

SEMINAR II

ARC 512

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Dhanmondi-10 Residential Area, Dhaka

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Submitted in partial submission of the requirements

For the degree of bachelor of architecture

Department of Architecture

BRAC University

Spring 2016

Abstract

Buildings are found to be both, one of the biggest consumer of energy and producer of greenhouse gases. And among them 60% building of Dhaka city are residential. It has become a global issue. According to the National Institute of Building Sciences, buildings generate 35 percent of the carbon dioxide (the primary greenhouse gas associated with climate change), 49 percent of the sulphur dioxide, and 25 percent of the nitrogen oxide found in the air. Since buildings are accountable for this scenario, it has imposed an immediate requirement to not only think of, but implement sustainability in every new construction instantly. This will render us a sustained environment and a healthy ecosystem. Green Buildings are buildings that subscribe to the principle of conscientious handling of natural resources, which means causing as little environmental interference as possible, using environment friendly materials, requires low operational energy, utilizes renewable sources of energy to fulfill its requirements, follows high-quality and longevity as a guideline for construction and last but not least, must be economically viable.. The paper focuses on green design as a vital transformation of contemporary architecture practiced in Dhaka city. It endeavours to present some environmental and physical design approaches for green buildings. In this regard, the study presents hands on analysis of basics and principles of green architecture, theories and viewpoints outlined in the field and also the analysis of efficacious cases of environment friendly buildings in Bangladesh.

Acknowledgement

‘In The Name of Allah, The Most Gracious, The Most Merciful’

I would like to begin by thanking Almighty Allah for bestowing me with the strength, courage and willpower to study and accomplish 5 years of education in the field of Architecture.

I offer my sincerest gratitude to the Pro Vice Chancellor of BRAC University and Chairperson of the Department of Architecture, Prof. Shaheda Rahman and ex-Chairperson Prof. Fuad H. Mallick for being a constant source of inspiration throughout my life at BRAC University. A big thanks to my course instructors- Mohammad Habib Reza (Ph.D) and Mahmudun Nabi sir for all their support, guidance and encouragement throughout the semester.

I owe my heartfelt gratitude to all those helpful people who allowed me to investigate their buildings as my case study. I would also like to thank Engr. Zawad Ul Karim and Engr. Shafiuddin Ahmed for helping me to choose the site and last but not the least, to my client Mr. Mamunur Rashid and his wife Mrs. Zainab Rashid for trusting me to fulfill their dream of a Green, environment friendly residence.

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Project brief

Name of the project: Living with Green

Location: House-26, road-10A, Dhanmondi residential area

Area: 1 Bigha (106x90) sqft

Client: M. Mamun-ur-Rashid

Introduction

The Industrial Revolution marked a major turning point in Earth's ecology and humans' relationship with their environment. The Industrial Revolution dramatically changed every aspect of human life and lifestyles. From human development, health and life longevity, to social improvements and the impact on natural resources, public health, energy usage and sanitation, the effects were profound. These processes gave rise to sweeping increases in production capacity and affected all basic human needs, including food production, medicine, housing, and clothing. This is the principle of environmental unity – a change in one system will cause changes in others.

Project Rational

Today, Bangladesh is one of the most vulnerable nations in the world due to climate change. As the ninth most populous country and twelfth most densely populated countries in the world, its rising population and limited land space have put tremendous strains on the urban ecosystem. The capital of Dhaka itself underwent severe transformations in recent years to catch up the increased rate of urbanization which simultaneously affected its natural ecosystem and resulted to scarcity of natural resources. More than 50% of Dhaka cities infrastructures are used for residential purpose, so a lot of carbon containing gases is being emitted from these places everyday due to the use of electrical devices and reducing natural system of living. Thus it is high time we should focus on these negative effects of residential buildings and try to make it more adaptive to the natural environment. In fact people has already become cautious about the sustainability of their living space and thus the demand of zero carbon emitting building has

increased. The first green building in Bangladesh was by EPIC group in May 2011 and after that none of such building was further built that would save energy and contribute to the environment.

Green building isn't cheap but it does promise returns that far outweigh the initial cost. Off-grid power generation through solar panels and passive solar heating, for example, can save 30 to 60 percent less energy. By the use of energy-efficient electrical appliances power consumption will drastically drop. It's not just about monetary savings too; energy efficiency points to a lifestyle that benefits the environment in many different ways. As resources are slowly exhausted, there's a need to think of sustainable solutions. The environment benefits, we benefit and so does other life.

It may not seem apparent at the outset but green building design can contribute to an improved quality of life. For example, reduced dependence on artificial heating and cooling means to enjoy natural warmth or coolness. Energy efficient windows with UV resistance protects against the harmful effects of the sun while maximizing the benefits of sunlight. Pollutants generated from fuel-based electricity don't have to be a cause for worry either. Again rainwater harvesting and water recycling will help to rely less on municipal water supply.

Traditional building design has given birth to stunning structures that continue to captivate the senses. Green building affords the same but with a twist. There's more greenery, a contemporary flair, and an interesting dimension to the overall design. Knowing that the design will still make an impact years from now is a positive way. Green building design aims to blend structures with the environment and sustainability drives the process into an exciting building design.

Literature review with the history of residence

HOUSE

House describes a particular type of building.

A **house** is a building that functions as a home, ranging from simple dwellings such as rudimentary huts of nomadic tribes and the improvised shacks in shantytowns to complex, fixed structures of wood, brick, marble or other materials containing plumbing, ventilation and electrical systems.

The social unit that lives in a house is known as a household. Most commonly, a household is a family unit of some kind, although households may also be other social groups or individuals. The design and structure of the house is also subject to change as a consequence of globalization, urbanization and other social, economic, demographic, and technological reasons.^[3] Various other cultural factors also influence the building style and patterns of domestic space.

HOME

Home is the place where we live and feel that we belong to.

According to different people-

Home isn't a place; it's a feeling.

Winter Skelton

Springfield, Missouri

A clean, fresh, lemon-scented living room, open windows, plenty of sun and warmth everywhere, and my mother's cheese pie baking in the oven.

Thei Zervaki

New York, New York

The sensation of peace on a cozy, rainy Sunday and the feeling of relief when you pull into the driveway after a long trip . Home has been many places for me over the years, but its comforts are defined by simple, blissful moments.

Sarah Bernard

Somersworth, New Hampshire

A place where I can be 100 percent me. If I want to make fried bologna with a side of couscous or have a cackling laugh attack watching *I Love Lucy*, I can, because I'm home.

Jessica Hanson

Marseilles, Illinois

Home is a place of love and comfort that always welcomes you with open arms—and perhaps a plate of freshly baked cookies.

Jaime Meier

Durham, North Carolina

A place that evokes a sigh of relief as I walk in the door .

Courtney Golden

Arlington, Virginia

It's the sun coming through the kitchen window every morning, my husband at the counter, making lunches as we leave for work and school. It's my neighbor Karen lending me a cup of sugar, the drone of Bill's lawn mower, and Liz turning on her porch light at precisely 8 P.M. and a final peek in each bedroom to make sure everyone is safe and sound. Home means predictability in an uncertain world.

Maureen Reilly Barnes

Arlington Heights, Illinois

HOUSE VS HOME

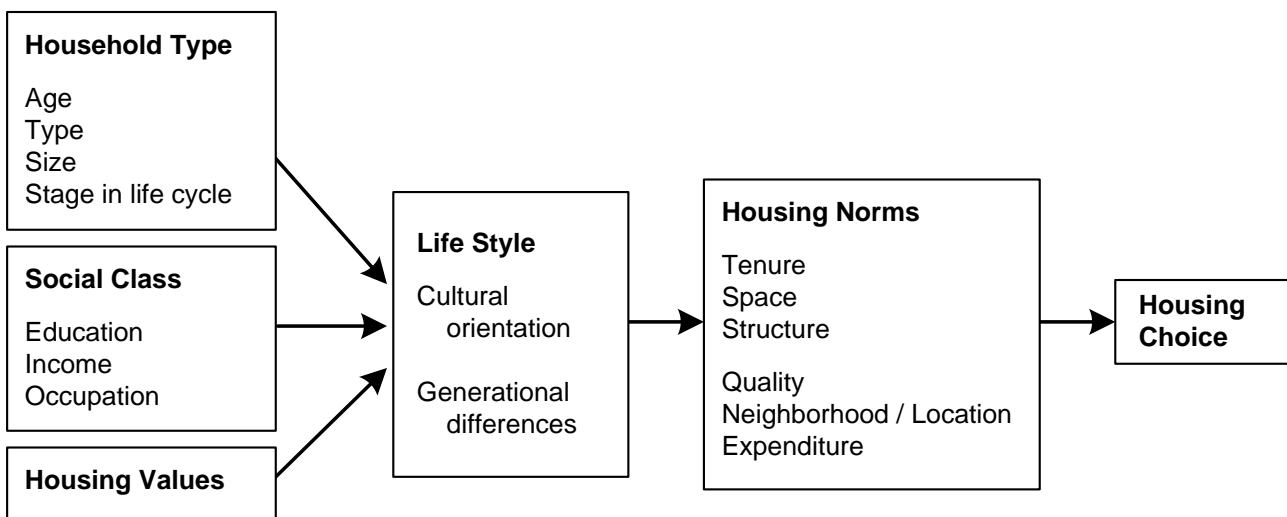
The main difference between them is that *house* is concrete. *House* refers to a building in which someone lives. In contrast, a *home* can refer either to a building or to any location that a person thinks of as the place where she lives and that belongs to her. A *home* can be a house or an apartment, but it could also be a tent, a boat, or an underground cave.

A home can even be something abstract, a place in your mind. When you say, "Let's go home," you are probably not talking simply about going to the physical structure where you live. You are talking about being in the special place where you feel most comfortable and that belongs to you.

DIFFERENT ASPECTS OF A HOME

- Proximics
 - Intimate
 - Personal
 - Social
 - Public
- Personal space
- Seating
- Privacy
- Crowding
- Sociofugal & sociopetal arrangements
- Territoriality
- Personalizing space
- Possessions
- Claiming spaces
- Displaying items
- Symbols of self

DIFFERENT ASPECTS OF A HOUSE



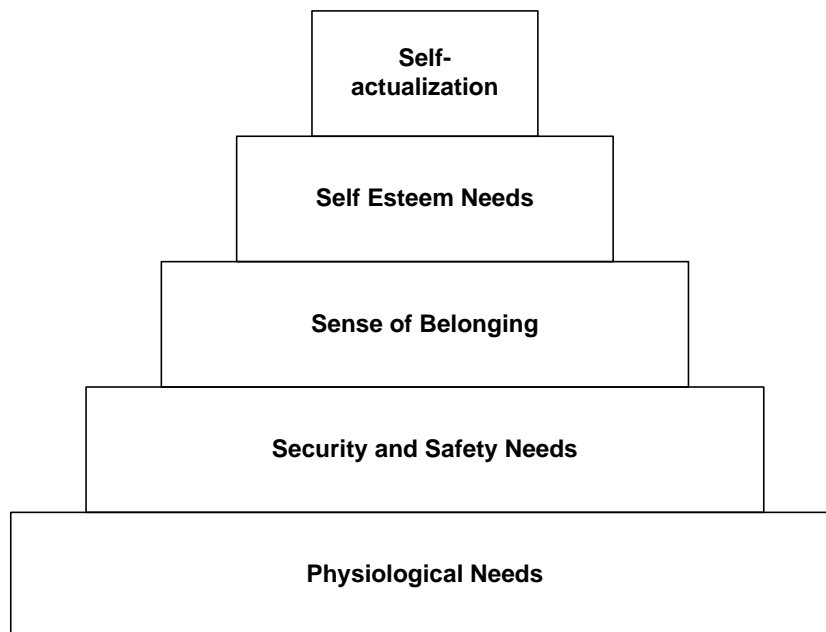
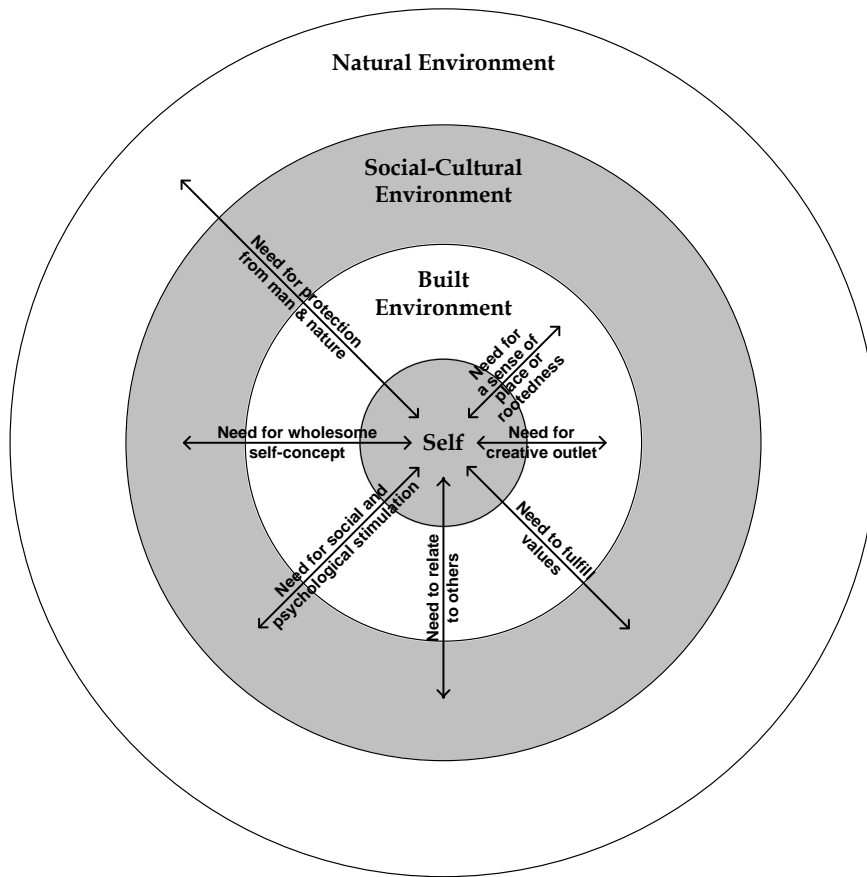


