

HIGH RISE APARTMENT COMPLEX

PURBACHAL NEW TOWN

By

Warda Islam

13208016

ARC 512 SEMINAR II

Submitted in partial fulfillment of the requirements

For the degree of Bachelor of Architecture

Department of Architecture

BRAC University

ABSTRACT

Dhaka city became one of the most densely populated cities due to daily migration of thousands of people from the outskirts in search of job, pursuing education , etc. This gave rise to the urban population beyond limit. This problem is predicted to get bigger with passing years. Thus inadequate dwelling for a large number of people will be seen in the urban areas. To mitigate the future housing demand in the urban areas the government planned to develop surrounding areas, one of them being the Purbachal New Town. Vertical expansion is an effective way to deal with the population rise in Bangladesh. The high rise residential complex of Purbachal New Town is an attempt of rethinking apartment patterns that exist in this country. In densely populated urban areas in the world apartment buildings have become a distinctive feature of housing due to its technical and economical advantage. The spaces inside the houses would be properly utilized to blend all the functions that suit the family type and pattern of Dhaka city in the long run. Special importance would be given into creating versatile communal spaces to encourage social interaction. It would be on three levels, private spaces within each apartment unit, semi public spaces within each building and public ones in the open area outside the buildings for the community. Lake side walk ways for recreation and enjoying the vista. Playing field for the children. Proper ventilation and lighting for healthy growth of human mind. It would be a city within a city where prayer spaces, mini mart, day care and medical care center is designed in close proximity. The project would meet international standards but keeping in mind the local aspects of housing trends in Bangladesh. The project would be sustainable and suitable for the environment of Dhaka city and it's citizens.

ACKNOWLEDGEMENT

The completion of this journey of architecture would not be possible without the grace and blessing of **Almighty Allah**. My immeasurable appreciation and deepest gratitude for the help and support are extended to the following people who in one way or the other have contributed in making this project possible.

I thank my father **Nobiul Islam** and mother **Arjuda Islam** for being the biggest support and source of inspiration right from the beginning. My sisters **Sadia Islam** and **Nadia Islam** for handling me at my worst, for all those all nighters and being there in every possible way. I have been blessed with the best family and friends and I will be forever in debt for keeping me in your prayers.

I would like to thank my course instructors **Mohammad Habib Reza, Huraera Jabeen, Iftekhar Ahmed** and **Tasmia Kamal Proma** for motivating and guiding me through out the semesters.

I am grateful to my dear friends **Nusrat Islam, Sarah S. Khan** and **Aisha Bari** for their tremendous support Without you people this thesis project would not have been possible. A special mention of my best friend **Sadaf Zareen Khan** who has always been my greatest source of comfort regardless of being thousands of miles away.

TABLE OF CONTENTS

Chapter 1: INTRODUCTION	
1.1 Background of the project	02
1.2 Project brief	03
1.3 Programs	03
1.4 Project introduction	03
1.5 Aims and objectives of the project	04
CHAPTER 2: LITERATURE REVIEW	
2.1 Understanding “Housing”	06
2.1.1 Understanding and Definition	06
2.1.2. Housing and home	06
2.2 History of housing in Bangladesh	07
2.3 Need for housing	08
2.4 Housing as the basic human right for citizen	08
2.5 Current trend of housing in Bangladesh	09
2.6 Consequences of poor housing on health	09
2.7 Features of housing	10
2.7.1 Communal spaces in housing complexes	10
2.7.2 Ventilation and housing	10
2.7.3 Lighting and housing	11
Chapter 3: SITE AND CONTEXT ANALYSIS	
3.1 Background of the Site	13
3.1.1 Geographical	13
3.1.2 Climatic	13
3.1.3 Historical	15
3.2 Site at a glance	17
3.2.1 Location of the site	17
3.2.2 Site analysis	19
3.2.3 Site Image	21
3.2.4 SWOT Analysis	22
CHAPTER 4: PROGRAM AND PROGRAM ANALYSIS	
4.1 Proposed program from client	24
4.2 Rationale of the program	24

4.3 Developed program	25
4.4 Maximum ground coverage (MGC)	28
CHAPTER 5: CASE STUDY	
5.1 Local case study	30
5.1.1 Digonto	30
5.2 International case study	31
5.2.1 Linked Hybrid	31
5.2.1 The Interlace	34
Chapter 6: CONCEPTUAL STAGE AND DESIGN DEVELOPMENT	
6.1 Concept and Design decision	36
6.2 Analysis of amenities	38
6.3 Form development	39
6.4 Communal space	40
6.5 Architectural drawings	41
6.5.1 Roof plan	41
6.5.2 Ground floor plan	42
6.5.3 Tower A	43
6.5.4 Tower B	44
6.5.5 Detail unit plan with furniture layout	45
6.5.6 Elevations: Tower A	46
6.5.7 Elevations: Tower B	47
6.5.8 Elevations through site	48
6.5.9 Sections	49
6.5.10 Rendered images	50
6.5.11 Images of model	51
CHAPTER 7: CONCLUSION	
7.0 Conclusion.....	53
REFERENCE	54

Chapter 1: INTRODUCTION

- 1.1 Background of the project
- 1.2 Project brief
- 1.3 Programs
- 1.4 Project introduction
- 1.5 Aims and objectives of the project

1.0 INTRODUCTION

1.1 Background of the project

Over the years Dhaka metropolitan city has turned into one of the most busiest and densely populated cities in the world. Thousands of people migrate to Dhaka, the capital city of Bangladesh in search of jobs, start their own business, pursue studies , etc. Thus Dhaka City resides lakhs of people on a permanent basis already. The amount of dwelling required to give shelter to the rising population is inadequate. Due to the extreme density of people and lack of dwelling the localities are becoming too crowded giving rise to unhealthy environment (Rising population big concern for Dhaka, 2014). As a result of this the government planned to develop the surrounding area of Dhaka City in a planned way to establish permanent residential accommodation of the vast rise in population as well as reduce the crowd inside the capital (RAJUK, 2011). In this way the unplanned and crowded housing patterns would decrease in the city.

Purbachal New Town is the biggest planned township in Bangladesh. The project is incorporate 6150 acres of land that is situated between the Shitalakhya and the Balu River at Rupgonj thana of Nrayanganj district and at Kaligonj thana of Gazipur district, in the north-eastern side of Dhaka. The connection of Purbachal would be made through the link with the 8 lane express way from the Airport Road (Progati swarani crossing) with a distance of only 6.8 km. There will be provision of about 26,000 residential plots of different sizes, 62,000 apartments with all necessary infrastructure and urban facilities. RAJUK intends to plan and develop the area as self-contained new township with all modern facilities and opportunities. 38.74% land used for Residential ,25.9% for Road ,6.41% for Administrative and Commercial , 3.2% for Institution and Industrial Park ,6.6% for urban Green and Open spaces , 7.1% for Lakes and canals ,2.5% for sports, 6% for Education, Health and Social Infrastructure (RAJUK, 2011). This shows the extent to which every aspect is being planned in the Purbachal New Town.

1.2 Project brief

Name of the project: High Rise Apartment Complex, Purbachal New Town

Client: RAJUK

Site location: Sector-2, Road- 102, Plot- 002, Purbachal New Town

Site Area: 15.84 acres

1.3 Programs

Unit sizes: 3 to 4

Community/multipurpose spaces

Roof top garden

Gymnasium and Indoor Games

Security guard's room

Utility room

Parking in the basement

Playing field for all age groups

Mini mart

Health care center

Primary school and Daycare

Mosque

Temple

Church

1.4 Project introduction

These high rise residential blocks are the first to be built in Bangladesh. There are existing housing projects for the low income groups in this country but these high rises would serve the lower middle to higher middle income group of citizens in this country. They would have all the possible standard and luxury facilities satisfying their lifestyle. The housing complex would work as a small town on its own. This

project is an attempt of rethinking the apartment patterns that exist in this country. In densely populated urban areas in the world apartment buildings have become a distinctive feature of housing due to its technical and economical advantage (Romanova, 2018). Vertical expansion is much needed for dealing with the population rise of Bangladesh.

It would be of international standards that is futuristic. The design decisions would have a scope to provide the people with good mental and physical growth through open communal and breathing spaces, proper ventilation and lighting. Prayer spaces, mini mart, day care and medical care center in close proximity , etc.

1.5 Aims and objectives of the project

- “To reduce the pressure of population in Dhaka City by creating opportunity of residential accommodation of the city dwellers in the vicinity of the city.
- To maintain the balance of environment by proper urbanization. To create environment friendly and sustainable atmosphere.
- To reduce the existing acute problem of housing.
- To expand civic facilities by urbanization to the near by and surrounding areas gradually.
- Development of new township and to expand economic facilities.
- To mitigate future housing demand” (RAJUK, 2011).

A trend shows that most of the housing complexes designed around the world lack communal spaces, breathing spaces, recreational spaces, and any other facilities. Monotonous looking apartment buildings deprive residents from proper lighting and ventilation. Social interaction between people living in the same community is very important for healthy growth of human mind. Only a well thought design keeping in mind the needs of the people living in the community can help solve a lot of existing problems. The foremost objective of this project is to provide good quality residential accommodation for the middle income, middle middle income and higher middle income group of the society. Proper housing and good environment is essential for proper mental and physical growth of a human being. Finally, this project also intends to allow suitable and healthy accommodation for the citizens of this country.

CHAPTER 2: LITERATURE REVIEW

2.1 Understanding “Housing”

2.1.1 Understanding and Definition

2.1.2. Housing and home

2.2 History of housing in Bangladesh

2.3 Need for housing

2.4 Housing as the basic human right for citizen

2.5 Current trend of housing in Bangladesh

2.6 Consequences of poor housing on health

2.7 Features of housing

2.7.1 Communal spaces in housing complexes

2.7.2 Ventilation and housing

2.7.3 Lighting and housing

2.0 LITERATURE REVIEW

2.1 Understanding “Housing”

2.1.1 Understanding and Definition

Housing refers to houses or buildings all together that accommodates people. All citizens of a country or members of a society have the basic right to have a home, regardless of its kind or type. A shelter, dwelling or a lodging is considered a house. Housing is vital because it gives us shelter, protects us from extreme weather conditions, comfort, security and a sense of ownership. When there are multiple houses, a community is formed then its called a housing complex. It provides the people with all the necessary services like sanitation, drinking water etc (Henilane, 2016). According to the quality and amount of services provided the housing type changes and which income group it serves.

2.1.2. Housing and home

House is the structure or the building where people live; the shelter for any household. Home is where people feel the attachment, the sense of belongingness (Sand, 2003). People living in the “house” makes it a “home”.

Table 1 shows the different type of housing classifications based on the housing type, the housing size, the housing amenities, the housing location, the group of population living in the housing, the type of housing ownership rights, the construction period of the housing, the energy efficiency indicators of housing and the construction materials used in the exterior wall of the housing.

