train stations are buildings which become a landmark of a certain place. Trains move from one place to another and stop at designated train stations.

Throughout time people have always tried to make communication and transportation better and faster. Cars, planes, and trains are a result of it. Trains are a mode of mass transport system. People can travel long distance within a short period of time and also within affordable range. With time trains have become faster and as more time is passing trains are becoming even more developed. Train stations are public buildings where trains pick up or drop off passengers and goods.

A train station depending on its size is a place with a lot of hustle and bustle. In our country train stations are filled up with lots of people moving in every direction, with some hurrying to find their designated train compartment and some leaving after getting off the train. The sound if the arriving train blaring out from far away, A red light announcing its arrival to the train station soon. people waiting anxiously for the train and then there are hawkers and beggars going about in every direction. There are also shops and bookstores with buyers who are the passengers or their friends or family the train arrives, people get off and on the train. the train waits for its passengers to fill up the seats and then takes off. Friends and families of some passengers say their goodbyes through the windows and finally, the train starts its journey leaving the platform and away it goes toward its destination.

The basic idea function of a rail station is it allows its users to easily load off and on the train to and from their desired destination with an allocated platform for where the train stops. A train station also gives its users shelter during the time they are there. In a train station people also buy train tickets from a ticket counter. The main idea behind a train station is that is allows a transition between the people coming here and leaving the station. There are also many other functions in a rail station like offices for the people who work in the station, rail police, etc.

“Some (train stations) celebrate the technological potential of high-speed rail; others have the ambitious goal of serving as catalysts for urban renewal.” (Wood, 2001)

There are many types of rail stations varying with their use and size. Train station can be built in different places like elevated, on ground and underground. Train stations in early times were often just a shed with a platform for people and good. Modern time rail stations are often more complex with many other functions like shopping, restaurants included in them.

2.1 History of Train

Fig 2.1.1: Rutways

Image source: Watler Werner and Fivos Verdelis

Between 650 to 1st century AD the Greek and the Roman people used rutways. These were roads on which land vehicles were driven on from one place to another.

During the 1500s hunds were used inside mines for coal transportation.

James Watt built the first stationary steam engine in 1774. Ever since that trains have been developed to achieve better quality, speed and less travel time. (Railway Timeline - Important Moments in Railway History, 2018)

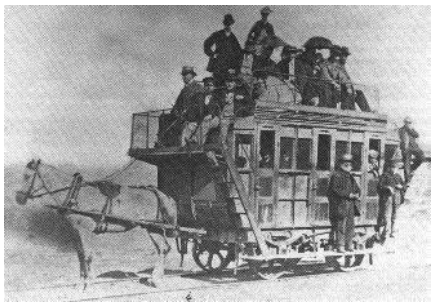


Fig 2.1.2: horse drawn railcars

During the 1800s horse drawn railcars ways were used in England. Around the same time steam locomotives were also used. (Patriciahysell, 2011)

2.2 Types of trains

Mine trains for example are the ones used inside coal mines. Trams are used in cities to travel form one place to another carrying passengers. Short and long-distance trains is used to carry passengers from one city to another or even one country to another. Rapid transit Freight train carry goods from one place to another. Inter-city trains are public transport trains used both above land and underground.

2.3 Types of rails

The types of rails found everywhere in the world are Common railway, Electrified railway, High speed rail, Maglev, Monorail.

Common railway is the type found almost anywhere in the world. Monorails are the ones on which trams drive on. High speed rails are for high speed trains like the ones in Japan for instance. (Types of Trains, Locomotives and Rails, 2018) The type of railway used in Bangladesh is common railway.

2.4 Different types of gauges

Type of gauges are differentiated by their width.

- Standard gauge
- Narrow gauge
- Meter gauge 1,000mm
- Broad gauge 1,676mm

There are three types of trains used in Bangladesh

- Inter-city trains
- Express trains
- Mail trains

The types of gauges used in Bangladesh are

- Meter gauge
- Broad gauge

2.5 History of Train station

The architecture of train stations has also evolved throughout time in different regions of the world. usually it is designed considering the context and the culture of the place it is built in.

Rail stations developed around the same time in both U.S.A and Great Britain during 1830 (Thorne, 2001). Unlike today's rail stations which have complex functions it was a very simple station.

England

Fig 2.5.1: Manchester Liverpool Road Station

Image source: English Heritage

Manchester Liverpool Road Station was first built in 1830. It was the first station in England which was for passengers. The station was just a wooden shade. (Thorne, 2001).

India

The first train started and arrived at the Bori Bunder station in 1853 which later called the Victoria Terminus and now called as Chhatrapati Shivaji Maharaj Terminus in Mumbai (Shah. 2017). The building was built during the British period and also has an architectural style of the Victorian era.

Fig 2.5.3: Bori Bunder Station

Image source retrieved from

http://memumbai.com/wp-content/uploads/2016/07/victoriaterminus-1.jpg

The first train station in India was built by the British. Today many stations can be seen India like the rail station in Delhi which is a modern architecture letting thousands of people pass through it every day.

Bangladesh

The first rail station was built during the British period in Bangladesh in Jogoti in 1862 (First Railway Station in Bangladesh | Jogoti Railway Station,2017). Later on, the Kamalapur station was built in Dhaka during the 1960s (Banglapedia, 2015). Kamalapur rail station is one of the iconic buildings of modern architecture in Bangladesh. The station has facilities hotel rooms, restaurants etc. As a piece of architecture, it is still very modern. If we consider functions, we will find that there is a lack of space for a few functions considering the present-day needs.

Fig 2.5.4: Kamalapur Rail Station

Image Source: Kishore Basak

Chapter 3: Site appraisal

3.1 SITE LOCATION AND ZONING

Name of the project: Cox's Bazar rail Station

Client: Bangladesh Railways

Location: Hazipara, Cox's Bazar, Chittagong

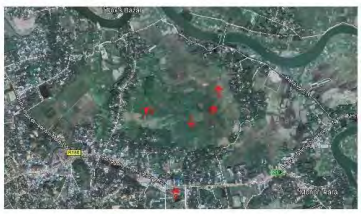
Area: 12 Arce

Cox’s Bazar District Hazipara

Fig 3.1.1: Location of site.

Source: Author, work based on images from google earth

3.2. SITE PHOTOGRAPHY



Source: Author, work based on image from google earth

Fig 3.2.1: South side image

Fig 3.2.2: East side image

Fig 3.2.3: North side image

Fig 3.2.4: West side image

Fig 3.2.5: Road side image

Image source: Author

3.3 SITE SURROUNDINGS

The site is located on a paddy field which is connected by a secondary access road from the Chittagong-Cox's Bazar highway. The Chittagong-Cox's bazar Highway is located on the south of the site. Surrounding the site on the west, east and south are trees and residences of the people who farm the paddy fields or work in the city. The place is locally known as Hazipara. These residents are mostly people who work in the restaurants, hotels, fish farms, leather factories or farmers or shopkeepers. On either side of the Chittagong-Cox's Highway bazar are shops of daily amenities, small restaurants, etc. On the north of the site there are also some residences along the banks of the Bakkhali River. There is a dam on the river and a bridge which people and small vehicles use it to cross the river. Along the river is a road called the Rabardam Road which connects the Dhaka- Chittagong Highway with the Jhinukmarket - Laboni more road which is at the edge of the town.

The Chittagong-Cox's Bazar Highway is very important route because it diverges at one point to connect with the Cox's Bazar -Teknaf Highway and The Dhaka-Chittagong highway leading the way out of Cox's Bazar. Chittagong-Cox's Bazar Highway also connects with the roads inside of Cox's Bazar town by connecting with the motel Road, Ramu road and also the Kuruskul road.