Fig- Pie diagram and Pyramid of Human needs in their home

History of housing in Dhaka

Human settlement in Dhaka can be traced back as early as the 12th century (Ahmed, 1986). It is likely that the fertile land of the delta brought human settlement on this land. The Mughals recognized the importance of the land and established a city in the early seventeenth century (Karim, 1989). The Mughals established the city as their capital and strategic centre to rule the region, and as a business centre for handicrafts (Mohsin, 1989). The independence of the sub-continent after World War II in 1947 gave it a fresh impetus for development as it became the capital of East Pakistan – a province of Pakistan. The creation of Bangladesh as a sovereign country in 1971 further boosted the development and it quickly grew to primate city status. While travelling through a political rollercoaster, the city received attention, negligence, political instability, poverty, natural calamity and went through different philosophical views for its development. The city in its present form translates its experiences through crowding, environmental degradation, land grabbing, mismanagement, corruption and political rivalry. However, as a home for millions and hope for more, it holds the opportunities for a better living place – a sustainable mega city that can lead this poverty stricken country towards a brighter future.

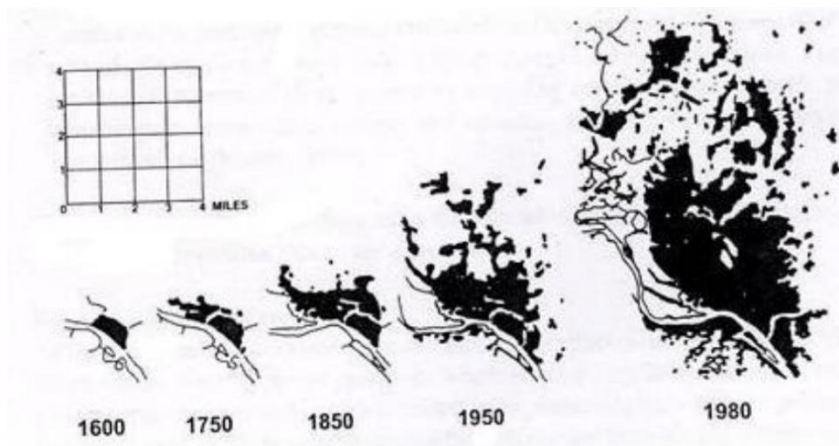
With a population over 12 million in the main city and 16.7 million in the mega region (United Nations, 2003), Dhaka is one of the largest cities in the world, being ranked the 11th largest city. Dhaka is also the fastest growing mega city in the world with a growth rate of 3.2% (Figure 1) and an estimated 300,000 to 400,000 new migrants, mostly poor, arriving to the city every year (World Bank, 2007). It is one of the most densely (968 person/Km²) populated countries on earth with an area of 144,000 km². Bangladesh is predominantly an agrarian country experiencing rapid urbanization and economic transformation in its recent history (Hossain, 2008). While developing nations in Asia show rapid rates of urbanization, Bangladesh still remains less urbanized (25%). Although the absolute urban population as well as the number of cities and towns in the country has significantly increased during the last few decades, both the process of urbanization and the dynamics of growth of urban centres in Bangladesh are quite different from other developing countries in South and Southeast Asia (Rahman, 2004). It appears, however, that trickle down effects are not spatially uniform, perhaps because of spatial variations in environmental conditions, and socio-economic infrastructure of the country (Rahman, 2004). And there exists wide spatial inequalities in the rates of urbanization, quality and quantity of social infrastructure and economic growth and development. Another reason that Islam (2006) mentioned for the existence of these inequalities is the practice of development planning. In Bangladesh traditional development planning takes a sectoral form (transport, housing, energy etc.) rather than a regional or spatial approach (Islam 2006).

URBAN EVOLUTION HISTORY OF DHAKA

Dhaka has come to its present state by experiencing different rulers of different cultures and through a wide range of governance structures, administration, natural calamity, poverty and an enormous number of other problems. In order to realize the form of the city and its spatial consequences, it is essential to understand the historical evolution of the city through knowing its major expansion, growth strategies, planning decisions and reasons behind it. Dhaka was a small rural settlement on relatively high and flat land surrounded by flood affected swampy land until the end of 16th century. In the last 400 years the city experienced several rulers having different perspectives on city development and expansion. The spatial growth, especially, in last 60 years is phenomenal. The Mughals established their capital in Dhaka in 1610 and developed the city as a business hub along with their defense headquarters. The British East India Company took over control of Dhaka in 1757 and considered Dhaka as a regional trading centre and market. Dhaka became the provincial capital of East Pakistan in 1947. During this time Dhaka received large numbers of Muslim migrants from India. To accommodate this sudden growth several area development projects were undertaken between 1950 and 1960. As the capital of Bangladesh since 1971, Dhaka leads the nation in urbanization and city primacy.

SETTLEMENT BEFORE AND AFTER MUGHAL EMPIRE (1608-1757)

Dhaka came into prominence after the Mughals appointed Islam Khan as the first Mughal viceroy of Bengal in 1608. Islam Khan established his capital in Dhaka in 1610 with a view to subjugate the landlords of Bengal (Ahmed, 1986 ; Karim, 1989). It was the geographical location of Dhaka, the topographic advantages of being situated on higher ground in a low lying region, and above all its strategic position on the water-routes of the country which convinced the Mughals to establish their capital (Chowdhury and Faruqui, 1989). During the Mughal era, Dhaka attained great commercial importance and became a trading centre for the whole of South East Asia.



Dhaka lost its status as a capital town in 1706 when the Mughal capital was shifted from Dhaka to Murshidabad, Kolkata and it started to decline and experienced a long slumber for more than a century (Ahmed, 1986). The factories of the companies attracted many people connected with manufacturing, trade, commerce and money lending. The export of the European companies from Dhaka increased enormously during this time. So, in spite of shifting the capital to Murshidabad, Dhaka as a city and commercial centre did not decline significantly, though city expansion and development was definitely contained (Karim, 1989).

DHAKA UNDER BRITISH RULE (1757 – 1947)

With the end of Mughal rule and the inception of British power around 1760, Dhaka began to decline in importance and contract in size. The city experienced disastrous famines, flood and fires. Calcutta was growing in importance and it was difficult for Dhaka to compete with Calcutta which was the capital of British India. During this period Dhaka suffered physical shrinkage as well (Chowdhury and Faruqui, 1989). From 1800 to 1867 the population dropped from 200,000 to less than 60,000 (Islam, 1996). The second half of the 19th century marked the beginning of the physical renewal of Dhaka. The city did not expand but the old Mughal town underwent changes. As a result medieval Dhaka was finally transformed into a modern city with metalled roads, open spaces, street lights and piped water supply' (Ahmed 1986, p. 129). In the process of consolidation of Dhaka's commercial dominance in Eastern Bengal, the Narayanganj-Dhaka-Mymensingh railway was opened in 1886. The rail was laid almost parallel to the Mugla road from Tongi through Tejgaon to the Phulbari area and encircled the Ramna area to save the greenery. The inner part of the city also witnessed widespread rebuilding activities of roads and houses, but not following any definite plan.

DHAKA AS THE EAST PAKISTAN CAPITAL (1947 – 1971)

Since becoming the capital of East Pakistan in 1947 the landscape of Dhaka City has been undergoing rapid change; the city expanded northward and the high class residential areas were constantly endeavouring to keep themselves at the northern periphery of the city by creating 'new Dhaka'; mainly, because, higher lands were available in the North and low lands in East and West were vulnerable to annual floods. The Motijheel area, once desolate and lying on the fringe of marshes and swamps, was earmarked as a commercial area in 1954. To cater to the ever increasing residential needs of the new capital, the Dhanmondi area, which was adorned with paddy fields, came to be developed as a residential area after 1955. The Mirpur road formed an axis and the highland on either side of the road came to be occupied right up to Mohammadpur and Mirpur. In the 1960s these two areas came to be developed by the government mainly to accommodate the migrant Muslim population.

The need for a planning body was felt at this time and the Dhaka Improvement Trust (DIT) was created in 1956 for the planning and development of the city. DIT developed the Ghulsan Model Town in 1961, Banani 1964, Uttara 1965 and Baridhara model town in 1972. Although these satellite towns were developed to accommodate the middle income groups, the inappropriate allocation procedure and rapid increase of land price has ended with these high class residential areas. These satellite towns have now matured, cater for a large number of jobs and are important centres for the city (Kabir and Parolin, 2010).

DHAKA AS THE CAPITAL OF BANGLADESH (SINCE 1971)

Independence in 1971 enhanced urbanization in Bangladesh. Dhaka, being the largest city and having most amenities, received the lions share of this growth. The driving factors for this rapid rural urban migration are surplus labour in agriculture, globalization, drought, systematic failure of rural agriculture and perceived opportunity in the city (Khan, 2008). With the increase in population, the highlands spreading towards the north came to be occupied and built up. The intervening ditches, swamps and marshes were filled up, not in any planned manner, but as the exigency arose and private initiative played a dominant role in the process (Huq and Alam, 2003). The planning and development authority DIT/RAJUK chose the highlands on the Dhaka-Tongi axes as sites for its residential projects. The city did not experience any serious effort to reclaim land under a well-planned scheme to give the city a homogenous and cohesive growth (Chowdhury and Faruqui, 1989 ; Talukder, 2006). Until 1990 the main city was limited between the Balu and Turag rivers in the east and west due to the area beyond this limit being low, swampy and flood affected. But with rapid population growth and the advent of private developers the low lying areas were filled in and elevated and different housing schemes offered. As the land become scarcer, the vertical development for both commercial and residential sectors becomes a common pattern.

SPATIAL GROWTH AND URBAN FORM OF DHAKA

Dhaka city grew from a rural settlement to become a mega city without much planning effort (Islam 1996b; Huq and Alam, 2003; Nilufar, 2010). Nilufar (2010) identified four distinct urban patterns in Dhaka (Figure 9), which reflects the age of the city, its rulers, planning philosophy and above all planning control. First is the historical core or 'Old Dhaka' which still contained the Mughal layout of the human scale city. Narrow lanes, very compact buildings, mixed use – all remain the same and remind one of the glorious past. The second category of urban area comprises the formal planned area or satellite towns conceived and planned since 1950. Dhanmodi, Gulshan, Mirpur, Baridhara are examples. It was usual that low lying areas were selected and reclaimed for 'site and services' satellite towns. Until 1980 only RAJUK was involved in planning and designing for this type of development but now private developers are also providing the same. There is a third category combining the two – a fusion of old and

formal patterns – which occupies the most part of development (Mowla, 2007). Shanty towns and small temporary houses falls in fourth category where about 30% of Dhaka dwellers lived .



Old Dhaka



Gulshan Residential (planned)



Organic



Slum

Dhaka mega city is growing in an uncontrolled manner leading to more crowding and congestion in the main city. The evidence suggests that if there are no major decisions in terms of its pattern of housing development, congestion could reach intolerable levels in the near future .The urban structure of the mega city, the allocation of land-use and activity and its intensity reflects the historical past of the city. Comprehensive action is urgently required that recognizes the character of an area and allocation or controlled activity in a sustainable manner.