Table 1. Housing Classifications

Type of housing classification	Characteristics
By housing type	Room in the apartment Apartment in multi-apartment residential building or non-residential building Multi-apartment residential building Family house Other
By housing size	One room One-room apartment Two-room apartment Three-room apartment, and more Family house Other
By housing amenities	Housing with all amenities. Housing with part of amenities Housing without amenities
By housing location	Housing in a city Housing in rural territory
By group of population living in the housing	Any resident Persons with low-income or other social group at risk
By type of housing ownership rights	State-owned housing Municipality-owned housing Natural person's owned housing Legal person's owned housing Other
By construction period of the housing	Housing build before World War II Housing built from 1945 to 1990 Housing built from 1990 until now
By energy efficiency indicators of housing	Minimum regulatory energy performance level allowed for new buildings Minimum regulatory energy performance level allowed for reconstructed or renovated buildings Almost zero energy consumption housing Other
By construction materials used in the exterior wall of the housing	Brick wall Wood Brick/panel Reinforced concrete / concrete Lightweight concrete Wood/masonry Other.
etc.	

Table 2.1.1 Housing classification. Source: (Romanova, 2018).

2.2 History of housing in Bangladesh

Eastern Housing Limited was established in 1964 as the first ever Public Limited Company in Bangladesh in the Real Estate Business under the private sector. They were one of the earliest member of the REHAB Association. Mr. Jahurul Islam took this initiative to reduce housing problems in Dhaka city. It successfully implemented their

project by building 700 houses in Pallabi Thana, Dhaka, and acquiring 910 acres of land. They have both housing complexes as well as apartment buildings all over Dhaka in present time. Their :

- “Vision: Establish world class modern habitat by creating maximum value, providing quality land, houses and business premises to contribute sustainable development of the nation.
- Mission: To build and develop environment friendly Apartment, Commercial Buildings and Land development by ensuring the highest standard facilities, safety, architecture, engineering and green technology abide by the National policy” (Eastern Housing Limited, 2016).

2.3 Need for housing

According to Worldometers (2018) the current urban population of Bangladesh is 60,649,009 and it is predicted to reach 98,935,284 by 2040. Since Dhaka city is already over populated thus development is required in surrounding areas and new residential accommodation is required to mitigate that rise in demand. The scarcity of land lead to the idea of vertical expansion, or high-rises. The trend in the densely populated urban areas shows that vertical expansion of apartment buildings have technical and economic advantages (Romanova, 2018). Thus the high requirement of high rises with the increase in population in Dhaka city.

2.4 Housing as the basic human right for citizen

Article 25.1 of the Universal Declaration of Human Rights thus proclaims that:

“Everyone has the right to a standard of living adequate for the health and well-being of himself and of his family, including food, clothing, housing and medical care and necessary social services, and the right to security in the event of unemployment,

sickness, disability, widowhood, old age or other lack of livelihood in circumstances beyond his control” (UN, 2018). Showing that the right to a house is considered a basic need.

2.5 Current trend of housing in Bangladesh

Apart from the demand-supply trends in the housing market there are many other strong socio-economic reasons. The change in family structure of people living in Dhaka city. Culturally the norm was living in joint families to extended families but in the last 20 years the pattern changed and people prefer living in nuclear families. These families usually consist of the set of parents with one child or at times two children and require an apartment of 2 to 3 rooms (Seraj, 2016). If we see Dhaka city in the present time, modern houses now even accommodate functions like, community center for occasions, playing area for children, prayer area, even a gym at times. Due to lack of time people prefer services near by, possibly in the same building.

2.6 Consequences of poor housing on health

Regardless of who the housing is being built for, a comfortable and safe environment is desired for good mental and physical well being. The temperature inside the house, humidity level, adequate ventilation, sufficient lighting etc is vital factors to be considered.

According to Housing and Health Resource, (2015):

- Dampness in the house causes increase heart rates and hygiene risks.
- Excess cold can cause infections and hypothermia.
- Excess heat in the house causes dehydration and thermal stress.
- Insufficient light causes eye strain.
- Noises causes sleep disturbance and headaches.

2.7 Features of housing

2.7.1 Communal spaces in housing complexes

According to Mahdavinejad, Mashayekhi and Ghaedi (2012) architecture, society and culture are closely linked. Our social structure as a matter of fact linked people together as a community. The bond was stronger in the past and the sense of community was more visible due to presence of communal spaces. As the short residential complexes transformed to high-rise residential complexes the quality and use of communal spaces changes drastically. In modern housing there is no consideration of the communal spaces for the gathering or interaction of the people in the same housing complex. This is a factor that should be taken into consideration, there should be different level of interaction within a community. For example in a small scale within a single building and on a larger scale the open spaces connecting the building in the complex. Small scale would be the roof top of a building designed in a way that welcomes people of all age groups, the community space given for celebrating of occasions etc. Large scale would be a playing field, a walk way, an open inviting area where the whole community can gather. Interaction creates bonding, sense of sharing and exchange of values.

2.7.2 Ventilation and housing

Due to Dhaka city having a hot humid climate and high population density it is very important to maintain a thermal comfort in the houses by ensuring proper ventilation. A well designed building, with proper orientation, sufficient openings, cross ventilation, various cooling techniques can be useful in doing so. This would decrease anxiety, depression, breathing problems and other health issues of the users (Islam, 2013). Thus proper ventilation has direct affect on the health.

2.7.3 Lighting and housing

Natural lighting is a key factor that affects mental and physical health of people living in a house. It ensures thermal comfort in the winter, prevent dampness etc (Wymelenberg, 2014). Orientation of the houses determine the amount of sunlight it receives and whether it has any open space in the surrounding. According to the orientation we place the functions in the plan, for example kitchen and toilets in the West, living rooms and bedrooms in the South etc. Too much sunlight causes glare but there are several ways to deal with it as well. The openings or the placement of windows determine the amount of sunlight that a house receives. Verandas are good sources of natural light in a housing. On a larger scale an atrium or a skylight could be a source of natural lighting in a communal space of a housing complex (Baten, 2017). Regardless of the size of the opening through which light is entering a house it is vital for the users.

Chapter 3: SITE AND CONTEXT ANALYSIS

3.1 Background of the Site

3.1.1 Geographical

3.1.2 Climatic

3.1.3 Historical

3.2 Site at a glance

3.2.1 Location of the site

3.2.2 Site analysis

3.2.3 Site Image

3.2.4 SWOT Analysis

3.0 SITE AND CONTEXT ANALYSIS

3.1 Background of the Site

3.1.1 Geographical

According to RAJUK (2011) Purbachal New Town (PNT) is said to be the biggest planned township in Bangladesh. The total area of the project comprise of about 6,150 acres of land divided into 30 sectors. It is located in between the Shitalakhya and the Balu River at Rupgonj thana of Narayanganj District and at Kaligonj Thana of Gazipur District, in the northeastern side of Dhaka. The town is about 16 km from the zero point of Dhaka city and will be linked with an 8 lane wide express way from the Airport Road (Progati Swarani crossing). The town is surrounded by Dhaka city on the West, Gazipur in the North and Narayanganj in the East and South.

3.1.2 Climatic

According to Weather and Climate information for every country around the world (2016) Dhaka city has a tropical climate with a mild winter (October - March), a hot humid summer (March - June) and a humid warm rainy monsoon season (June - October). Thus, while designing any housing complex we have to consider the climatic factors.

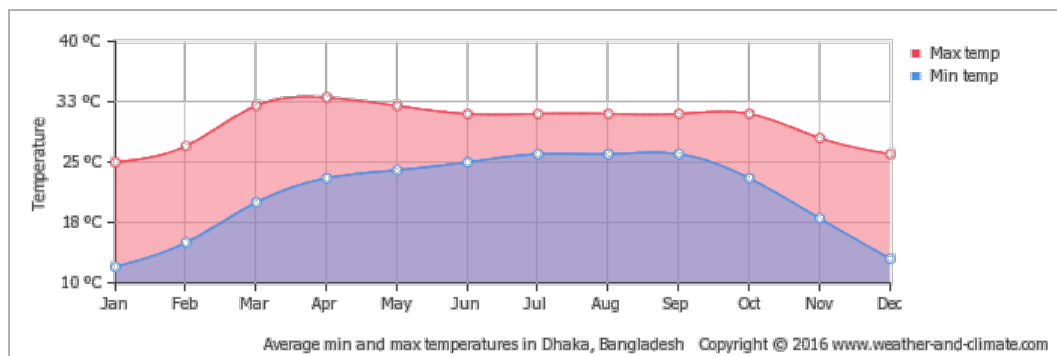


Figure 3.1.1 Shows the average min and max temperature in Dhaka City. (Source: Weather and Climate information for every country around the world, 2016).

On an average January (19°C avg) is the coolest month and June(30°C) being the warmest. High temperature: 34°C, Low temperature: 14°C and Mean temperature: 27°C (2018)

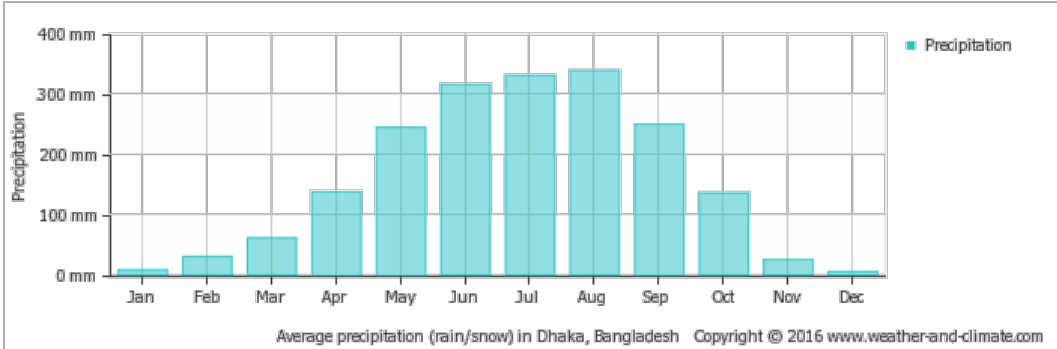


Figure 3.1.2 Shows the average precipitation in Dhaka city. (Source: Weather and Climate information for every country around the world, 2016).

Precipitation: 124.4 mm (2018).

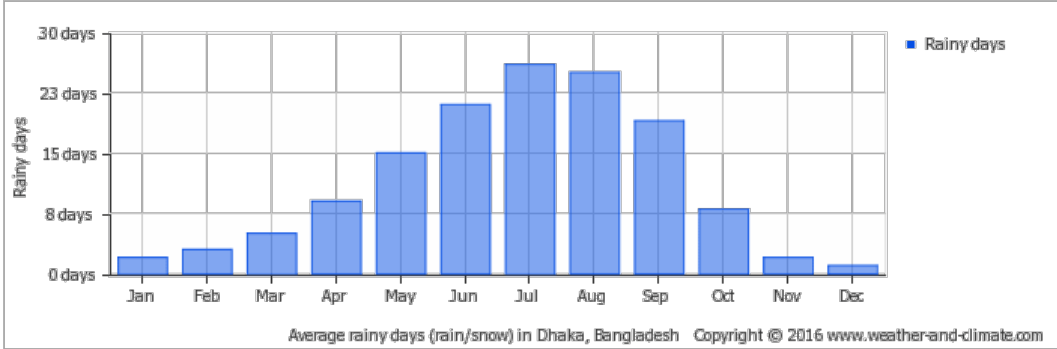


Figure 3.1.3 Shows the average rainy days in Dhaka city. (Source: Weather and Climate information for every country around the world, 2016).