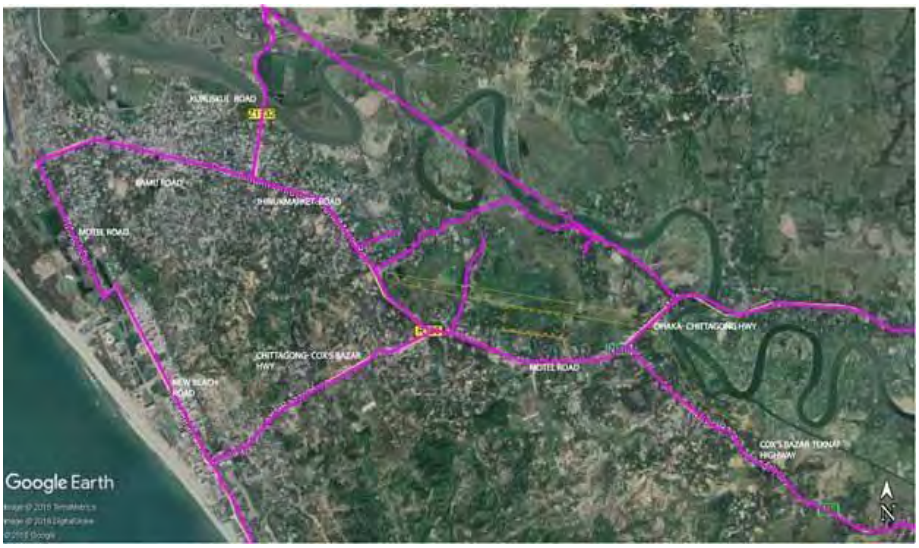


Fig 3.3.1: Site and Road network

_____ Road network

_ _ _ _ _ _ Proposed Site

_____ Proposed rail track

Source: Author, work based on images from google earth

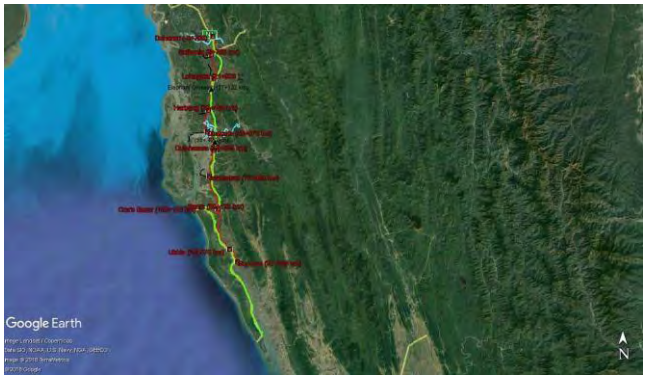


Fig 3.3.2: Proposed rail stations from Dohazari to Gundum

_____ Proposed rail track from Dohazari to Gundum

_____ Highway

Image Source: CRB Chittagong

Fig 3.3.3: Road network and proposed rail network around site

Proposed Site

_____ Proposed rail track

_____ Existing Highway

Image Source: CRB Chittagong

3.4 HISTORICAL AND SOCIAL BACKGROUND

Fig 3.4.1: SATELLITE IMAGE IN 2004

_____Proposed rail track

_ _ _ _ _ proposed Site

Fig 3.4.2: SATELLITE IMAGE IN 2011

_____Proposed rail track

_ _ _ _ _ _ **proposed Site**

Fig 3.4.3: SATELLITE IMAGE IN 2014

_____Proposed rail track

_ _ _ _ _ _ proposed Site

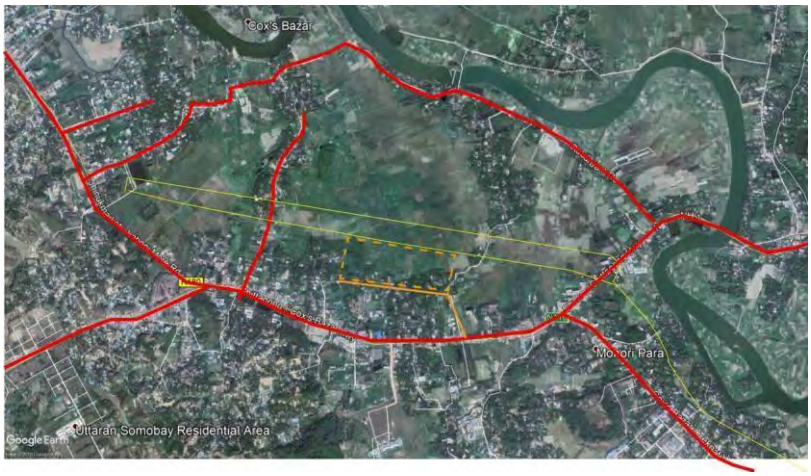


Fig 3.4.4: SATELLITE IMAGE IN 2018

_____Proposed rail track

_ _ _ _ _ _ proposed Site

Source: author, work based on images from Google Earth

According to the locals the site has always been paddy fields. Satellite images show that the size of the locality increased. Urbanization is increasing day by day. We can understand from the maps that the area will eventually reach a state which will be highly urbanized.

The site was always used for farming until the recent years. The area surrounding the site is mostly residential. Bangladesh Railways has acquired most of the land and are still acquiring.

There is also a proposed detailed area plan which shows there is a proposed CBD near the site of the rail station in the future. This will change the existing fabric of the place. According to the proposed DAP, since there will be a CBD, the place will pull a big crowd toward it. The station will hold the potential to influence the urban fabric and the people.

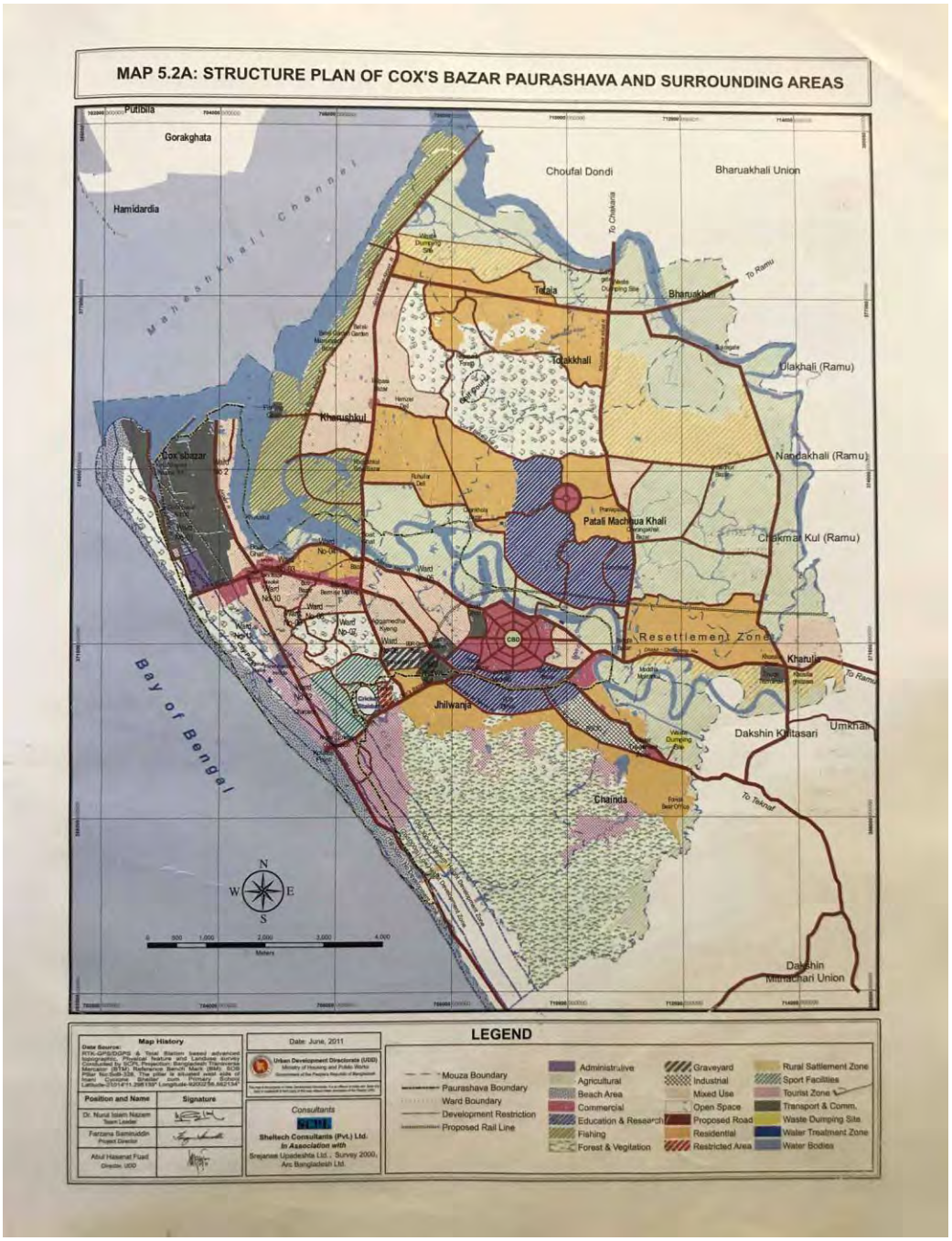


Fig 3.4.5: Detailed Area Plan (DAP)

Source: Cox's Bazar Development Authority

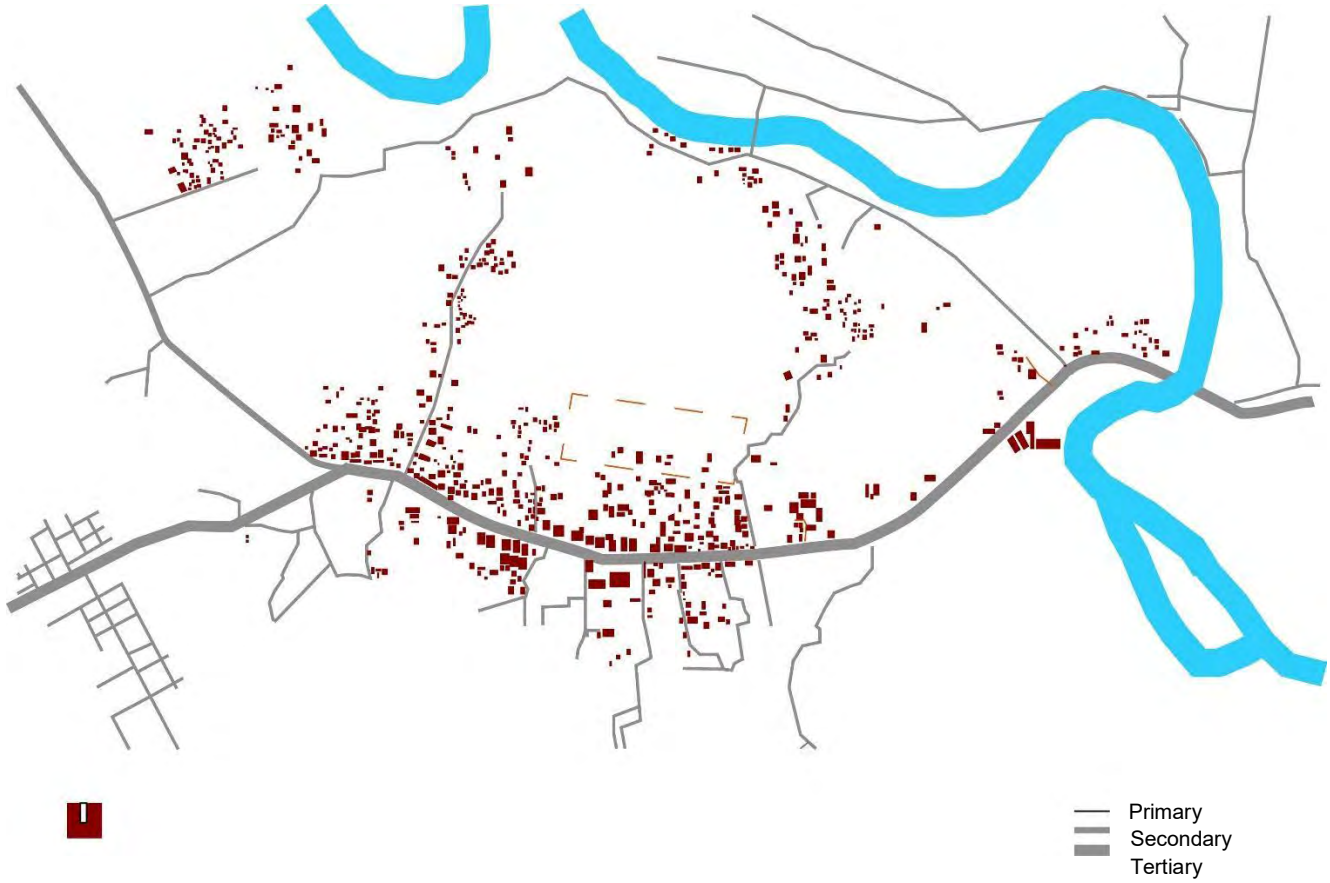


Fig 3.4.6: Mapping of road network

The site is connected to an important network of three highways: Dhaka- Chittagong, Chittagong- Cox's bazar and Cox's Bazar Teknaf Highway.

