UPRISEN TO THE FUTURE :
DESIGN OF A RESIDENTIAL HOUSING

Introduction

Housing is not just a mere shelter, but it is a place where a family lives and it plays a comprehensive role as far as socio-economic state of the family is concerned. Housing is considered to be a global problem all around the world. In many cities of developing countries, up to half of the urban population lives in slums and squatters.

Bangladesh, being no exception to this problem also faces problem in providing proper shelter in an affordable rate to all of its inhabitants since there are three different major income groups living here. According to Bangladesh Bureau of Statistics urban population is categorized into High, Middle- and Low-income groups. Being of greater economic ability.

Sector of Housing

There are two types of housing.

- Formal housing
- Informal housing

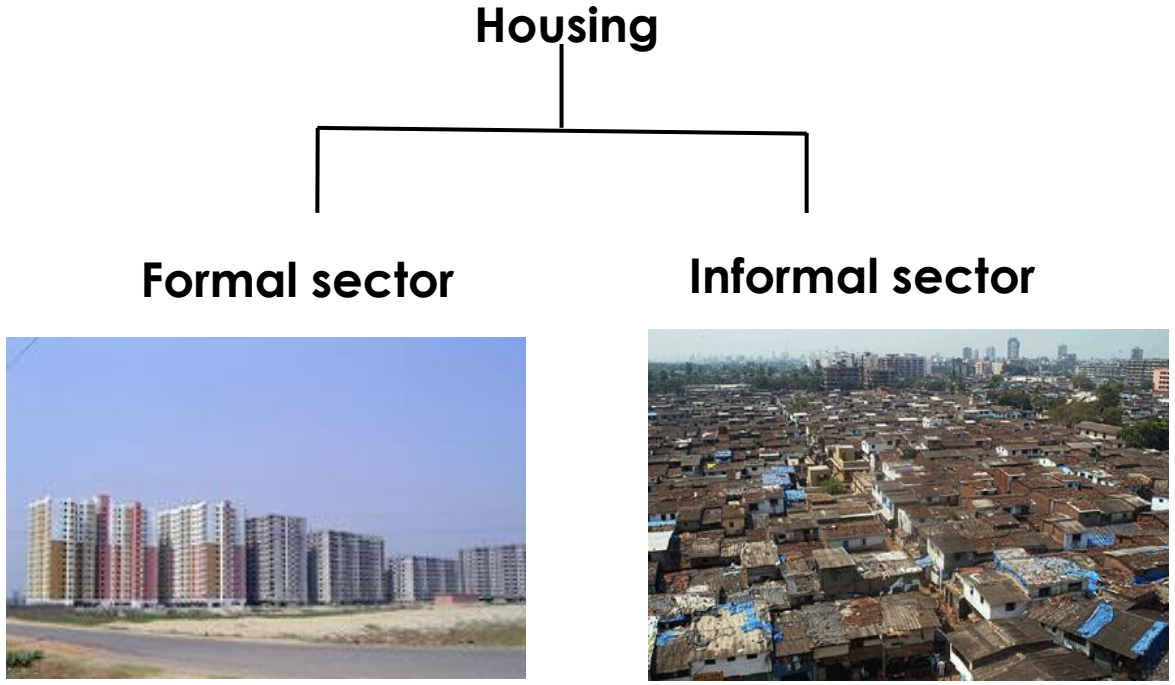


Fig: Housing
Source: Flicker/Raghu Kumar

Sector of Housing

Formal sector

- People of formal sector has defined address, employment, bank account, social security and government initiative.
- Houses are built with money often from private source, bank etc.
- **Example :** CDA plots, University quarters, etc

Informal sector

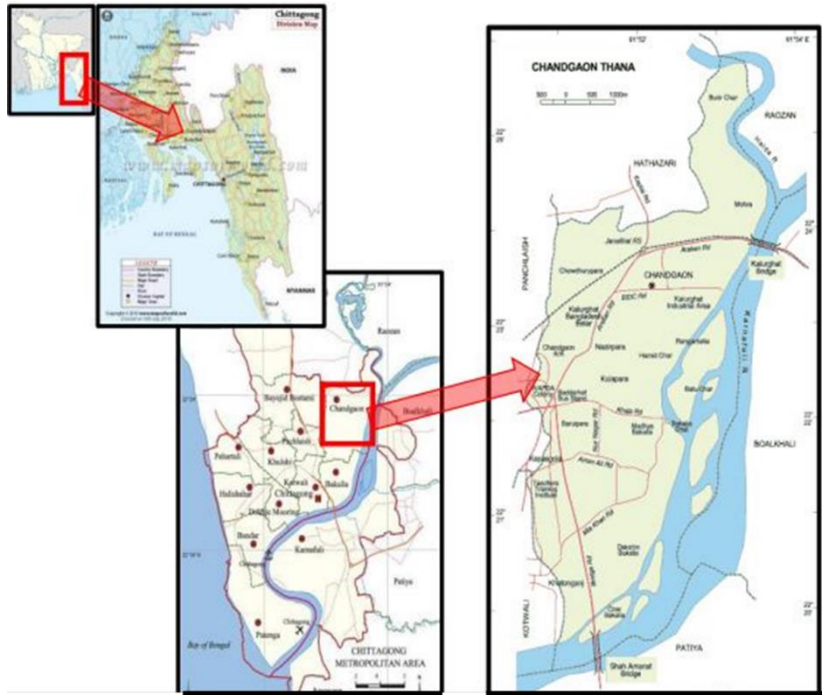
- People of informal sector means the part of population who has no specific employment, address and living standard.
- Informal sector people stay in roads, slums and squatters having no physical or other facilities.
- **Example:** squatters beside the rail line, etc

Site Appraisal

Site Information

Chandgaon The residential area is situated to the east of the city. It is bound by the Karnaphuli River on the east and south, the Halda River on the upper eastern portion, and the Nawab Sirajuddowla road, Kapashgola Road, Kothiber Hat and Chan Mia road in the west. The Patharghata and Boxirhat wards are in the west. The area covered by zone consists of Chandgaon and Bakalia Thana and seven wards which are 4, 5,6,17, 18, 19 and 35.

Total Area: 41(in acre)
Total No. of Plots: 606
Land Development: 1962-1963
Organization: CDA
Proposed Site Area : 10.5 (in acre)
No. of Plots in proposed area : 70



Site Location

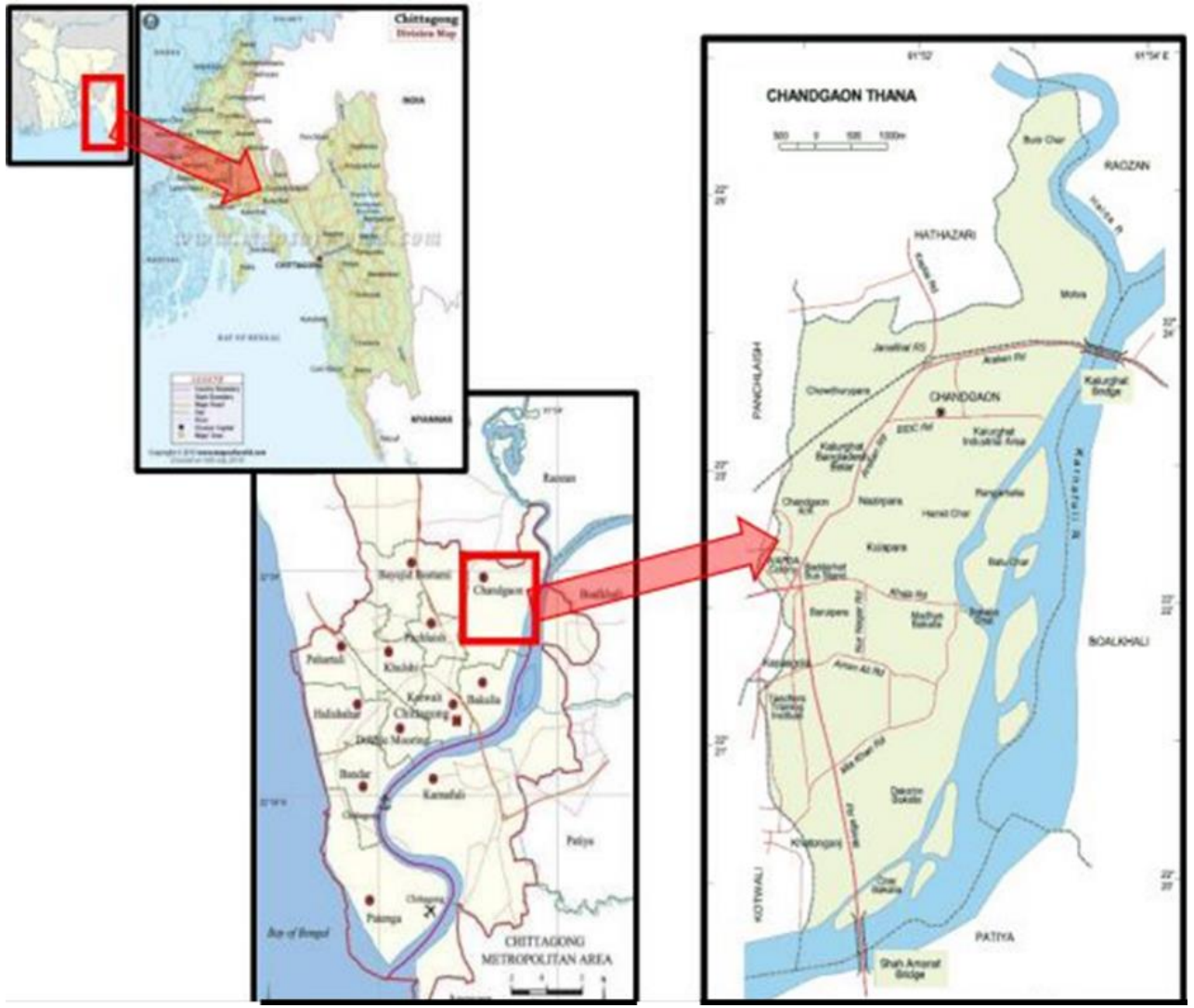


Fig: Site location

Pattern of site

This proposed site is a residential area. It is a trapezoidal site. There are many residential building block and sum public building.

Fig: Top View Of site

Fig : Pattern Of site

Land use and building pattern

Residential

Public

Commercial

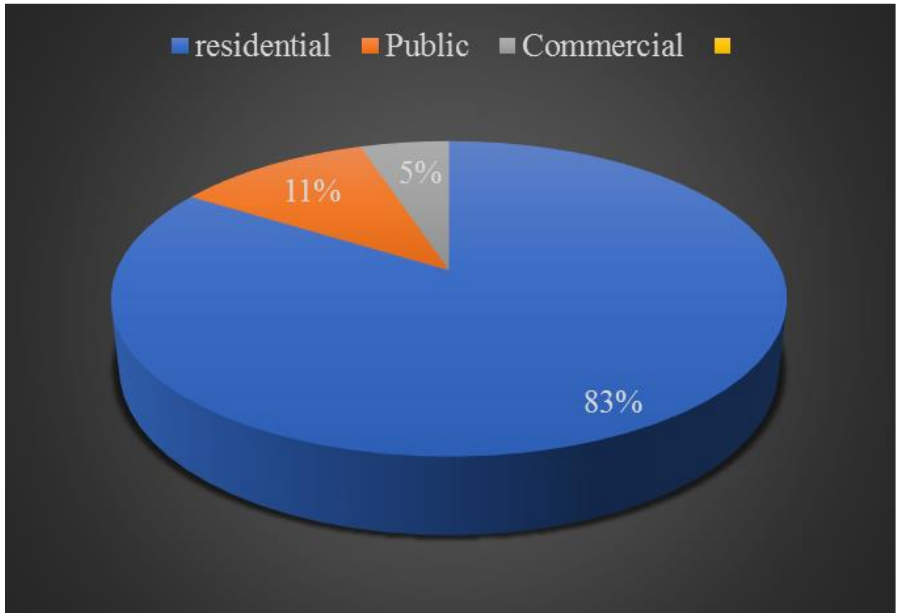


Fig : Land use pattern

Building Height

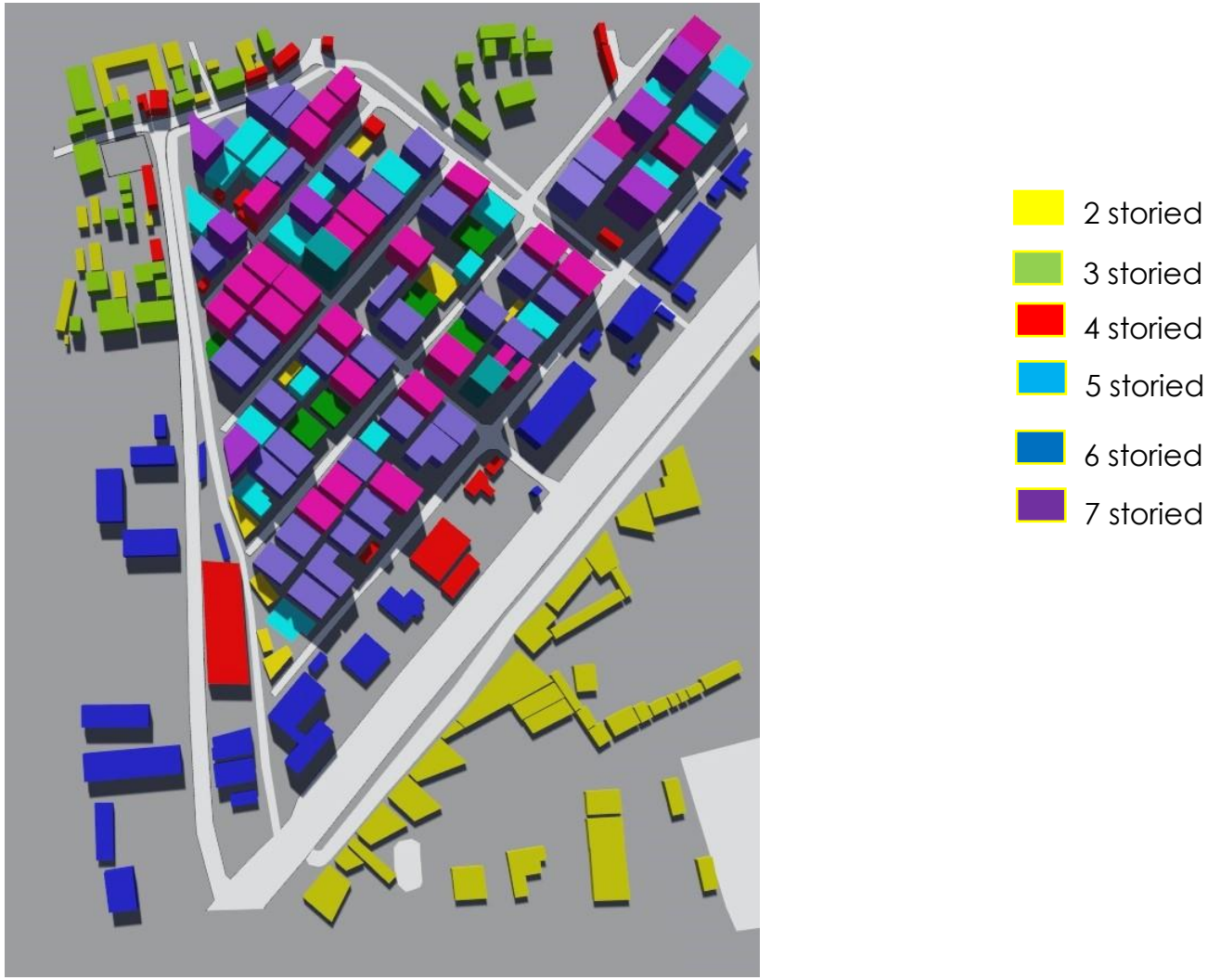


Fig : Building height

Image mapping

EXISTING DRAIN

ENTRY

SONALI BANK

NATURAL ELEMENT

WDB BOARD

POST OFFICE

HELTH FACILITIES

PEDESTRIAN CONDITION

MIXED USE BUILDING

Fig: Image mapping

Land use and building pattern

The land and use building pattern of this proposed area are regular rectangular shaped. There are 83% is building block , 3%b drainage , 5% are road & 6% are vacant land.

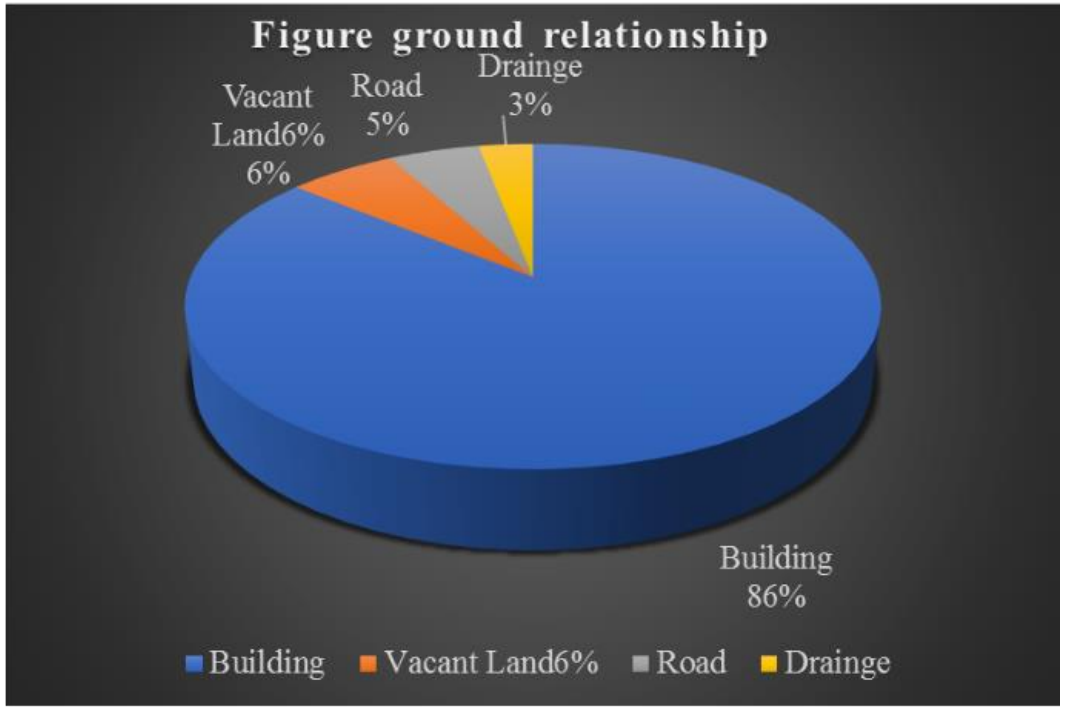
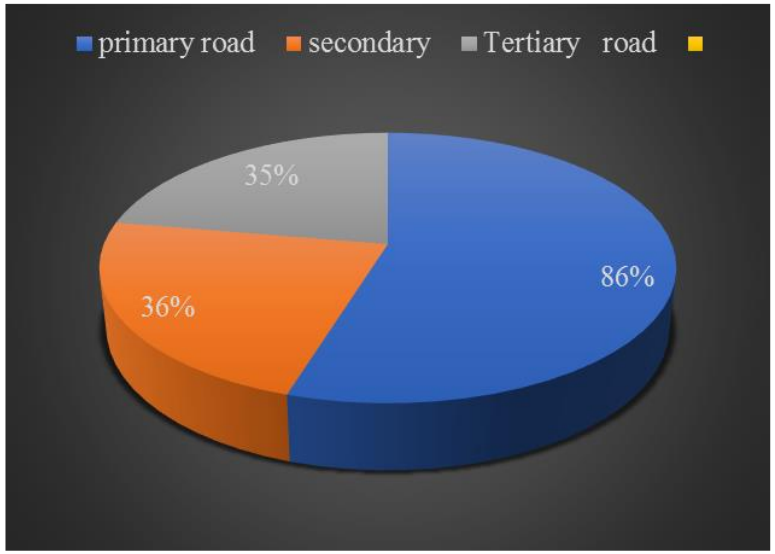


Fig : Figure ground relationship

Traffic and transportation pattern

The road and transportation network of site are regular Pattern. This situated in beside 120-foot-wide Arakan road. The internal road of site are 40 & 20 foot wide road

Heavy intensity



Primary road (Main Road)

Secondary road (20 foot wide road)

Tertiary road (15 foot wide)