The rainy season is between the months of April-October. The wettest month being August (306.5 mm avg) (2018). The amount of rainfall determines the type of material being used in the buildings.

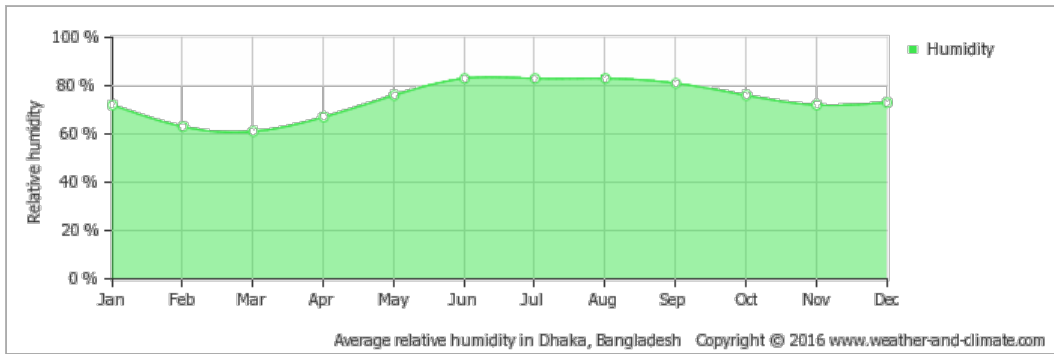


Figure 3.1.4 Shows the average relative humidity in Dhaka city. (Source: Weather and Climate information for every country around the world, 2016).

Humidity: 71%, determines the factors to be considered to keep the interiors damp proof.

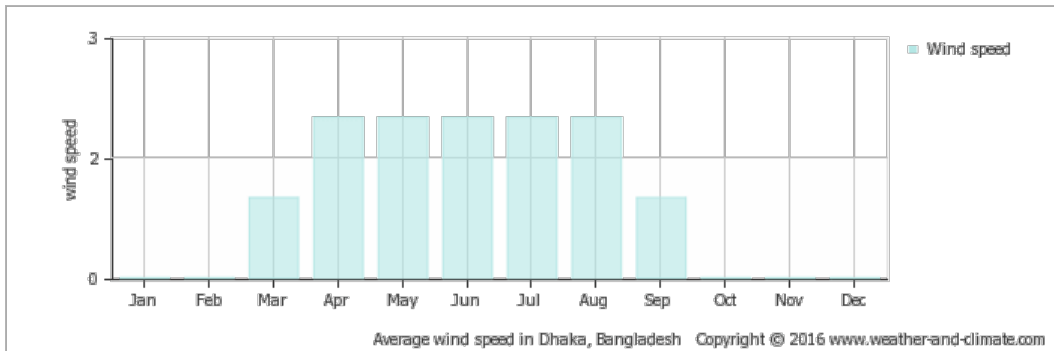


Figure 3.1.5 Shows the average wind speed in Dhaka city. (Source: Weather and Climate information for every country around the world, 2016).

The windiest month being April (6 km/h avg) Wind: 4 km/h (2018) This factor has to be taken into consideration for high rises being built in the city.

3.1.3 Historical

Over the years Dhaka city became densely populated mainly due to migration in search of jobs, opportunities and better standard of living. This population is going to rise even more by 2050 (figure 3.1.6) creating a large number of problems and scarcity in infrastructure.

Thus the government planned to build Purbachal new town project as a smart city where quality infrastructure will be built with modern amenities for a high standard of

living (Hossain, 2016). This is important so that it matches international standards.

Population of Bangladesh (2018 and historical)

Year	Population	Yearly % Change	Yearly Change	Migrants (net)	Median Age	Fertility Rate	Density (P/Km ²)	Urban Pop %	Urban Population	Country's Share of World Pop	World Population	Bangladesh Global Rank
2018	166,368,149	1.03 %	1,698,398	-470,000	26.0	2.19	1,278	35.3 %	60,649,009	2.18 %	7,632,819,325	8
2017	164,669,751	1.05 %	1,718,191	-470,000	26.0	2.19	1,265	35.7 %	58,746,319	2.18 %	7,550,262,101	8
2016	162,951,560	1.09 %	1,750,674	-470,000	26.0	2.19	1,252	34.9 %	56,856,665	2.18 %	7,466,964,280	8
2015	161,200,886	1.16 %	1,810,357	-505,297	25.6	2.22	1,238	34.1 %	54,983,919	2.18 %	7,383,008,820	8
2010	152,149,102	1.19 %	1,743,600	-714,191	23.9	2.48	1,169	30.3 %	46,035,276	2.19 %	6,958,169,159	8
2005	143,431,101	1.74 %	2,369,972	-308,291	22.4	2.94	1,102	26.8 %	38,373,642	2.19 %	6,542,159,383	8
2000	131,581,243	2.08 %	2,574,874	-151,224	20.9	3.43	1,011	23.7 %	31,229,852	2.14 %	6,145,006,989	8
1995	118,706,871	2.25 %	2,503,646	-159,632	19.5	4.06	912	21.9 %	26,003,685	2.06 %	5,751,474,416	9
1990	106,188,642	2.64 %	2,597,755	-43,873	18.6	4.98	816	20.0 %	21,274,633	1.99 %	5,330,943,460	9
1985	93,199,865	2.73 %	2,345,801	-157,493	17.7	5.98	716	17.7 %	16,496,299	1.91 %	4,873,781,796	8
1980	81,470,860	2.70 %	2,032,987	-215,346	17.3	6.63	626	15.0 %	12,251,656	1.83 %	4,458,411,534	8
1975	71,305,923	1.85 %	1,251,631	-595,571	17.6	6.91	548	10.0 %	7,107,810	1.75 %	4,079,087,198	9
1970	65,047,770	3.10 %	1,842,746	-32,364	17.8	6.92	500	7.7 %	5,034,728	1.76 %	3,700,577,650	9
1965	55,834,038	2.98 %	1,526,858	-11,019	19.4	6.36	429	6.4 %	3,552,536	1.67 %	3,339,592,688	12
1960	48,199,747	2.73 %	1,215,645	297	19.1	6.62	370	5.3 %	2,543,661	1.59 %	3,033,212,527	11
1955	42,121,524	2.14 %	845,369	-11,019	19.4	6.36	324	4.8 %	2,020,726	1.52 %	2,772,242,535	12

Bangladesh Population Forecast

Year	Population	Yearly % Change	Yearly Change	Migrants (net)	Median Age	Fertility Rate	Density (P/Km ²)	Urban Pop %	Urban Population	Country's Share of World Pop	World Population	Bangladesh Global Rank
2020	169,775,309	1.04 %	1,714,885	-470,000	27.5	2.07	1,304	38.0 %	64,479,585	2.18 %	7,795,482,309	8
2025	178,262,909	0.98 %	1,697,520	-300,000	29.5	1.94	1,369	41.5 %	74,020,473	2.18 %	8,185,613,757	8
2030	185,584,811	0.81 %	1,464,380	-300,000	31.6	1.84	1,426	44.8 %	83,160,000	2.17 %	8,551,198,644	8
2035	191,600,525	0.64 %	1,203,143	-300,000	33.7	1.76	1,472	47.8 %	91,510,533	2.15 %	8,892,701,940	8
2040	196,294,312	0.49 %	938,757	-300,000	35.9	1.70	1,508	50.4 %	98,935,284	2.13 %	9,210,337,004	8
2045	199,743,520	0.35 %	689,842	-300,000	38.0	1.67	1,534	53.0 %	105,950,886	2.10 %	9,504,209,572	8
2050	201,926,816	0.22 %	436,659	-300,000	40.0	1.66	1,551	55.7 %	112,443,436	2.07 %	9,771,822,753	8

Figure 3.1.6 Bangladesh Population Forecast. Source: (Worldometers, 2018).

According to RAJUK (2011) the revised project implementation period is July 1995 to June 2018. During 2002- 2003 fiscal year development in the Narayanganj part (4500 acres) took place and the Gazipur part (1500 acres) in January 2013.

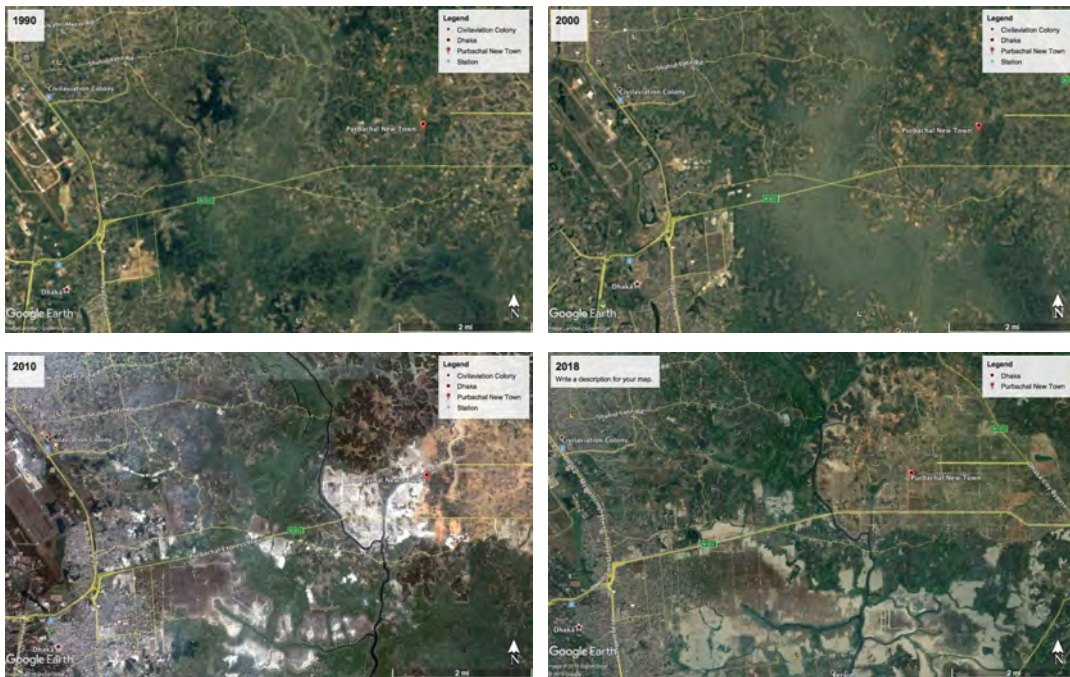


Figure 3.1.7 The above images show the google images of 1990, 2000, 2010 and 2018. Where it is clear how the development started from 2000 and drastically increased from 2010 onwards. Source: (Google Earth, 2018).