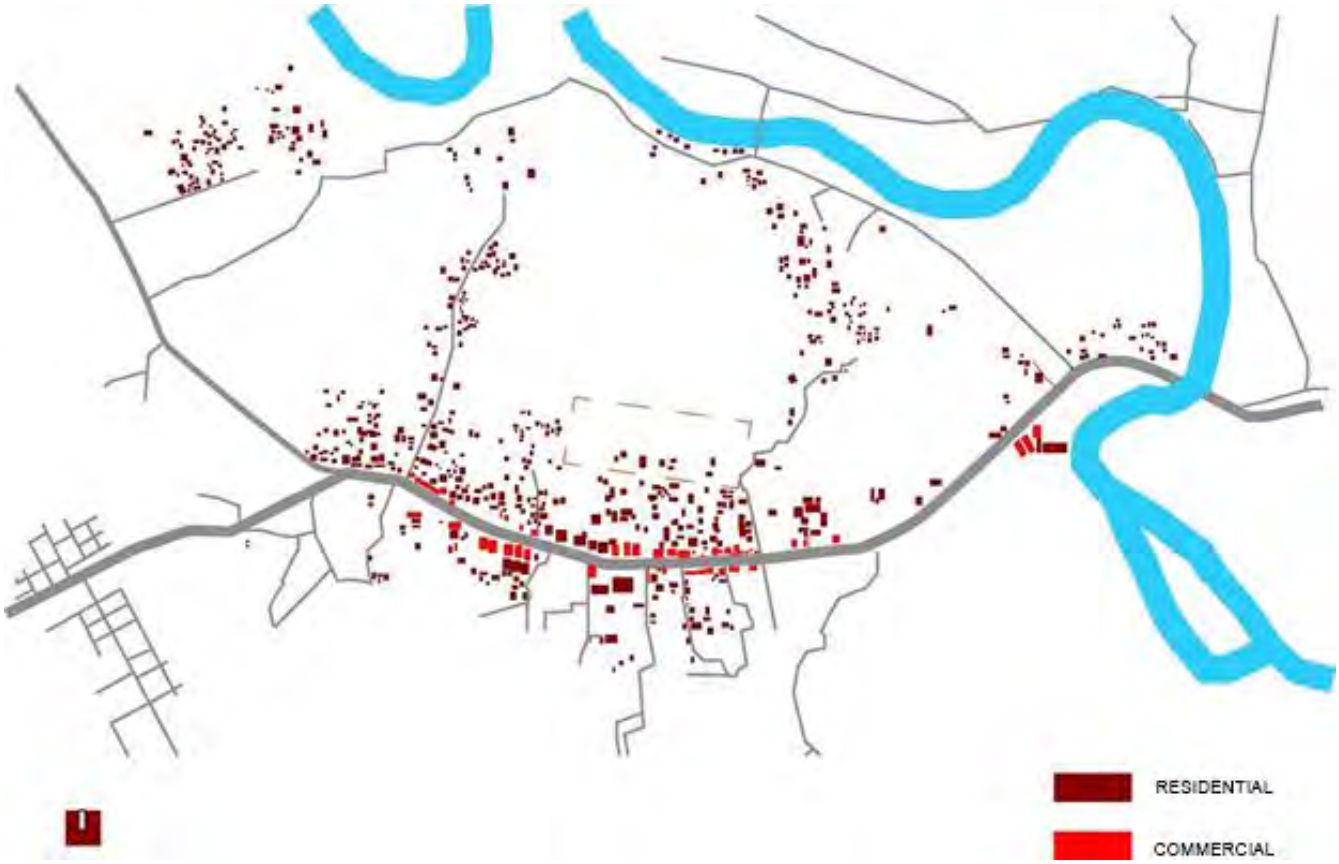


Fig 3.4.7: Mapping of building types

Mapping if building types show that the buildings around the site are mostly residential with a few commercial activities by the road sides.

3.5 SWOT ANALYSIS

Strength:

- Provide good connectivity to all sides.
- Connected to an important highway

Weakness:

- The site will undergo drastic change since the existing fabric is underdeveloped.

Opportunity:

- There is a good opportunity for increasing green space.
- Creates opportunity for better development of the place

Threat:

- Might disrupt the existing fabric

Chapter 4: Program and Program Development

The total program of the rail station is comprised of major functions which are generally part of any big modern rail station nowadays. The major functions are the station terminal, hotel, shopping mall, commercial space, restaurant, and convention hall. facilities like the shopping, hotel, restaurants will provide opportunities for both tourists and locals to enjoy.

4.1 DETAIL PROGRAM:

Functions Area (sft)

Entry hall: 7121

Railway officers block: 8349

Passenger waiting area: 10013

Parking: 11145

Shopping: 23598

Commercial space: 29740

Hotel rooms: 7590

Multipurpose hall: 5915

Function	Detail	Area (sft)
Entry hall	lobby	5446
	Shop	745
	Lift core	700
	Snacks/ utility shop	135
	Pharmacy	95
		Total 7121
Railway officers block	Ticket Counter	288
	Cash room	190
	Ticket counter	270
	Store	100
	TIT/TIC Room	160
	TT room	118
	TTE RM	300
	TC room	300
	Sanitary inspector room	225
	Public address room	290
	ASM	375
	Station Master	448

	Station manager	475
	(Attached toilet)	
	janitor	
	Female staff toilet	350
	Male staff toilet	370
	Maintenance room	225
	Battery room	225
	Signal relay and equipment room	475

	Electrical substation	290
	Store room	250
	Head TXR room (with Attached toilet)	230
	TRX room 1	132
	TRX room 2	132
	Elec. Office 1	125
	Elec. Office 2	125
	Head elec. room	260

	Platform inspector room/ bedding room	255
	Generator room	248
	RNB1	85
	RNB2	85
	RNB3	112
	Male toilet	
	Female toilet	
	Electrical room	60
	GRP police room	153
	GRP OC's office	220
	GRP strong room (for arms)	248
	Jail temporary	205
	GRP malkhana (storage)	350
	Security guard post	
		Total: 8349

Function	Detail	Area (sft)
Passenger waiting area	lobby	495
	VIP waiting area	1100
	VIP toilet	
	Luggage lockers	460
	Common passenger waiting area	3657
	Toilets (male)	1530
	Toilets (female)	1530
	1st passenger waiting area	608
	Male prayer	
	female prayer	
	Children play area	633
		Total:10013

Function	Detail	Area (sft)
Parking	Surface parking for staff	640
	Service parking	720
	Motorized vehicles	5120
	Rickshaw parking	1890
	Van parking	1890
	Motor cycle parking	885
	Bus stop	
		Total:11145

Function	Detail	Area (sft)
Shopping	Show room	9100
	Shop	8758
	Male toilet	370
	Female toilet	370
	restaurant	5000
	Food court	
		Total: 23598

Function	Detail	Area (sft)
Commercial space	office	29000
	Male toilet	370
	Female toilet	370
		Total: 29740

Function	Detail	Area (sft)
Inn	office	450
	Male toilet	370
	Female toilet	370
	rooms	6400
		Total: 7590

Function	Detail	Area (sft)
Multipurpose hall	Female toilet	370
	Male toilet	370
	hall	5175
		Total: 5915