Fig : Road network

Utility pattern

There are some utility are available here. Drainage system are given below

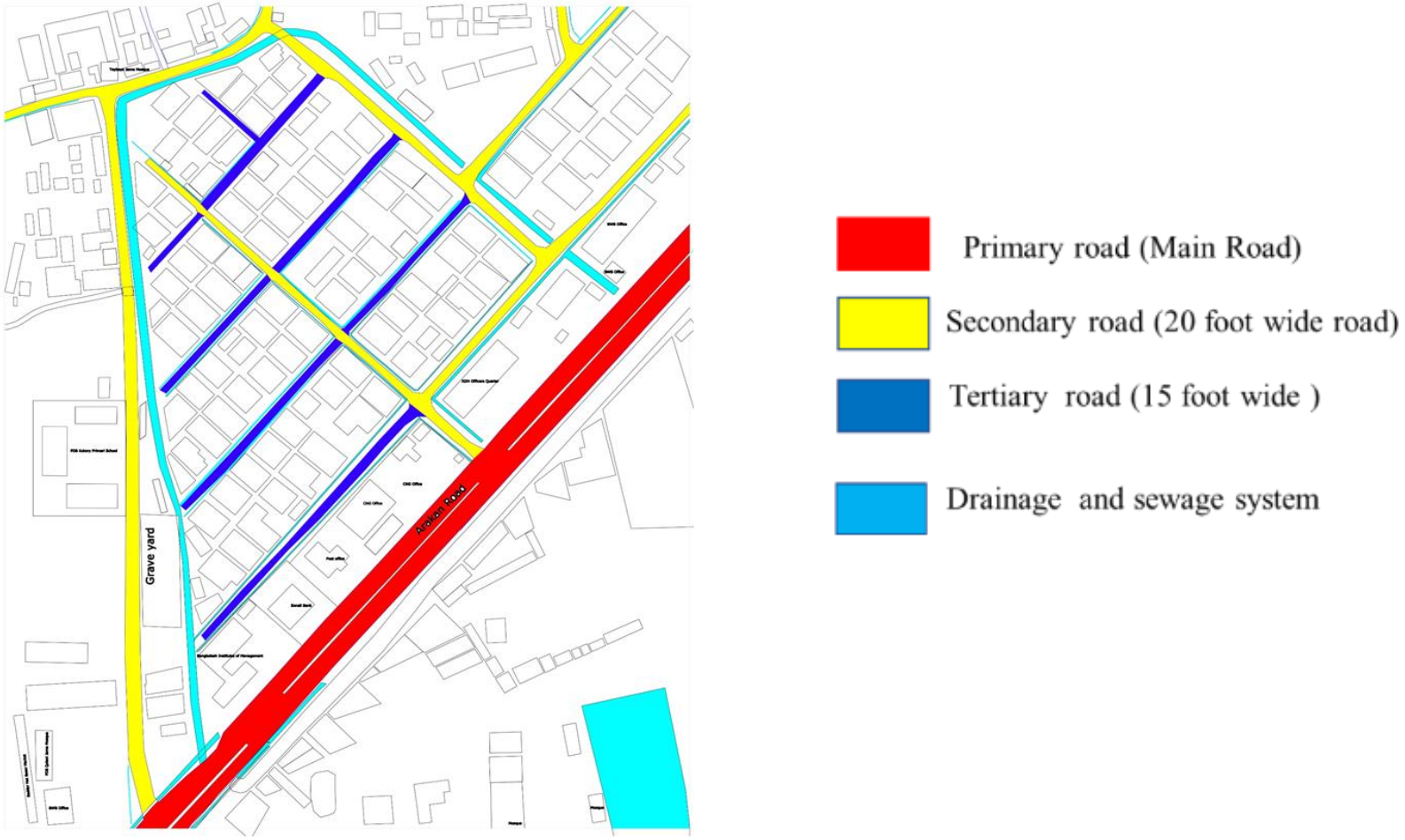


Fig : Road network with Drainage

Utility pattern

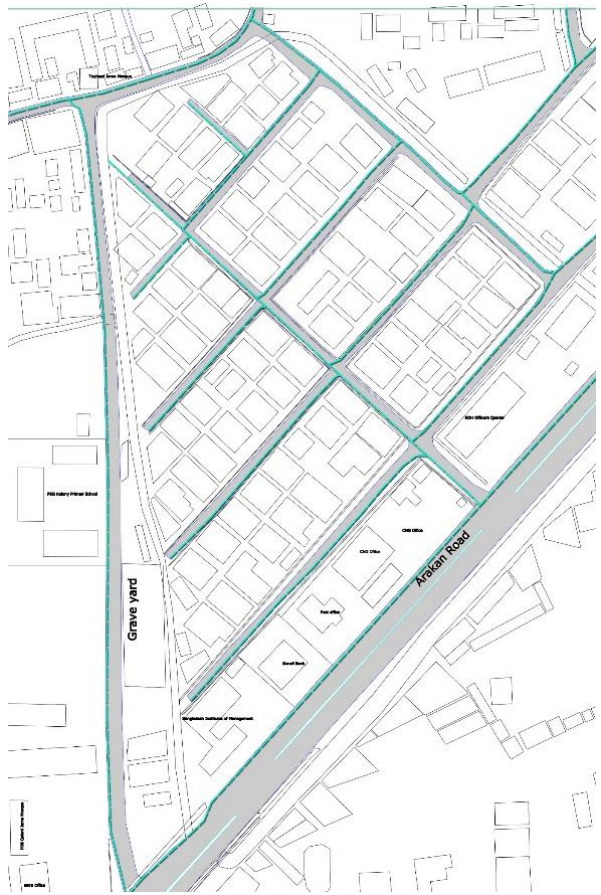
There are some utility are available here. Gas, electric and water supply line are available.

In this area electricity supply provided by government. Power distribution board are supply electricity here. The electricity line connects to national electricity grid line

Fig : Electricity network

in this area are used the line gas . Kornafuly gas company limited are provided gas here. This an governmental limited company.

Fig : Gas network



in this area are used the water under WASA . WASA are provided water here. This an governmental Water board.

Fig : WASA network

Climatic Analysis

The climate is tropical in Cahndgaon, Chittagong. Chittagong has significant rainfall most months, with a short dry season. The average temperature in Chittagong is 25.7 °C. About 2794 mm of precipitation falls annually.

- On average, the temperatures are always high.
- A lot of rain (rainy season) falls in the months of: April, May, June, July, August, September and October.
- Chittagong has dry periods in January and December.
- On average, the warmest month is April.
- On average, the coolest month is January.
- July is the wettest month. This month should be avoided if you don't like too much rain.
- January is the driest month.

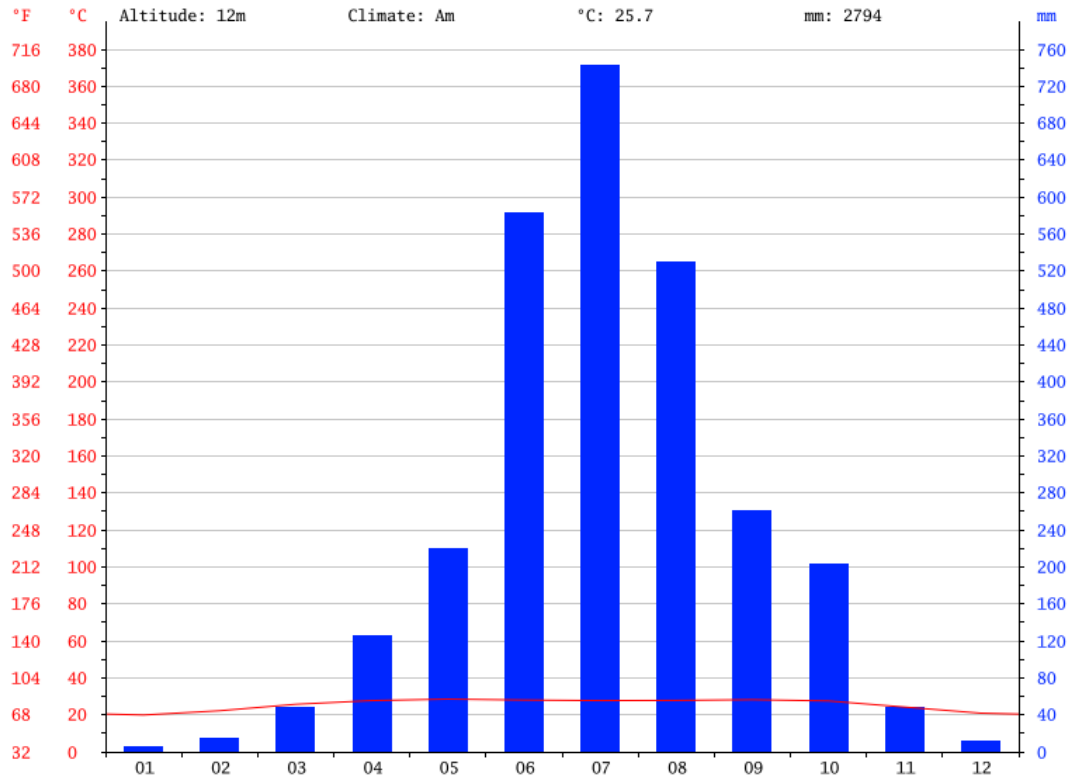
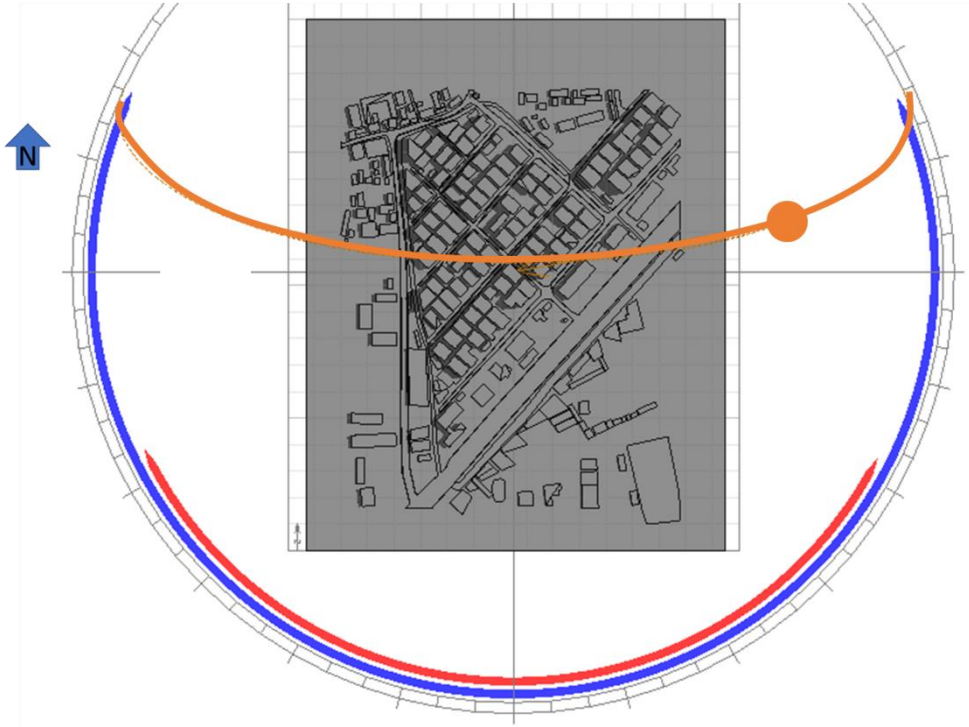


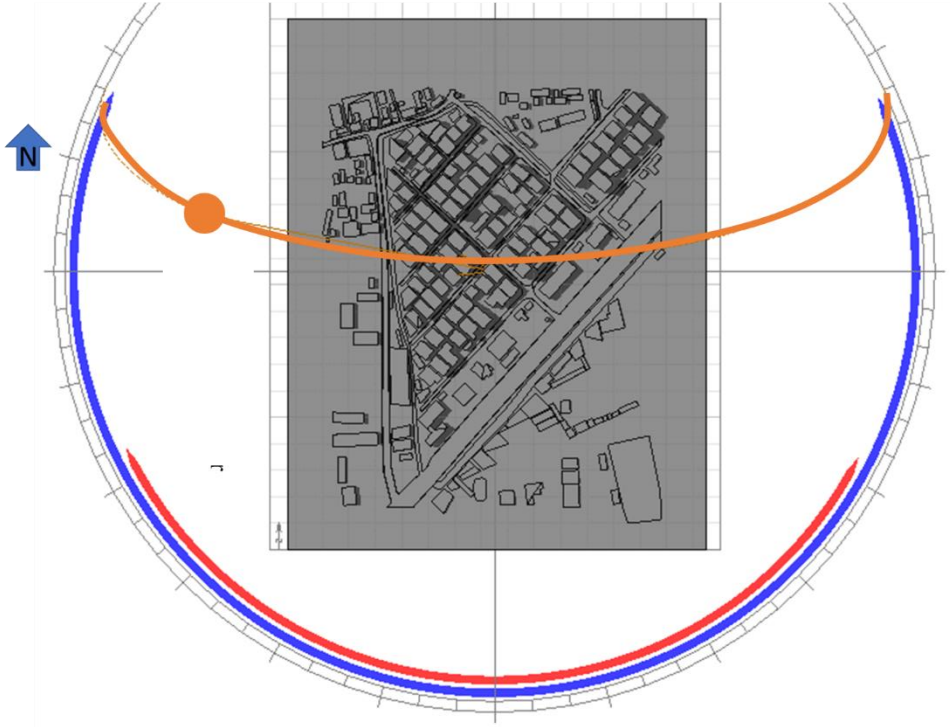
Fig : Climate graph

Sun Path Analysis Of Chandgoan Abashik Area

Climate and sun path analysis of Chandgaon area are given below . this calculation are calculated by environmental data analysis software . this data are given below



Sun path in summer 9 am



Sun path in winter 9 am

Fig : Sun path Diagram

Shadow Range Analysis Of Chandgoan Abashik Area

The shadow range analysis is shown the shadow parameter in various time in proposed area existing site.

Fig : Shadow range analysis in Summer

Fig : Shadow range analysis in winter

Fig : Shadow range analysis in Autoran and spring

Wind Analysis Of Chandgoan Abashik Area

Summer Prevailing Wind

Fig : Summer Prevailing Wind from South East

Fig : Summer Prevailing Wind from South

Fig : Summer Prevailing Wind from South west

Wind Analysis Of Chandgoan Abashik Area

Winter Prevailing Wind

Fig : winter Wind from North West

Fig : winter Wind from North

Climate Analysis Of Chandgoan Abashik Area

Climatic Analysis Of Chandgoan Abashik Area

This climatic analysis data are taken through the 4in1 environment meter . we are measure here sound , relative humidity ,temperature and light flax .

POINT	1	2	3	4	5	6	7
SOUND (dB)	95	46	69	83	67	60	53
LIGHT (lux)	970	256	745	925	754	678	359
HUMIDITY (HR)	68.3	66.7	70.3	70.9	68.5	69.2	70.4
TEMP (°C)	31.9	25	30.6	31.5	31	28	25.4

Fig : climatic data station point and data

Site surroundings

Site surroundings

This site is near of Bhahaddar hat circle , Zia complex , Farider para , Shomser para & Muradpur. This a urban populated area.