3.2 Site at a glance

3.2.1 Location of the site and access point

The site is located in Sector-2, Road- 102, Plot- 002 of Purbachal New Town (shown in figure 3.2.1 & figure 3.2.2). The site can be accessed from Purbachal link road (300 ft).



Figure 3.2.1 Satellite image of Purbachal. Source: (Google Earth, 2018).

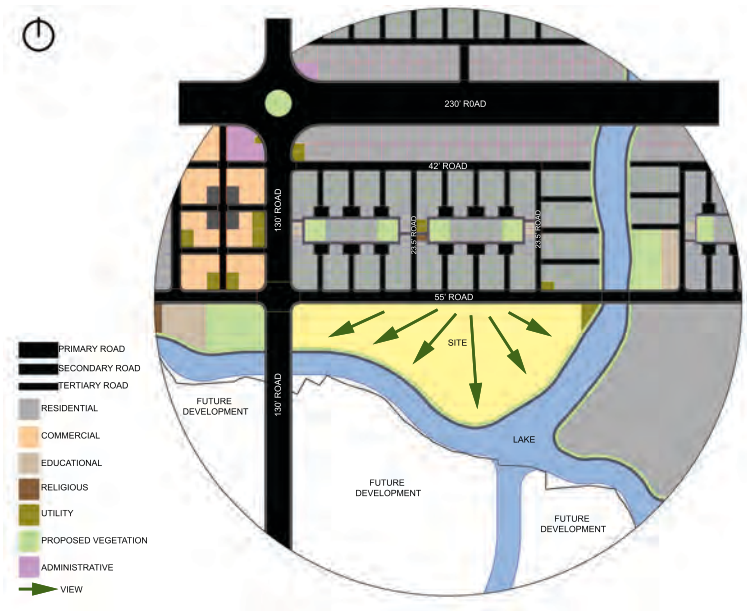


Figure 3.2.2 Map of the site and surrounding (500 m) . (Source: Author)

3.2.2 Site analysis



Figure 3.2.4 Satellite image of site. Source: (Google Earth, 2018)



Figure 3.2.3 Map of Sector 2 showing the location of the site and the access road. (Source: Author)

The detailed location plan shows the map of residential/housing blocks of PNTN the site has Netra Lake on the South, Silonia Lake in the East and residential areas in the North and West.

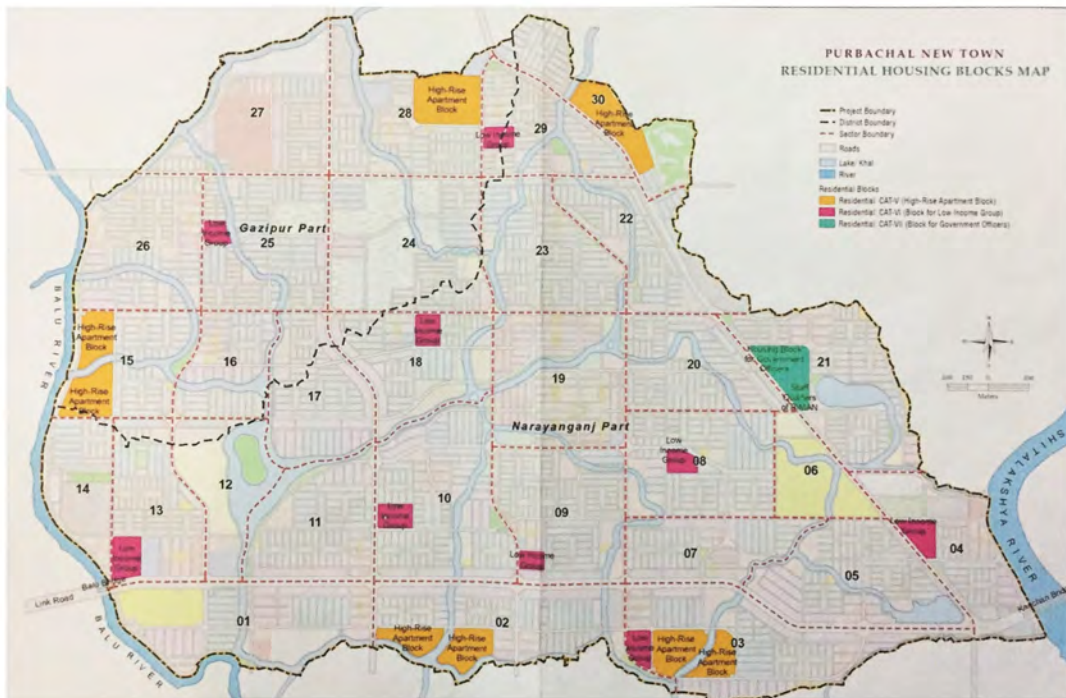


Figure 3.2.5 Location Map of Residential/ Housing Blocks of PNTP. Source: (RAJUK, 2011).

There would be 8 such residential high rise apartment complexes in Purbachal in an effort to mitigate the rise in urban population in the near future.

3.2.3 Site Image

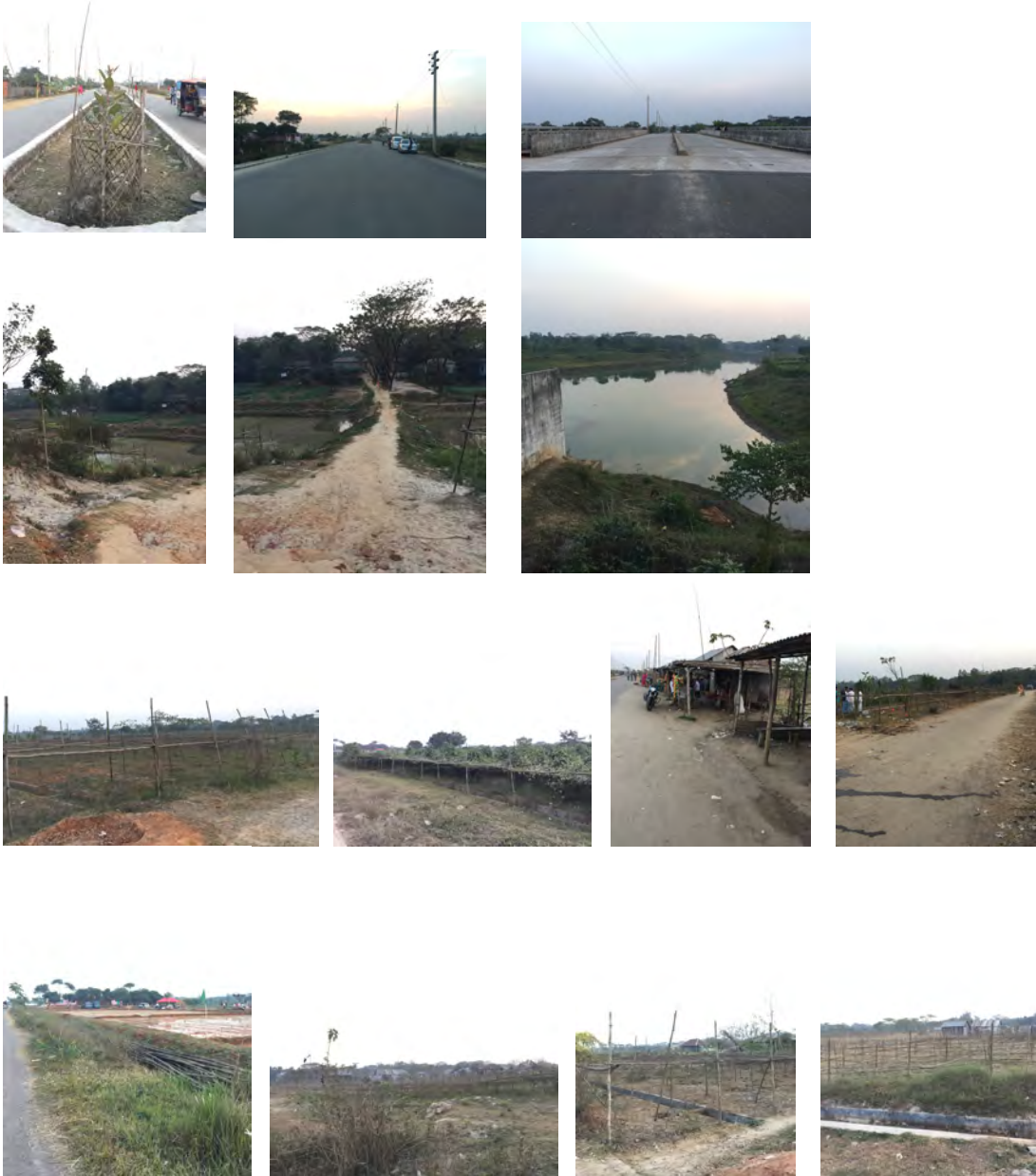


Figure 3.2.5 Site Image. (Source: Author)

3.2.4 SWOT Analysis

Strength

- It is a completely planned city with gratifying road network.
- Access road to nearby areas.
- The site has lake on 2 sides which is preferred for a housing complex.

Weakness

- Currently the site now has no infrastructure and is far away from the urbanism.
- The future has to be analyzed and predicted for design purpose.
- Security issues.
- A lot could go wrong while developing and not follow the planning.

Opportunity

- The development could bring and raise scope for further planned cities.
- New public realm for people to enjoy near water bodies.
- The site is barren which increases the control over urban sprawl.

Threat

- Purbachal could turn into the next Dhaka city, densely populated and chaotic.
- Industrial park might consume a lot of energy.

(Rahman, 2013) ; (Rahman, 2015)

CHAPTER 4: PROGRAM AND PROGRAM ANALYSIS

4.1 Proposed program from client

4.2 Rationale of the program

4.3 Developed program

4.4 Maximum ground coverage (MGC)

4.0 Program and Program Analysis

4.1 Proposed programs from client

Unit sizes: 3 to 4

Community/multipurpose spaces

Roof top garden

Gymnasium and Indoor Games

Security guard's room

Utility room

Parking in the basement

Playing field for all age groups

Mini mart

Health care center

Primary school and Daycare

Mosque

Temple

Church

4.2 Rationale of the program

The high-rise residential blocks of PNTP has been planned to mitigate the population rise in the her future. It is supposed to be a self reliant and sustainable development ensuring all the luxuries and essential amenities of a housing. A comfortable and futuristic approach to housing complexes which promotes community interaction.

Within each building recreational facilities like community/multipurpose spaces, roof top gardens, gymnasium would be present along side basement parking, utility room and security guard's room. And for the whole community playing fields, open area, lakeside

walkways, mini mart, health care center, nursery school and day care, mosque, temple and church would be present. All this so that the people in the community can get the services within the boundaries. More like a tiny city within a city.

The apartment sizes vary so that people can chose according to the size of their families as well as affordability. Since the housing complex is meant for a huge number of people thus a lot of children would be needing the nursery schools and daycare center. These services being nearer to the house makes it easier for the parents.