Total built area:103471 sft

Total built area with circulation: 129338 sft

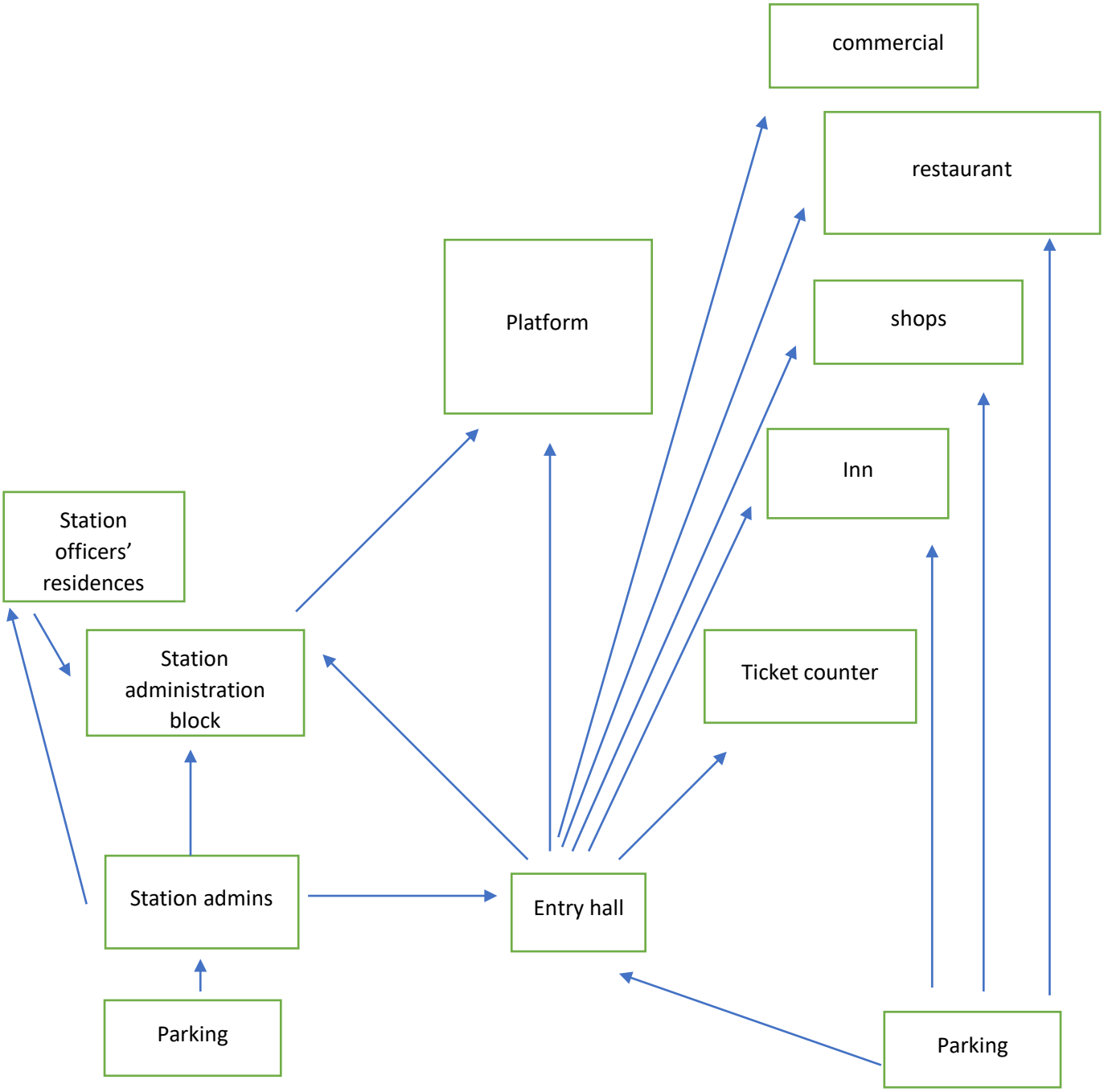


Fig 4.1.1: Functional flow diagram

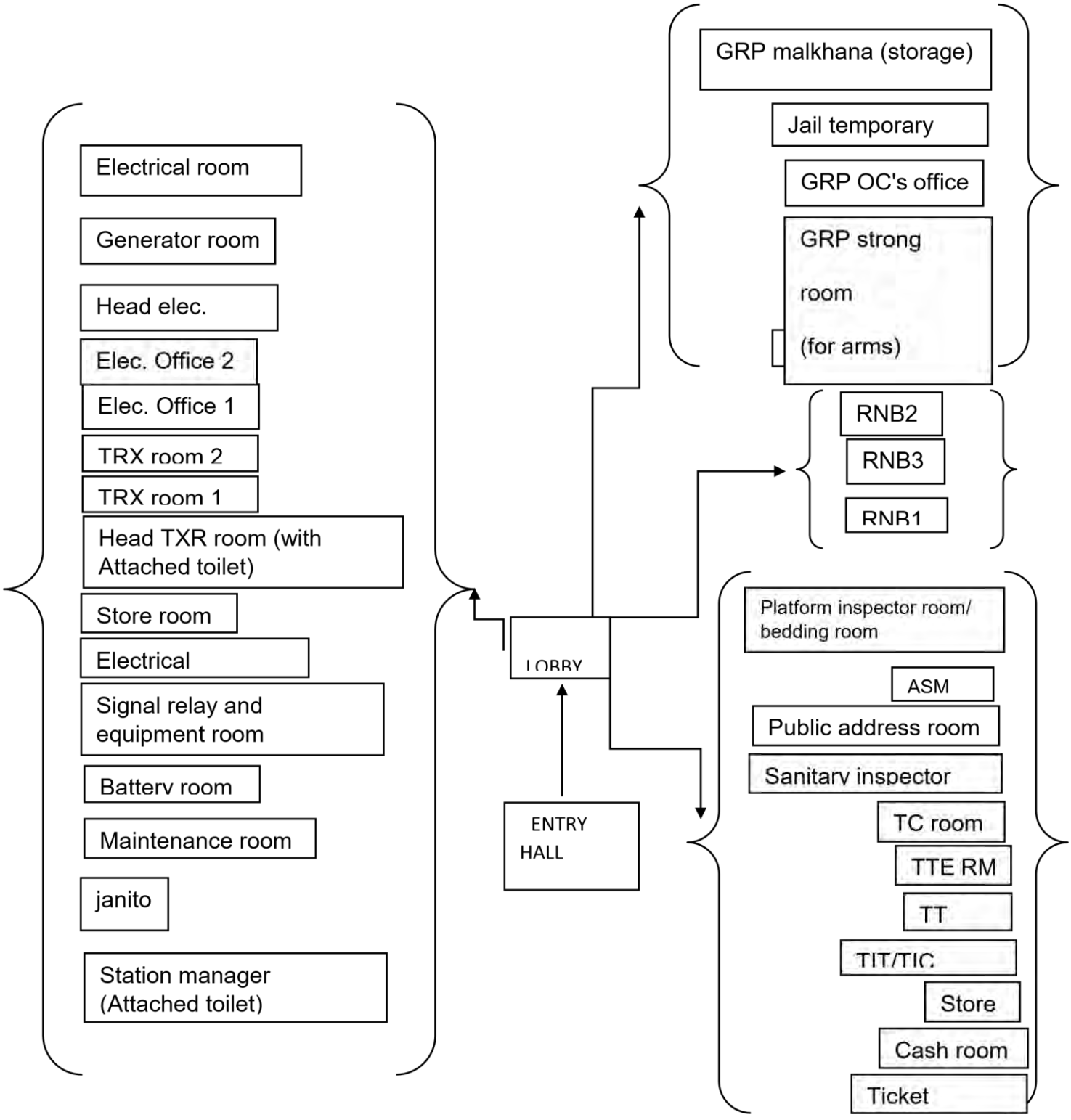


Fig 4.1.2: Programs in the officer's block Since the rail station will be around CBD it will also be convenient for everyone to avail these amenities. Facilities like shopping

and commercial spaces will create job opportunities in Cox's Bazar. Hotel facilities will be an advantage for tourists as an easy excess.

Chapter 5: Case study

5.1 Komolapur Rail Station

Opened on: 1st May 1960

Location: North-east side of Motijheel

Built Area: 156 Acres

Architects: C. Dunham & Robert G. Boughey

Kamalapur Rail station was constructed in the 1960s (Banglapedia, 2015). The station building is one of the few oldest modern architecture buildings which still stands as a landmark today in Dhaka city. It is most noticeable because of its roof structure which the architect designed at that time. It is a place where thousands of people pass through every day. People travel from all over the country to the capital and from Dhaka to the rest of the country using this rail station. The station has platforms for the passengers and rail tracks for both passenger trains and freight trains.

Fig 5.1.1: Location of Kamalapur Rail Station

Source: author, work based on image from Google earth

Fig 5.1.2: Kamalapur Rail Station

Image source: Tarin1975

Fig 5.1.3: Entry hall

Image source: Author

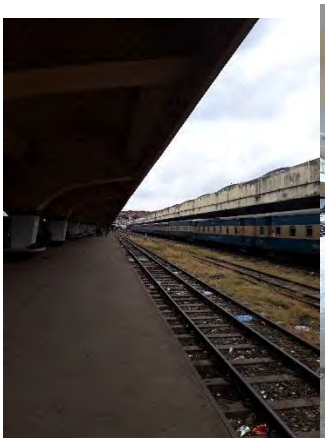


Fig 5.1.4: Boarding platform

Fig 5.1.5: Platform

Image source: Author

In Kamalapur rail station the transition of passengers can be seen from the semipublic zone to the public zone which is the entry hall or vice versa. From the entry hall people can go to their desired location whether it is the ticket counters or the platform or the parking or hotel rooms and restaurant or the bus terminal nearby.