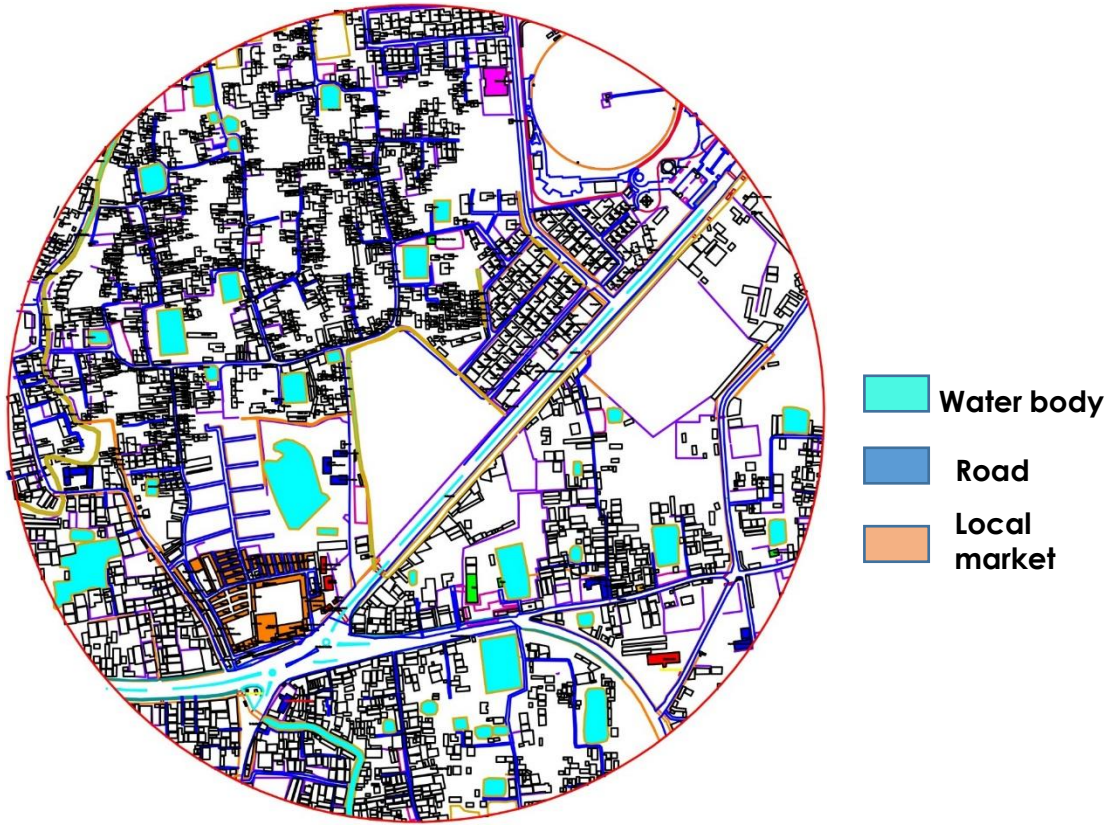


Fig: Plan of Chandgaon residential area with Site surrounding

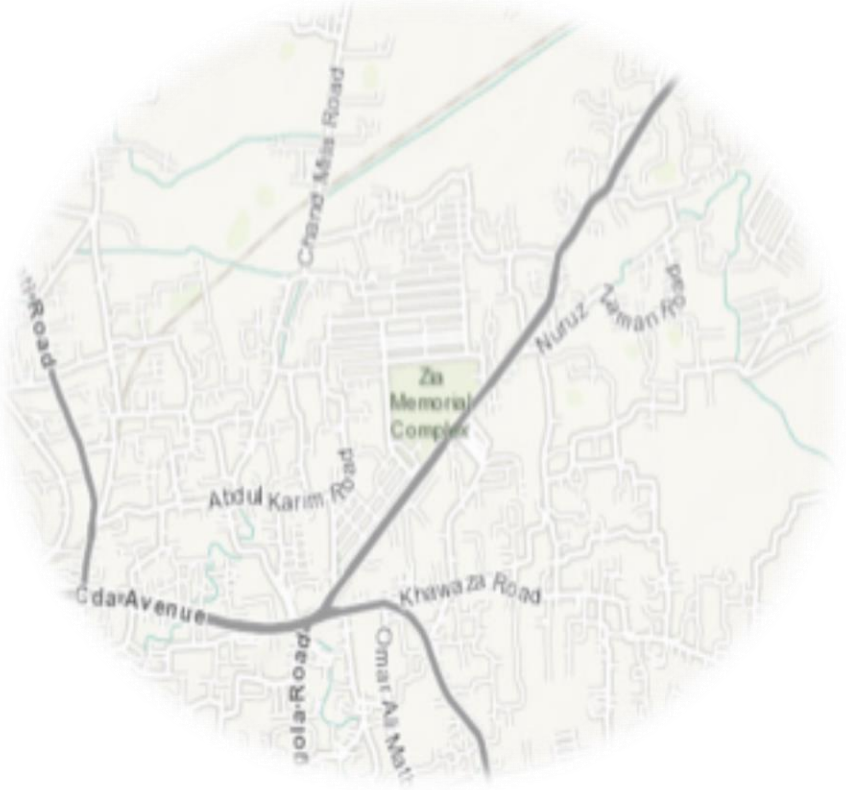


Fig: Topography of Chandgaon residential area with Site surrounding

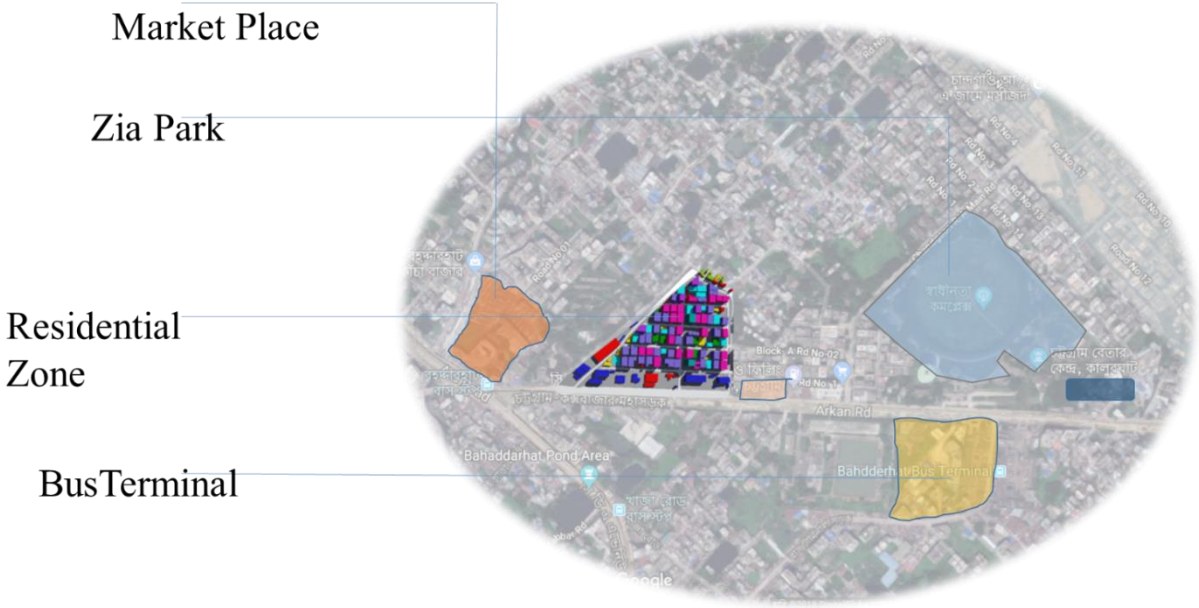


Fig: Proposed site area with Site surrounding

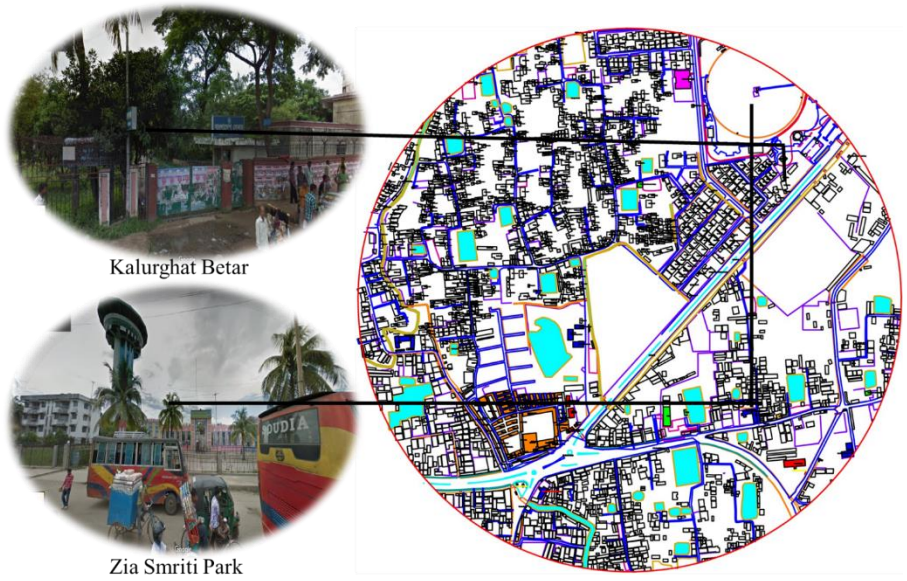


Fig: Historical place in Site surrounding

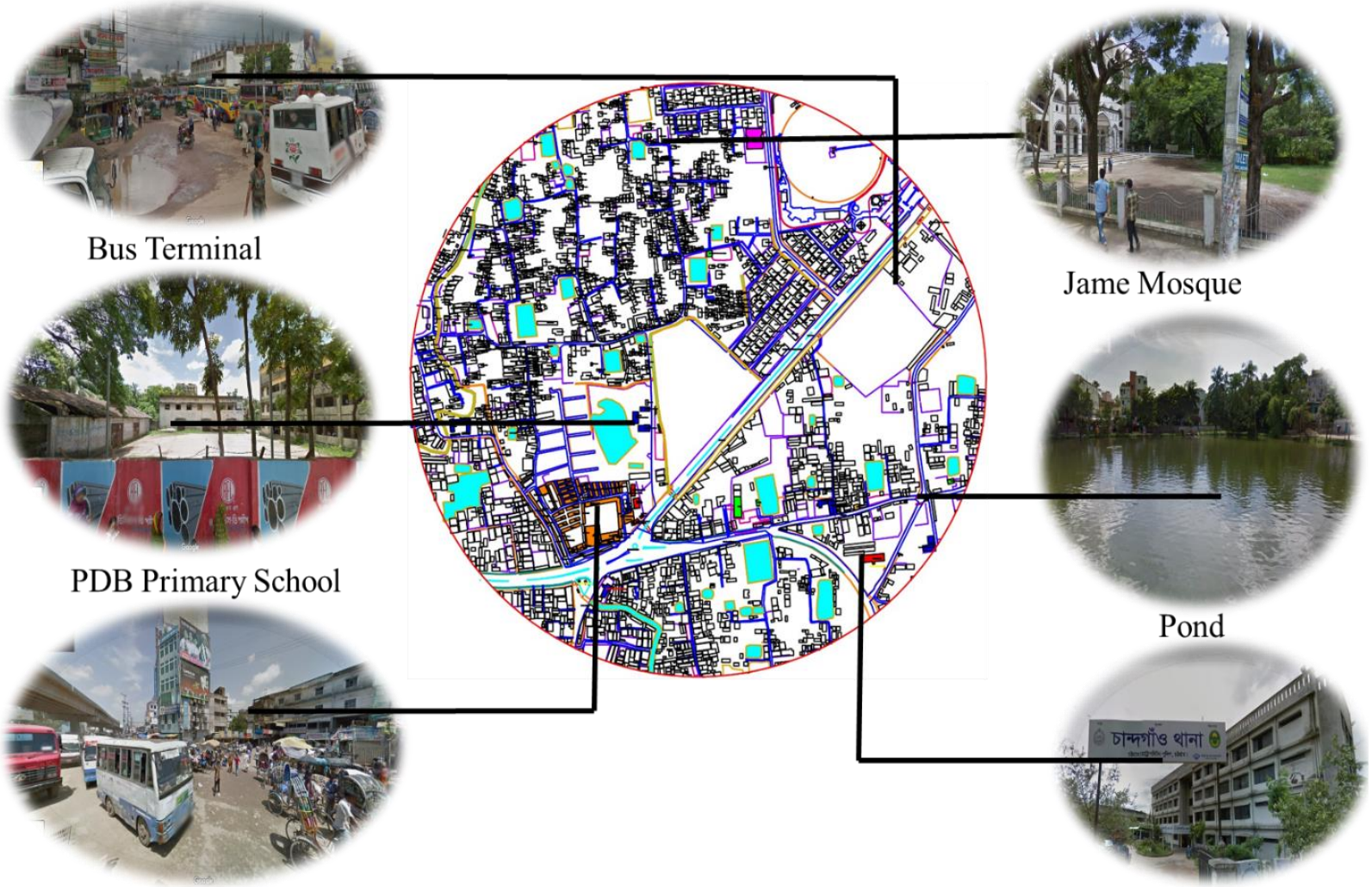
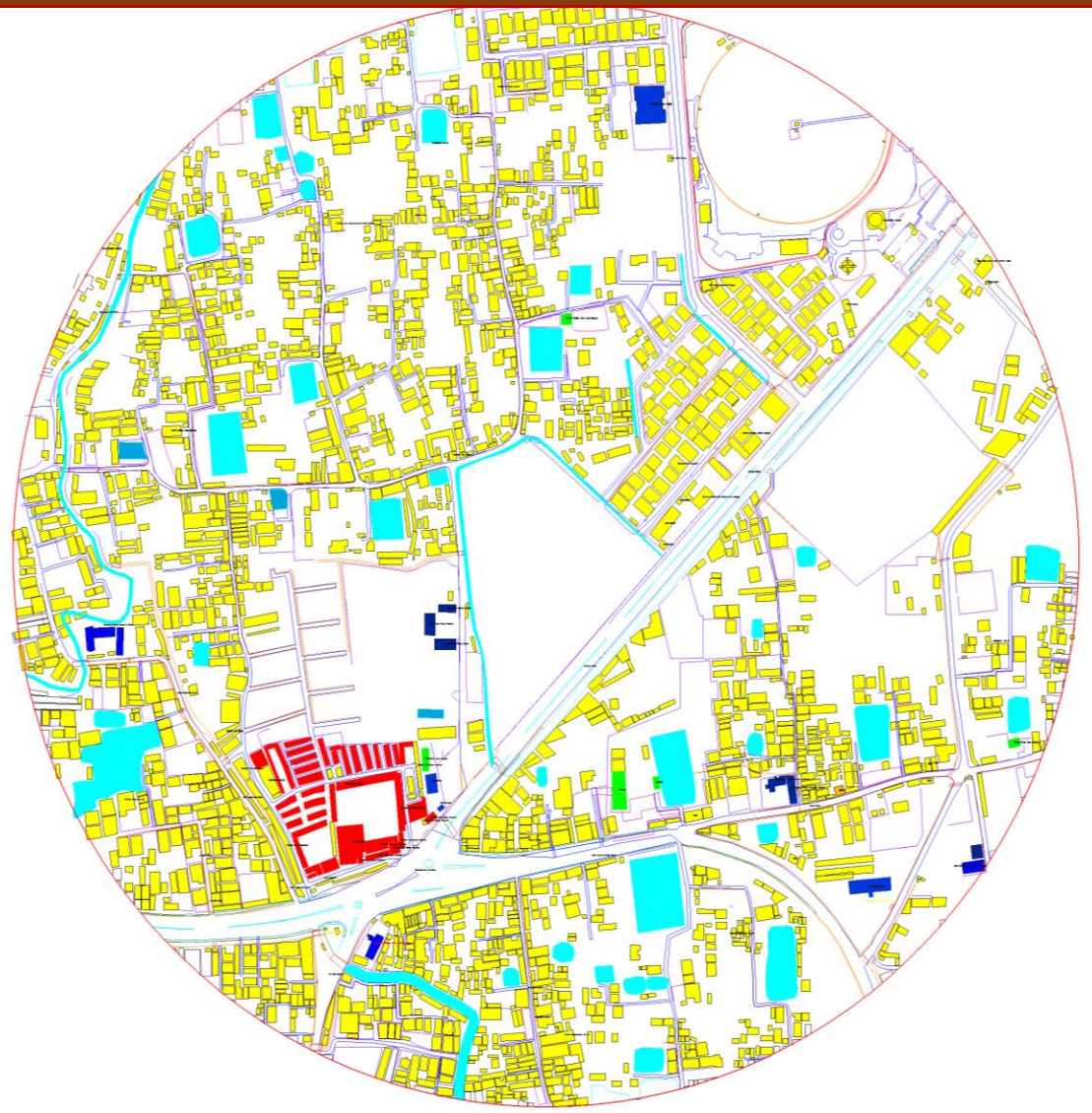


Fig: Site amenities place in Site surrounding

Building details



Residential

Commercial

Public

: Fig: Building uses in Site surrounding

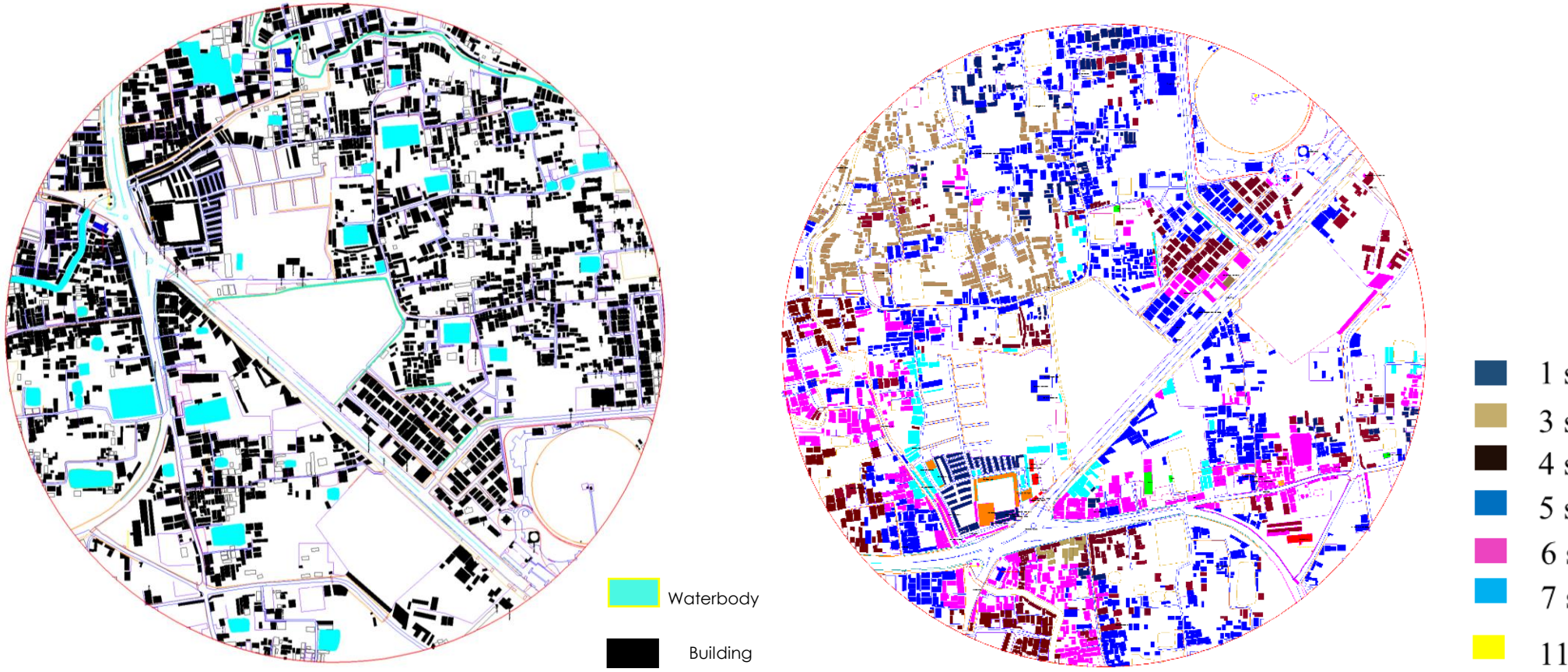


Fig: Figure ground relationship and building height details

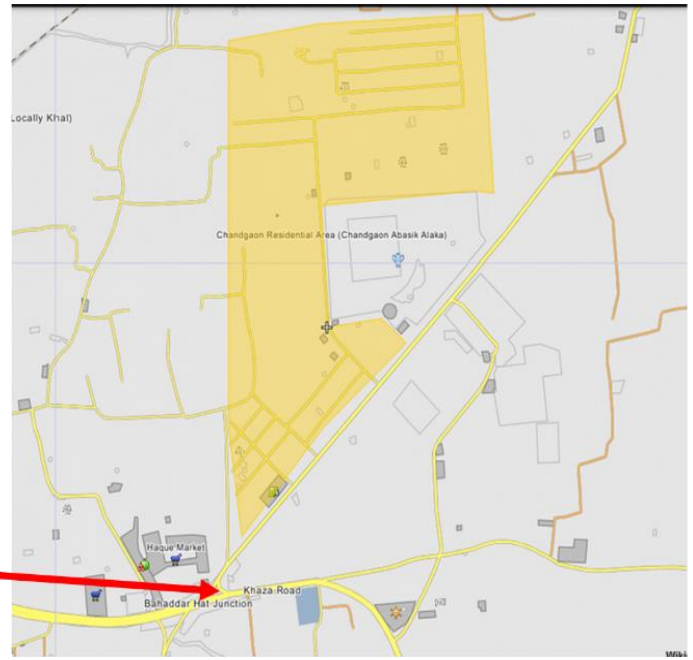
Road network details

Primary road Secondary Road Tertiary road

Fig : Site connectivity of road through the neighborhood area

Fig : Bahaddar Hut Junction

Fig : Bahaddar Hut Junction



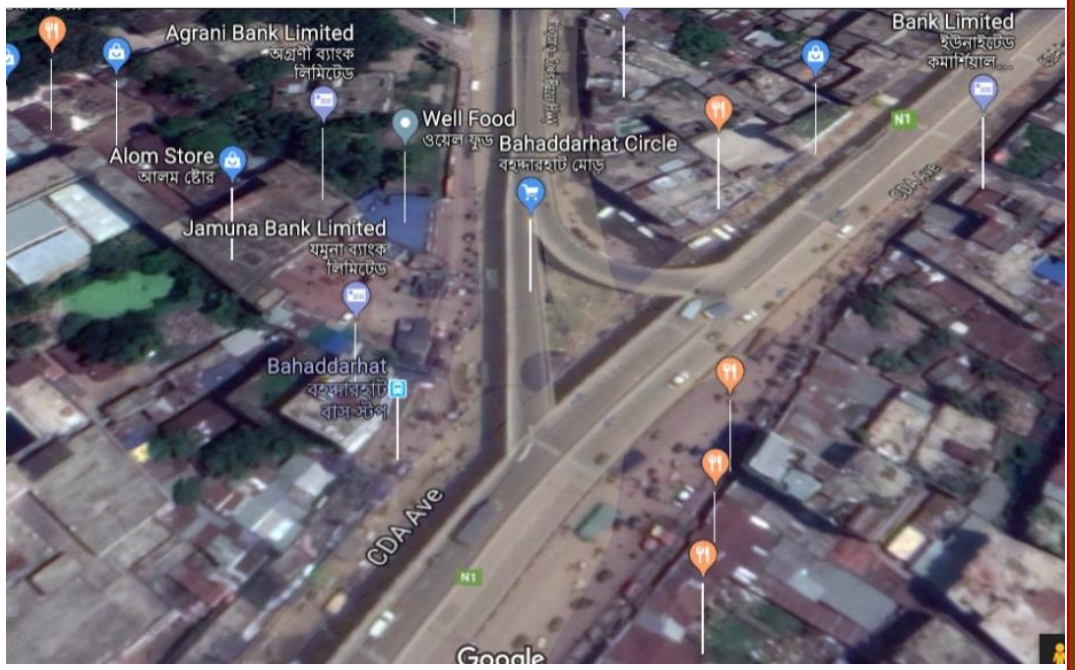
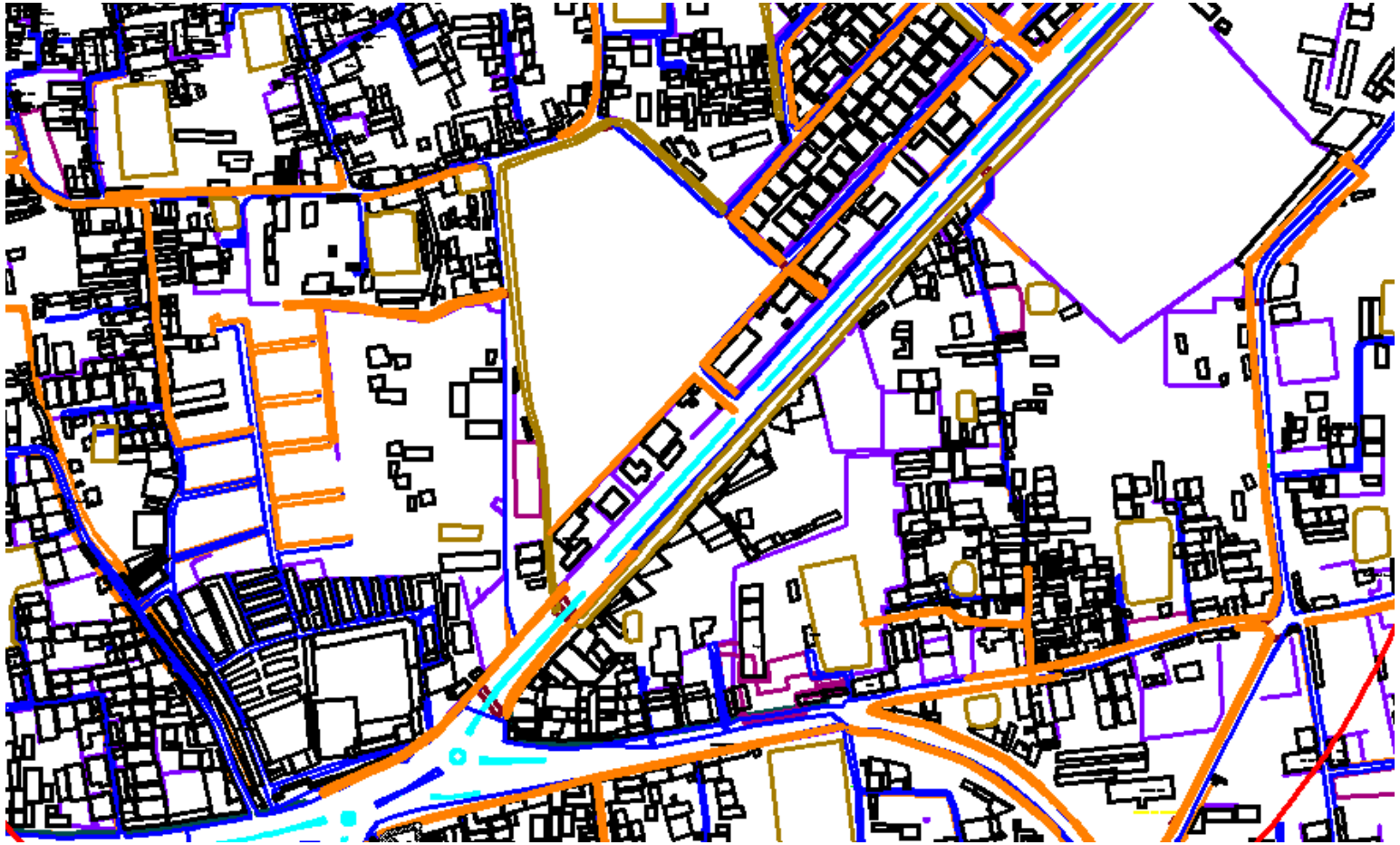


Fig : Bahhadrhat junction (Source : maps.google.com)



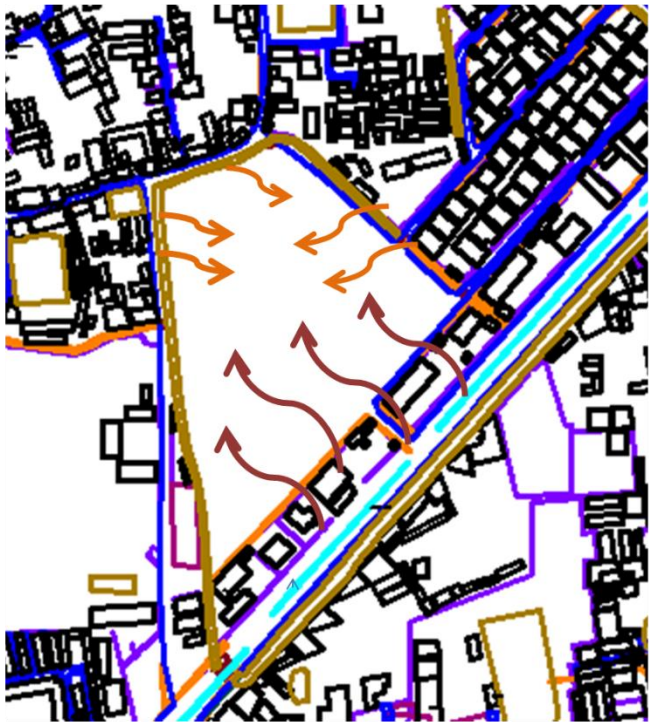
Pedestrian

Fig : Site connectivity of pedestrian through the neighborhood area

Findings

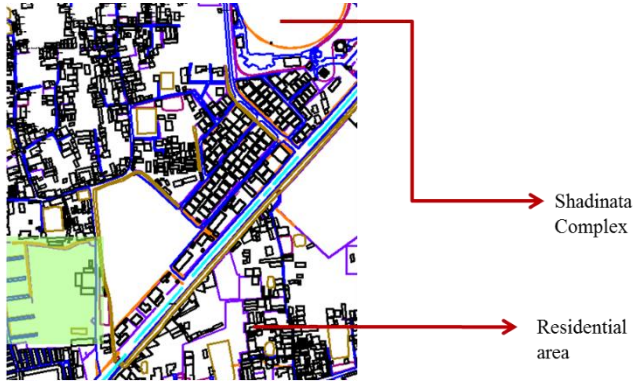
- Not continuous
- Not in good condition.
- Are broken
- The width is too less and not sufficient.
- Often occupied by vendors.