Bangladesh has a majority of Muslim population (89.8%) who pray 5 times a day and Jummah on Fridays. Thus a mosque is of utmost importance and within a close proximity from the community. The community would also have a temple (Hindu population: 9.1%) and a church (other population: 0.2%). The scale would vary according to the number of users but it is important to respect all religions within a community.

4.3 Developed Program

Unit sizes:

1000 sft, 1200 sft, 1500 sft, 1800 sft

(Analysing the demand of the middle income population in REHAB fair 2017 & 2018)

Total number of units: 1200

(According to maximum gross density : 350 people per acre)

Average household size: 4.6

Thus total number of people: 5544

Multipurpose space as per total floor area

Prayer space: 1500 sft

Gymnasium and indoor game: 1000 sft

Security guards's room: 300 sft

Parking for 900 cars

Utility building: 5000 sft
Mini mart: 28800 sft
Health care centre: 8000 sft
Primary school: 38200 sft
Day care centre: 8000 sft
Mosque: 30000 sft
Temple & church
Waste and water management
Playing field for people of all age groups

After analyzing the space distribution of the developer companies (private sector):

1000 sft:

Master bedroom + toilet and balcony
Bedroom 2 + balcony
Common toilet
Living + Dining area
Kitchen + toilet and balcony

1200 sft:

Master bedroom + toilet and balcony
Bedroom 2
Bedroom 3
Common toilet
Living + Dining area
Kitchen + toilet and balcony

1500 sft:

Master bedroom + toilet and balcony

Bedroom 2 + toilet

Bedroom 3

Common toilet

Living area

Family Living + Dining area

Kitchen + toilet and balcony

1800 sft:

Master bedroom + toilet and balcony

Bedroom 2 + toilet

Bedroom 3

Common toilet

Living area

Family Living + Dining area

Kitchen + balcony

House aid's room + toilet

4.4 Maximum Ground Coverage (MGC)

Site area: 15.84 acres = 689990.4 sft

Minimum width of road inside the site: 6m = 20 ft (approximately)

FAR for residential area = 6.5

MGC = 50% = 7.92 acres = 344995.2 sft

Total built area, TBA = FAR x Site Area = 6.5 x 689990.4 = 4484937.6

With 30% circulation = 4484937.6 + (4484937.6 x 30%) = 5830418.88

Setback for the site:

Front: 1.50m = 5 ft

Back: 3m = 10 ft

Side: 3m = 10 ft

CHAPTER 5: CASE STUDY

5.1 Local case study

5.1.1 Digonto

5.2 International case study

5.2.1 Linked Hybrid

5.2.1 The Interlace

5.0 Case Studies

5.1 Local case study

5.1.1 Name of the project: Digonto

Client: Shanta Properties LTD.

Architect: DOMUS

Site location: 3 & 3A Paribagh

Site Area: 84 Katha

Programs :

- Total built area: 619,000 sft
- Number of floors: Ground plus 14 floors
- Number of apartments: 150 nos.
- Size of Apartments: 2,600 - 3,200 sft
- Number of basements : 3.5 nos.
- Number of car parkings: 255 Nos.
- Number of Basements: 03

Air-conditioned lavish reception lobby at ground floor, 2,000 feet long walkways, 50 feet long temperature controlled indoor swimming pool, separate ladies' and gents' gymnasium, central water purification system, rooftop garden, grand community and party hall, children play area, table tennis room, snooker room, steam bath and sauna (Shanta Holdings Ltd, 2017). Making it modern in terms of functional needs.



Figure 5.1.1 Digonto during day and night time. Source: (Domus, 2018)

Digonto is said to be the first true condominium of Bangladesh with high end lifestyle facilities. It is unique because of its harmonized use of wind, sunlight and open spaces to create a healthy community (Domus, 2018). Shown is figure 5.1.2.



Figure 5.1.2 Terraces and voids incorporating the green. Source: (Domus, 2018)

Project Analysis:

Apart from the lavish and indispensable amenities in the building a lot of focus has been given into creating meaningful communal spaces of various scale. Larger more accessible public open spaces in the ground level, then the semi public intermediate ones like the lawns and lastly the smaller private ones. These open communal spaces enhance social interaction to build a stronger sense of community within the people. As seen in figure 5.1.2 one of the captivating features of the building is the terraces and void spaces in intermediate floors where the green is incorporated perfectly (Baten, 2017). The spaces created also play a role in maintaining proper ventilation and natural light in the apartments. Overall the project has a different but positive approach towards the housing design compared to the ones we see in Bangladesh nowadays.

5.2 International case study

5.2.1 Name of the project: *Linked Hybrid*

Client: Modern Green Development Co., Ltd. Beijing

Architect: Steven Holl Architects

Site location: Beijing, China

Site Area: 220000.0 m²

Programs: 750 apartments, public green space, commercial zones, hotel, cinemateque, kindergarten, Montessori school, underground parking



Figure 5.2.1 The Linked Hybrid with typical floor plan. Source: (Steven Holl Architects, 2009)

According to Steven Holl Architects (2009) the architects of Linked Hybrid, the project was to counter the current urban development in China by creating a 21st century porous urban space that was inviting for people from every direction (figure 5.2.1). An attempt to make an “open city within a city”.

The public spaces created encourage community interaction on different levels and the types vary from commercial, residential, educational and recreational.

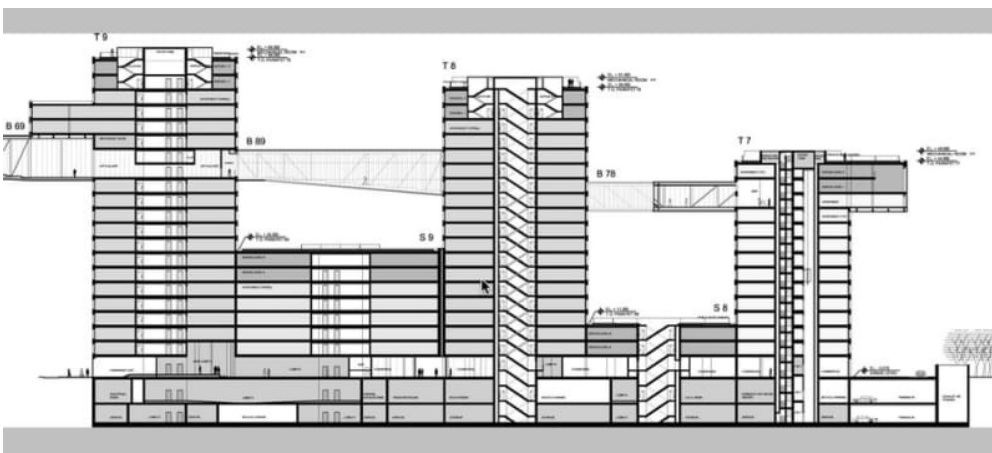


Figure 5.2.2 A sectional elevation of Linked Hybrid. Source: (ArchDaily, 2009)

As shown in figure 5.2.2 the building has functions under the ground, on the ground level as well as above it. The ground level has open passages for residents and visitors to walk through (figure 5.2.3). Large reflecting ponds with shops to activate the spaces. The green spaces within the projects are incorporated with the restaurant, hotel, Montessori school, kindergarten and cinema

On the intermediate levels of the lower buildings are green spaces and public roof gardens.

At the top 8 residential towers the pent houses are connected by private roof gardens.

The hotel tower is connected to the residential tower with multi-functional series of sky bridges with a swimming pools, a fitness room, a cafe, a gallery, auditorium and a mini saloon (Steven Holl Architects, 2009).

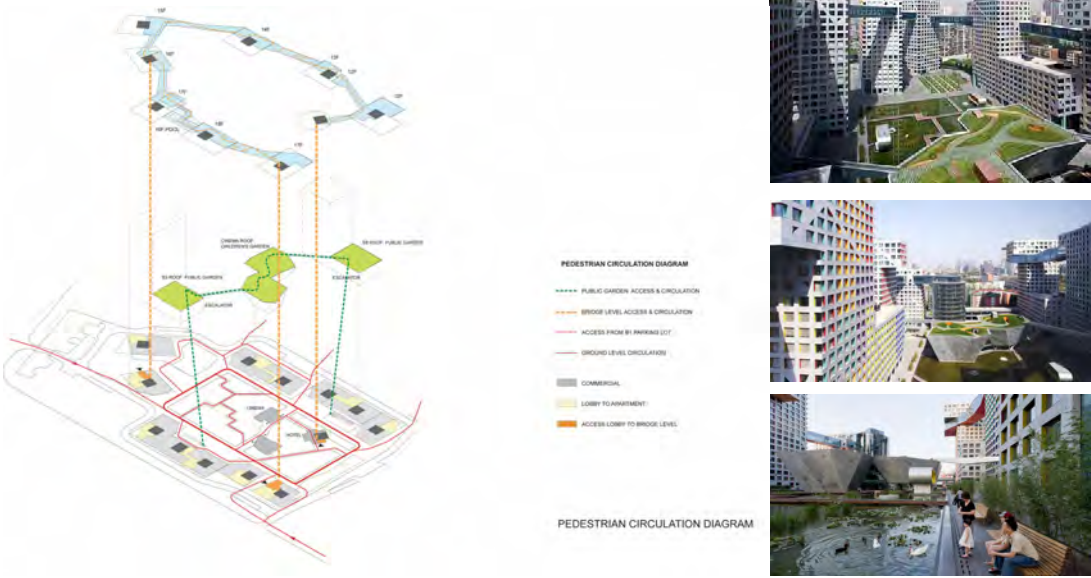


Figure 5.2.3 The pedestrian circulation diagram of Linked Hybrid with real life images. Source: (ArchDaily, 2009) ; (Baan, 2009)

The Linked Hybrid has gold LEED certification making it of the largest green residential projects which also has geo-thermal wells (660 at 100 meters deep) that helps cooling in the summer and heating in the winters (figure 5.2.3).

Projects Analysis:

The Linked Hybrid is almost break through from the monotonous apartment building complexes. It is sustainable and energy efficient which is encouraged in architecture in today's world. The integration of nature with the built form is extensive and makes it pleasing to the eye. The communal space are very versatile, in terms of usage, scale and the type of people it attracts. There is recreational spaces for people of all age groups and initiates a lot of community interaction as well as interactions with people outside the community. There are so many functional mostly complex ones but they are very nicely solved and connected based on it's users (public, semi public and private).

5.2.2 Name of the project: *The Interlace*

Client: Capital and Residential Singapore

Architect: OMA, Ole Scheeren

Site location: Singapore

Site Area: 169600.0 sqm

Programs: Figure 5.3.1 shows the master plan of The Interlace with facilities available.



Figure 5.3.1 Master plan of The Interlace. Source: (ArchDaily, 2015)

According to the architects of The Interlace OMA and Ole Scheeren (2015), the project is a stretch of green belt situated on an elevated 8 hectare site. This project is also said to be a break away from Singapore's to high rise apartment buildings: "an expansive interconnected network of living and communal spaces integrated with the natural environment. Thirty-one apartment blocks, each six-stories tall and identical in length, are stacked in a hexagonal arrangement to form eight large-scale open and permeable courtyards" (ArchDaily, 2015). They lead to sky gardens, both public and private roof terraces (figure 5.3.2).