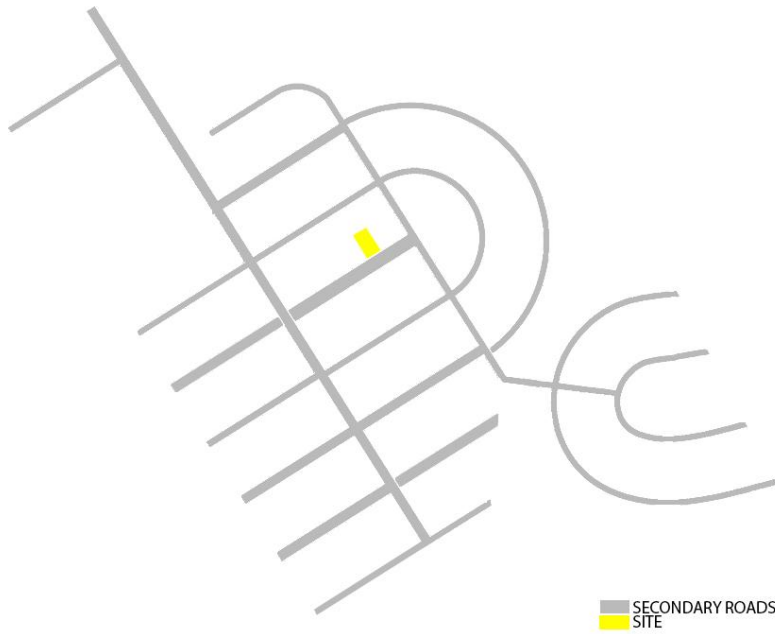
But fortunately, both the housing dwellers and the construction personals are enormously aware of this sustainability and as a result sustainable design for housing has been already started, though the example of this type is not much yet. As for exemple-