Site sensory (with respect to site surroundings)



Less intensity sound (from secondary 20' roads)
-source: rickshaws, CNG

More intensity sound (from Primary or main road)
-source : bus,CNG,tempo,rickshaw,truck,lorry,etc



View from height 20' and below.

View from height 20' and above.

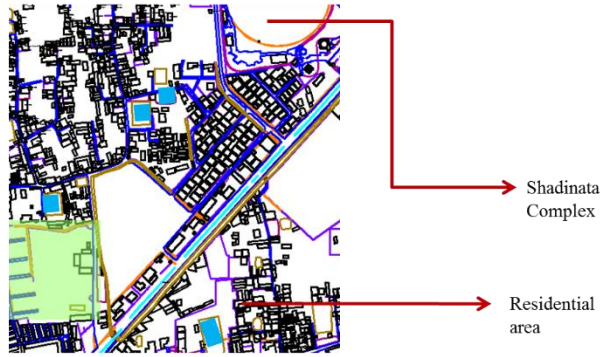


Fig Site sensory (with respect to site surroundings)

Site surroundings name

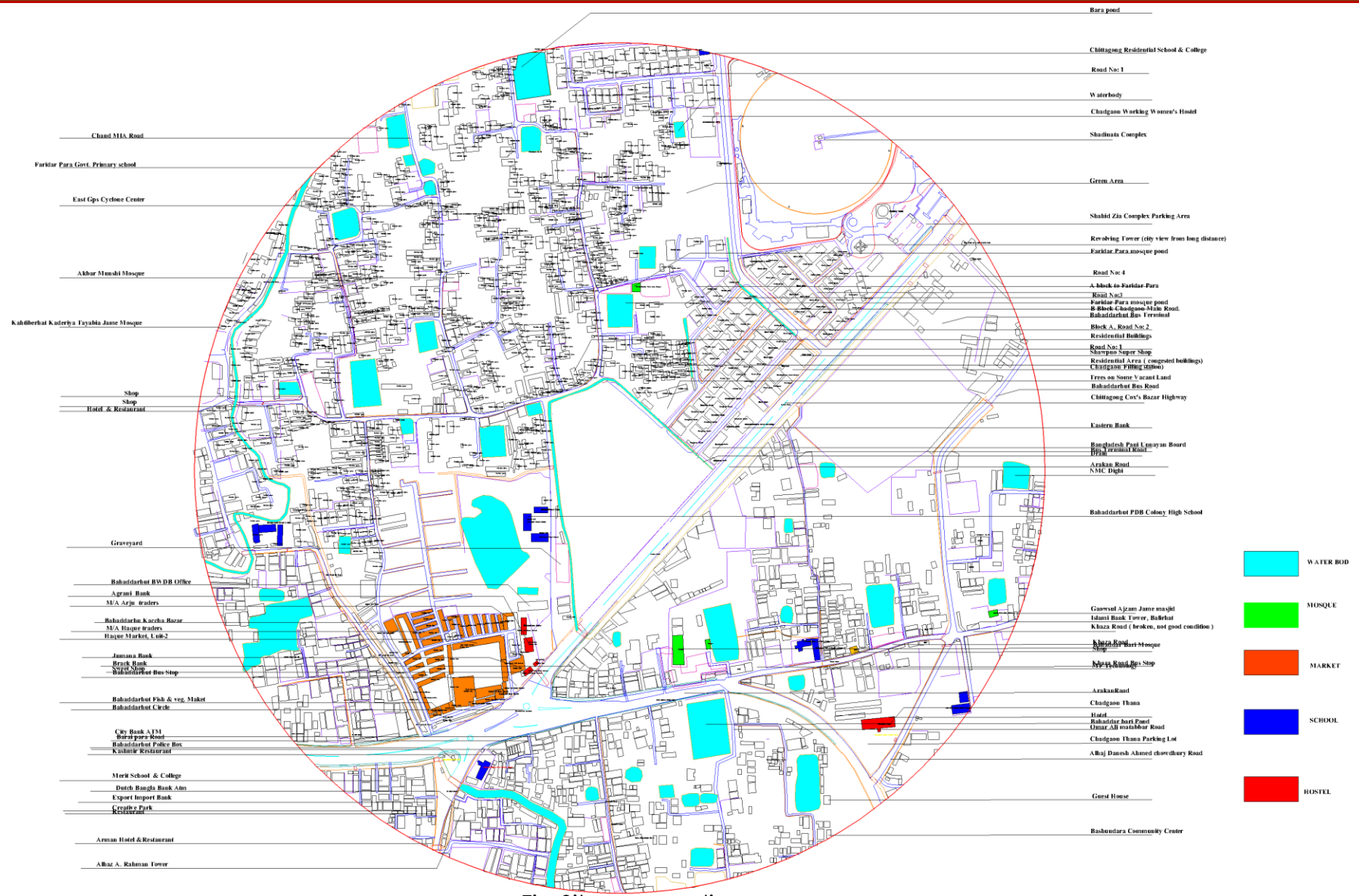


Fig Site surrounding name

Site surroundings name

Fig Existing Site surroundings

Climatic analysis

Sun-path diagram summer

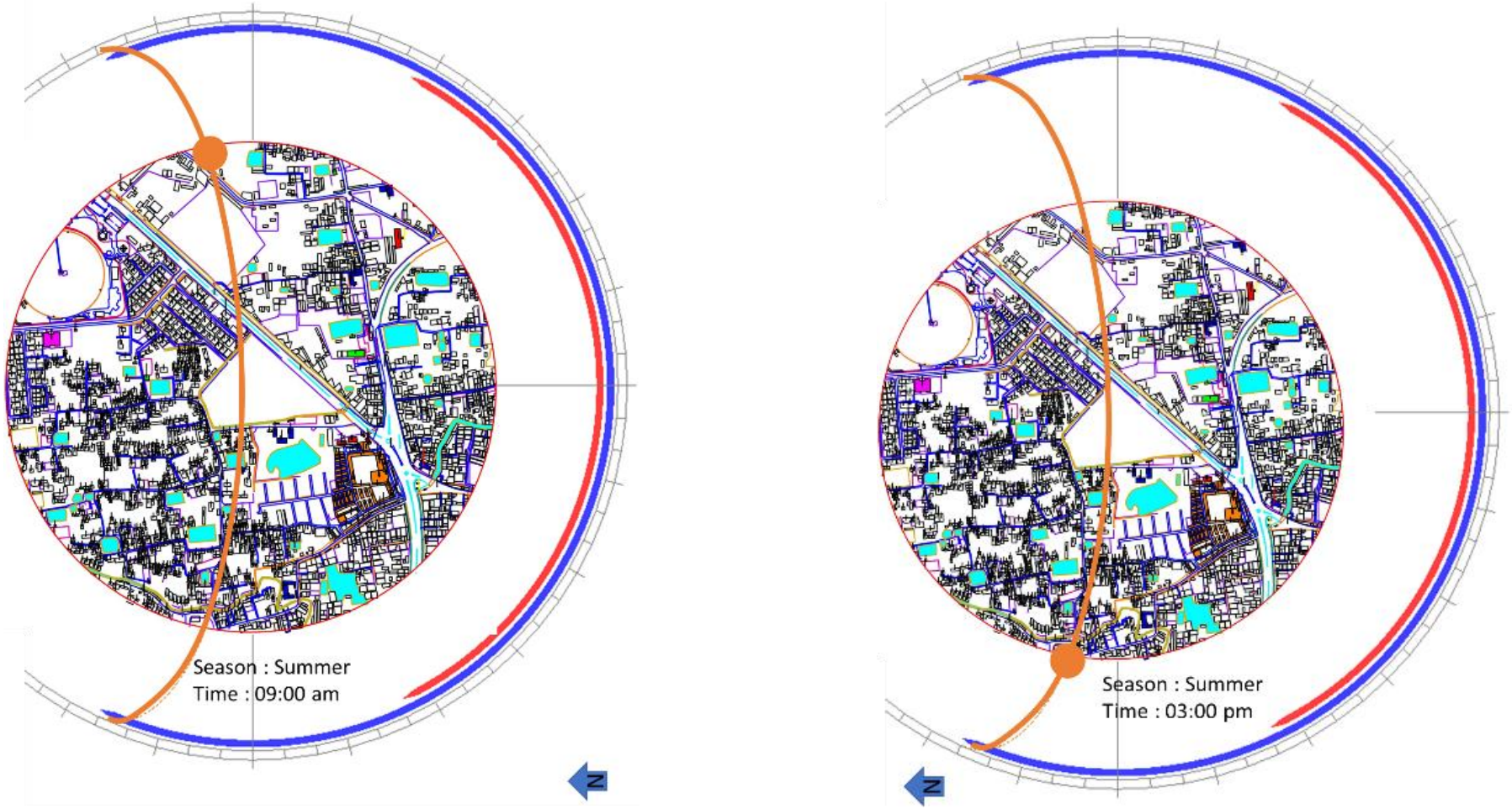


Fig Sun path diagram

Climatic analysis

Sun-path diagram (winter)

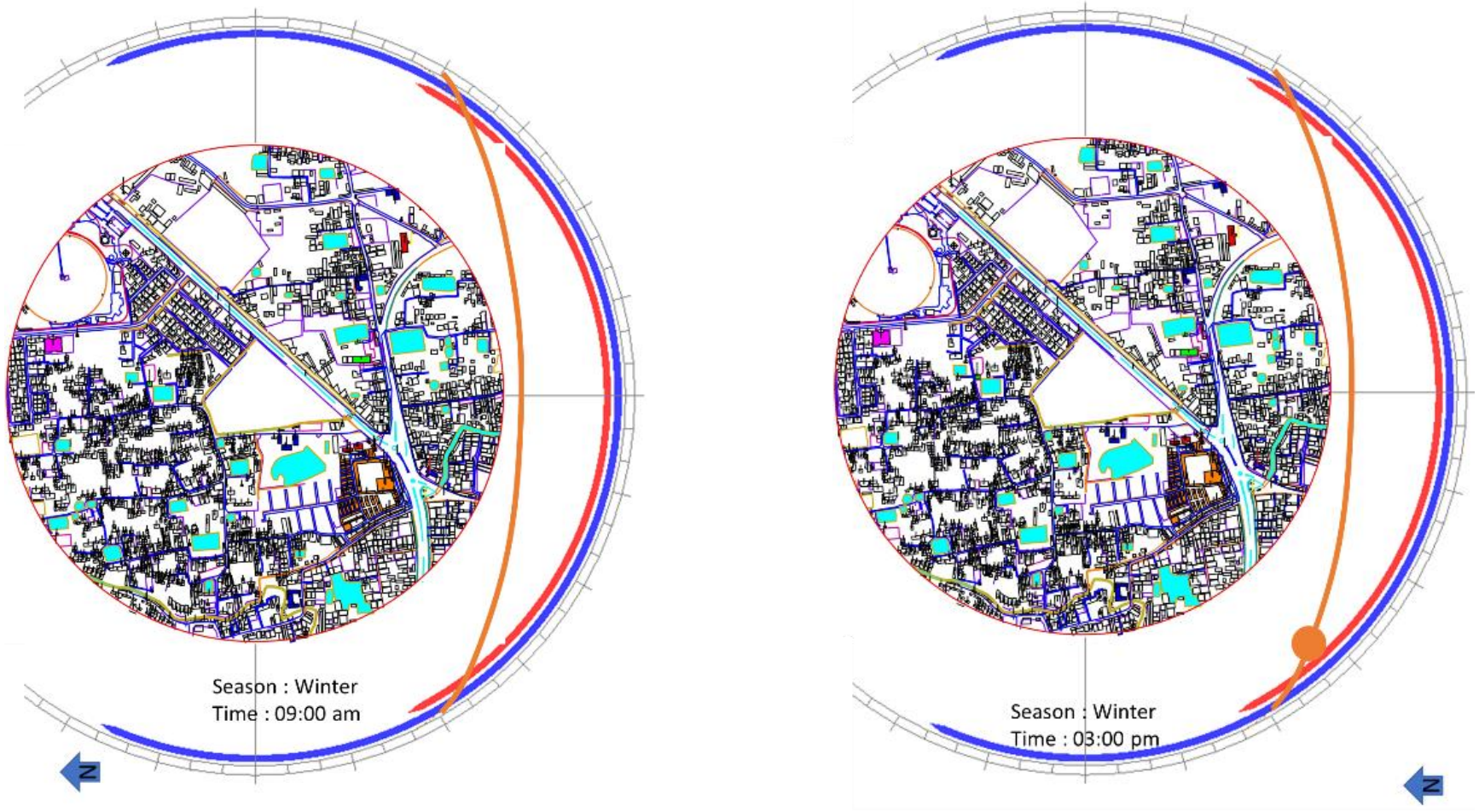


Fig Sun path diagram

Wind analysis

Summer wind from South East

Summer wind from South

Summer wind from South West

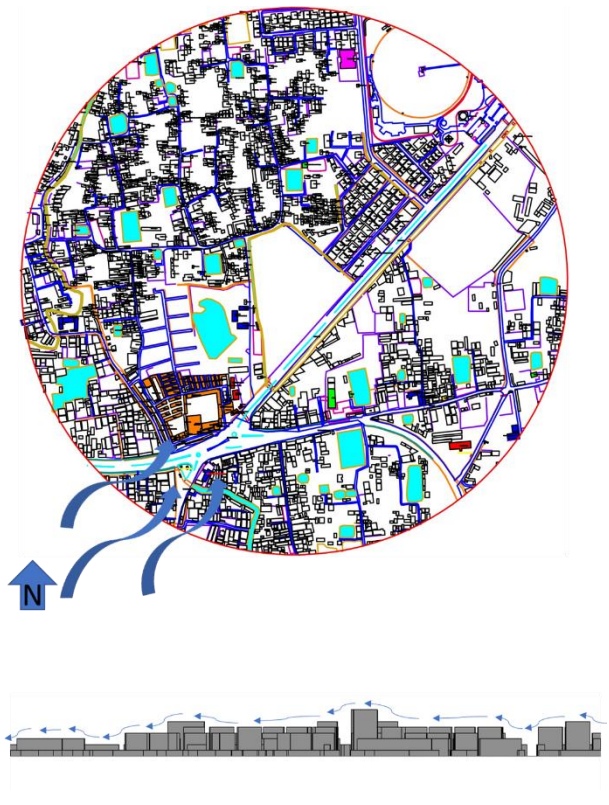
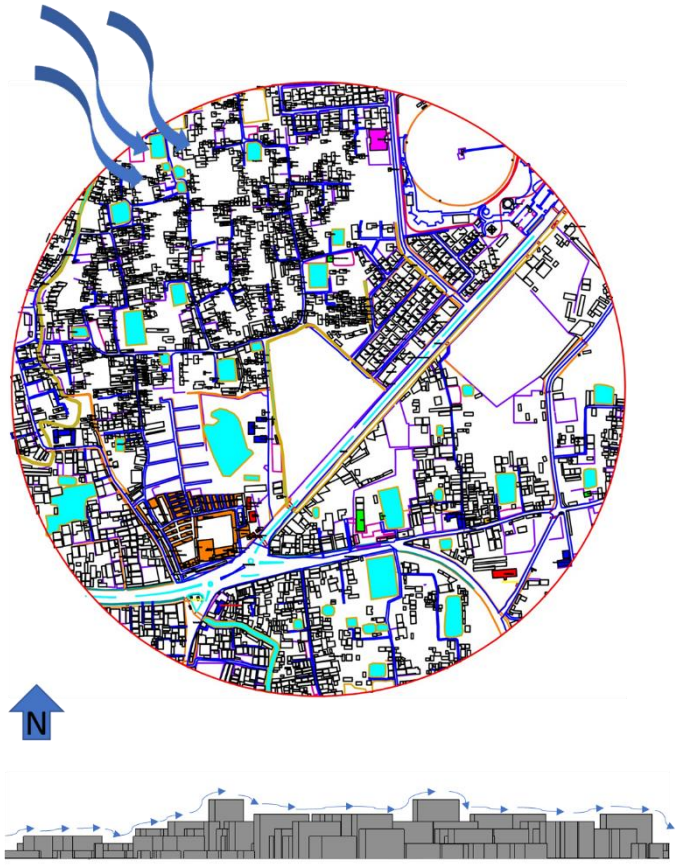


Fig :Wind analysis

Wind analysis

Winter wind from North west



Summer wind from North

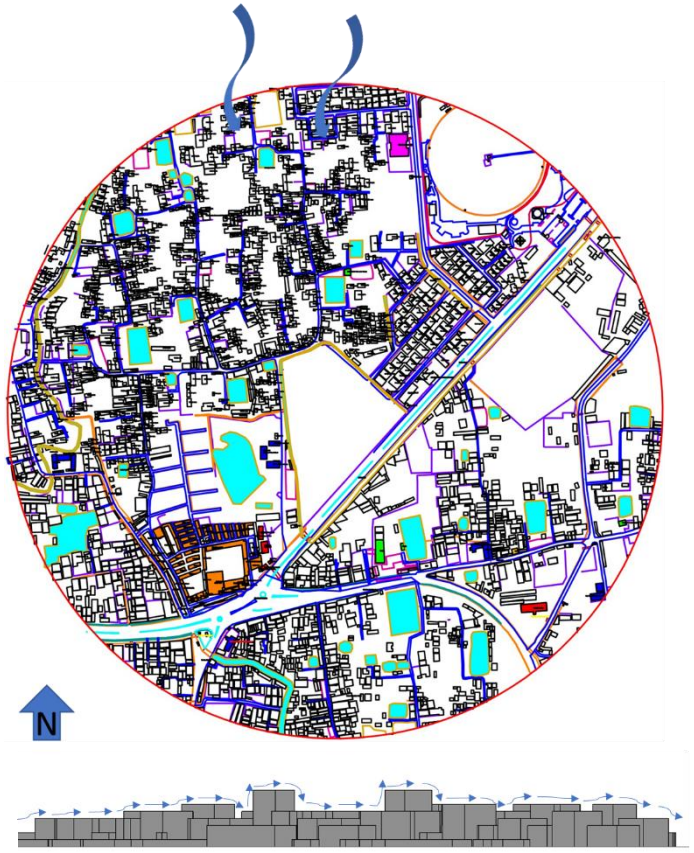


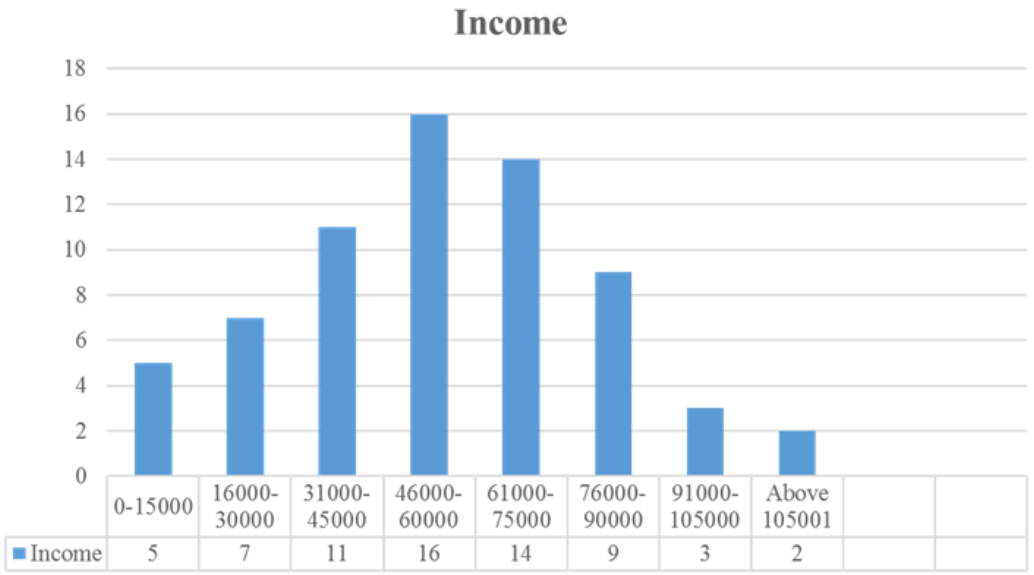
Fig :Wind analysis

Housing design sustainability survey in Chandgoan Abashik Area

In proposed site we are surveyed with local peoples needs, population, income level, age, family pattern, etc. . This surveyed data shown the total scenario in this site and denoted the ideas about site and client.