Figure 5.3.2 The Interlace with extensive roof gardens, landscaped sky terraces and cascading balconies. Source: (Baan, 2015)

The Interlace has extensive roof gardens, landscaped sky terraces and cascading balconies. The green areas are maximized by minimizing vehicular pathways (figure 5.3.3). To create a sustainable community the environment is carefully merged with the micro-climate, suns and wind analysis. Communal spaces are designed for social interaction and recreation.

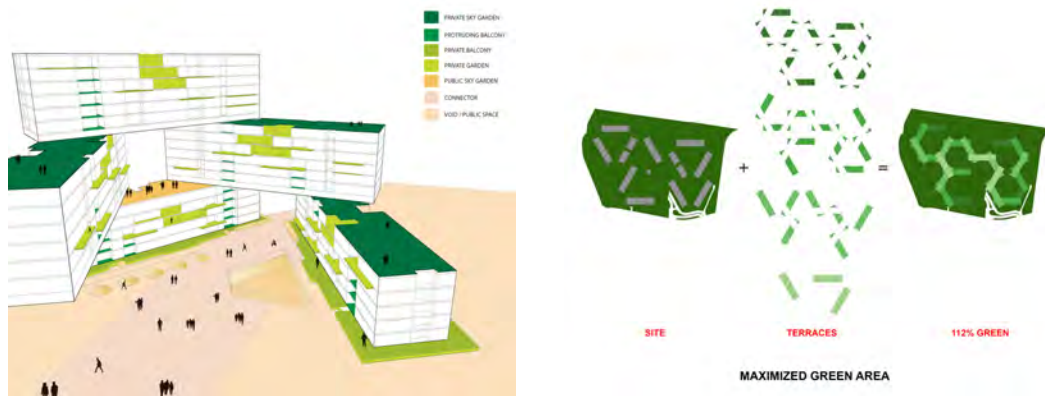


Figure 5.3.3 Public spaces and maximization of green area. Source : (Ole Scheeren, 2015)

Project Analysis:

The take away from the project is definitely the integration of communal spaces with the residential units. The roof gardens, landscaped sky terraces and cascading balconies is the breathing space that makes a healthier environment for the people living in the community. The project is sustainable which is essential for our country as well. The spaces created are so versatile and interesting that it makes a sheer difference in how we perceive the housing complexes.

Chapter 6: CONCEPTUAL STAGE AND DESIGN DEVELOPMENT

6.1 Concept and Design decision

6.2 Analysis of amenities

6.3 Form development

6.4 Communal space

6.5 Architectural drawings

6.5.1 Roof plan

6.5.2 Ground floor plan

6.5.3 Tower A

6.5.4 Tower B

6.5.5 Detail unit plan with furniture layout

6.5.6 Elevations: Tower A

6.5.7 Elevations: Tower B

6.5.8 Elevations through site

6.5.9 Sections

6.5.10 Rendered images

6.5.11 Images of model

6.0 CONCEPTUAL STAGE AND DESIGN DEVELOPMENT

6.1 Concept and Design decision



Figure 6.1.1 The existing context analysis of the project. (Source: Author)



Figure 6.1.2 Connecting the surrounding community to the lakeside. (Source: Author)



Figure 6.1.3 Creating lakeside green breathing spaces (parks, gardens etc). (Source: Author)



Figure 6.1.4 Creating the different zones (school, community, housing). (Source: Author)



Figure 6.1.5 Creating a connecting pathway of experience throughout the site. (Source: Author)

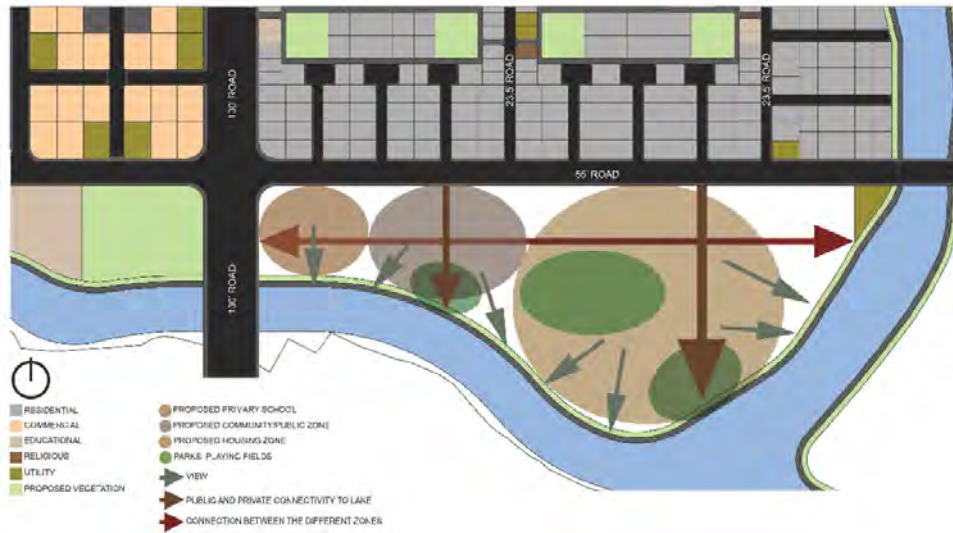
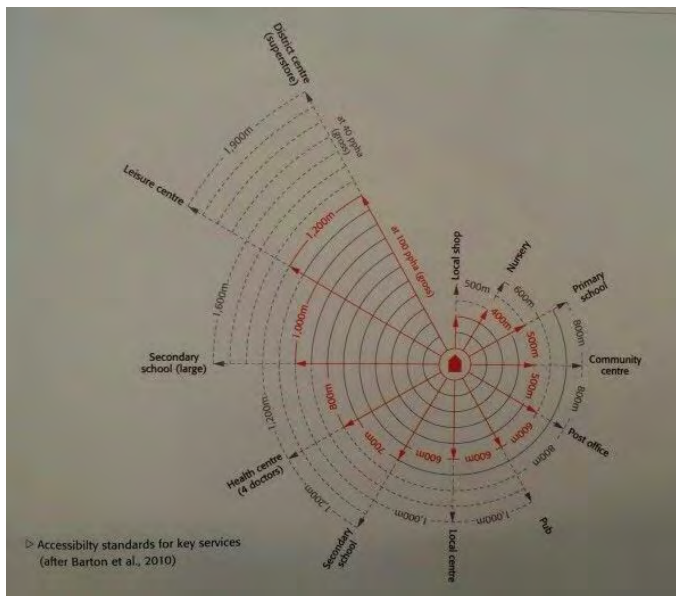


Figure 6.1.6 Design decision (Source: Author)

6.2 Analysis of amenities



Amenities inside the housing complex

- 1200 residential units
- Primary school
- Mosque
- Gymnasium
- Mini mart
- Health care centre
- Jogging track
- Cycling track
- Football field
- Basket ball court
- Tennis court
- Park

6.3 Form development

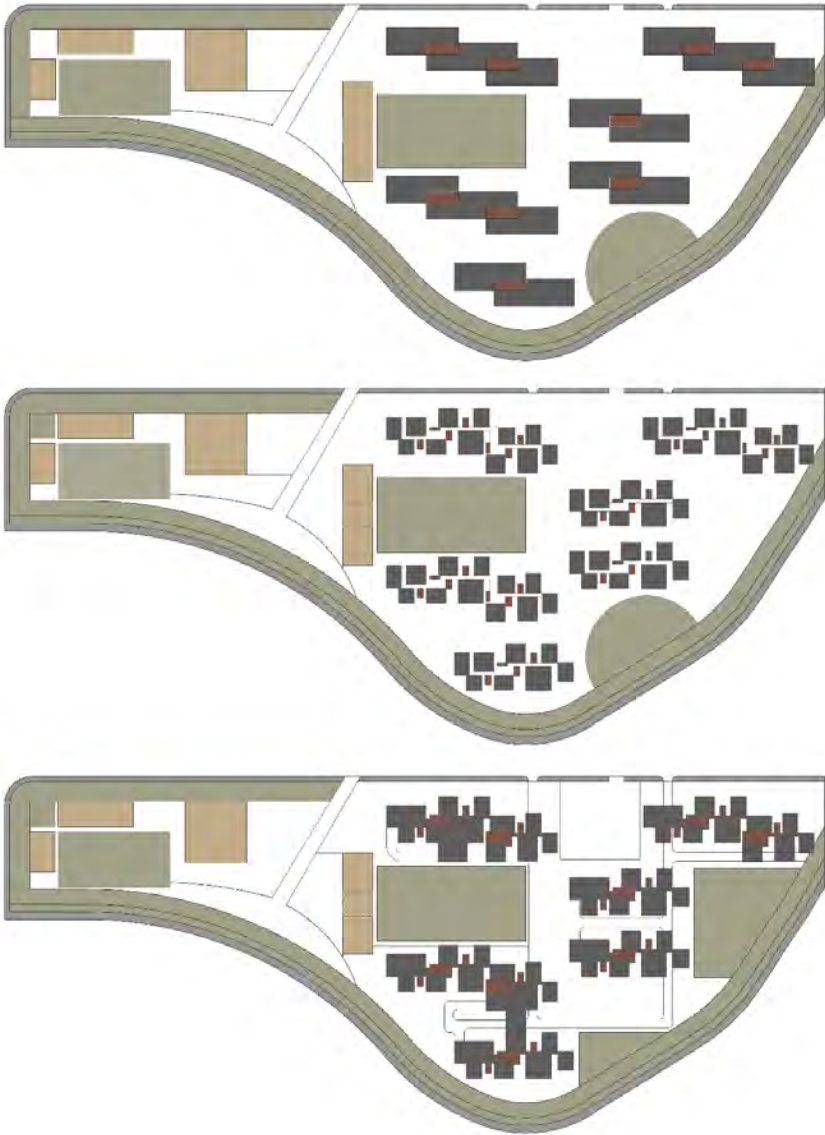


Figure 6.3.1 Form development. (Source: Author)

- Linear massing
- Interlocked masses elongated horizontally to minimise West facade
- Placement of core in the interlocked space

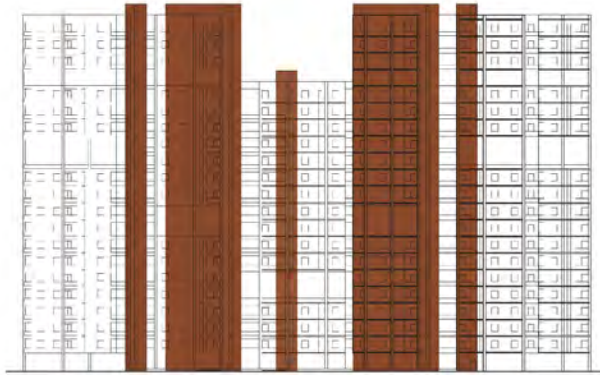


Figure 6.3.2 Core with fire stair and lift lobby (vertical circulation). (Source: Author)

6.4 Communal space



Figure 6.4.1 Zoning of communal spaces (Source: Author)