Site Analysis

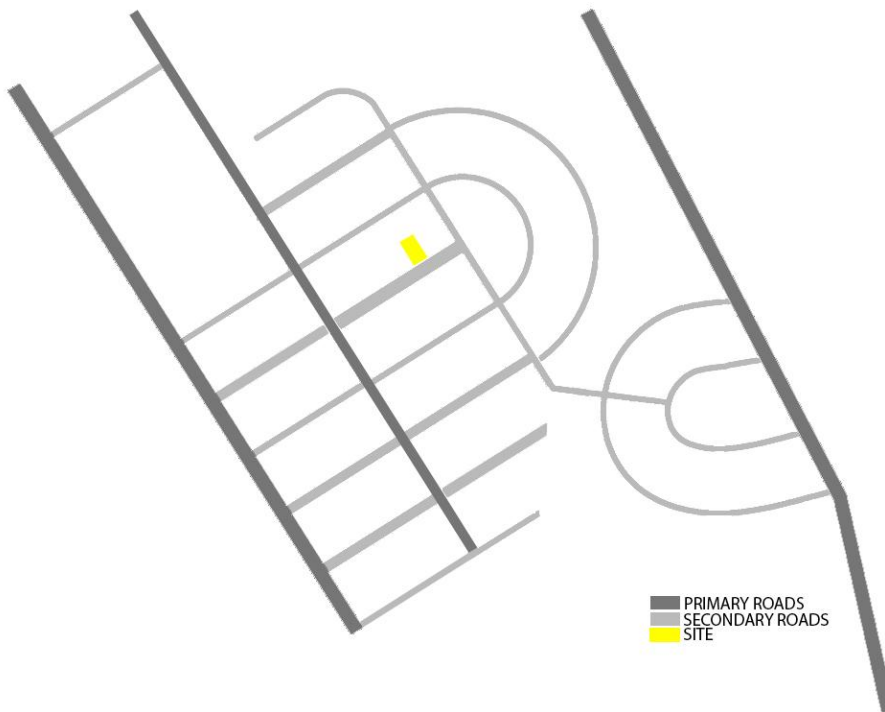
SITE LOCATION

House-26, road-10A, Dhanmondi residential area

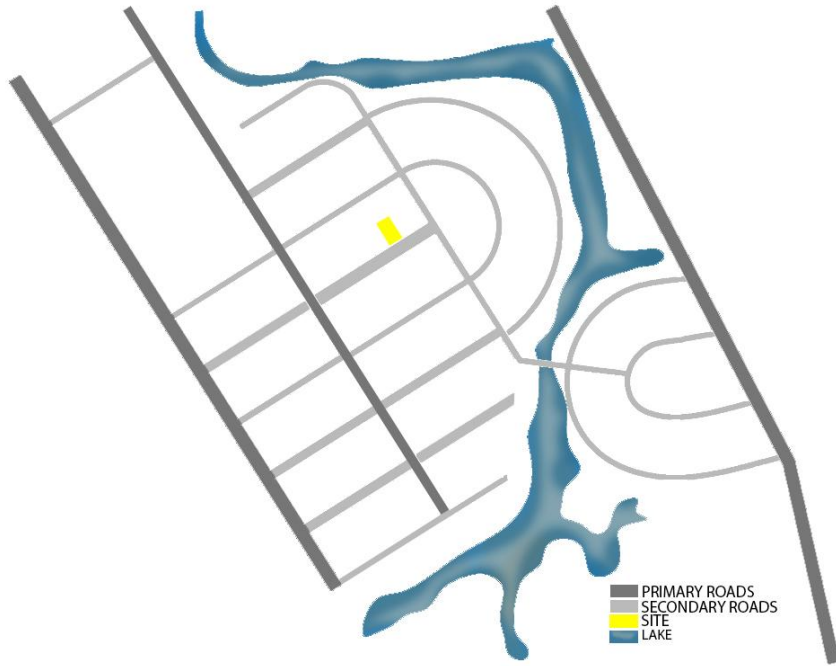




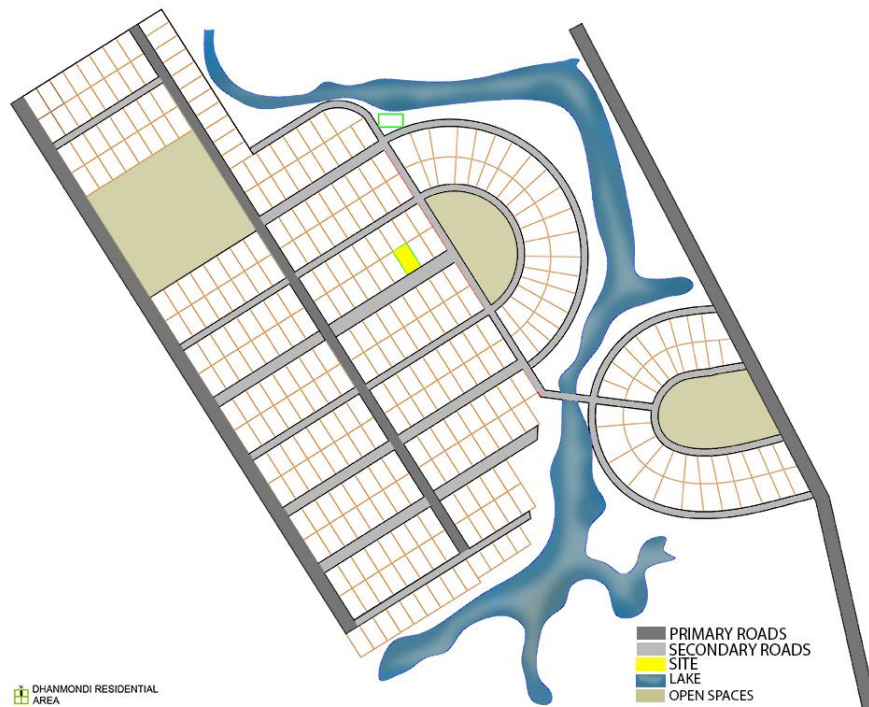
PRIMARY ROAD



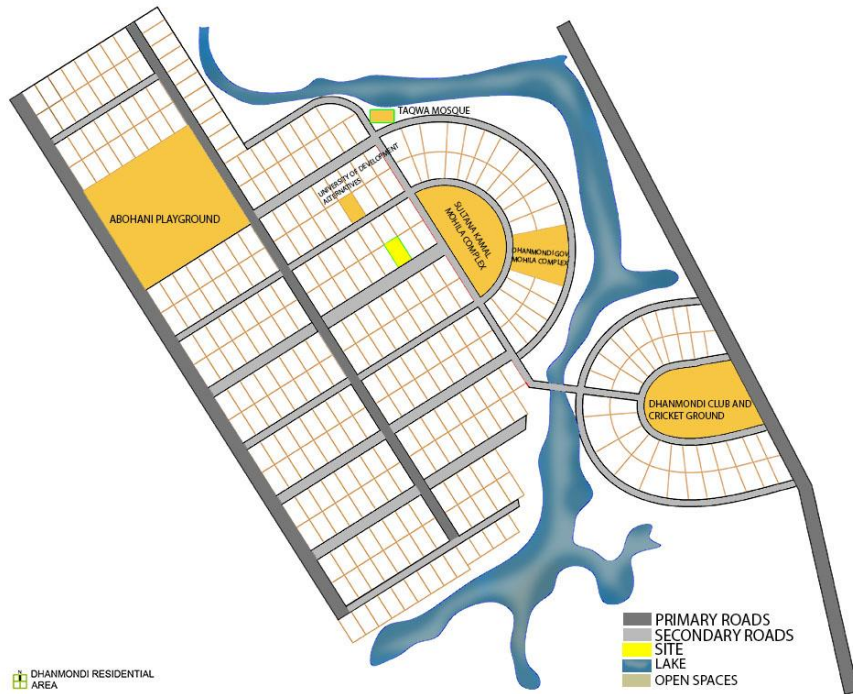
PRIMARY AND SECONDARY ROAD



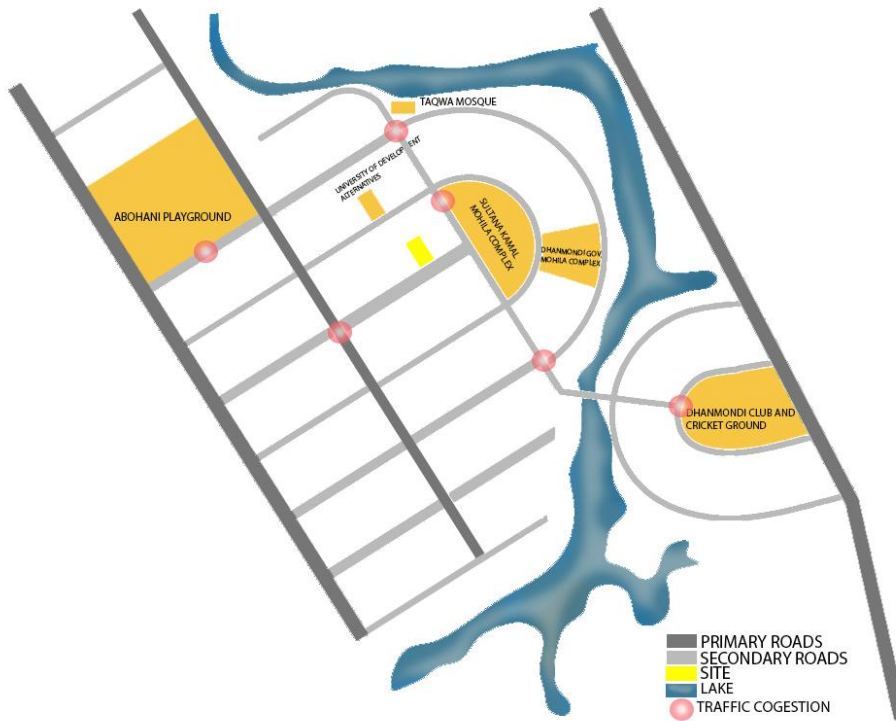
WATER BODY NEAR THE SITE



OPEN FIELDS AROUND THE SITE



IMPORTANT NODES AROUND THE SITE



TRAFFIC CONGESTION NEAR THE NODES



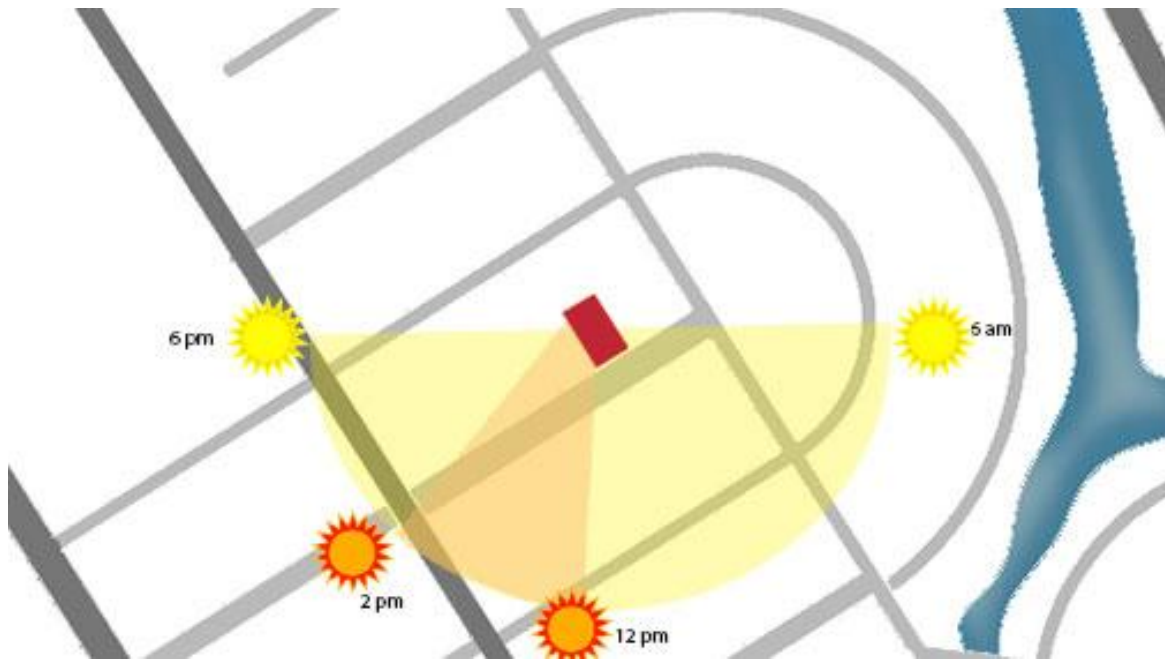
GREENERIES AROUND THE RESIDENTIAL AREA



BUILT SPACE



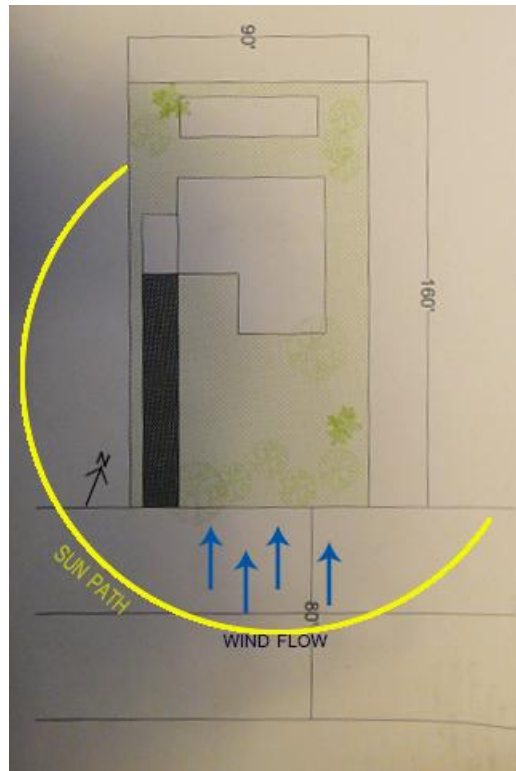
GREENERIES INCORPORATED WITH THE BUILT SPACES



SUN PATH



WIND DIAGRAM



Existing top view of the site

Case Studies-

NATIONAL-

CITYSCAPE TOWER, Gulshan Avenue, Gulshan

Cityscape International Ltd took the initiative to build the 17-storey building to pursue the platinum certification of the Leadership in Energy and Environmental Design (LEED), a set of rating systems for “green” constructions developed the US Green Building Council, under its Core and Shell category.



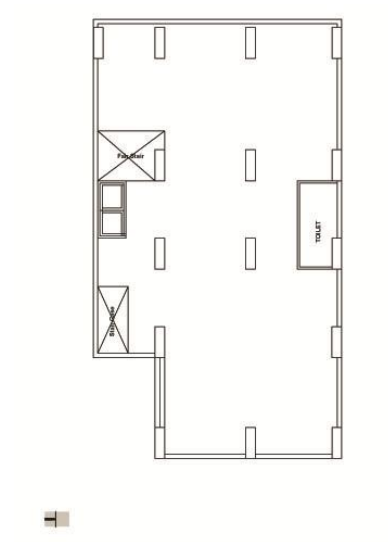
3D view of Cityscape tower

Views from different angles





Ground Floor Plan



Typical office floors



3D View of Ground Floor



3D View Of Typical Office Floors

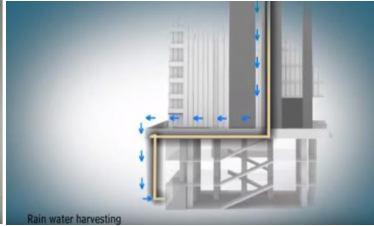
The construction of the building, in the capital's Gulshan Avenue area has been completed in December 2015.

This project accurately places Bangladesh in the world map of modern, sustainable futuristic construction. This high-tech green building ensures up to 44% and 60% less energy and water consumption, respectively.



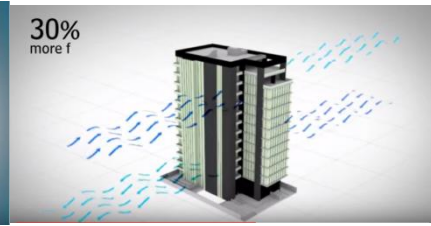
Protects building from heat-iron

Effect

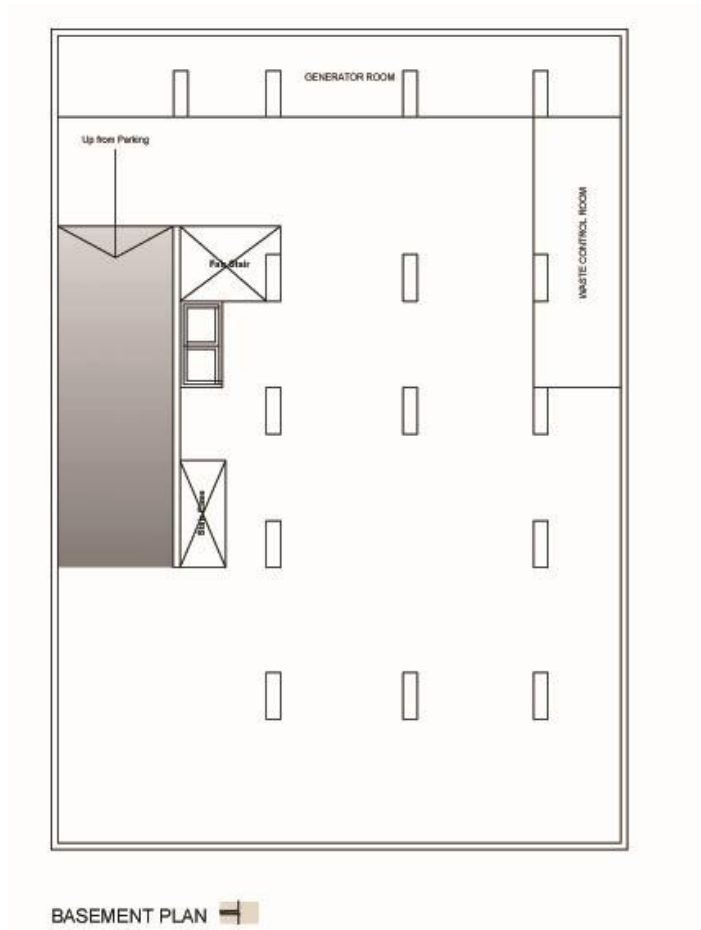


Rain water harvesting

System



Assure indoor air comfort



Solar panels on the roof



Smart occupancy sensor



Protecting soil erosion



Ultimately its main intention is to keep its surrounding environment carbon free and its users ecologically protected

The concept of green building can play a significant role in making Dhaka city suitable for human habitation and adaptive to global economic trends. As a response to burning issues like global warming, sustainability, rapid urbanization, the notion of green buildings is being recognized worldwide

Reputed corporate and governmental entities including Google, NASA, etc have already implemented the concept of green constructions due to the significant savings associated with less energy and water consumption as well as less carbon dioxide emission by such constructions.



An interior with maximum exposure to nature but with extreme comfort.

Cityscape Tower is a very unique and prestigious building considering its architecture, interior, landscaping, design, material and security system, while being an icon of eco-friendly commercial establishment in the country. The interior has been designed in such a way that it reminds its user about the sustainability every time they use it.

INTERNATIONAL- “55 Timeless” Xin-Yi Residential Tower in Taipei



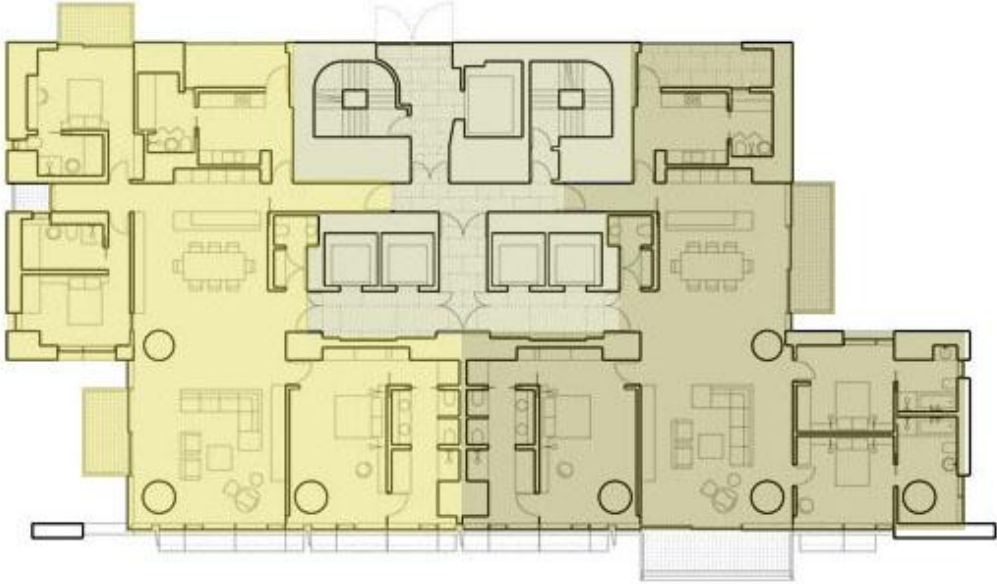
Richard Meier & Partners designed a high-rise in taipei.

For Taipei, the building represents a significant break from much that's preceded it. What makes this project different than other projects here is first the approach defined by the site is to make the site "public". The landscape immediately fronting the tower is open to all, is the first such hybrid private-civic park space in the city. Not only that, but "the curtain wall exposes the entire south facade towards the main street," giving the high-rise a more open, welcoming urban presence than has been typical in the city's streetscape to date.

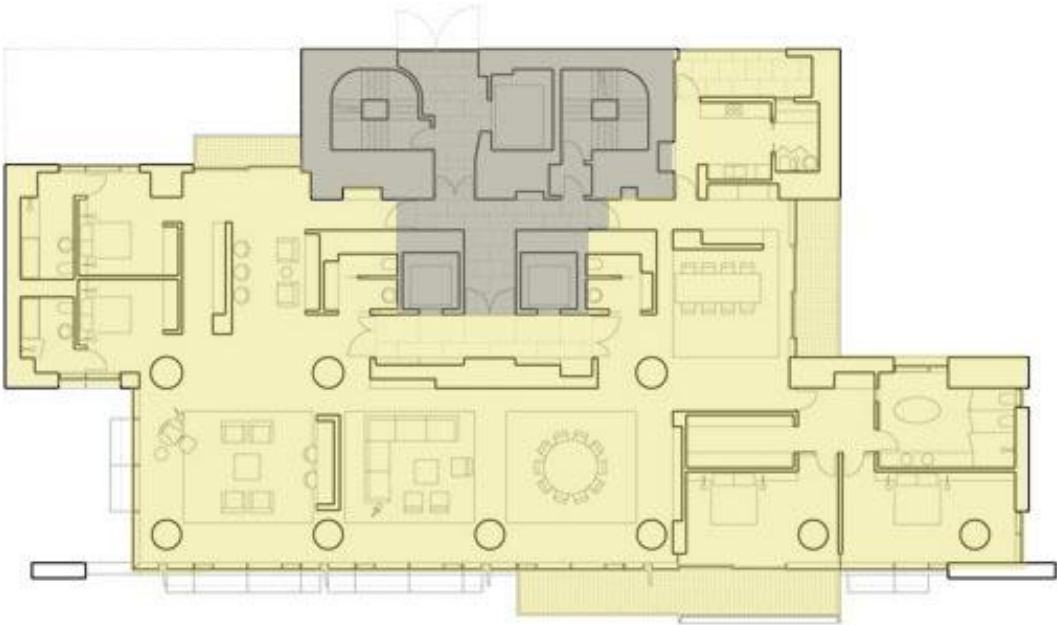


The building rises to total height of 127 meters and seeks to set a precedent in taiwan as a private building that dedicates the entirety of its landscape to the public. The lower part of the building has two apartments per floor with the upper portion offering one large apartment unit per storey. Luxury amenities, including an outdoor swimming pool and roof deck, are located at the top levels of the tower with views towards the city's landmark 'taipei 101' skyscraper.