Income

There are many income level people are lived here. This data shown the income level of people of surveyed area



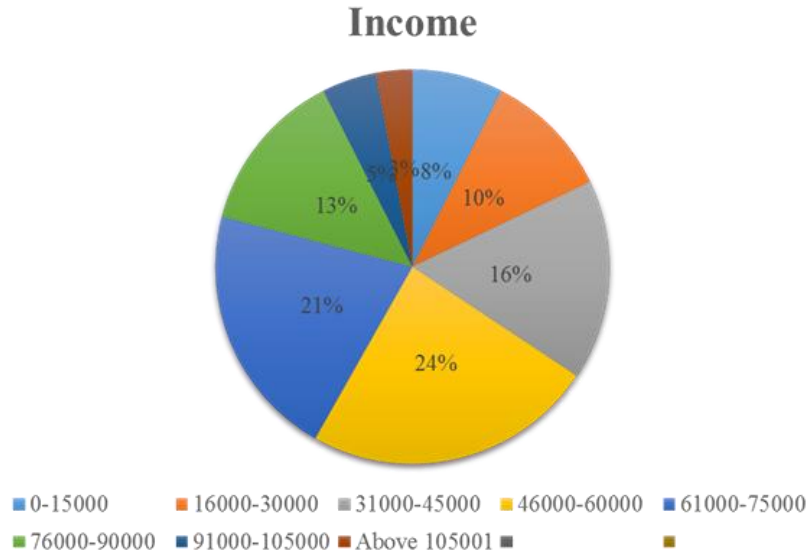
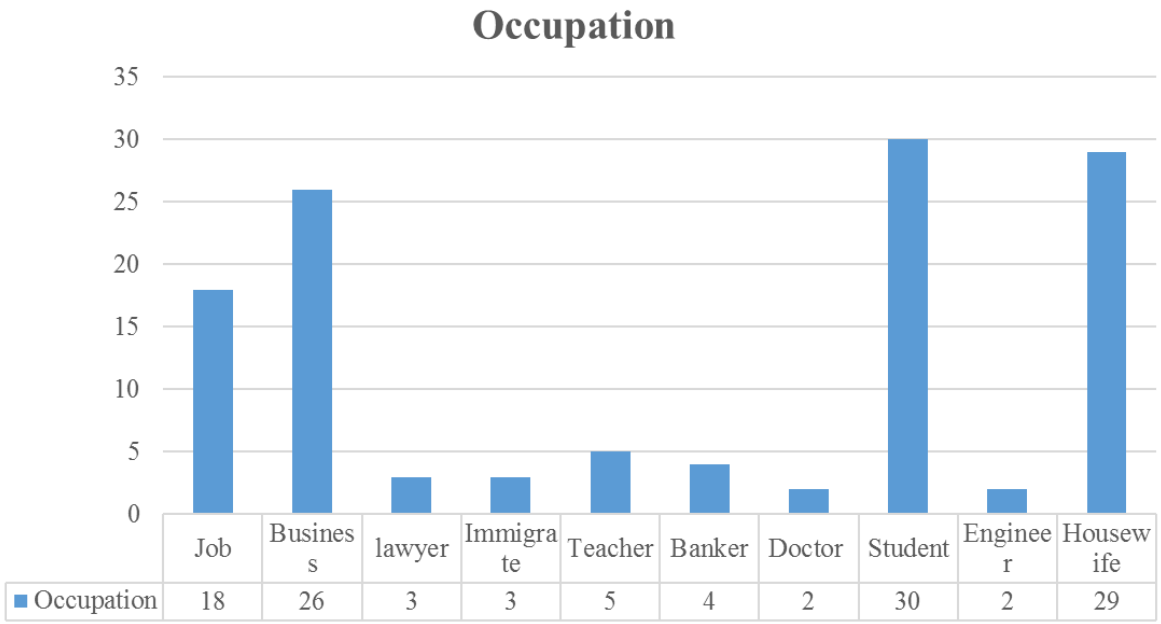
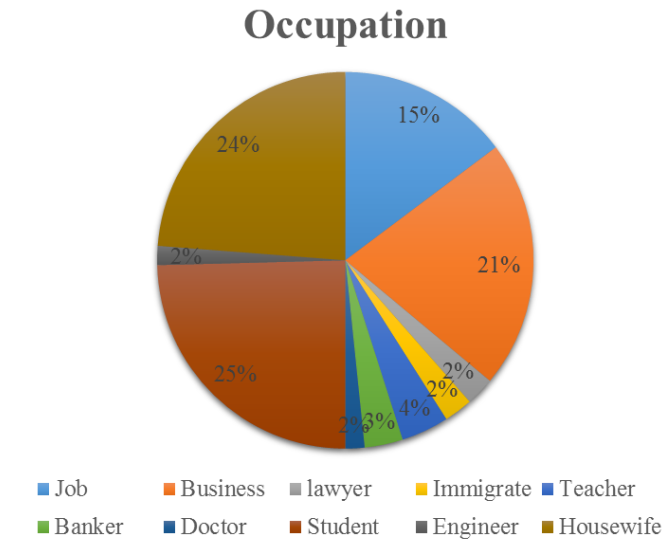


Fig : Income of surveyed people

Occupation

There are many Occupation level people are lived here. Businessman, Pvt job holder , Govt job holder , teacher , etc. occupation people are lived here. This data shown the occupation level of people of surveyed area





Education

There are many education level people are lived here. This data shown the education level of people of surveyed area

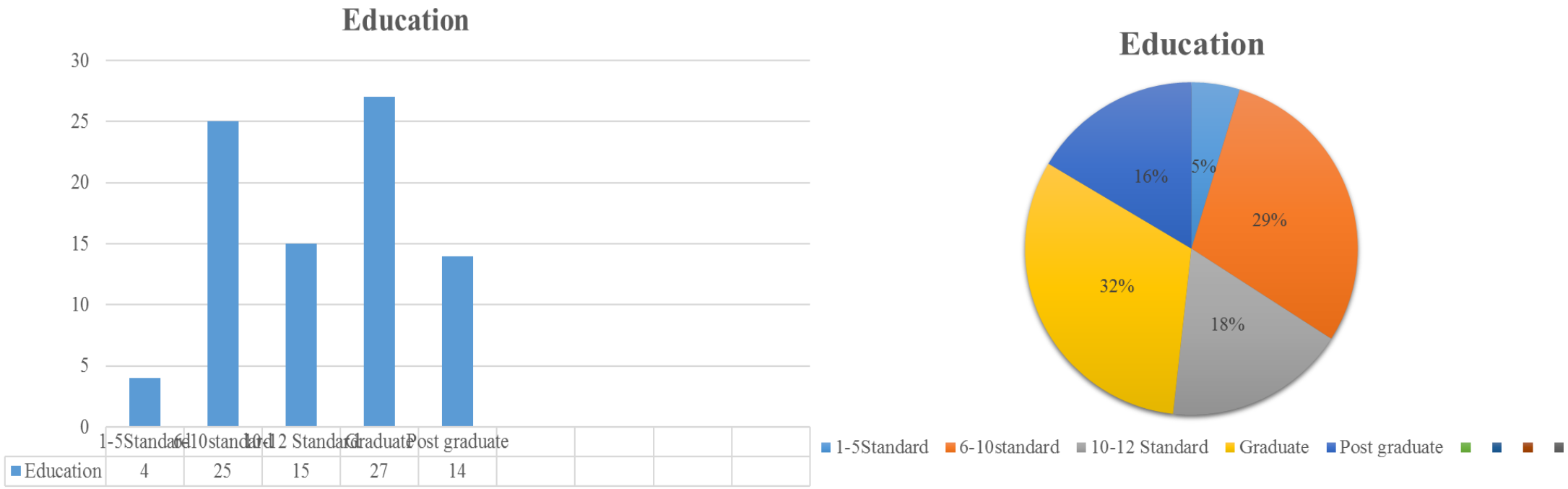


Fig : Education of surveyed people

Family pattern

There are many families lived here. the many family pattern are single family .This data shown the Family pattern of people of surveyed area.

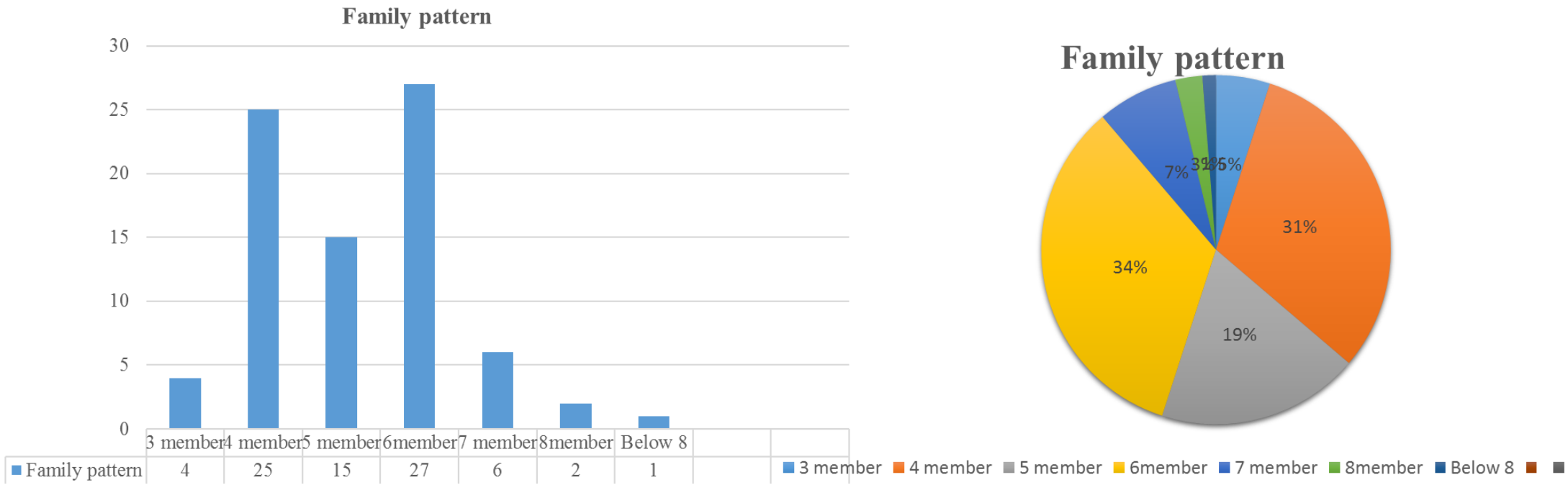


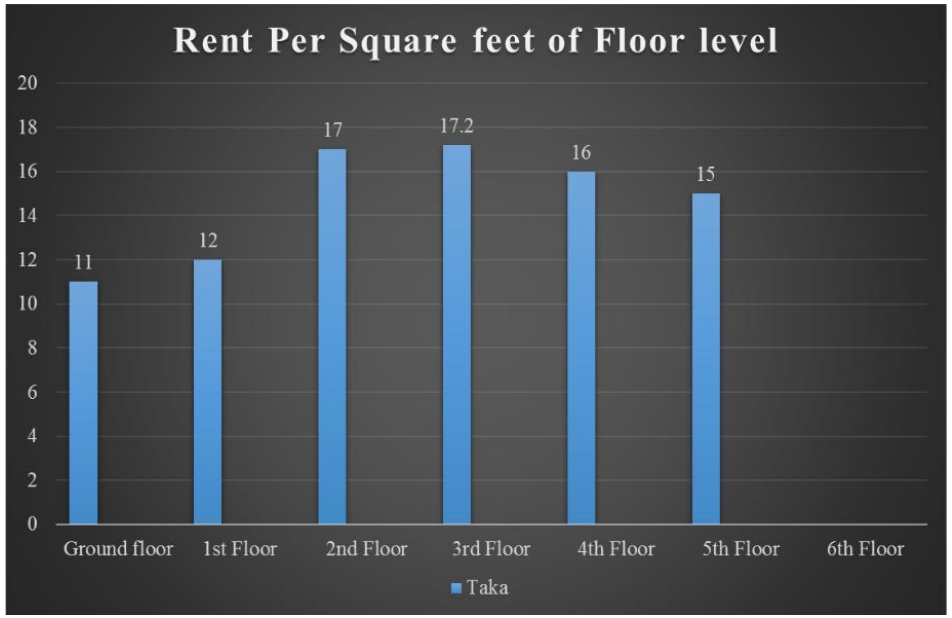
Fig : Family pattern of surveyed people

House rent

There are many rentable house in here. the many family are lived here. This data shown the House rent of people of surveyed area.

Work place and Leisure activity

There are many people lived in here. the workplace of people are different. This data shown the workplace and leisure activity of people of surveyed area.

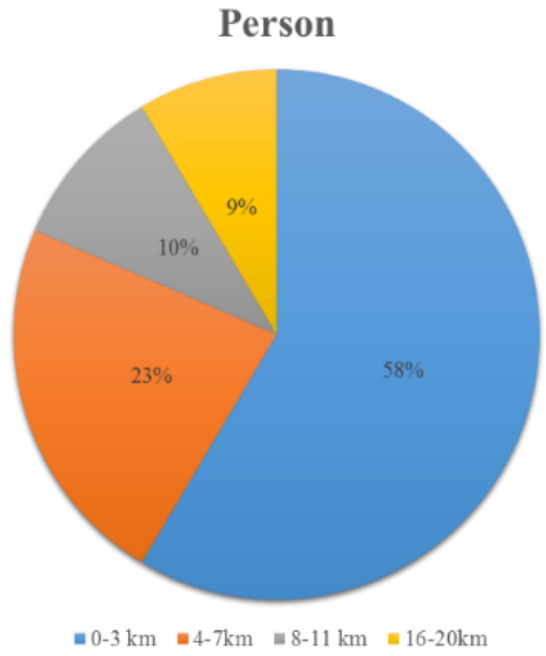


Floor Level	Rent per square feet
Ground Floor	11 tk
1st Floor	12 tk
2nd Floor	17 tk
3RD Floor	17.12 tk
4TH Floor	16 tk
5TH Floor	15.33 tk
6TH Floor	14.82 tk

Fig : House rent of surveyed people

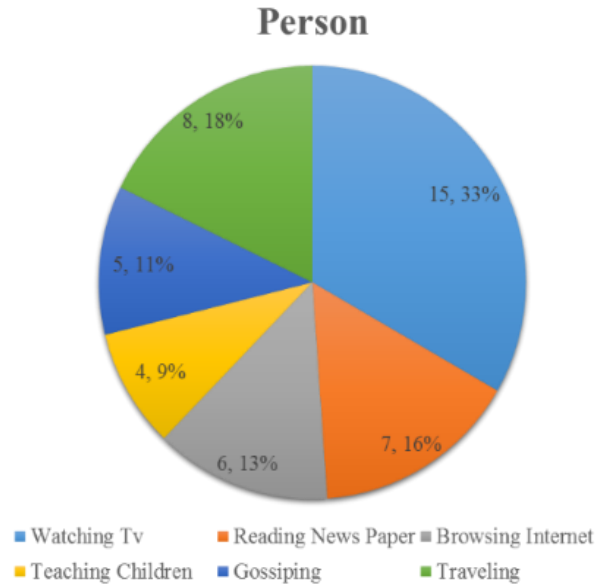
Working place distance

DISTANCE	PERSON
0-3 km	17
4-7 km	19
8-11 Km	13
12-15 km	2
16-20 km	3



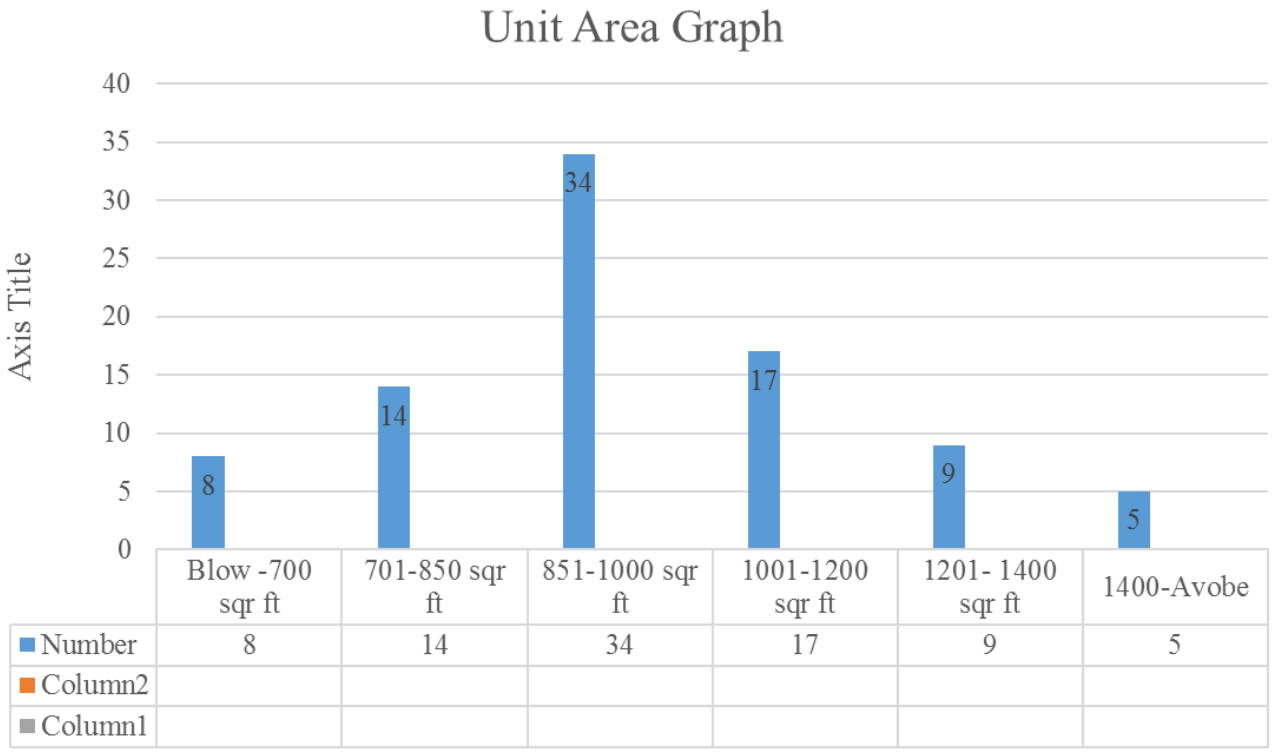
Leisure activity

Leisure Activity	Person
Watching TV	15
Reading News Paper, Book	7
Browsing Internet	6
Teaching Children	4
Gossiping	5
Traveling	8



Unit type

There are many people lived in apartment. The apartment unit are various type. This data shown the unit type area data of surveyed area.



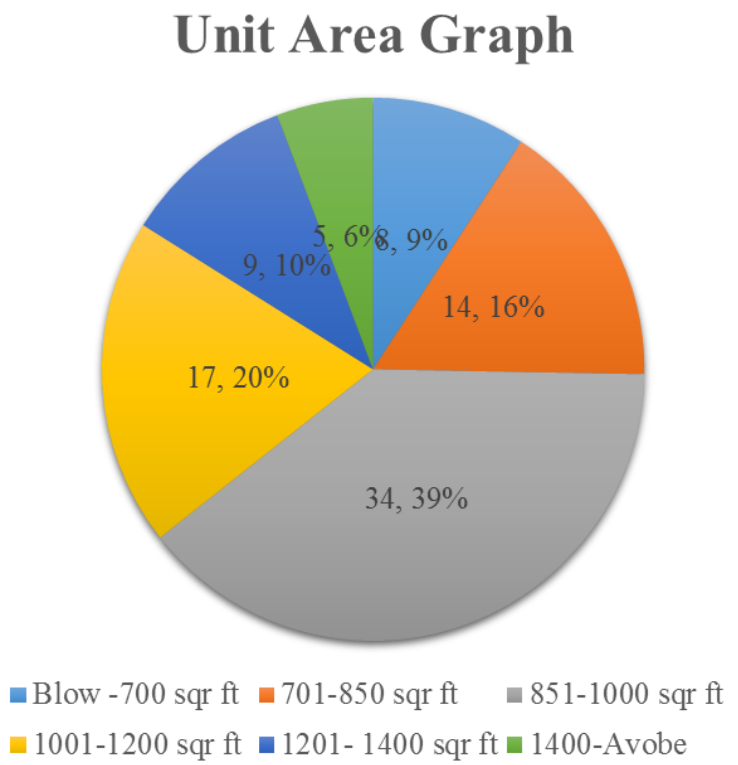
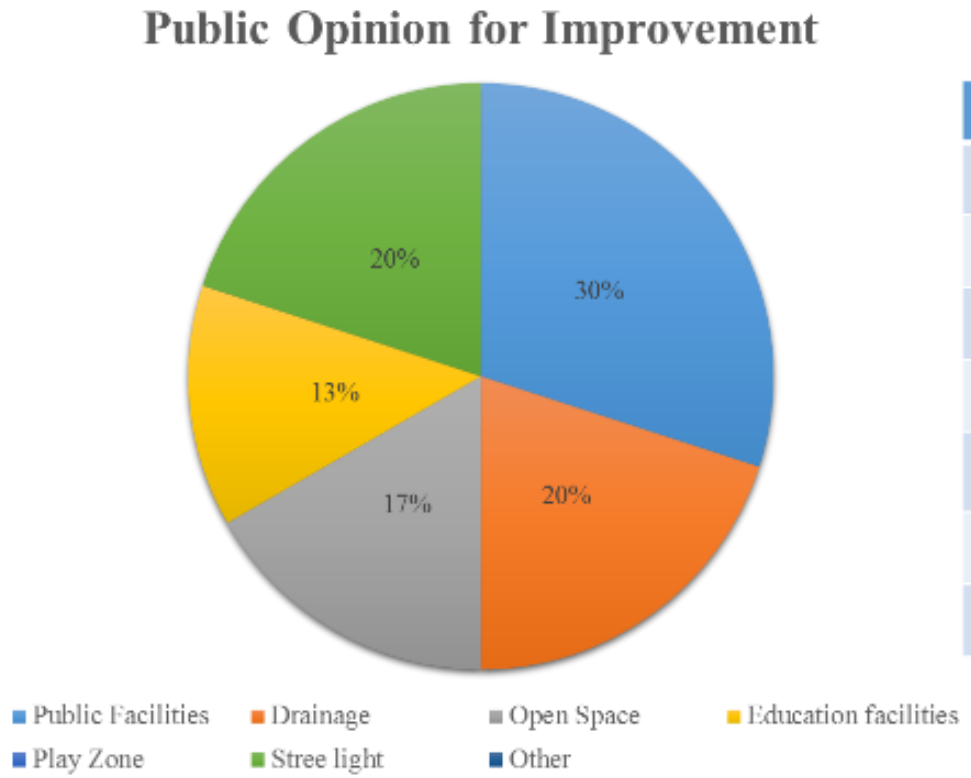


Fig : Unit type of surveyed people

Public opinions

Improvement things

The public opinions of this area , there are many improvement things



Public opinion for improvement	Number
Public facilities	9
Drainage	6
Open Space	5
Education facilities	3
Playing Zone	4
Street light	6
Other	7

Fig : Improvement things survey

Case study of Building on surveyed site

We are surveyed many existing buildings in proposed site. this building are denoted the scenario of this areas buildings type , planning , setback and authority rules .
This case study are given below

Case study :01
PLOT NO- 45D
Built are- 1917.28sqft.