- LIGHT GREEN: Transitional interactive spaces that also connects visually with the green on ground level
- ORANGE: Community space
- BROWN: Open ground floor that flows and connects to the surrounding

6.5 Architectural drawings

6.5.1 Roof plan



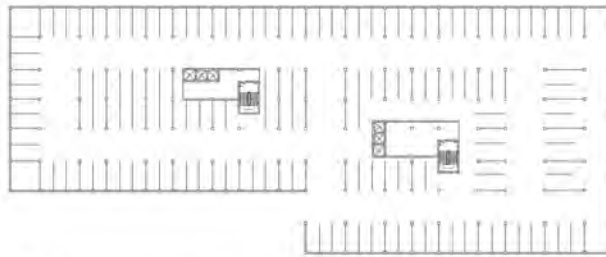
Figure 6.5.1 Roof plan (Source: Author)

6.5.2 Ground floor plan



Figure 6.5.2 Ground floor plan plan (Source: Author)

6.5.3 Tower A



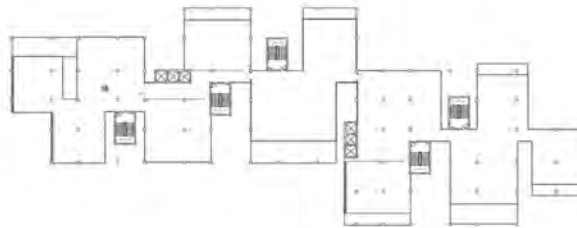
⊕ BASEMENT PLAN



⊕ TYPICAL FLOOR PLAN



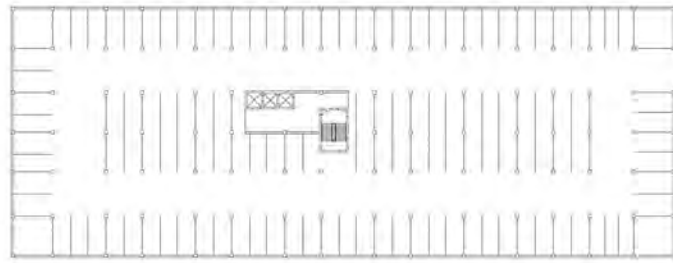
⊕ TWELFTH FLOOR PLAN



⊕ SEVENTEENTH FLOOR PLAN

Figure 6.5.3 Tower A plans (Source: Author)

6.5.4 Tower B




 **BASEMENT PLAN**



 **TYPICAL FLOOR PLAN**



 **EIGHTH FLOOR PLAN**



 **SEVENTEENTH FLOOR PLAN**

Figure 6.5.4 Tower B plans (Source: Author)

6.5.5 Detail unit plan with furniture layout



UNIT A: 1000 SFT



UNIT C: 1500 SFT



UNIT B: 1200 SFT



UNIT D: 1800 SFT



Figure 6.5.5 Detail unit plan with furniture layout (Source: Author)

6.5.6 Elevations: Tower A

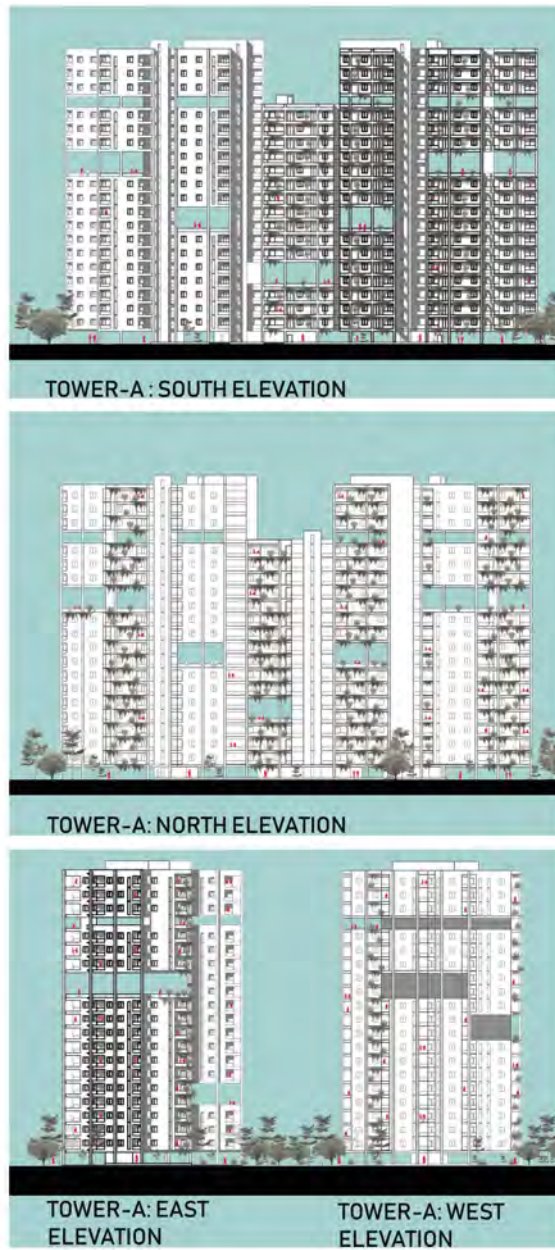


Figure 6.5.6 Elevations: Tower A (Source: Author)

6.5.7 Elevations: Tower B

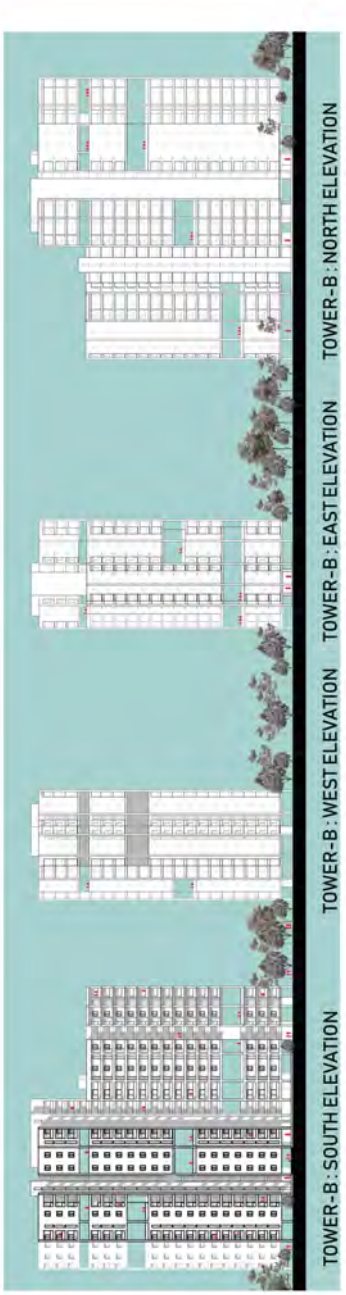


Figure 6.5.7 Elevations: Tower B (Source: Author)

6.5.8 Elevations through site

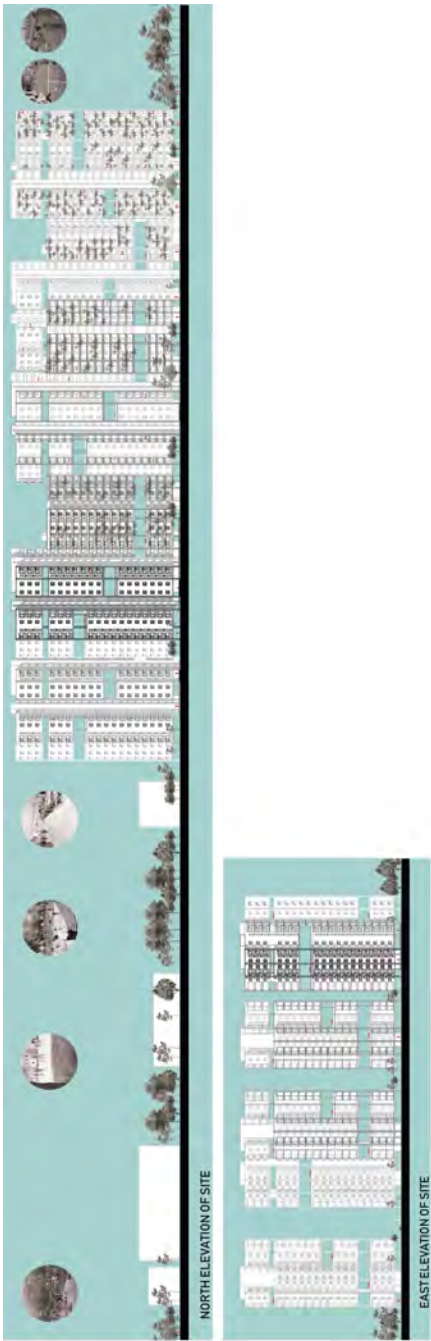


Figure 6.5.8 Elevations through site (Source: Author)

6.5.9 Sections

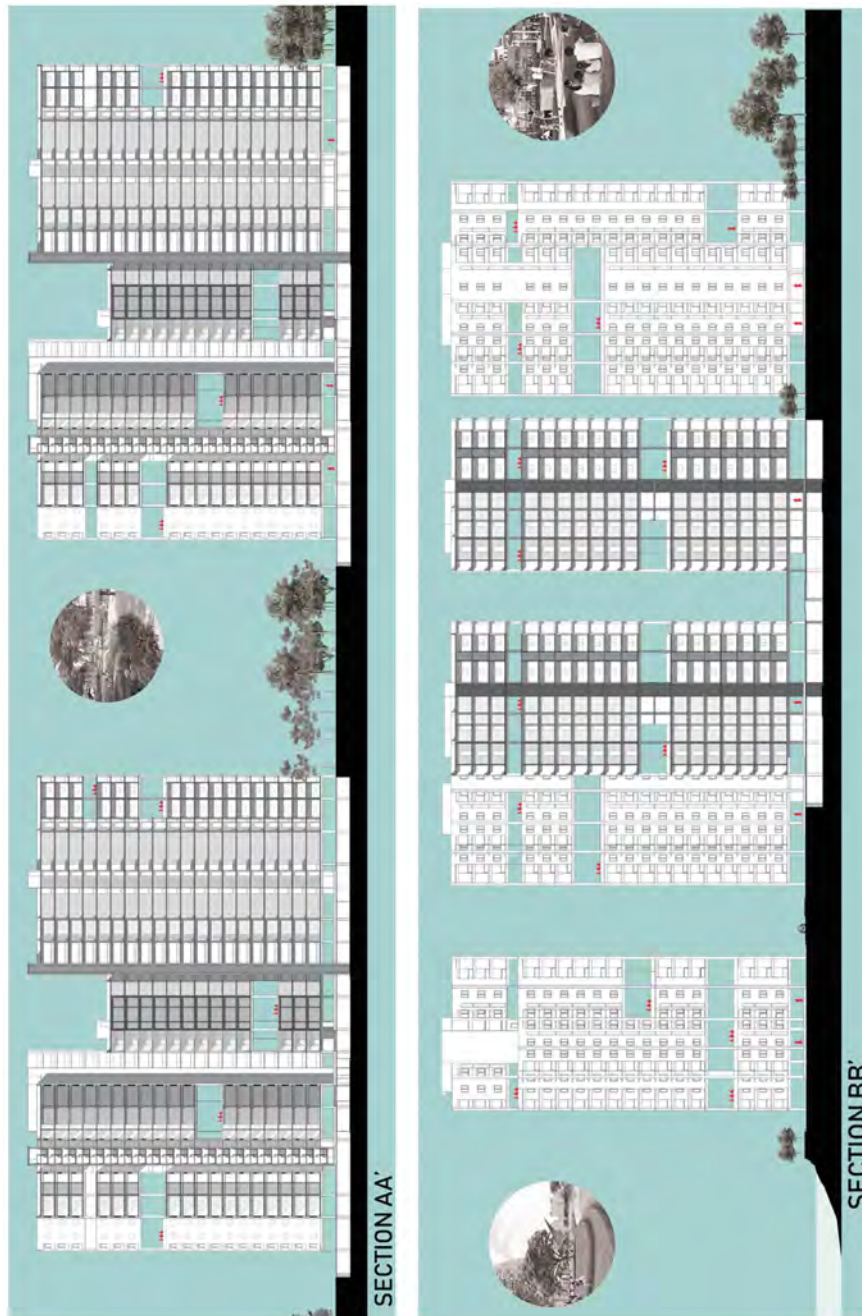


Figure 6.5.9 Sections (Source: Author)