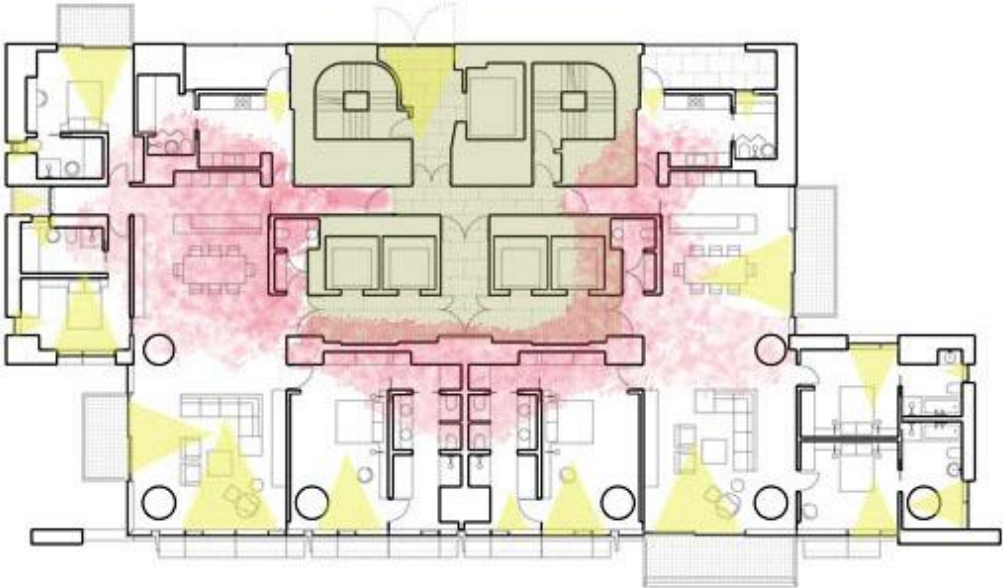
Two types of floors



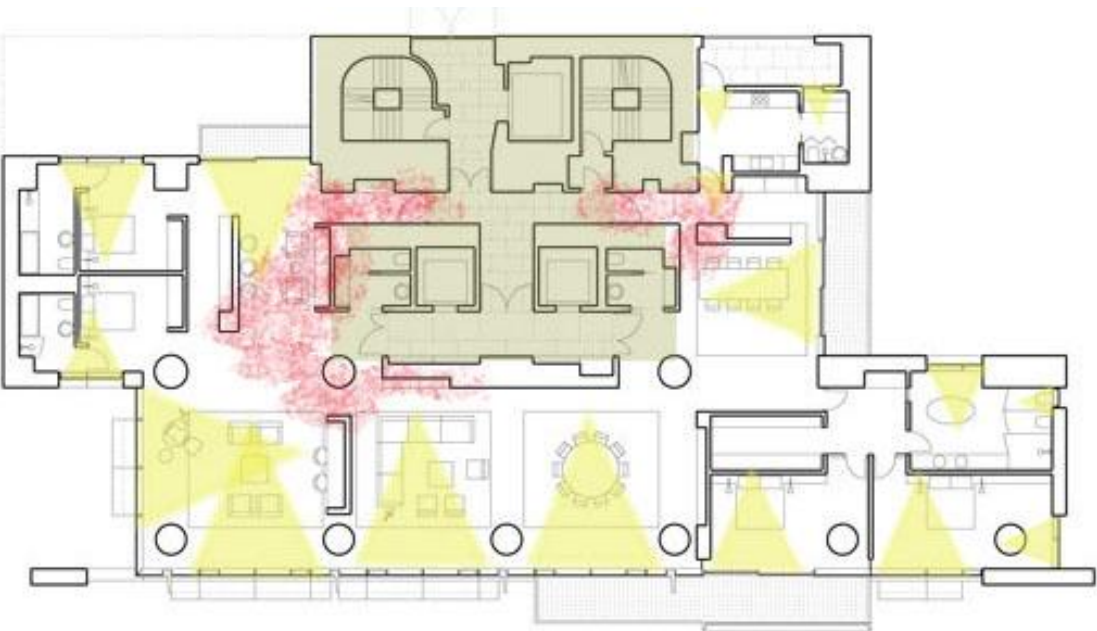
Double unit floor



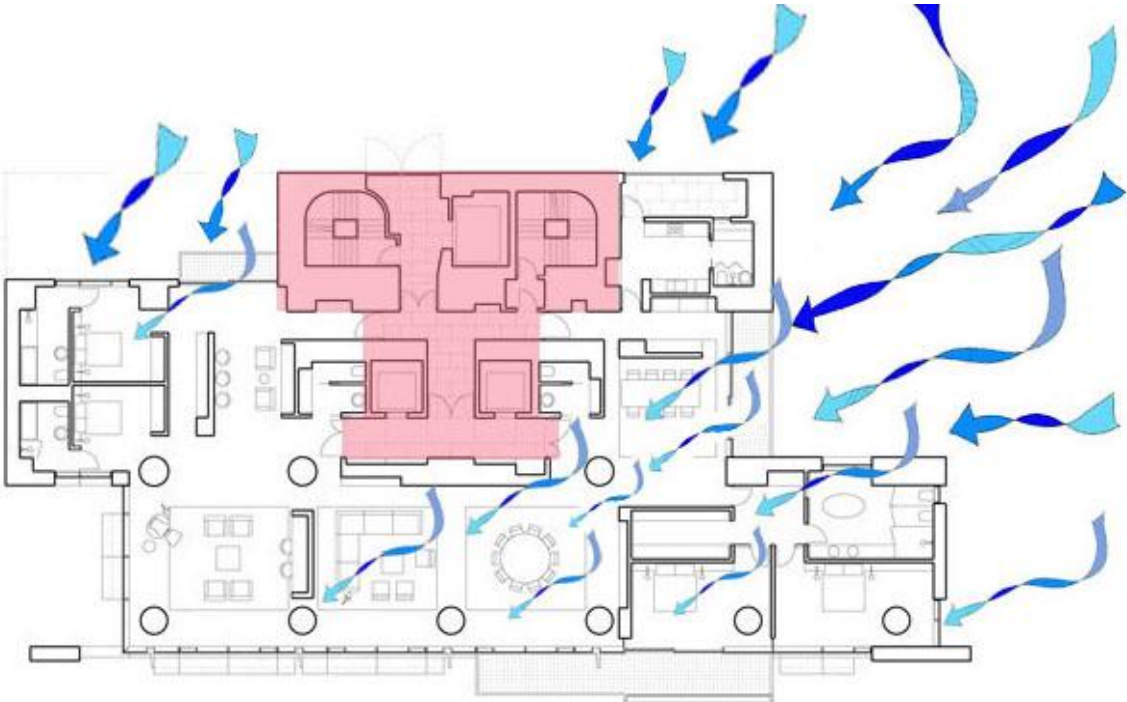
Single unit floor



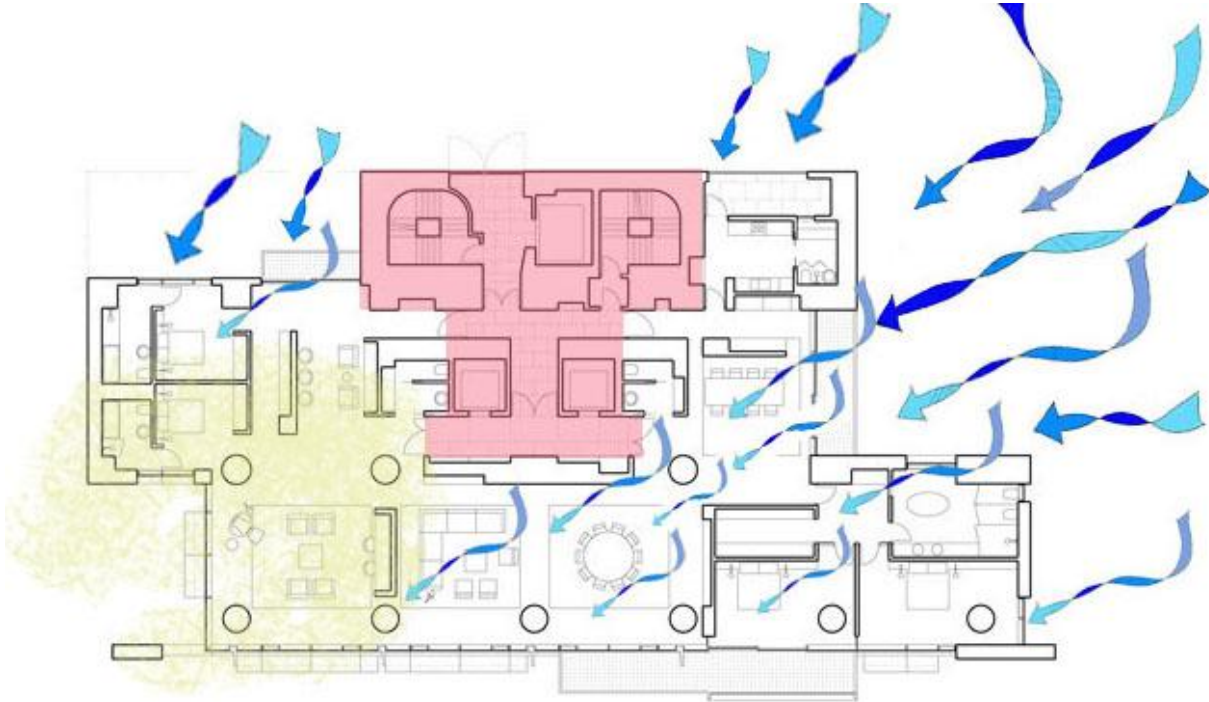
Light and shadow on double unit floors



Light and shadow on single unit floors



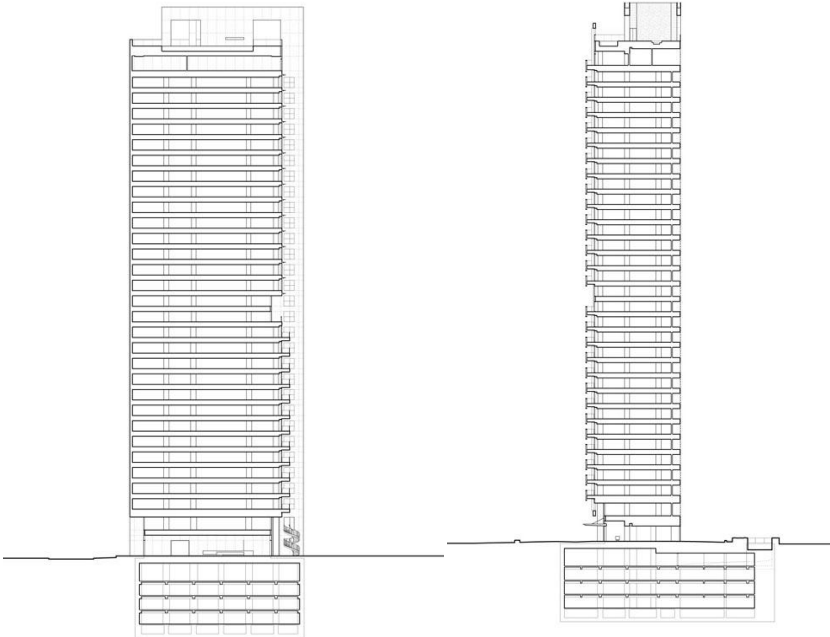
Wind flow diagram from Northeast side



Less windy area

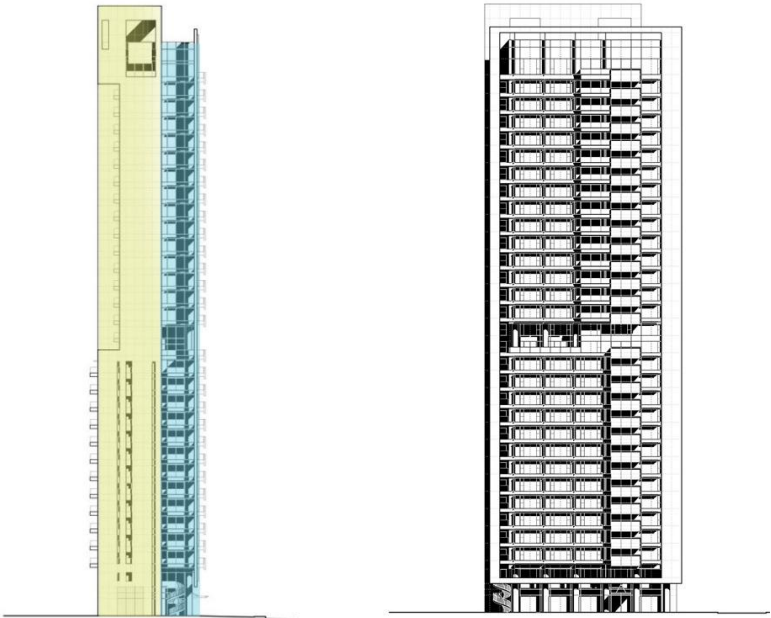


The entire structure is formed with thick columns and sheer walls



SECTIONS with three basement parking floors

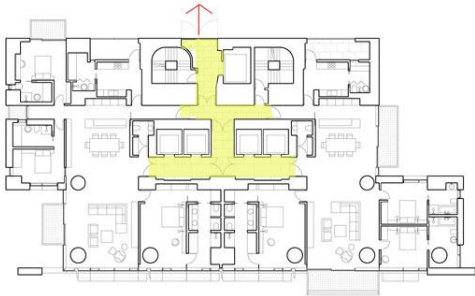
The tower comprises two complimentary portions, a transparent south volume and a solid north volume. The relationship between these two main elements is emphasized through a subtle shift in both plan and elevation creating a dynamism and variation in scale that responds to the immediate urban environment



West elevation

South elevation

The solid north volume (■) contains the core of the residential units that flows towards the transparent south volume (■) which is a natural light-filled space where living, social and the more public programs are located. A carefully crafted geometric organization allows viewing corridors towards the mountains in the far distance.