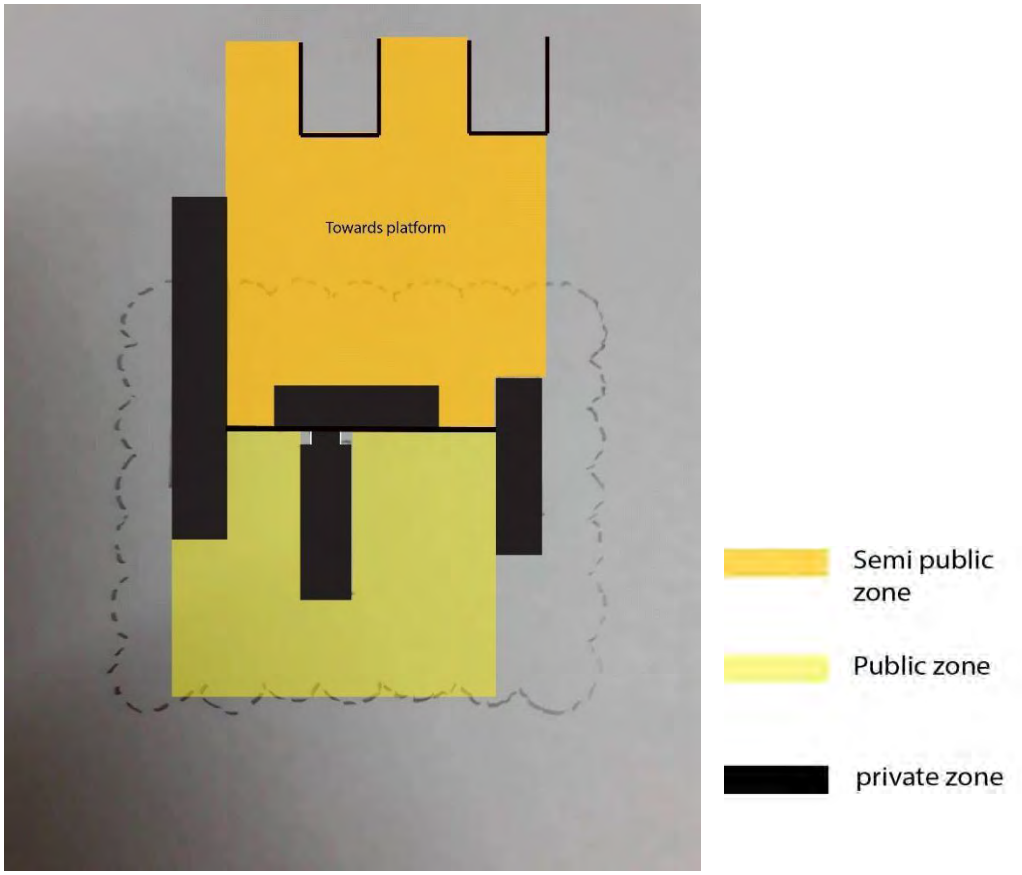


Fig 5.1.6: Zoning in Kamalapur Rail Station

Source: Author, work based on image from google map

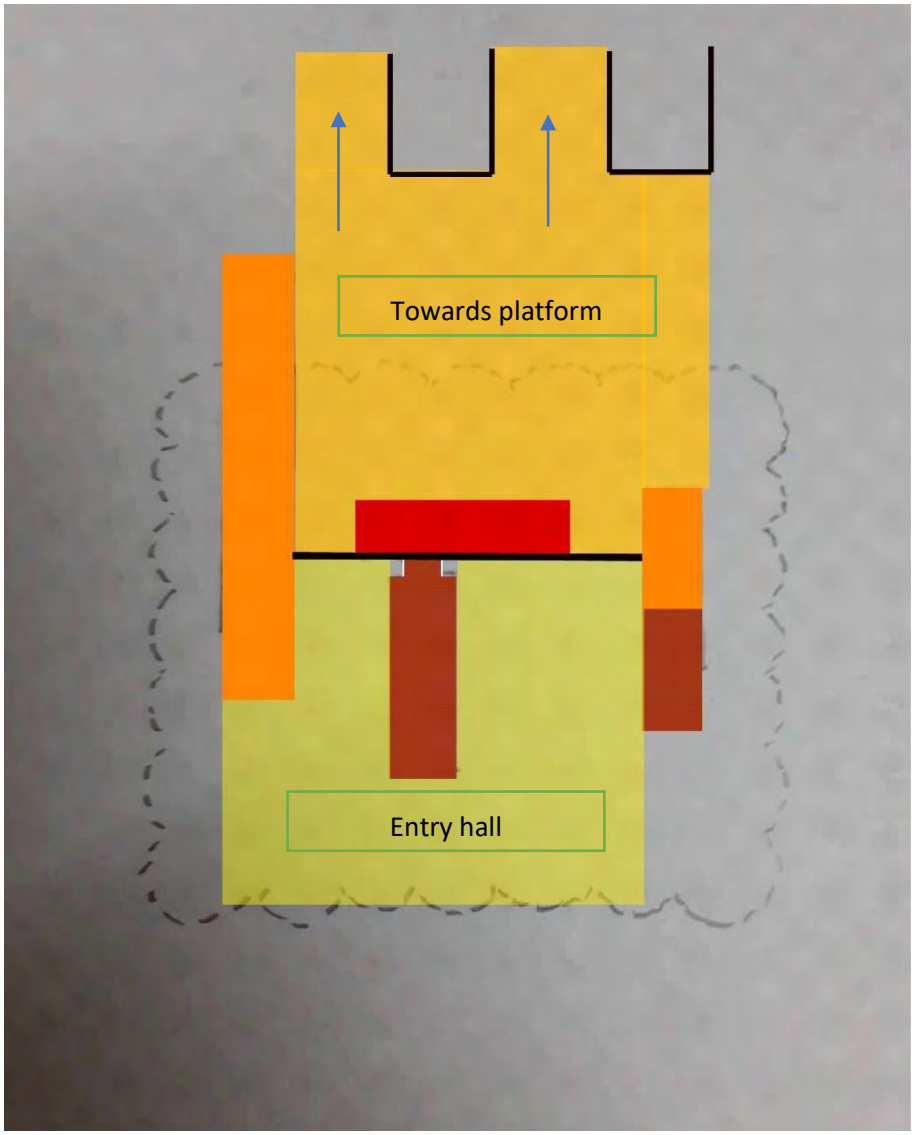


Fig 5.1.7: Different Functions in Kamalapur Rail Station

Source: Author, work based on image from Google map

Programs:

- Station officers block
- Ticket counter
- Shops
- Restaurant
- Hotel
- Bank booth

5.2 Kyoto Rail Station

Location: Kyoto

Built Area: 238000 square meters

Architect: Hiroshi Hara

Japanese rail stations are buildings which have been take been taken to such a level that they are deeply integrated with the people's lives. the stations are not merely station buildings but also centers which attracts people for shopping, recreation, and for their everyday life facilities. the train stations provide facilities for tourists and all people. For instance, their train stations have the best hotel accommodations. the train stations also have other transportation facilities within very close proximity for instance bus terminals, rentable cars etc. to make movement from one place to another easier. people come to the station buildings with their families to spend their weekend because of many recreational facilities. the stations are not just a single separate building but rather something which has a big influence on the lives of the urban dwellers.

Fig 5.2.1: View of entrance of Kyoto Station

Image source: KyotoStation.com

Fig 5.2.2: Inside Kyoto rail station

Image source: SjorsProvoost

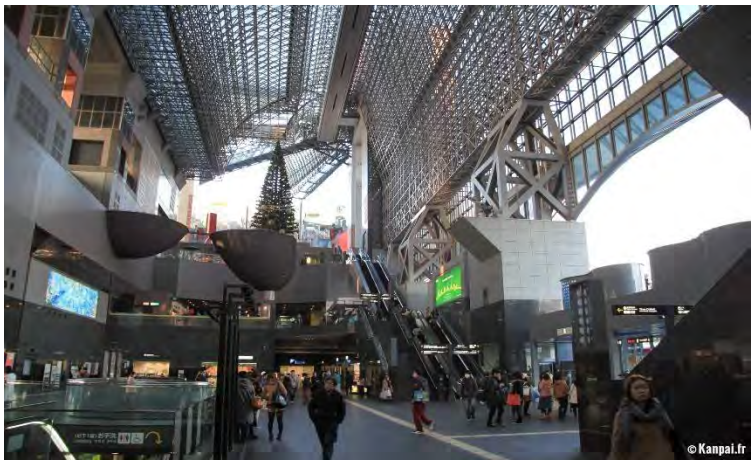


Fig 5.2.3: Inside Kyoto rail station at ground level

Image source: Kanpai.fr

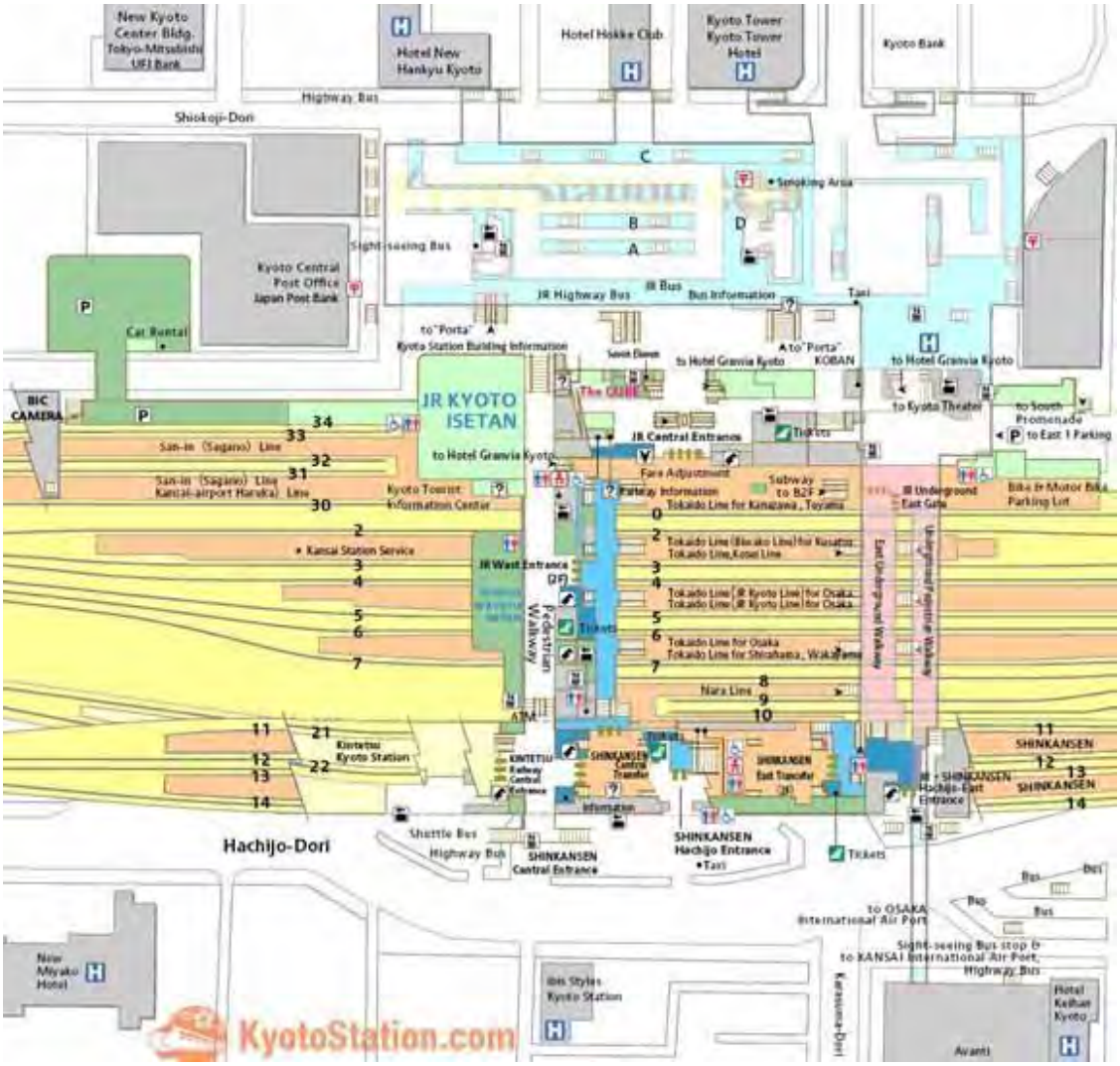
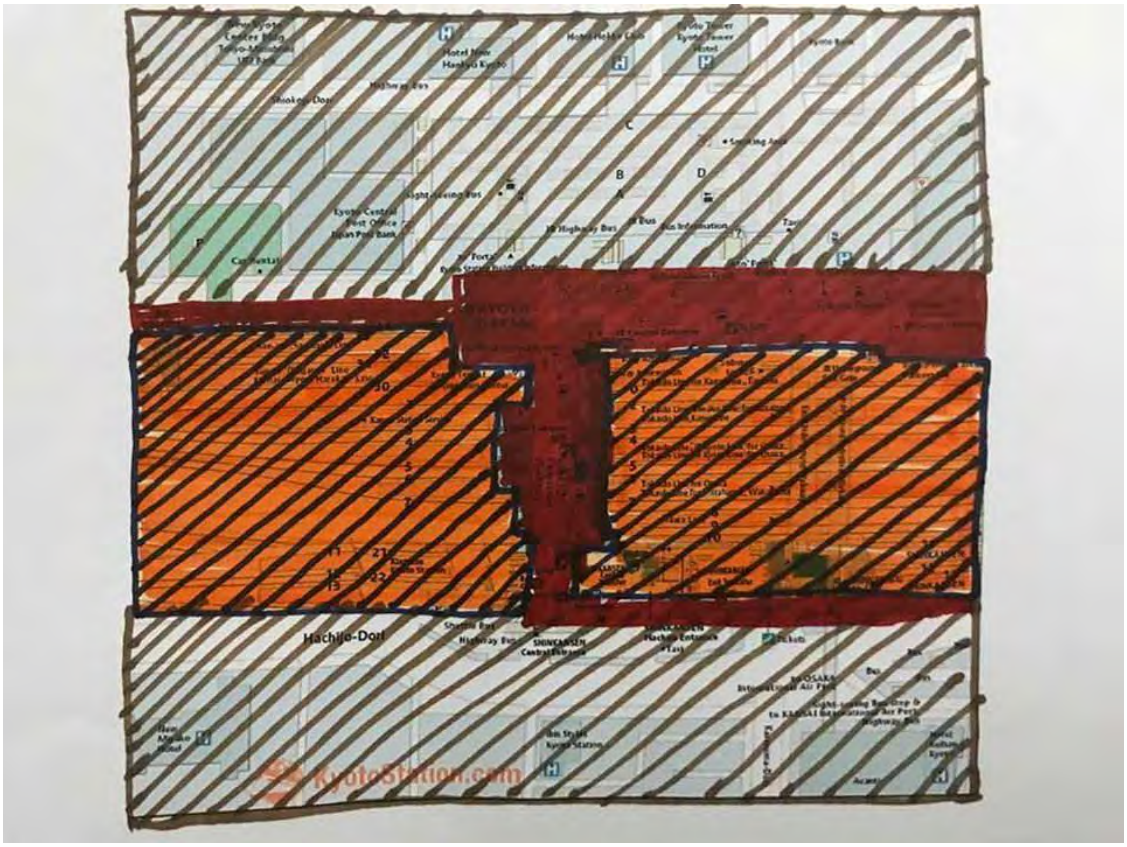