6.5.10 Rendered images



Figure 6.5.10 Rendered images (Source: Author)

6.5.11 Images of model

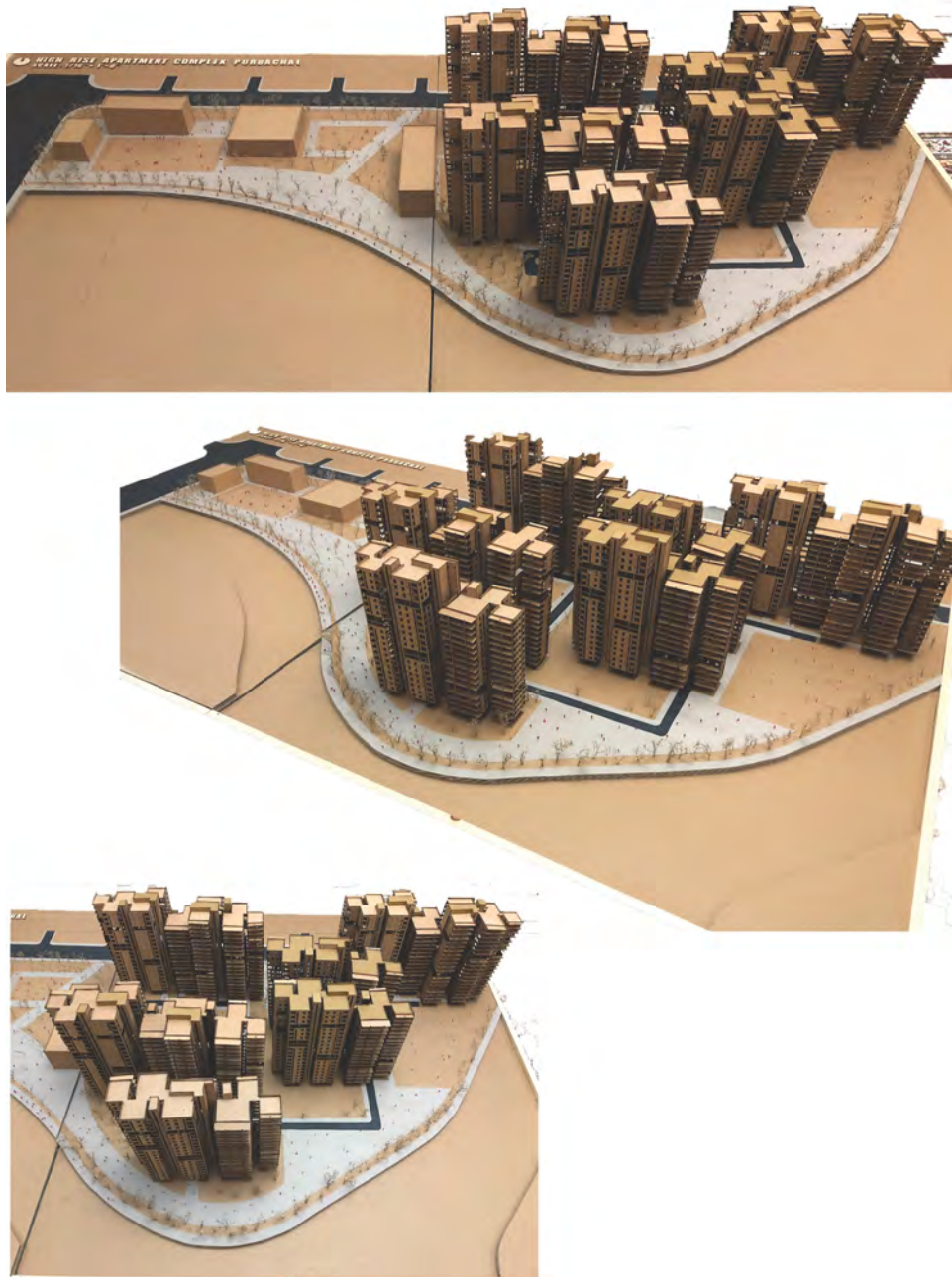


Figure 6.5.10 Images of model (Source: Author)

CHAPTER 7: CONCLUSION

7.0 CONCLUSION

As housing is considered a basic right for any citizen living in a country, it should be designed in such a way that it contributes to their mental and physical health. Their well being should be of utmost importance. Something that housing complexes nowadays lack is proper ventilation and lighting. In order to fit too many buildings these components are often compromised. This project is an attempt to ensure a good experience for the users in terms of ventilation and natural lighting. Something that this housing complex promotes is communal spaces for social interaction. As lives became busier people hardly engage in community interaction which is vital in a housing complex. This is because people live in these housing complexes for a life time thus interactions with neighbors would be a pleasing thing. Interaction within the individual units, within the buildings and out in the open. There would be people of all age groups so a source of recreation for all age groups would be provided. Having lakes on two sides is a rare aspect in urban areas today. So people would get to enjoy the vista of the lake and the greenery. A healthy community would be able to contribute to the nation in all aspects.

REFERENCE

ArchDaily, (2009). Linked Hybrid / Steven Holl Architects
Retrieved from: <https://www.archdaily.com/34302/linked-hybrid-steven-holl-architects>
Date Accessed: March 16, 2018

ArchDaily, (2015). The Interlace / OMA / Ole Scheeren.
Retrieved from: <https://www.archdaily.com/627887/the-interlace-oma-2>
Date Accessed: March 17, 2018

Bangladesh Population (2018) - Worldometers
Retrieved from: <http://www.worldometers.info/world-population/bangladesh-population/>
Date Accessed: March 15, 2018

Baan, I. (Photographer). (2009, 9 September). Linked Hybrid (digital image).
Retrieved from: <https://www.archdaily.com/34302/linked-hybrid-steven-holl-architects>

Baan, I. (Photographer). (2015, 6 May). The Interlace (digital image).
Retrieved from: <https://www.archdaily.com/627887/the-interlace-oma-2>

Baten, P. (2017). Housing complex for government employees.

Domus, (2018). Digonto
Retrieved from: <http://www.domusarchitect.com/details/3>
Date Accessed: March 16, 2018

Eastern housing limited, (2016).
Retrieved from: <http://www.easternhousing.com/about-us/background>
Date Accessed: March 15, 2018

Gang, J. (2016). Three points of the residential high-rise: Designing for social connectivity. *International journal of high-rise buildings*, 5(2), pp. 117-125

Henilane, I. (2016). Housing concept and analysis of housing classification, *4*, pp. 168-179

doi: 10.1515/bjreecm-2016-0013

Hossain, S.Z., (2016). Purbachal to be first smart city by 2018. Dhaka Tribune

Housing and Health Resource, (2015). Physical health – key issues

Retrieved from: <http://www.cieh-housing-and-health-resource.co.uk/housing-conditions-and-health/key-issues/>

Date Accessed: March 15, 2018

Islam, S. (2011). A study on zoning regulations' impact on thermal comfort conditions in non-conditioned apartment buildings in Dhaka city.

Mahdavinejad, M., Mashayekhi, M., & Ghaedi, A. (2012). *Procedia - Social and Behavioral Sciences. Designing communal spaces in residential complexes*, 51(2012), pp. 333 – 339.

O'Shea, P. (Photographer). (2010, August 29). *Rescued hedgehog* [digital image]. Retrieved from <http://flickr.com/photos/peteoshea/5476076002/>

Rajdhani Unnayan Kartripakkha (RAJUK), (2011). Purbachal new town.

Retrieved from: <http://www.rajukdhaka.gov.bd/rajuk/projectsHome?type=purbachal>

Rahman, A.I., (2015). Center for international trade fair events Purbachal, Dhaka.

Rahman, F., (2013). International trade fair complex at Purbachal, an event platform for branding a new city.

Rising population big concern for Dhaka, (2014). Mega cities now growing beyond richer world. The Daily Star.

Retrieved from: <http://www.thedailystar.net/rising-population-big-concern-for-dhaka-33081>

Date Accessed: March 16, 2018

Romanova, E. (2018) Increase in Population Density and Aggravation of Social and Psychological Problems in Areas with High-Rise Construction.

Sand, J. (2003). House and home in modern Japan. Architecture, domestic space and bourgeois culture 1880-1930

Seraj, T.M. (2016). Real estate development. The Daily Star.

Shanta Holdings Ltd, (2017). Digonto

Retrieved from: <http://www.shantaholdings.com/completed/project/digonto>

Date Accessed: March 16, 2018

Shukri, F. A. B., & Misni, A. B. T. (2017). The impact of roof gardens at high-rise residential buildings on property values. *Sustainable development and planning IX*, 226, pp. 39-48

doi:10.2495/SDP170041

STEVEN HOLL ARCHITECTS, (2018). LINKED HYBRID

<http://www.stevenholl.com/projects/beijing-linked-hybrid>

Date Accessed: March 16, 2018

Time and date, (2018). Climate & Weather Averages in Dhaka, Bangladesh.

Retrieved from: <https://www.timeanddate.com/weather/bangladesh/dhaka/climate>

Date Accessed: March 16, 2018

United Nations, (2018). Fact Sheet No.21, The Human Right to Adequate Housing
Retrieved from: <https://www.un.org/ruleoflaw/files/FactSheet21en.pdf>

Weather and Climate information for every country around the world, (2016).
Retrieved from: <https://weather-and-climate.com/>
Date Accessed: March 15, 2018

Worldometers, (2018). Real time world statistics.
<http://www.Worldometers.info/>
Date Accessed: March 16, 2018

Wymelenberg, K.V.D (2014). The Benefits of Natural Light. Research supports
daylighting's positive effect on building performance and human health.