SITE AREA	BUILT AREA	SET BACK	UNIT AREA	UNIT NO	COMMON SPACE	POPULATION	PARKING
2700sqft	1917.28 sqft	front-4'6"	type A-	2	127.78sqft	36	car-2
		back-2'6"	897.98sqft	total-12			bike:2
		left-3'10"	type B-				
		right-3'7"	908.85sqft				

Fig : Building location

Case study of Building on surveyed site

Case study :01

PLOT NO- 45D

Built are- 1917.28sqft.

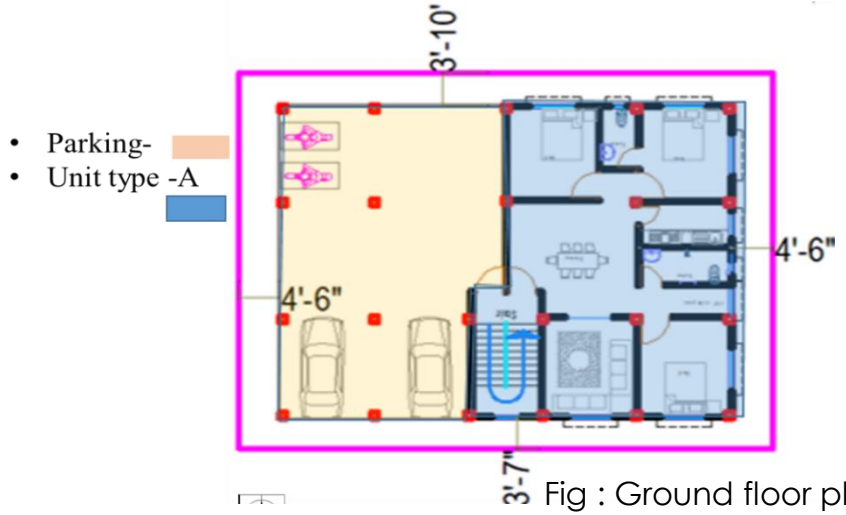


Fig : Ground floor plan

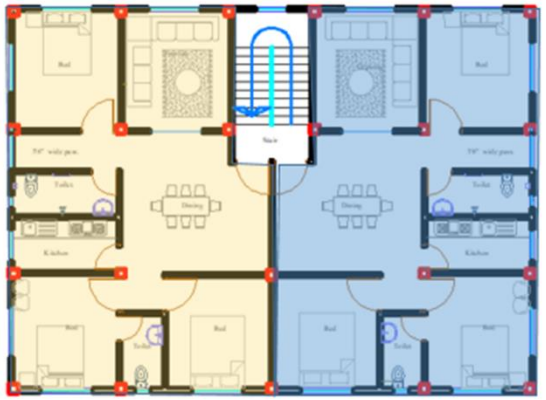


Fig : Typical floor plan

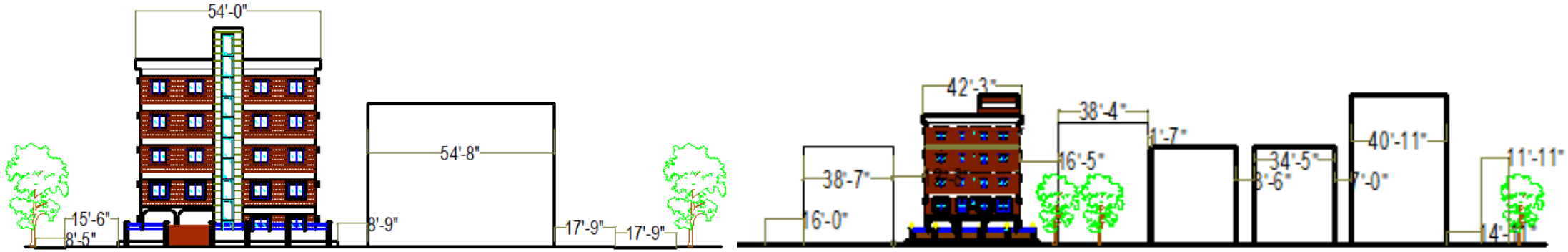


Fig : Sectional analysis

Conclusion:

- Parking space is not available.
- There is no veranda in any unit.
- For medium sized family.
- Case 1 road width is less

Case study :02

PLOT NO- 55A

SITE AREA	BUILT AREA	SET BACK	UNIT AREA	UNIT NO	COMMON SPACE	POPULATION	PARKING
2045sqft	1752.74 4sqft	front-1'6' back-2'6" left-6" right-1'2"	type A- 805.141sqft type B- 796.534sqft	2 total-09	133.125sqf	36	car-6

Fig : Building location

Case study :02

PLOT NO- 55A

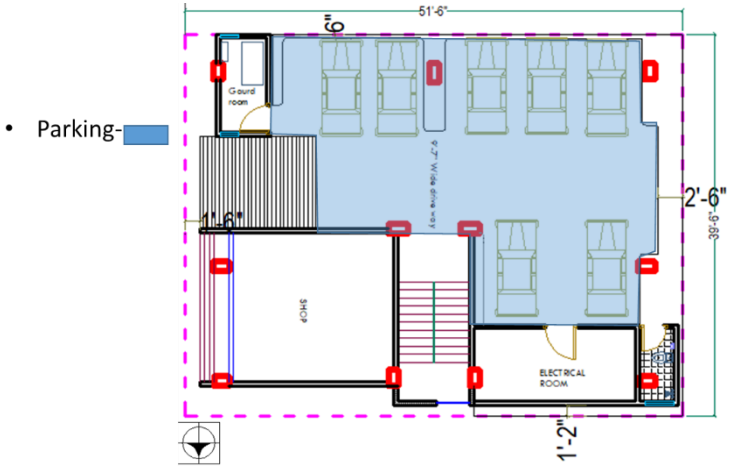


Fig : Ground floor plan

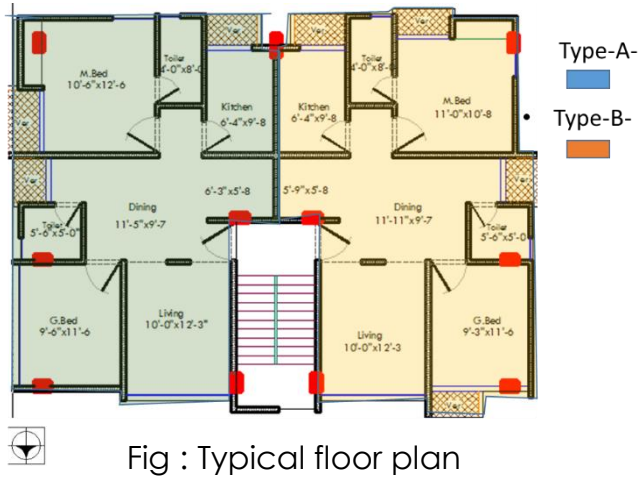


Fig : Typical floor plan

Conclusion

- Parking space is available.
- Veranda is present every unit.
- For medium or small sized family.
- Road width 14'1

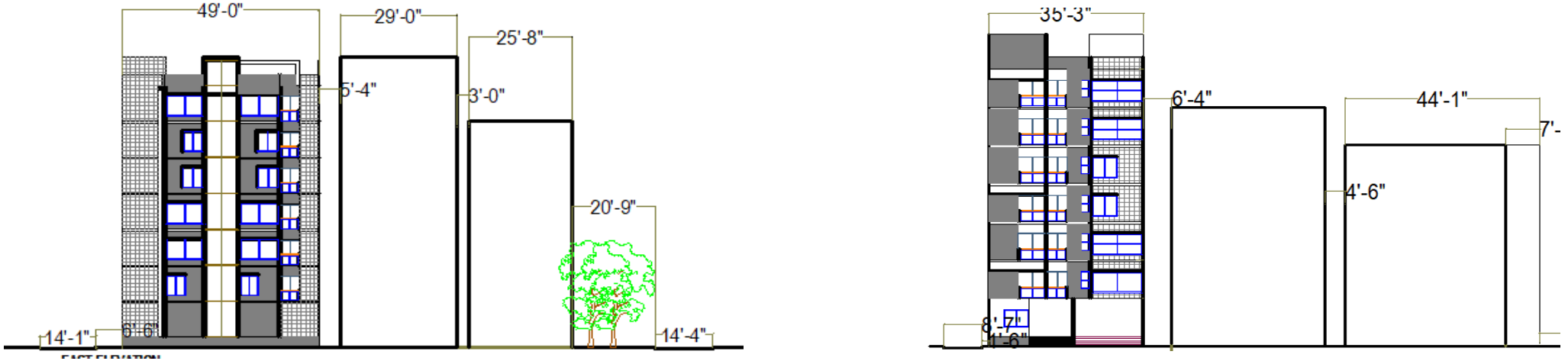
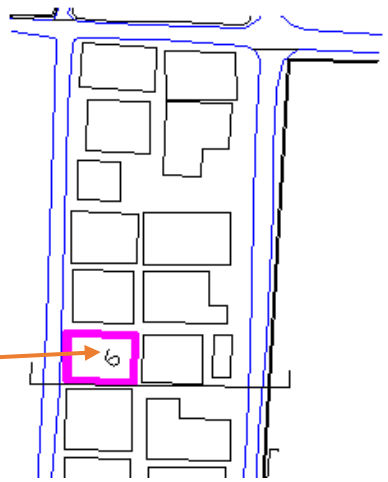


Fig : Sectional analysis

Case study :03

PLOT NO- 67D

Built area - 1912.80 sqft.



SITE AREA	BUILT AREA	SET BACK	UNIT AREA	UNIT NO	COMMON SPACE	POPULATION	PARKING
2160.104sqft	1912.80 0sqft	front-3'9" back-2'6" left-2'8" right-2'6"	type A- 1045.455sqf type B- 715.242sqft type C- 876.896sqft type D- 876.896sqft type E- 972.36sqft type E- 875.45sqft	2 total-12	140.13sqft	46	car-2

Fig : Building location

Case study :03

PLOT NO- 67D

Built area - 1912.80 sqft.

- Type-A-
- Type-B-
- Type-C-
- Type-D-
- Type-E
- Type-F

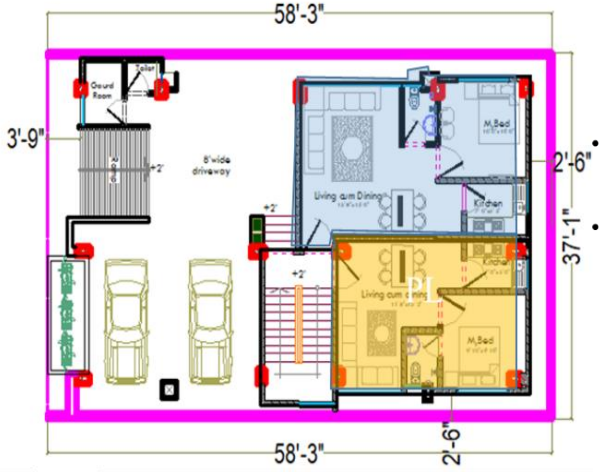


Fig : Ground floor plan

Fig : 1st floor plan

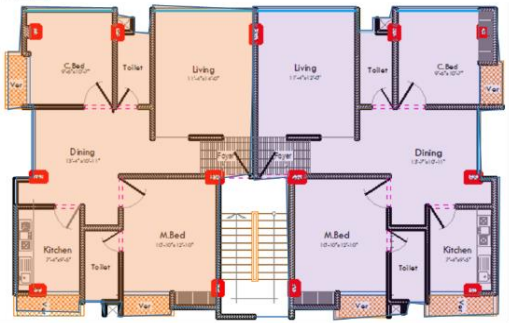
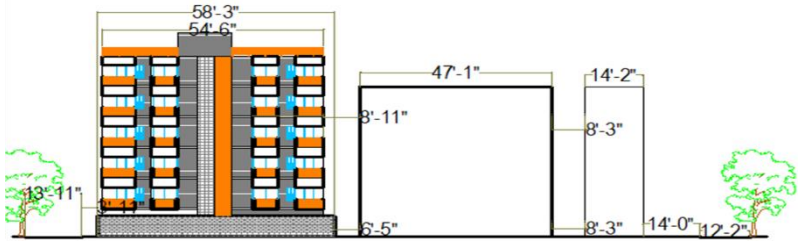


Fig : Typical floor plan

Conclusion:

- Parking space is not available.
- Verandah is present every unit.
- For medium or small sized family.
- Road width 13'8".
- Ground floor has 1 bedroom, first floor has 3 bedroom & 2 bedroom. Typical floor has 2 bed room



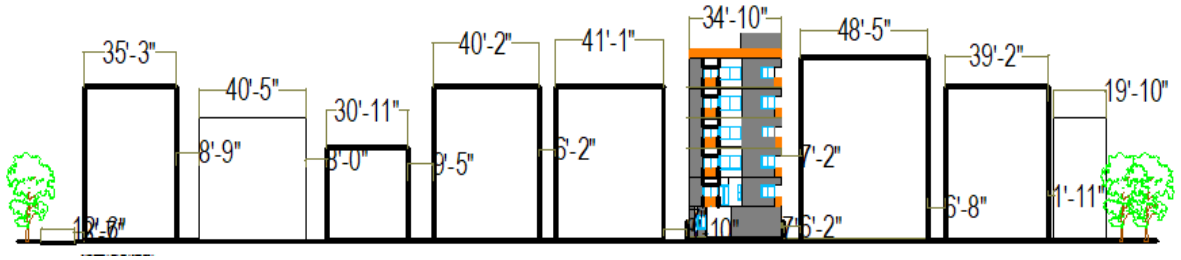
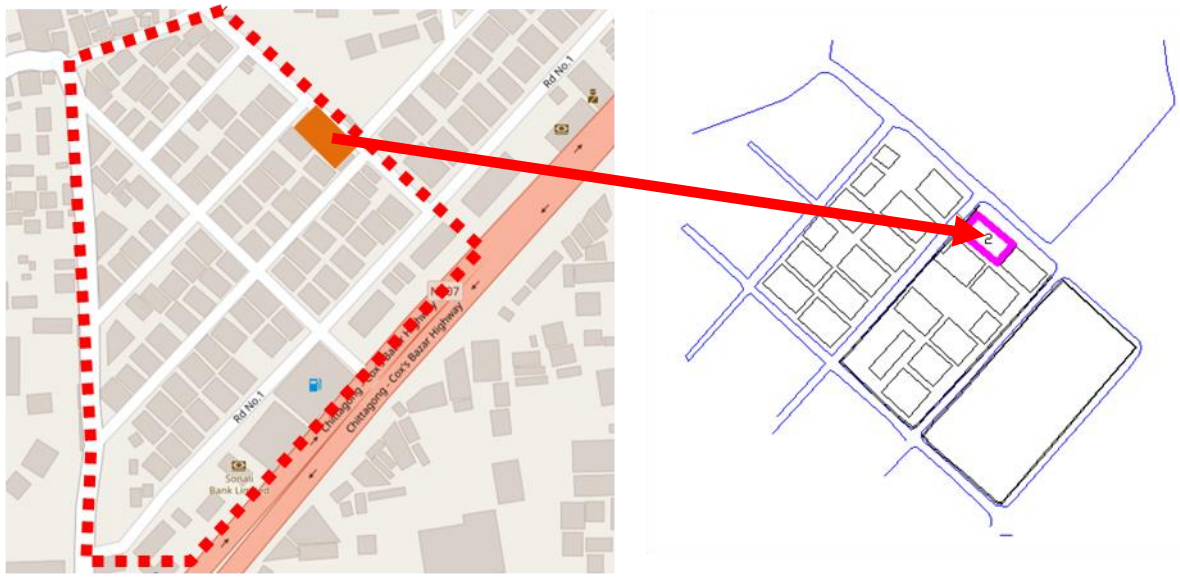


Fig : Sectional analysis

Case study :04

Site area: 2800 sqft
Built area: 1922 sqft
Road width: 13'-2" , 12'-5"



FLOOR	UNIT NOS	AREA (in sqft)	SET BACK			
			F	B	L	R
GROUND FLOOR	1	TYPE A: 448.143	3'	3'	3'	3'
TYPICAL FLOOR	2	TYPE B : 449.543 TYPE C : 449.523				

Fig : Building location

Case study :04

Site area: 2800 sqft
Built area: 1922 sqft
Road width: 13'-2" , 12'-5"

Fig : Typical floor plan

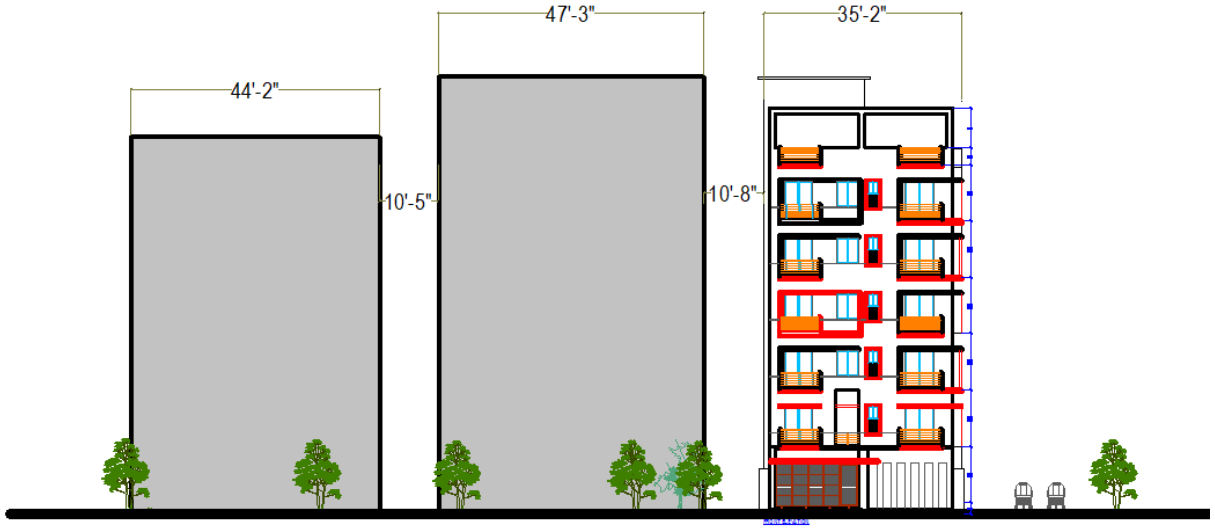


Fig : Sectional analysis

Conclusion:

- The width of the road, pedestrian and drains are not proper.
- The pedestrian is too small for people to have a comfortable walk.
- There is no proper drop off for vehicles.
- The drains are present immediately front of the building's gateway.