Fig 5.2.4: Map of Kyoto Station Image

Source: KyotoStation.com

- Platform
- Hotels
- Trasnportation facilities
- Ticket counters and other facilities
- Rail tracks



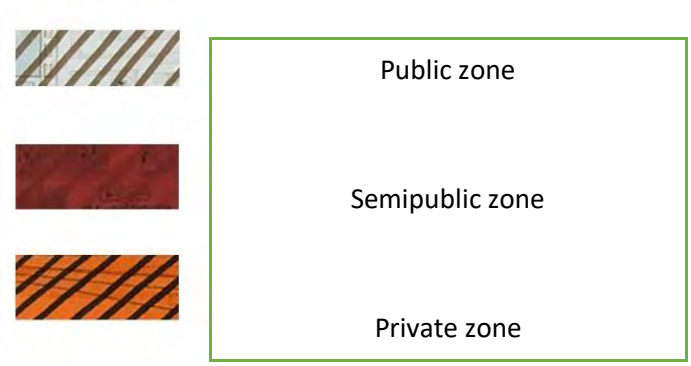


Fig 5.2.5: Zoning in Kyoto Station

Image Source: Author, work based on image from KyotoStation.com

Fig 5.2.6: Programs in Kyoto Station

Image Source: Author, work based on image from KyotoStation.com

Kyoto Station Building has a futuristic look, which is something that attracts a lot of foreign tourists.

It can be entered from the north side called Karasuma and from the southside called

Hachijo. The Karasuma side faces the Kyoto Bus Station and Kyoto Tower. The Karasuma side has the main Central Gate.

The south side faces Hachijo Street, which opens up to shopping malls and hotels. there is also the shinkansen platforms and Kintetsu Kyoto Station on this side. These two stations are connected by passageways. The two sides of the station are also connected by an underground passage.

There is a pedestrian walkway which runs from north to south on the second floor of the station building. it connects to the other station building.

Programs:

- Station block
- Ticket counter
- Information booth
- Shops
- Restaurant
- Hotel
- Bank
- Post office
- Rentable car stands
- taxi stand
- bus stops

	Kamalapur Rail Station	Kyoto Station
	Area in percentage	Area in percentage
If Total area is 100%		
circulation	84	77.04
Total built area:	16	23
Administration:	10	9.80
Hotel, shops, restaurants etc.	6.6	22.96

For the percentage of hotels, shops and amenities, we have to consider that the percentage is higher because of more tourists coming to Kyoto station from all over the world. Also, since the people of the city come here to avail many facilities. We can also see a close margin between the percentage of circulation space, and also in the amount of space used by the administration.