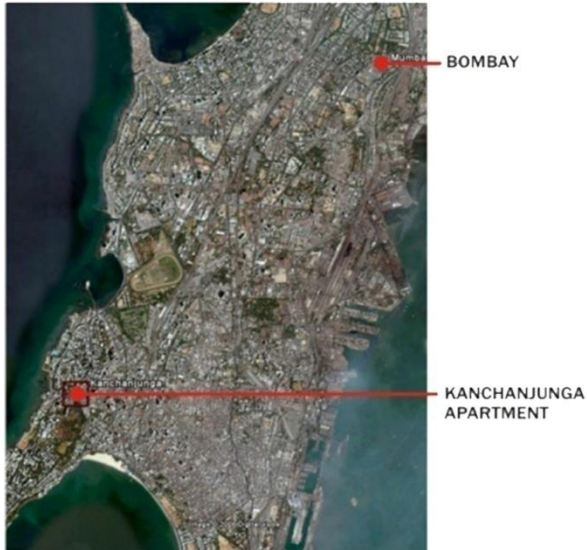
Corridor viewing mount

KANCHANCHANGA APPARTMENT

Arc- Charles Correa

Skyscraper multifamily housing

Bombay, India (1970 – 1983)

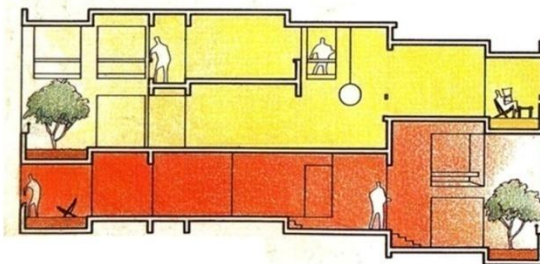


In Mumbai, buildings are ideally orientated east-west to catch the prevailing sea-breezes, and views out to the Arabian Sea on one side and the harbour on the other: the same directions as the hot afternoon sun and heavy monsoon rains. Old bungalows solved these problems by wrapping a protective layer of verandas. Kanchanjunga apartments are located south-west.

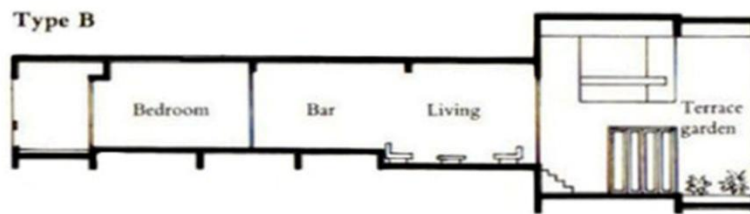
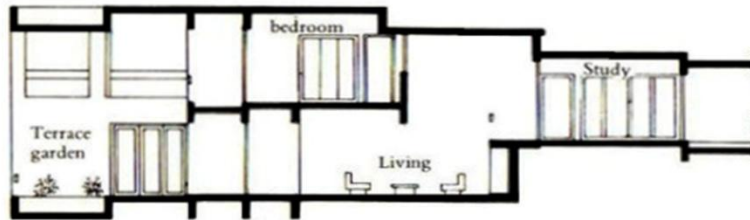
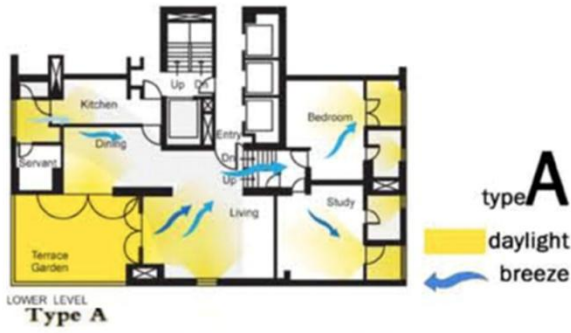
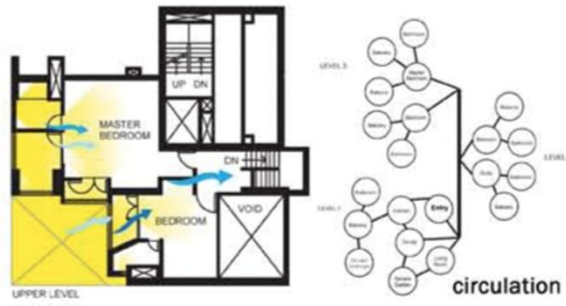
Interlock of four different apartment typologies varying from 3 to 6 bedrooms each. Smaller displacements of levels. Differentiated between the external earth-filled terraces and the internal elevated living volumes. Effectively shield these high rise units from the effects of both the sun and monsoon rains. Achieved by providing the tower with relatively deep, garden verandas, suspended in the air.

The building is a 32 story reinforced concrete structure with 6.3m cantilevered open terraces. The central core is composed of lifts and provides the main structural element for resisting lateral loads. The central core was constructed ahead of the main structure by slip method of construction.

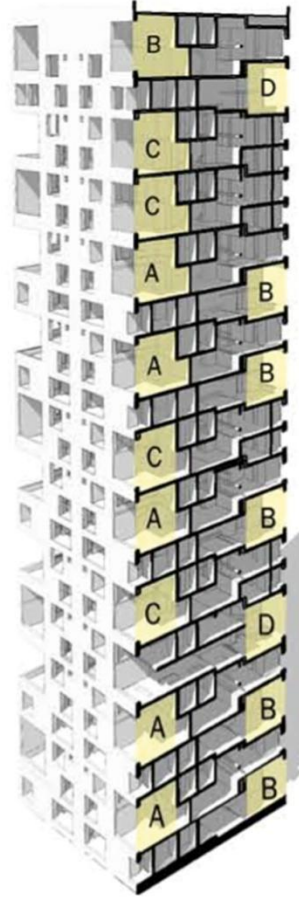
The garden terraces of Kanchanjunga apartments are actually a modern interpretation of a feature of the traditional Indian bungalow; Veranda. In India and other Asian countries, one finds a predominance of reds and yellows.



ORGANIZATION OF SPACE & NATURAL SOURCES



MODULARITY



Program Analysis

1. Community space
2. Basement parking
3. Children park
4. Green species regeneration space
5. Orchid culture centre
6. Green balconies
7. Living area-
8. Master Bed
9. Child Bed
10. Guest bed
11. Living Room
12. Family living
13. Kitchen
14. Master toilet
15. Common toilet
16. Servants quarter
17. Balconies

BUILDING FEATURES

- Energy requirement (Required)
- Energy efficiency Envelope
- Mechanical systems
- Water heating
- Appliances
- Lighting
- Materials Foundation
- Structural frame
- Subfloor 10 Windows
- Doors 8 Insulation
- Exterior wall finishes
- Roof
- Finished floor

SUSTAINABLE FEATURES

- Site planning
- Tree protection and planting measures
- Energy efficient building envelope and systems
- Energy measures
- Insulation 50 Windows
- Natural Heating and cooling
- Energy efficient lighting/appliances
- Resource efficient design
- Resource efficient building materials
- Recycled/natural content materials
- Advanced products
- Durability
- Waste management Waste management practices
- Recycle construction waste
- Indoor air quality
- Ventilation
- Materials
- Water—indoor use

FAR area calculation according to BNBC

Site Area = 20 katha

=14,400 sqft

Road = 24.39m

=80ft

Additional road width= 24.39 - 9.0 = 15.39m

Additional FAR = 15.59 x 0.05 / 0.03 = 2.565

FAR to be considered is- 5.50

So, Max. Residential space = 14,400x 5.50

=79,200

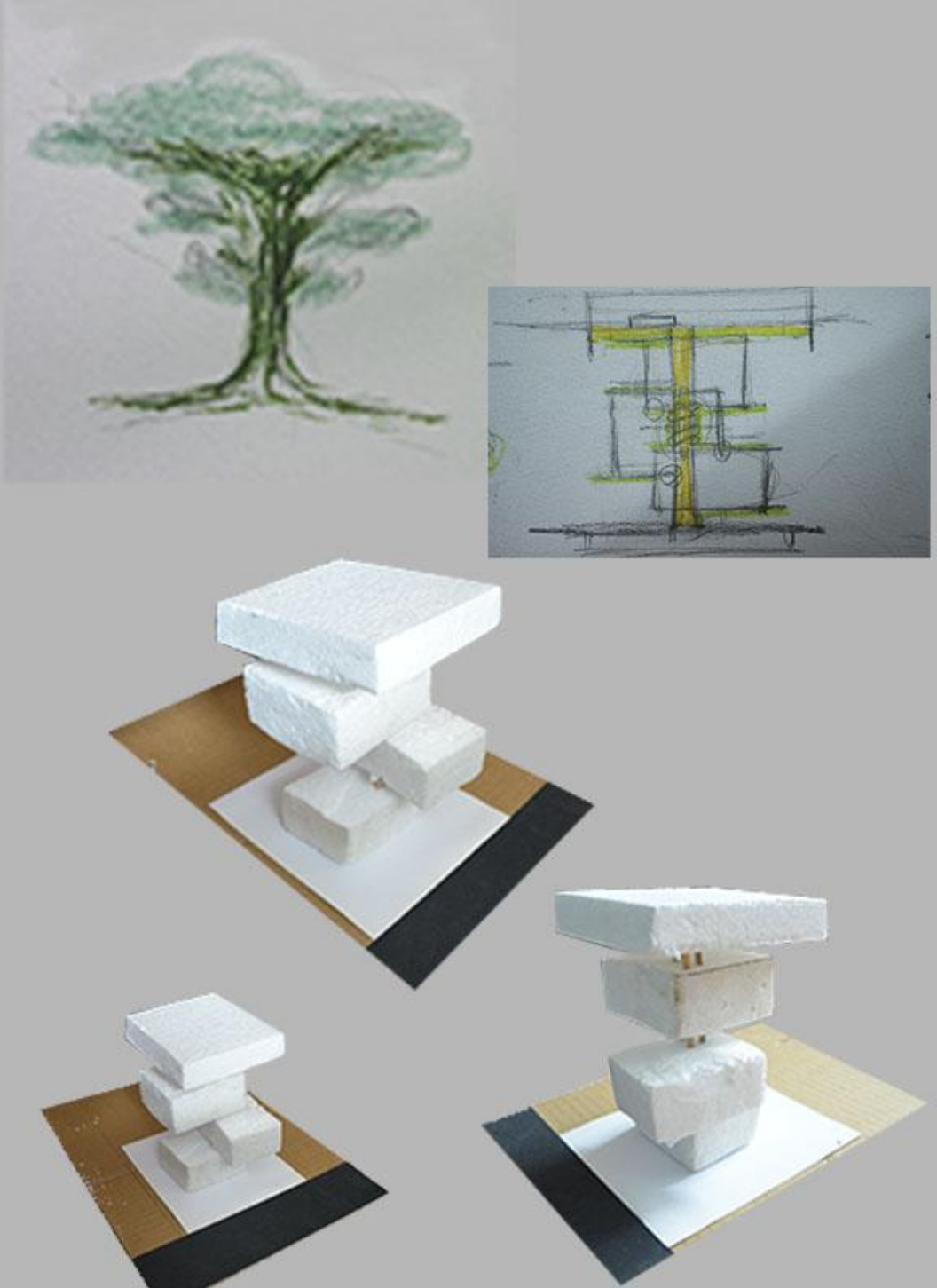
Ground-floor area setback = (70x 145)' =10,150