Proposed design

Implementation

Apartment complex is infect a vertical village for better interaction to the community people

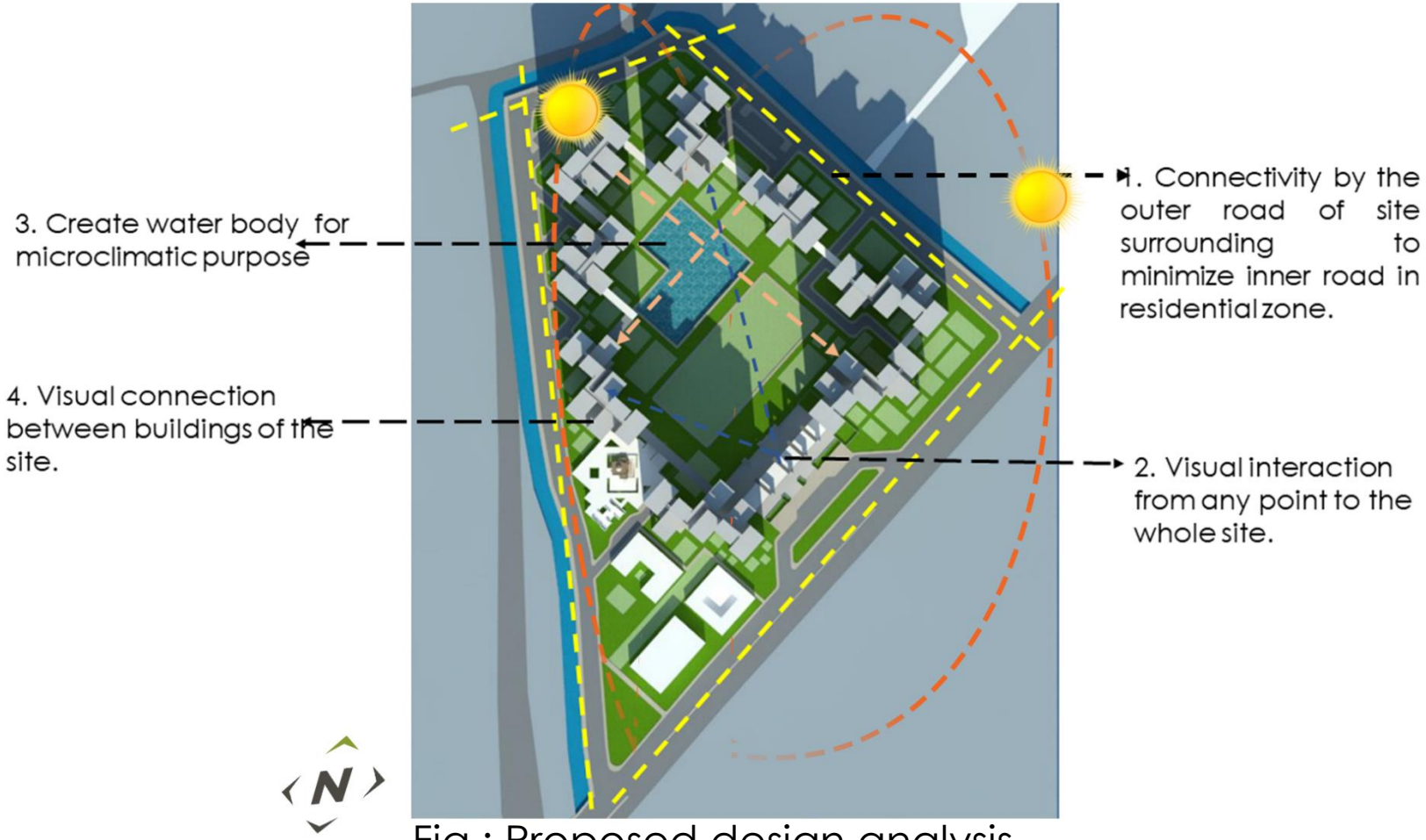


Fig : Proposed design analysis

Fig : Conceptual ideas -1

Fig : Conceptual ideas -2

Fig : Conceptual ideas -3

Fig : Conceptual ideas -4

Shadow analysis

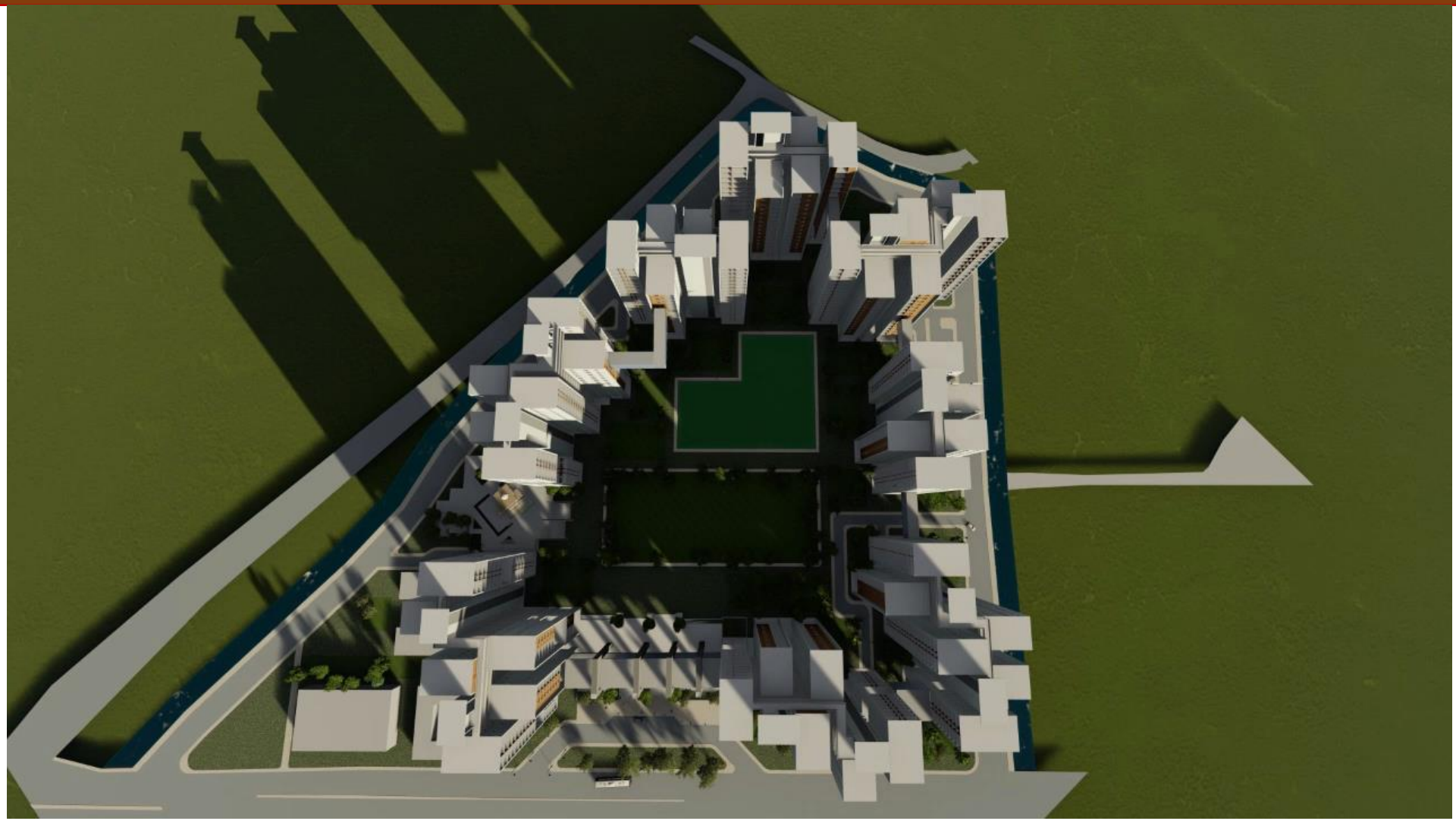


Fig : Proposed design analysis

Functions

There are we use many functions . They are necessary for housing per housing design rule and **BNBC code** .

1. **Residential block**
2. **School**
3. **Health Center**
4. **Mosque**
5. **Market**
6. **Play-Ground**
7. **Pond**

There are use under-ground drainage system

Area calculation

Name	Area
Total area	10.7 acre
Total unit	750 nos
Total population (per unit- 5nos)	3750
person in per acre (Gov rule)	350 nos
Per acre 350	(10.7x 350)= 3745
Ground coverage (residential block)	78409 sft (1.8 acre)
Ground coverage (utilities)	30950 sft (0.73 acre)
Road coverage (outer)	79382 (1.83 acre)
Road coverage (inner)	33000 sft (0.76 acre)
Water body	23450 sft (0.54 acre)
Other (soft pedestrian And green space)	5.04 acre
total	5.66+5.04 =10.7 acre

Structural system

In this design we are use **shear wall** structural system.

A **shear wall** is a structural panel that can resist lateral forces acting on it.

Lateral forces are those that are parallel to the plane of the wall, and are typically wind and seismic loads. In simple terms, lateral forces could push over parallel structural panels of a building were it not for perpendicular **shear walls** keeping them upright.

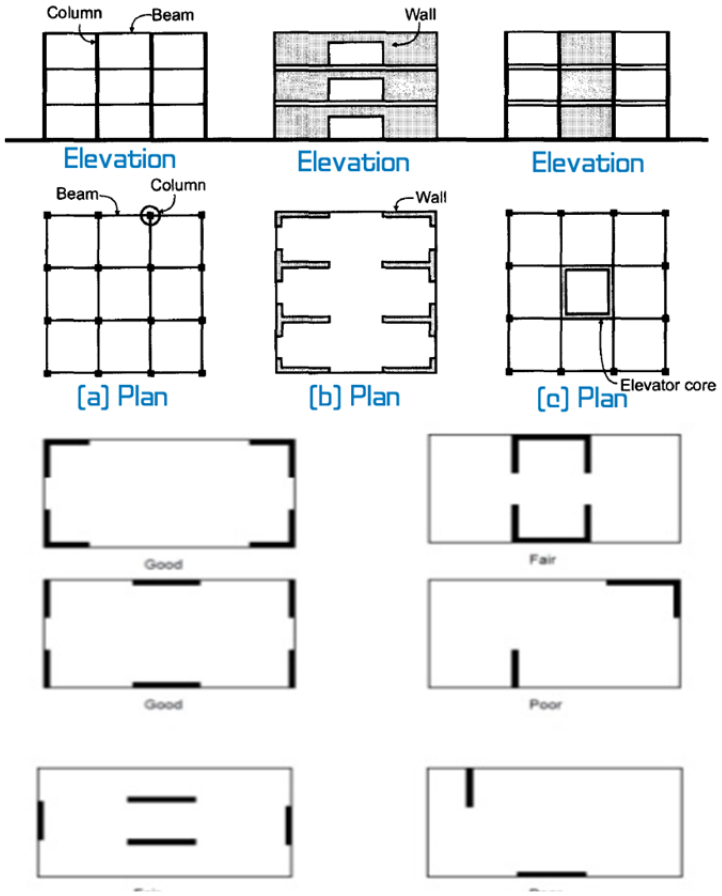


Fig : Plan & Placement of Shear wall structure

Materials

Reinforced concrete (RC) *(also called reinforced cement concrete or RCC)* is a composite material in which concrete's relatively low tensile strength and ductility are counteracted by the inclusion of reinforcement having higher tensile strength or ductility.

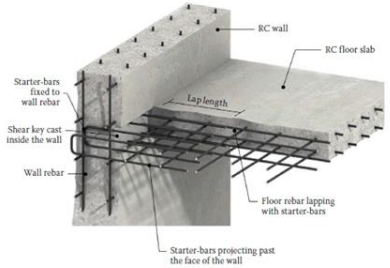


Fig : RC Structure

Brick

A **brick** is building material used to make walls, pavements and other elements in masonry construction. Bricks are produced in numerous classes, types, materials.

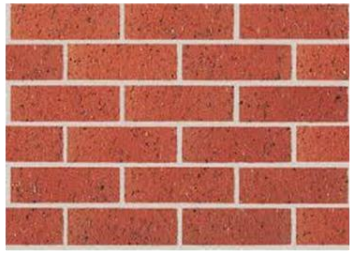


Fig : Brick

Float glass

Float glass is a sheet of glass made by floating molten glass on a bed of molten metal. This method gives the sheet uniform thickness and very flat surfaces.

Fig : Float glass

Aluminum bar

Aluminum bar is produced by several different processes. These processes elongate the aluminum into circular or **bar**-shaped pieces that can be machined into all kinds of applications.

Fig: Aluminum bar

Circulation Analysis

Fig : Basement floor plan

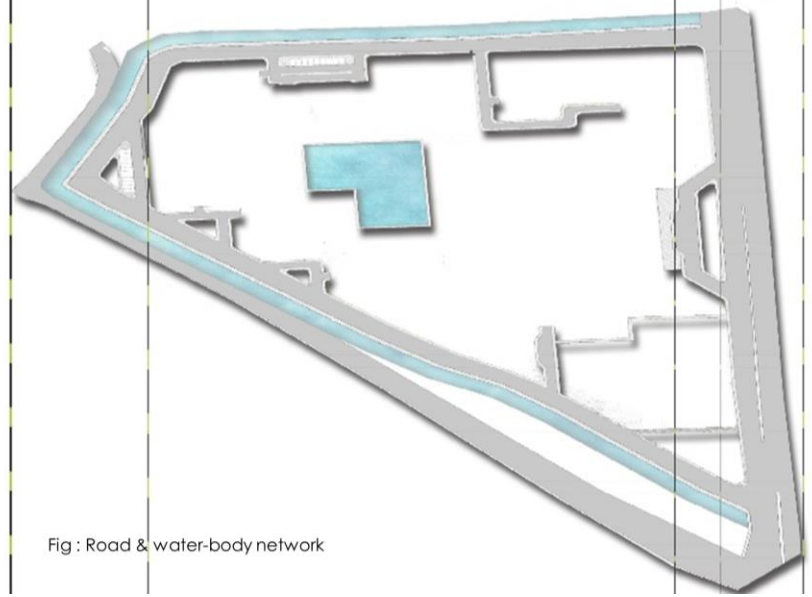
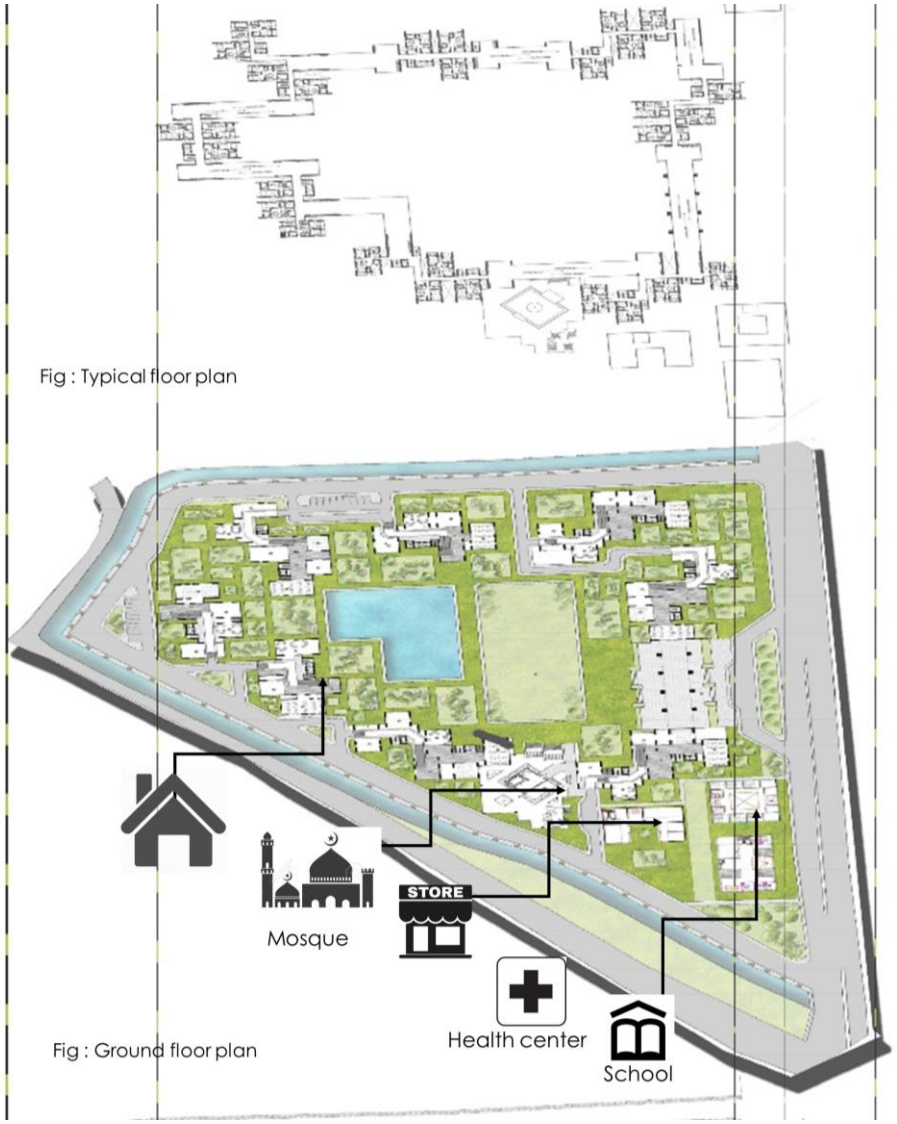


Fig : Road & water-body network

Circulation Analysis



Circulation Analysis

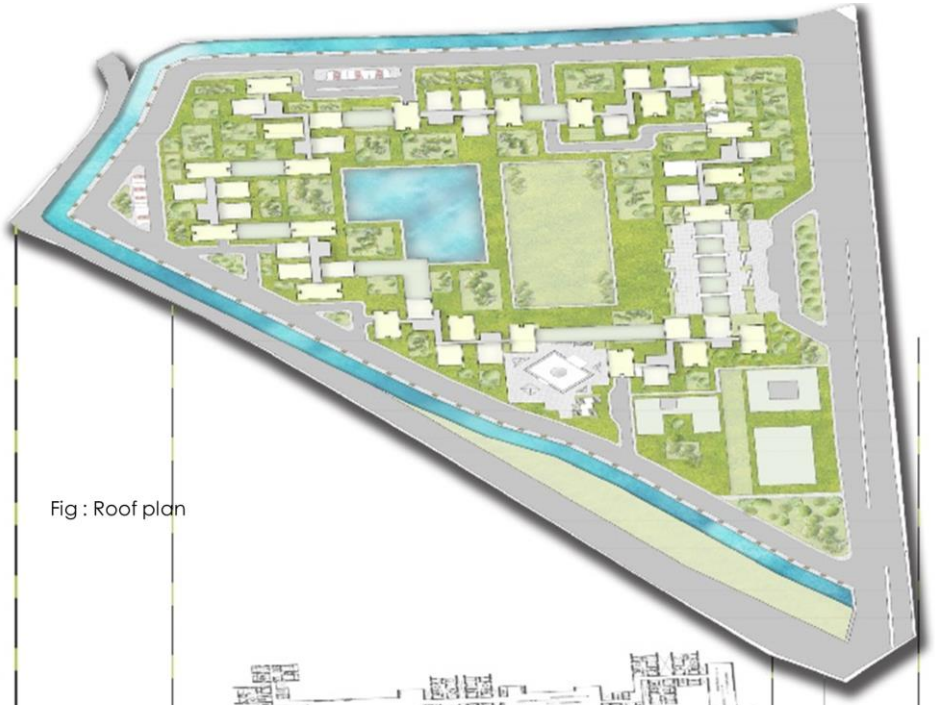


Fig : Roof plan

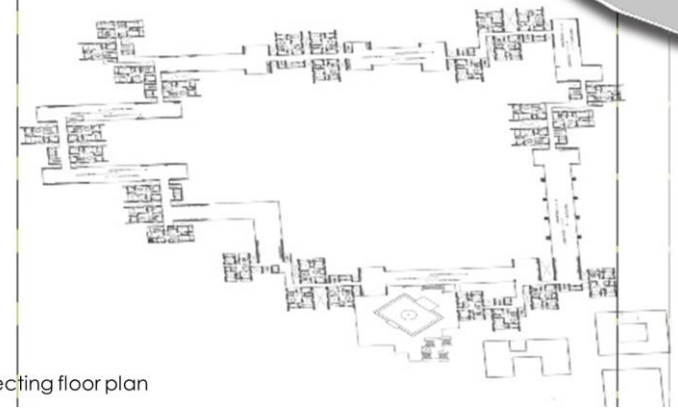


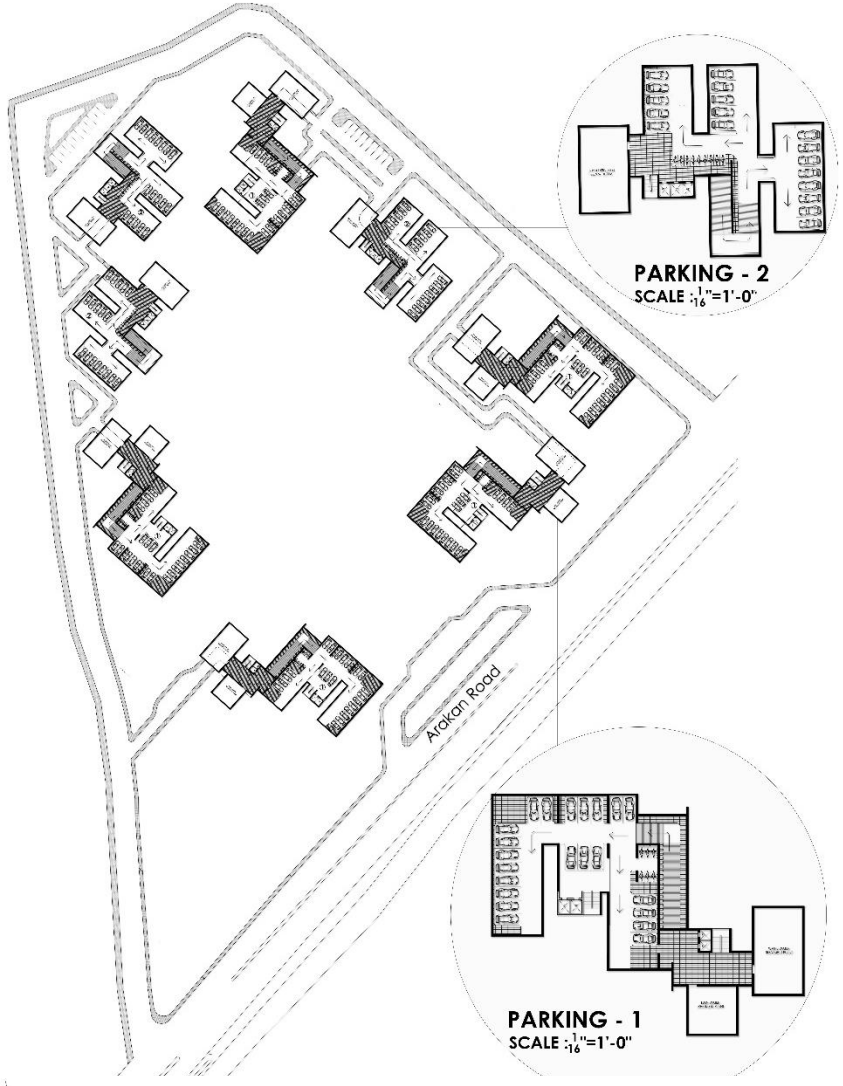
Fig : Connecting floor plan

Plan

ROOF PLAN
SCALE : 1/44"=1'-0"