Chapter 6: Design Development

6.1 Concept

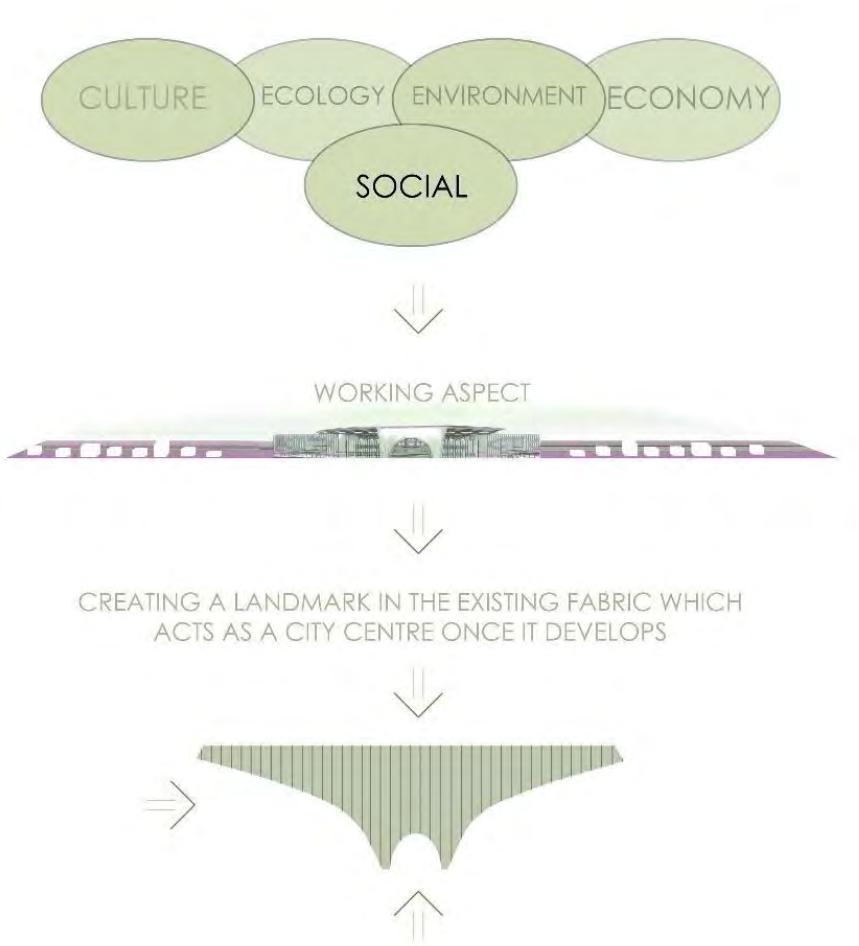


Fig 6.1.1: Conceptual diagram

6.2 Form Derivation

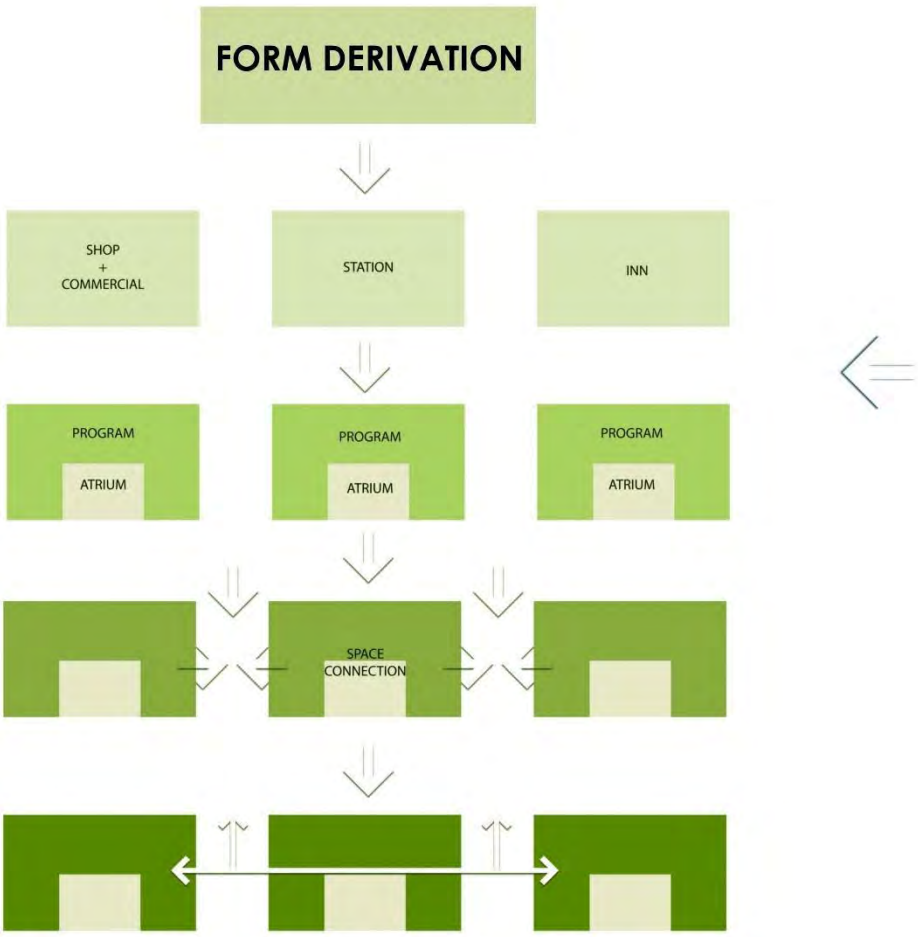


Fig 6.2.1: Conceptual diagram

6.3 Programmatic Distribution

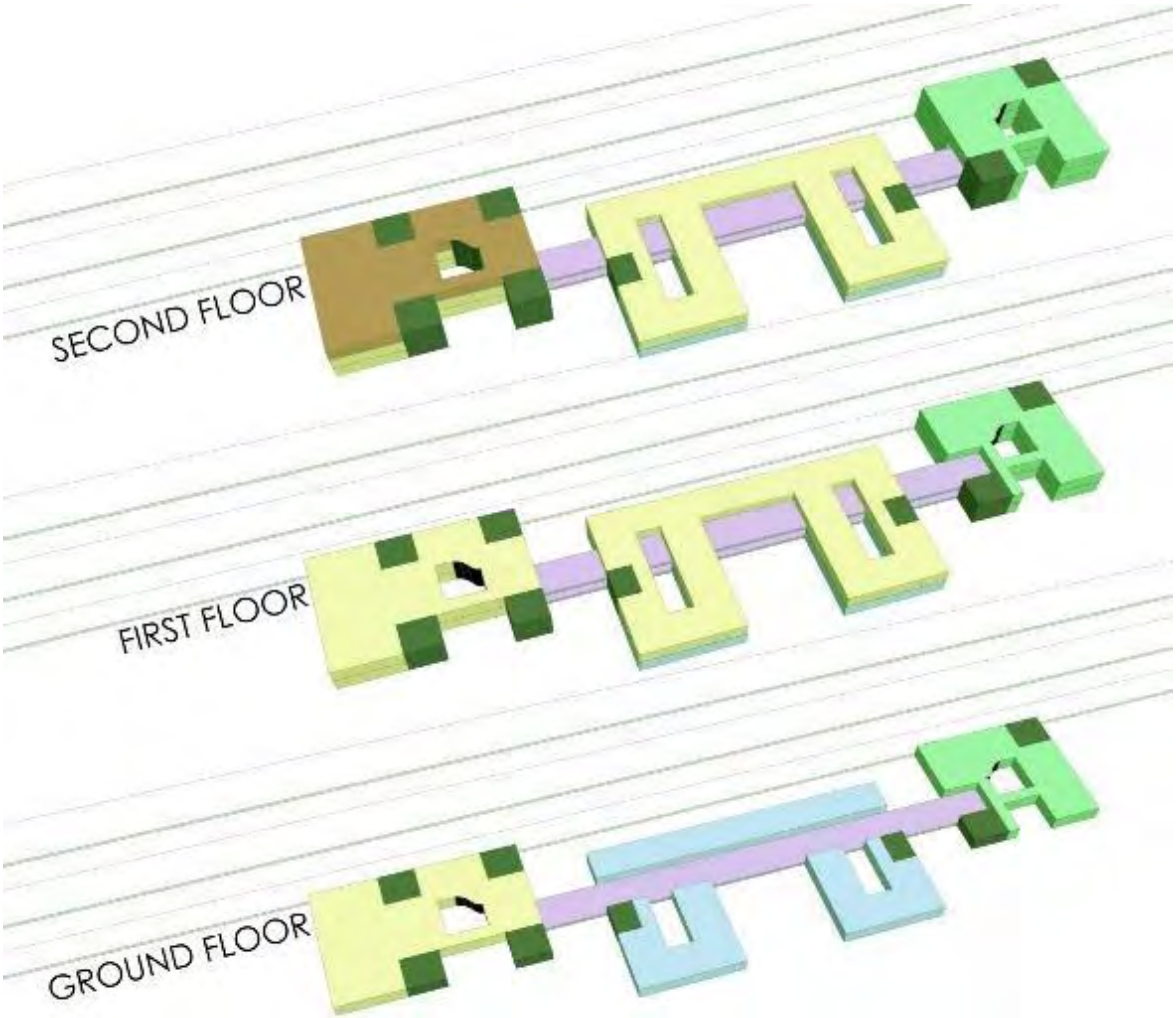


Fig 6.3.1: Programmatic Distribution diagram

6.4 Plans

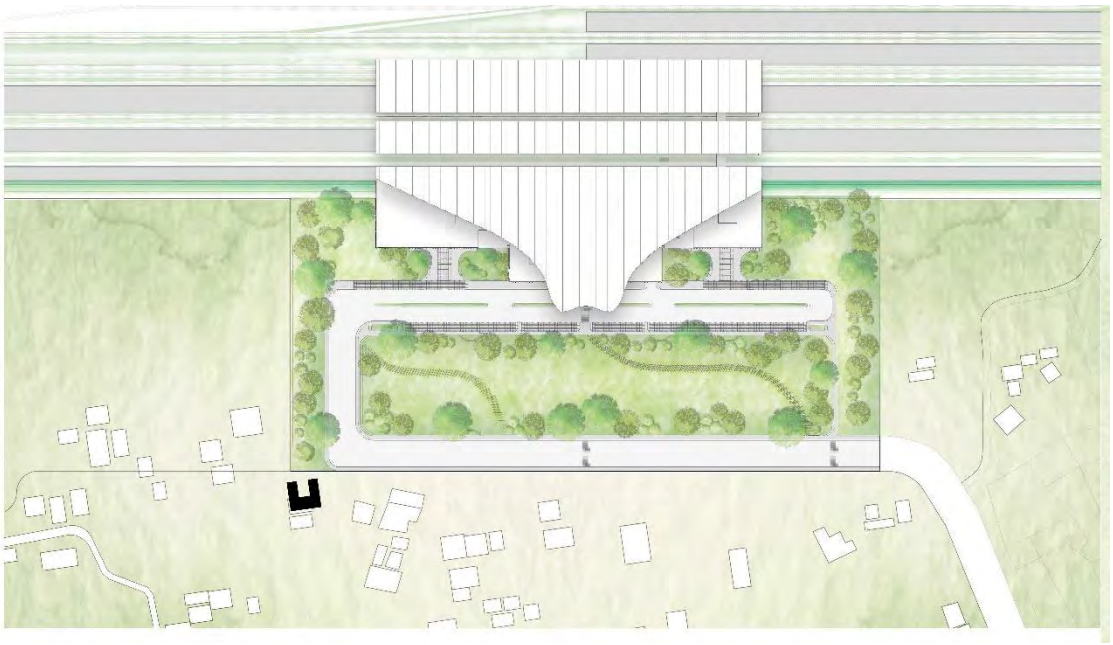


Fig 6.4.1: Site Plan

The site is accessed by a 65’ proposed road from the southeast corner of the site. The road loops around to help cars reach the three blocks of the railway station. On the east and west side of the building Ha Ha wall has been proposed to stop people from crossing over to the platform and also to hold water during rainy days.

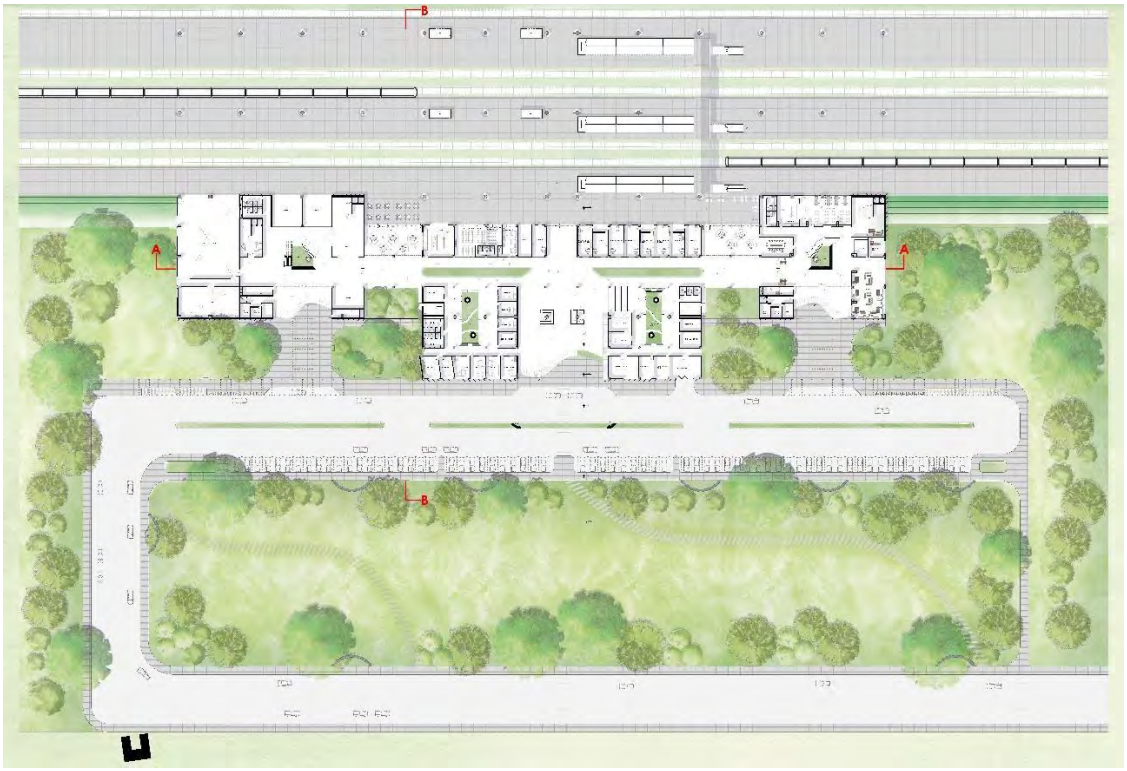


Fig 6.4.2: Ground Floor Plan

The ground floor has three blocks which a central spine connecting all three blocks. One the west is the shopping and commercial space block. The middle one is the rail station admin block. The block on the west is the inn block.