Basement area = (10,150 x 2) = 20,300

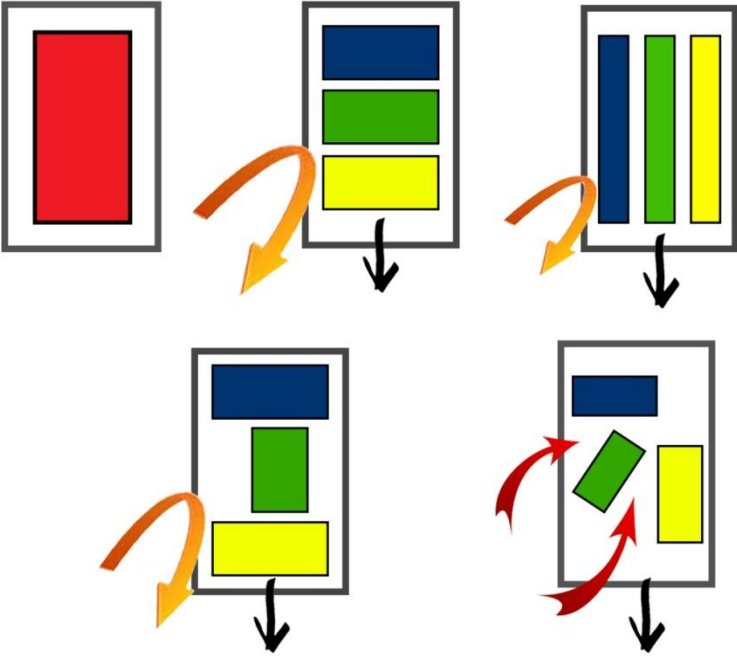
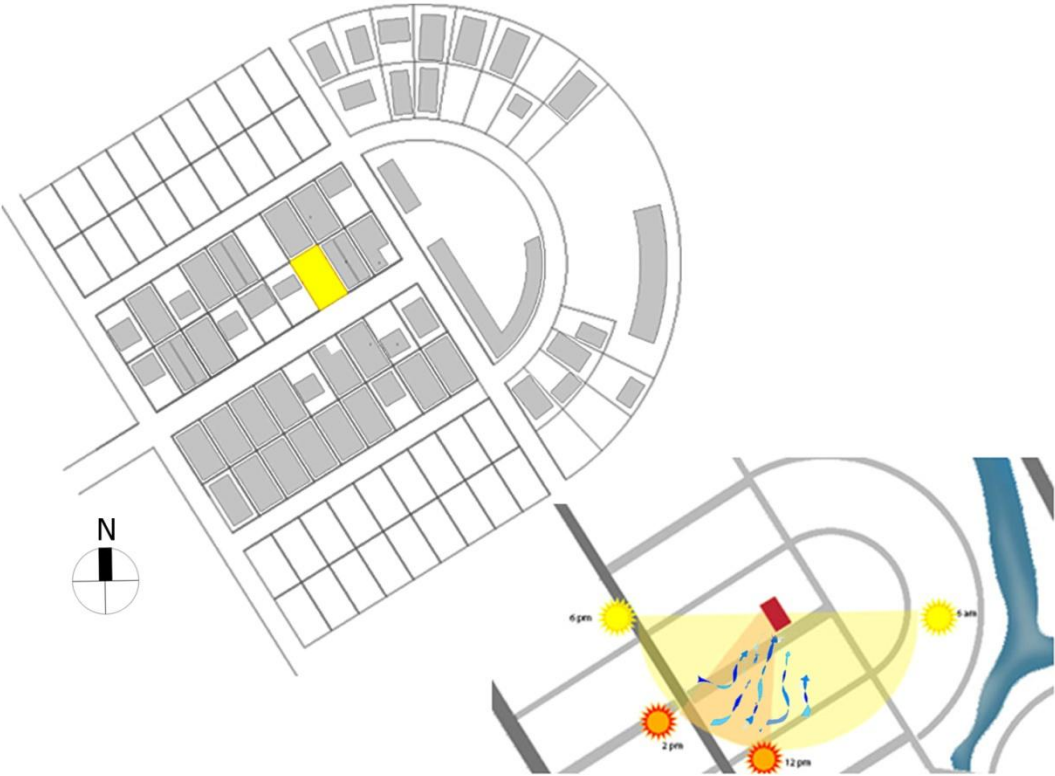
So, Total built area = (79,200 + 10,150 + 20,300)

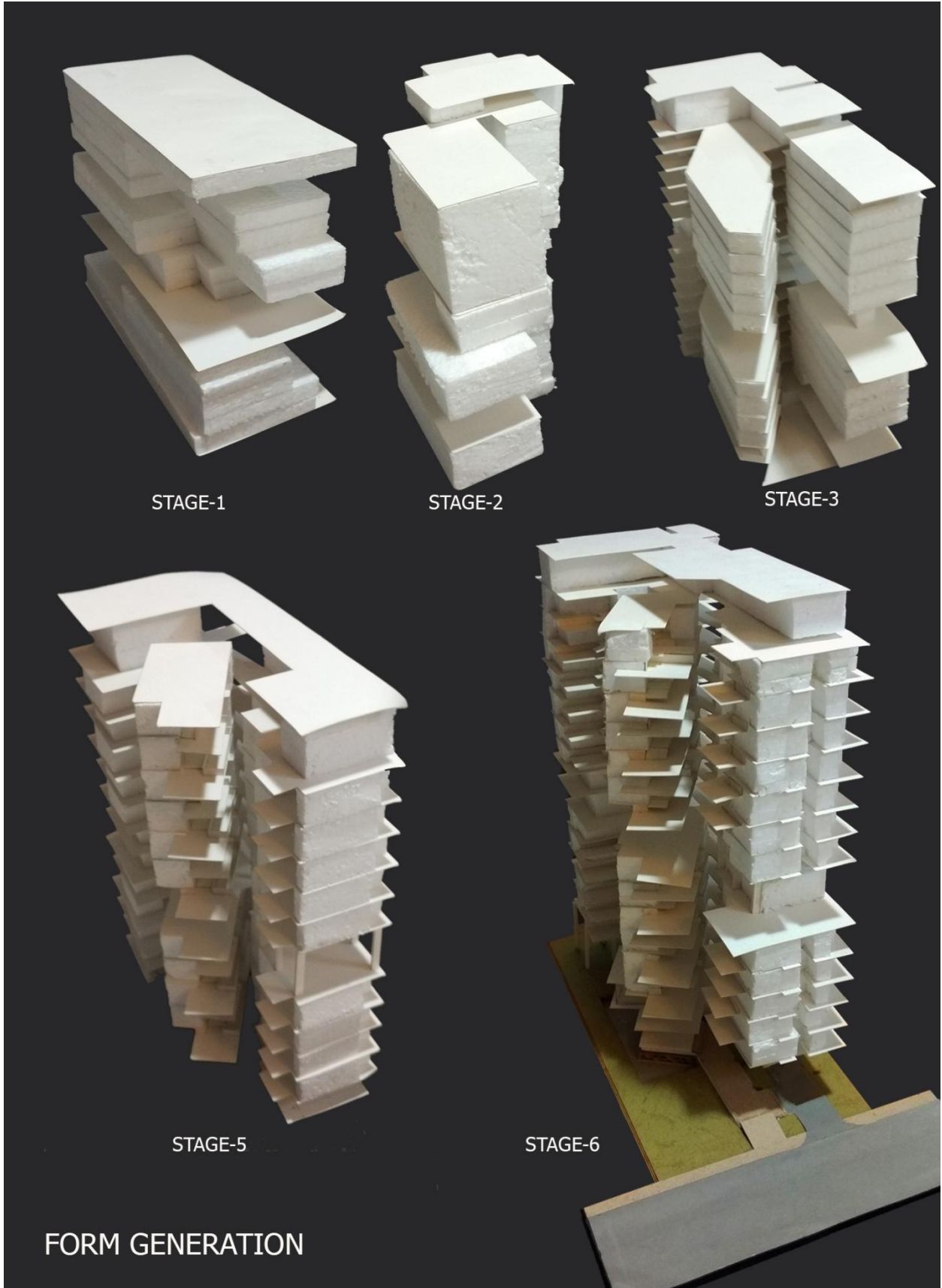
= 1,09,650 sqft

Design development

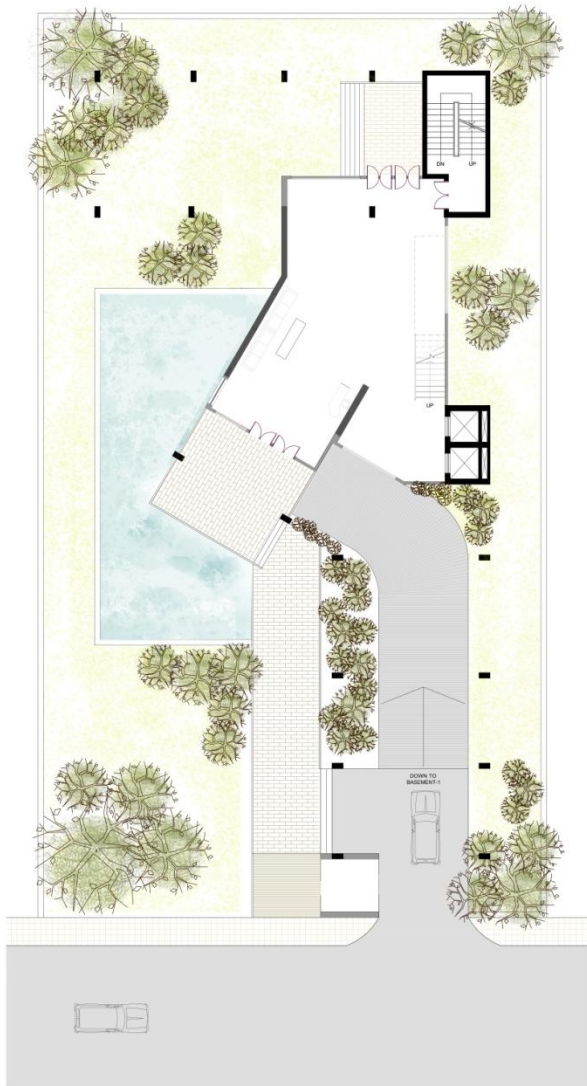


Form generation from site analysis



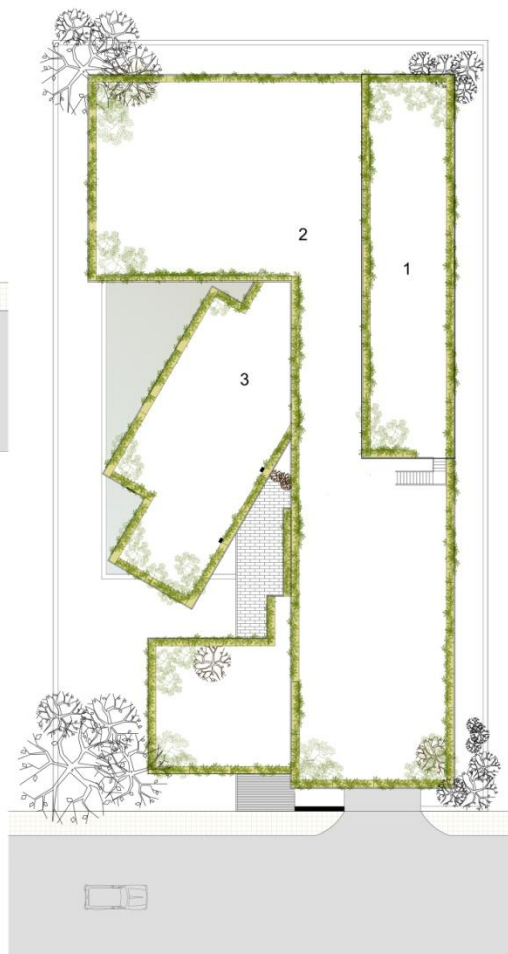






GROUND FLOOR PLAN

The ground floor of the building contains a shallow water body to accommodate aquatic creatures. The car drop-off directs toward the entrance and then the lobby through a floating pathway, to the reception. From the lobby there is an exit to the children green soft play ground. The ground floor surrounds the building by large and small trees all over the site.



SCALE: 1/8" = 1'-0"
ROOF PLAN

RESIDENTIAL FLOOR

The residential floors contain three units of apartments among which two are simplex and the centre one is duplex.

All the unit has a contentious semi-private zone that starts from the entrance and leads to the green balconies.

A small balcony is provided in every units with the service zone.