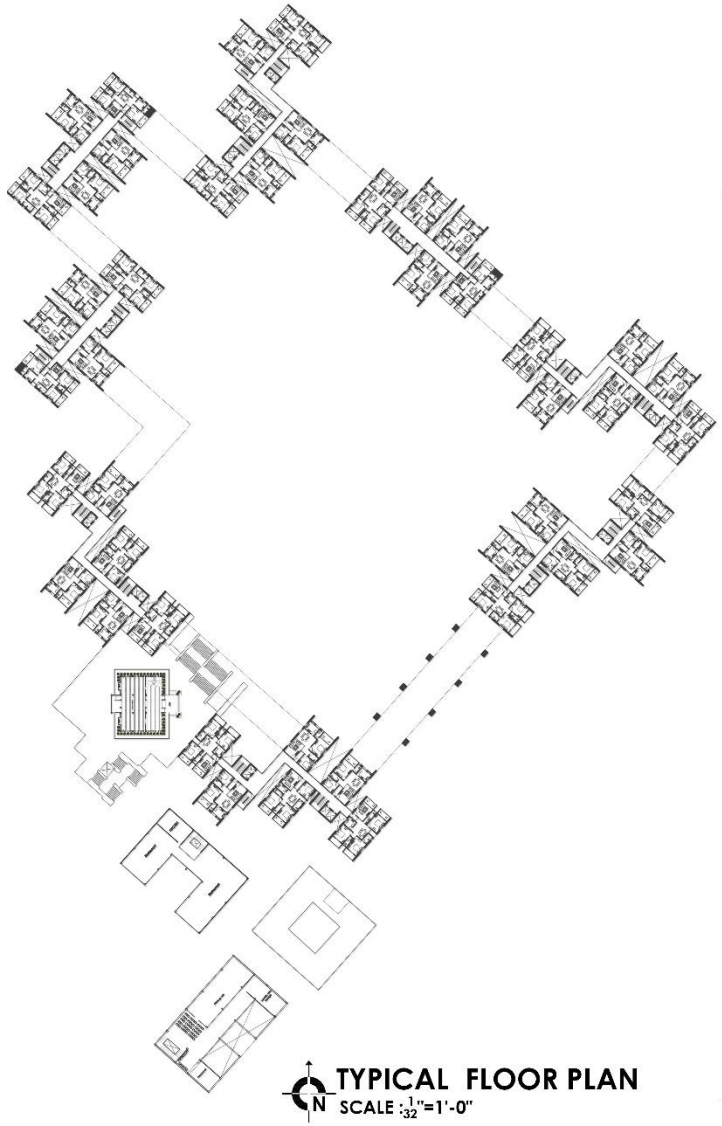
GROUND FLOOR PLAN
SCALE : 1/32"=1'-0"

Plan

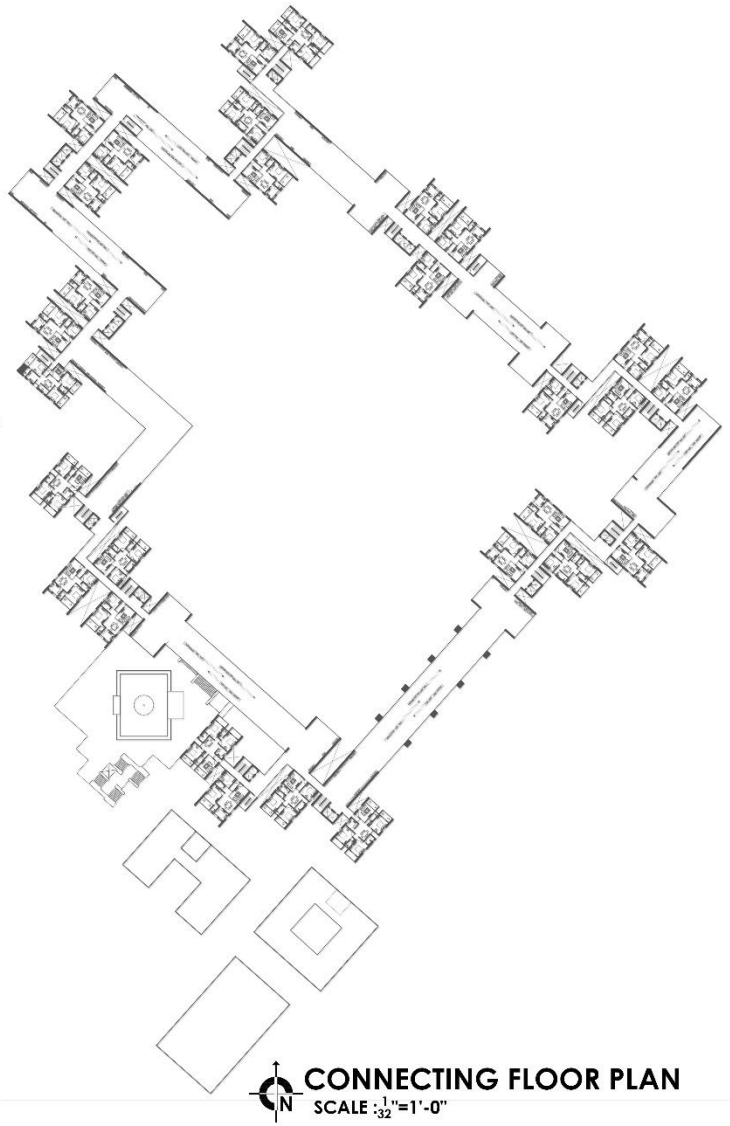


BASEMENT PLAN - PARKING
SCALE :1/32"=1'-0"

Plan

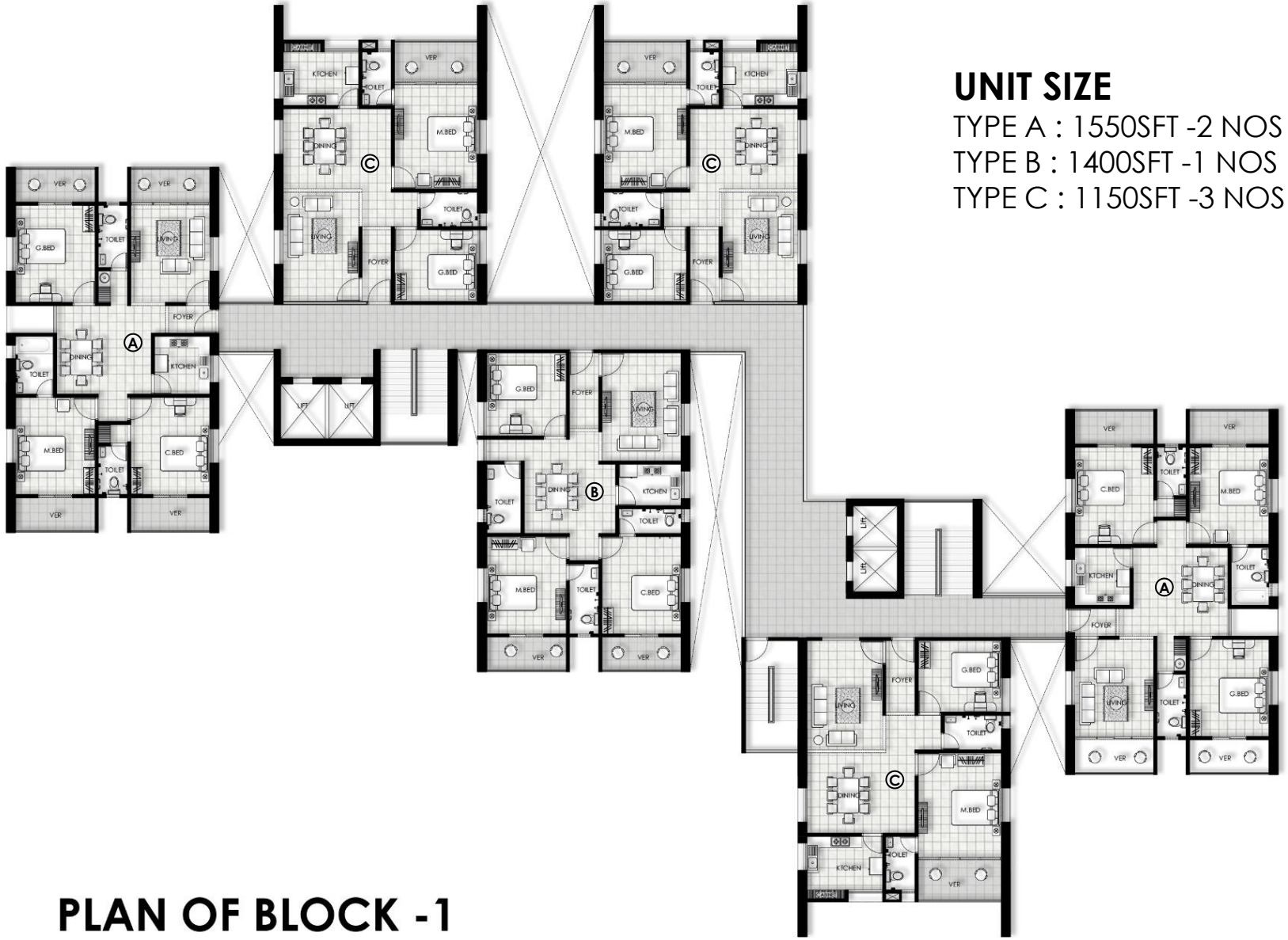


TYPICAL FLOOR PLAN
SCALE : $\frac{1}{32}$"=1'-0"



CONNECTING FLOOR PLAN
SCALE : $\frac{1}{32}$"=1'-0"

Plan

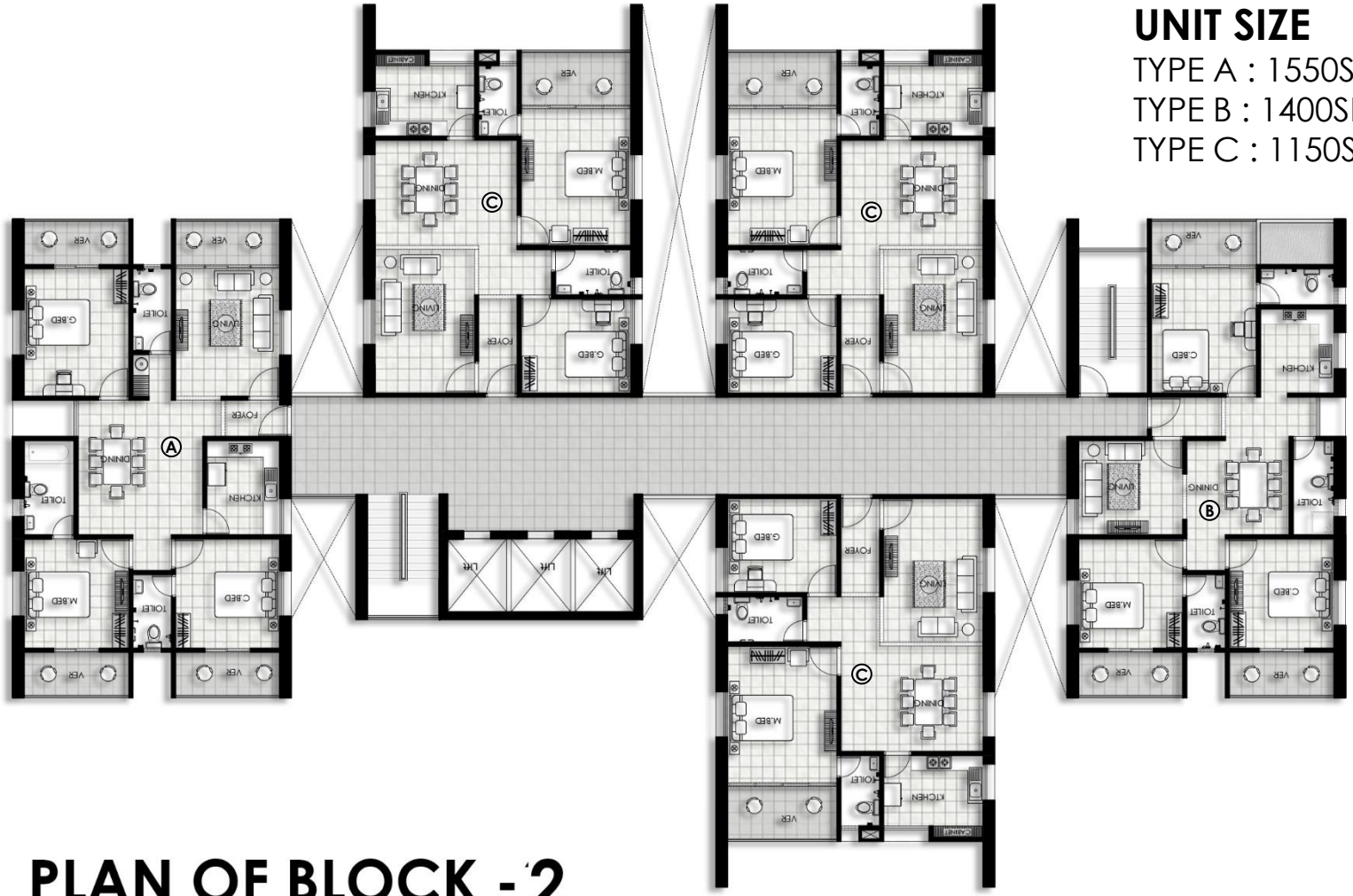


UNIT SIZE

TYPE A : 1550SFT -2 NOS
TYPE B : 1400SFT -1 NOS
TYPE C : 1150SFT -3 NOS

PLAN OF BLOCK -1

Plan



UNIT SIZE

TYPE A : 1550SFT -1 NOS
TYPE B : 1400SFT -1 NOS
TYPE C : 1150SFT -3 NOS

PLAN OF BLOCK - 2

Perspective view

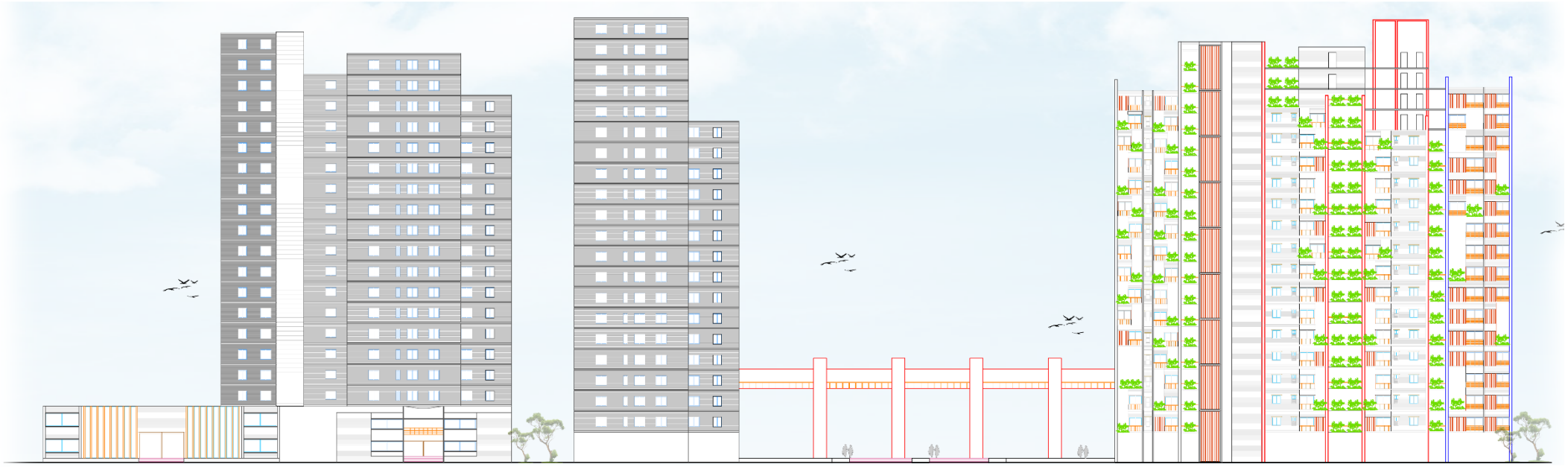
ENTRY

VIEW FROM ENTRY

Elevation

ELEVATION 1

Elevation



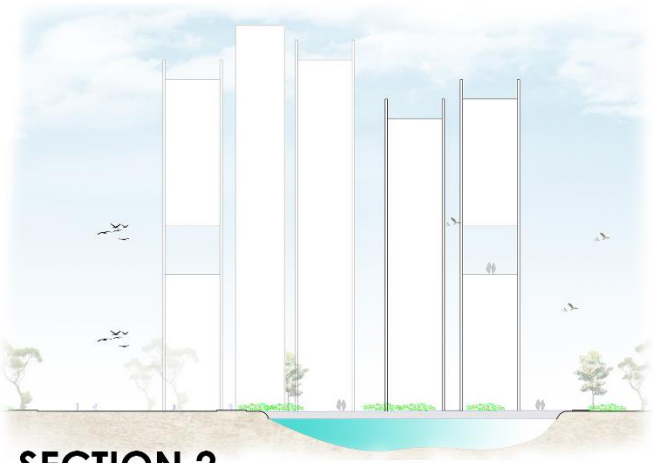
ELEVATION 2

Section

SECTION A-A

Section

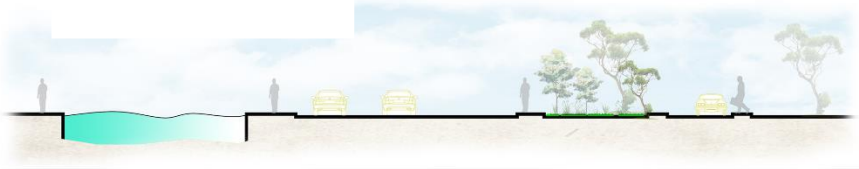
SECTION 1



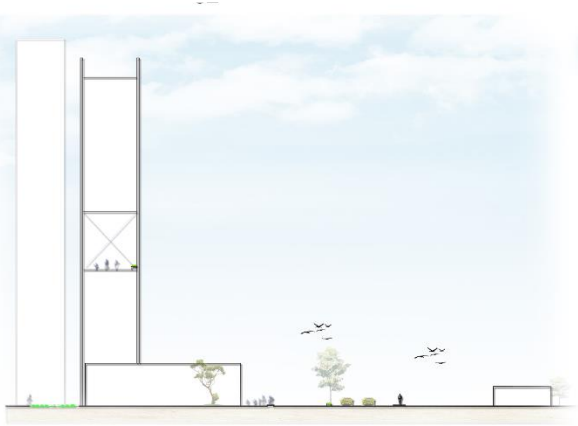
SECTION 2

SECTION 3

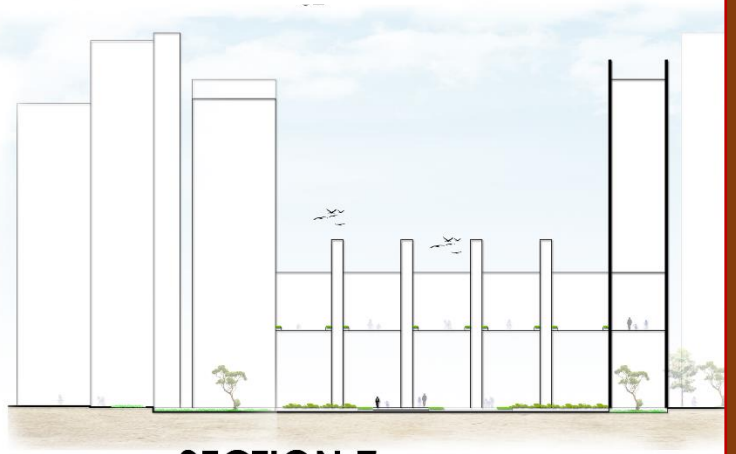
SECTION 4



SECTION 5



SECTION 8



SECTION 7

Perspective view

ENTRY

FRONT VIEW

WATER-BODY WITH SURROUNDINGS

WATER-BODY WITH SURROUNDINGS

Perspective view

PLAY GROUND

PLAZA WITH MOSQUE

WATER-BODY

ENTRY

Thank you