Fig 6.4.3: Station Block

Fig 6.4.4: Shopping and commercial block

Fig 6.4.5: Inn block

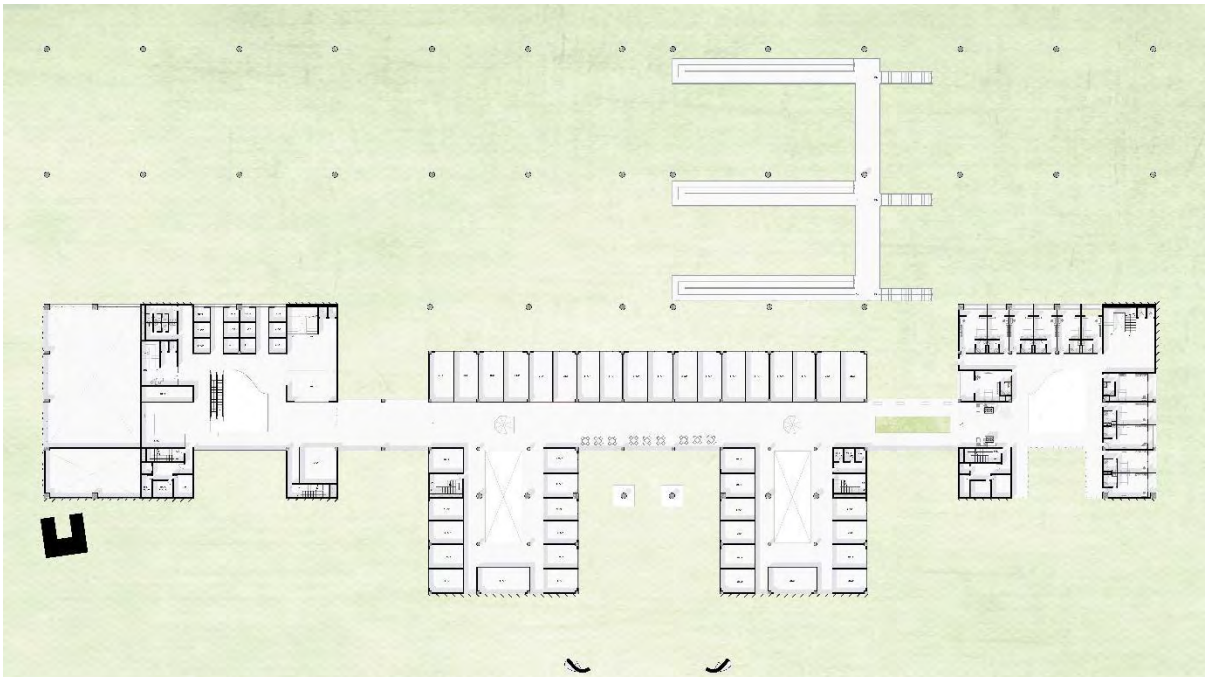


Fig 6.4.6: First Floor Plan

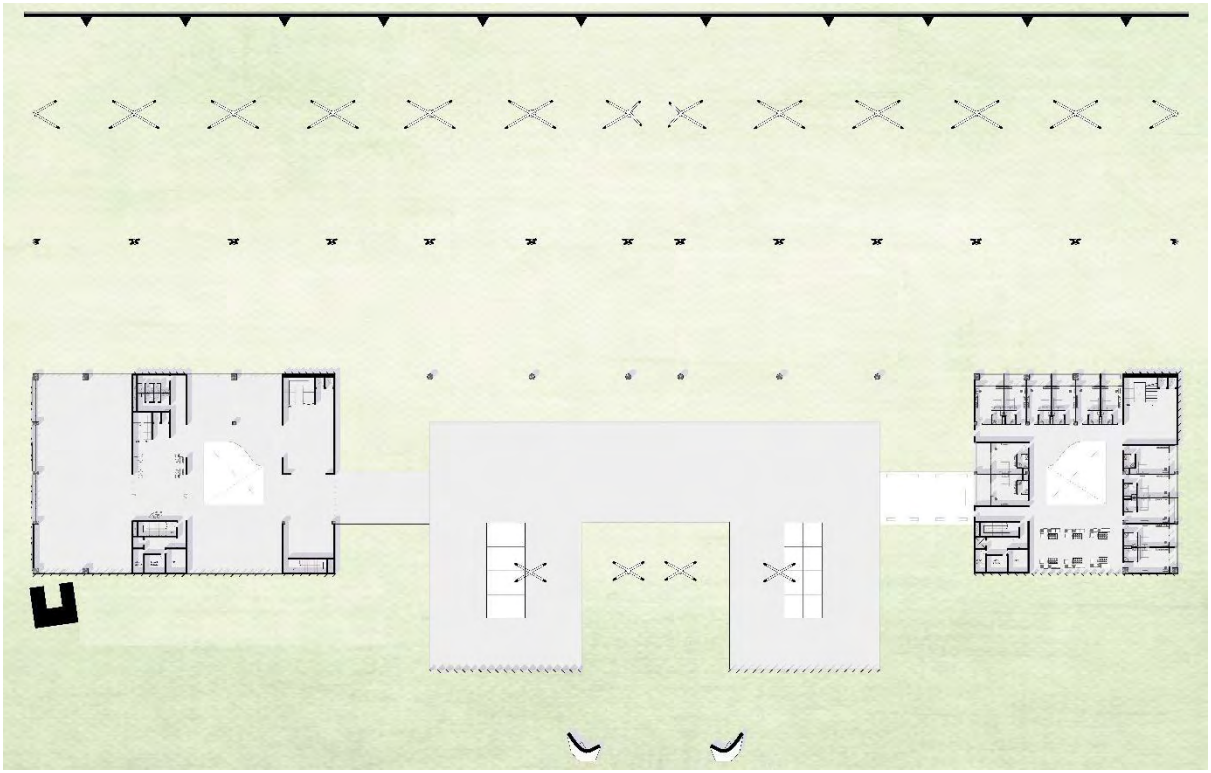


Fig 6.4.7: Second Floor Plan

6.5 Elevations

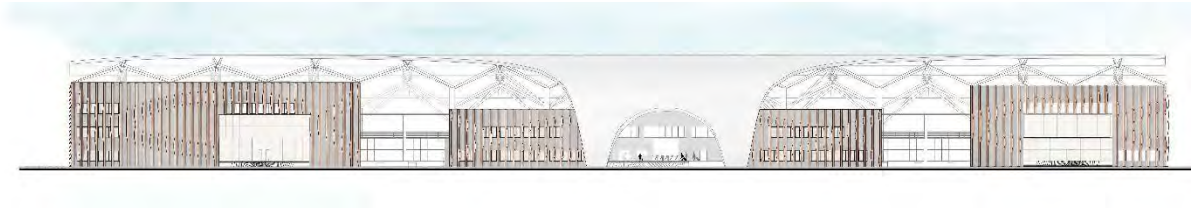


Fig 6.5.1: South Elevation

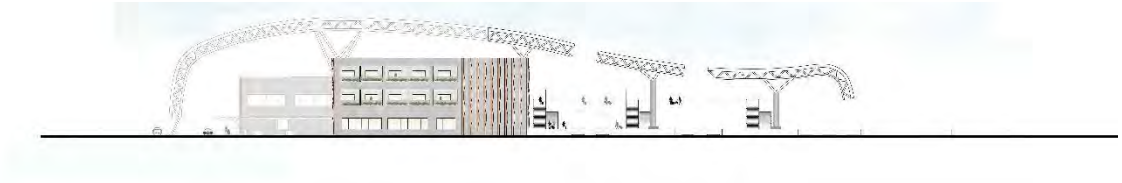


Fig 6.5.2: East elevation

6.6 Sections

Fig 6.6.1: Section AA

Fig 6.6.2: Section BB

6.7 Roof Structure and Ha Ha Wall Detail:

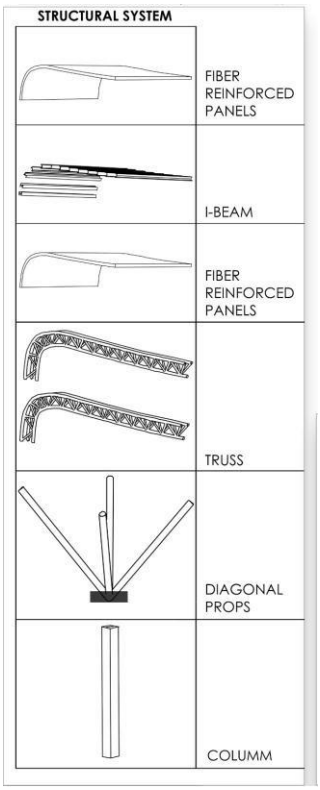


Fig 6.7.1: Roof Structure Detail

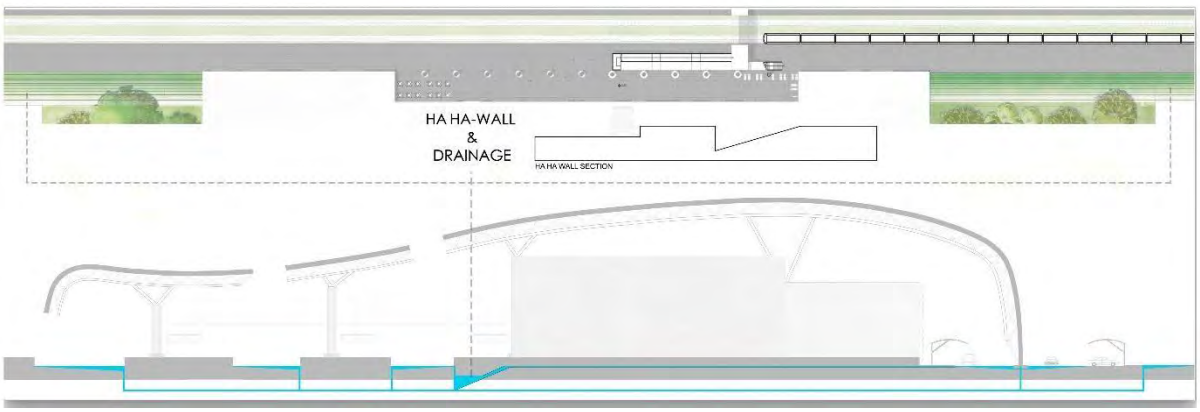


Fig 6.7.2: Detail of Ha Ha Wall

6.8 Computer generated images

Fig 6.8.1: Top View

Fig 6.8.2: Platform

Fig 6.8.3: Cafeteria

Fig 6.8.4: Entrance

6.9 Model images

Fig 6.9.1: Model image

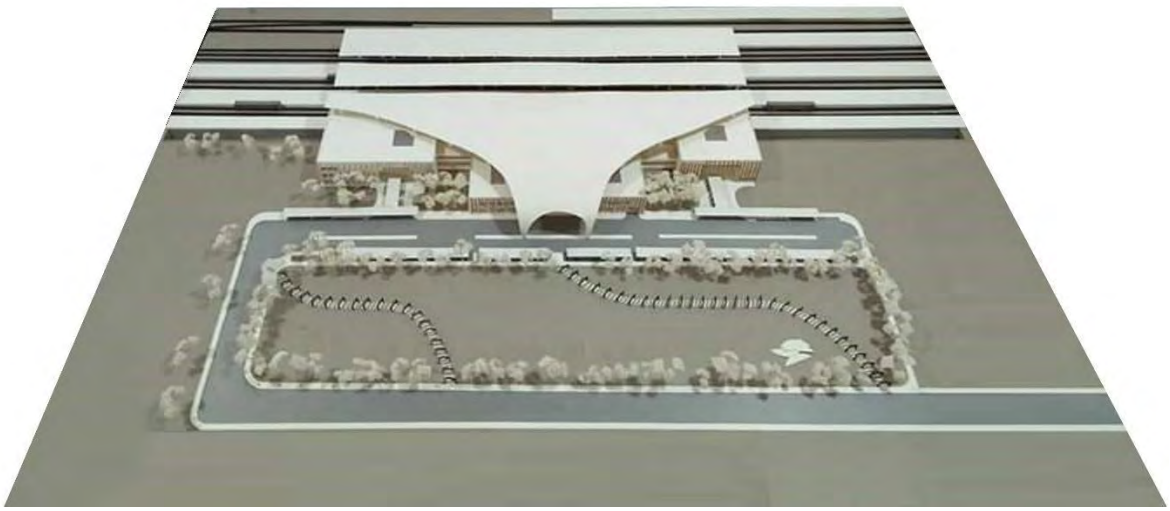


Fig 6.9.2: Model image

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