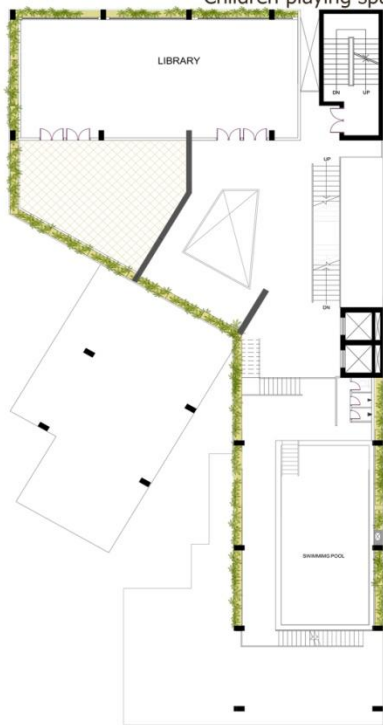
 TYPICAL FLOOR TYPE-B



 TYPICAL FLOOR TYPE-A

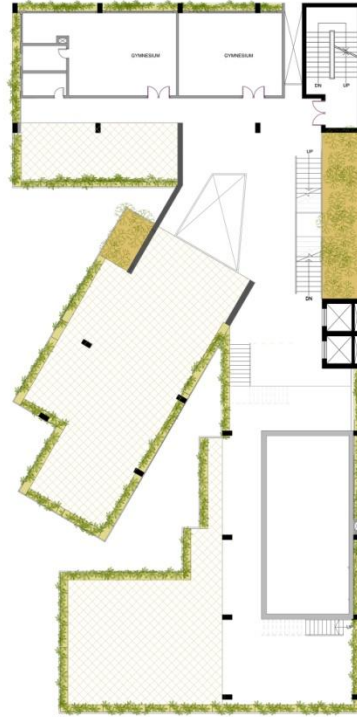


PLAN AT (20)' **Function-** Mosque
Children playing space

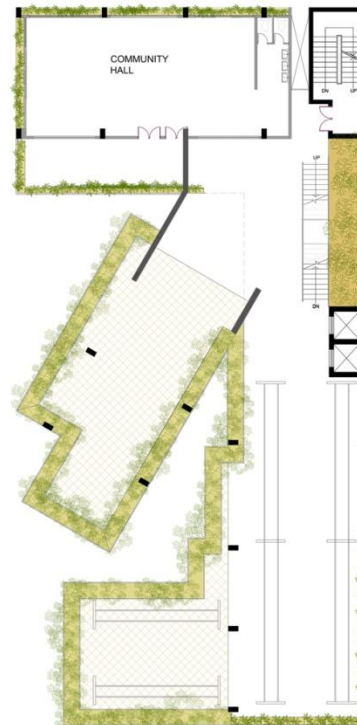


PLAN AT 105' Library
Swimming pool

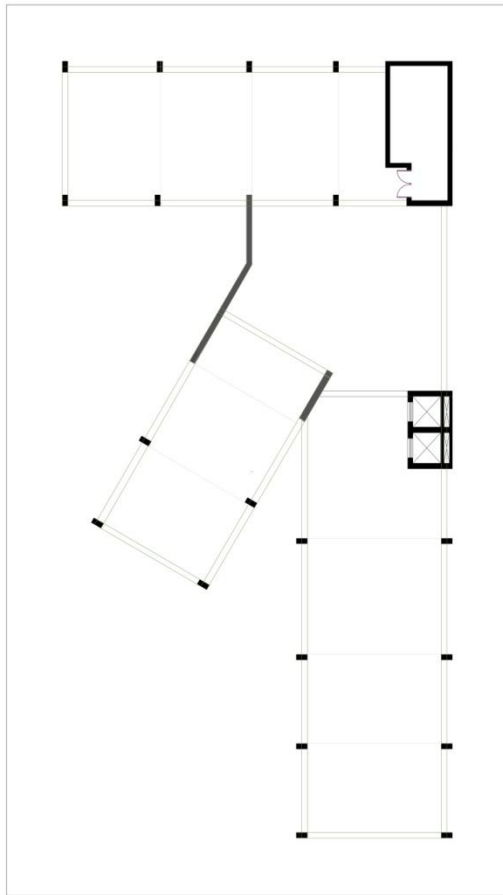
COMMUNITY FLOORS



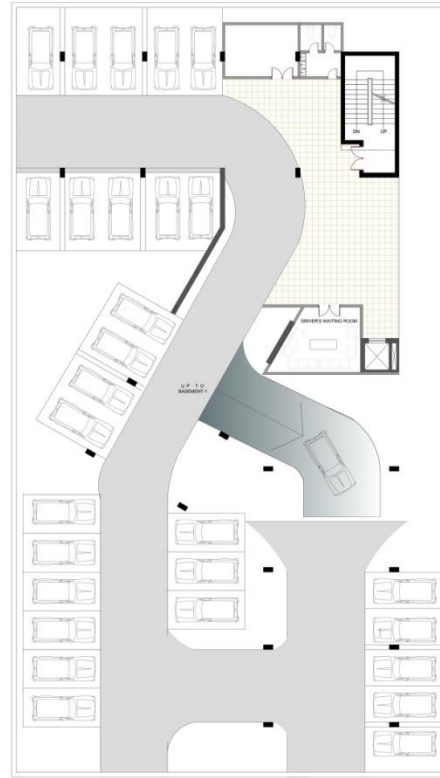
PLAN AT 95' **Function-** Gymnasium
Stair up to Swimming pool
Children playing space



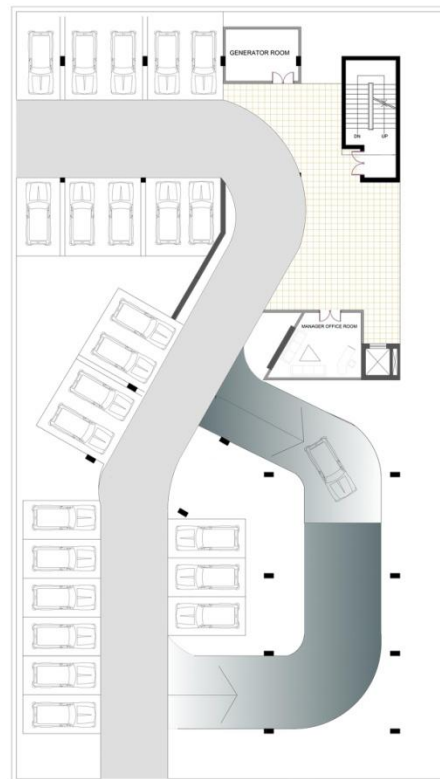
PLAN AT 175' Community hall
Orchid culture centre



 COLUMN BEAM LAYOUT



 PLAN AT (-20)'



 PLAN AT (-10)'



APPT-C
1850sqft



APPT-B
2350 sqft



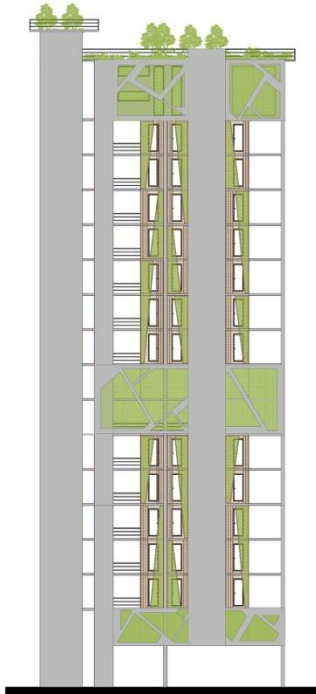
APPT- A (DUPLEX)
3273 sqft



SOUTH-EAST (FRONT) ELEVATION
SCALE: 3/32" = 1'-0"



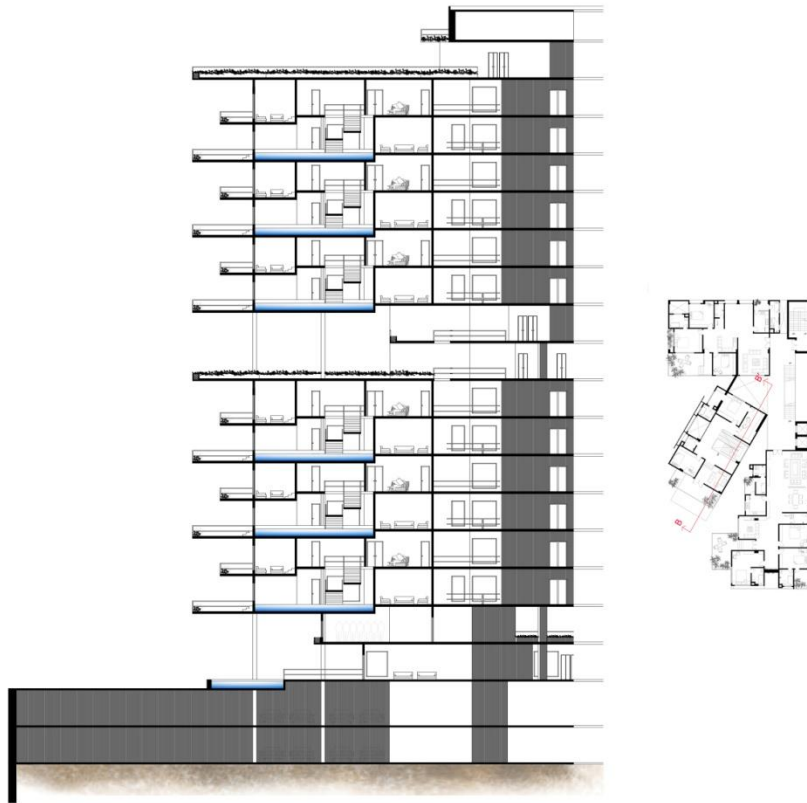
NORTH-EAST ELEVATION
SCALE: 3/32" = 1'-0"



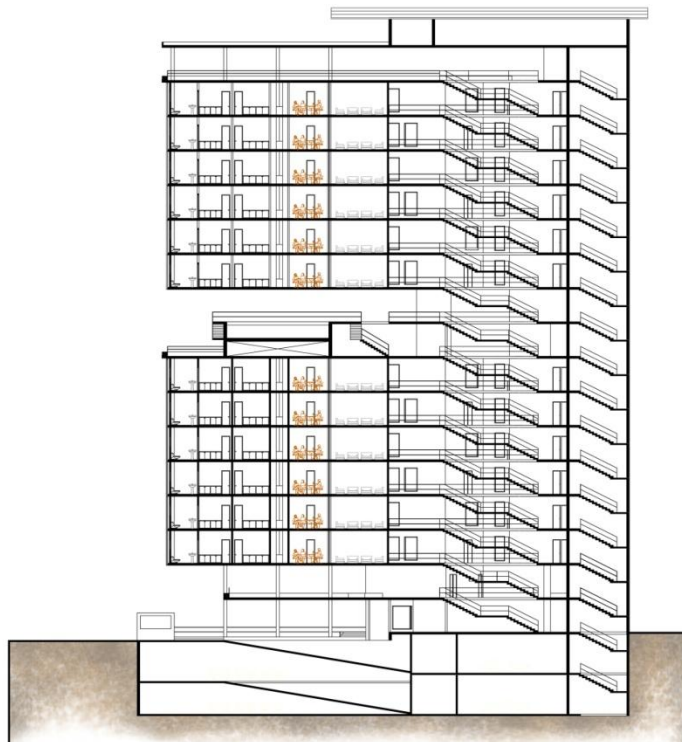
NORTH-WEST ELEVATION
SCALE: 3/32" = 1'-0"



SOUTH-WEST ELEVATION
SCALE: 3/32" = 1'-0"



SECTION BB'
SCALE: 3/32" = 1'-0"



SECTION AA'
SCALE: 3/32" = 1'-0"



All the open balconies of every units are front road facing and towards the south. It has been placed in such a way that daylight and south-east wind can enter the apartments through it. It has also been acknowledged for the neighbourhood interaction and enhancing social relations within the building.



The interior opens to every wall that invites required sunlight and wind in the day time. The stair of the duplex unit is free standing over the shallow water body inside the units. The entrance has an open view to the balcony that attracts people towards it. The Living, Dining and Family-living are inter connected in every units, including the duplex one.

POSSIBILITIES

- **Site:** The location will support a pedestrian, bicycle- and transit-friendly lifestyle.
- **Energy:** energy will be saved by providing enough natural light and ventilation in day time
- **Health:** The building will promote health for its occupants, with inviting stairways, operable windows and features to promote walking and resource sharing by gymnasium and swimming pool for physical exercise.
- **Materials:** The building will not contain any “Red List” hazardous materials, including PVC, cadmium, lead, mercury and hormone-mimicking substances, all of which are commonly found in building components.
- **Equity:** Unlike many residential buildings, large operable windows and balconies will offer fresh air and daylight to all the people who live in the building.
- **Beauty:** Stunning architecture, an innovative photovoltaic array, a green roof and other native plantings, large structural timbers, with elevated green all over the building and a revitalized neighboring pocket park will help beautify the residence.

AIMS AND OBJECTIVES

While Government policies for sustainability has started to address the need to reduce the energy use of buildings, the energy used in their construction and the depletion of other, non-energy resources, has not yet featured on the building standards agenda.

While we are surrounded by claims of Eco homes and “green” building materials, it is very difficult for architects, designers and the construction industry to identify which building products, are sustainably sourced, processed, and manufactured.

But we believe that by providing independent assessment of specific sustainable living design and style, as currently available is likely to become a legal requirement in time, we can protect natural resources, reward those producers who genuinely innovate, and

assist the development of a resource efficient, sustainable and healthy building sector to make life more comfortable and easier.

CONCLUSION

Buildings are not only one of the largest contributors to resource depletion and climate change, they are also the most visible and enduring elements of an organization's commitment to sustainability. The value of green buildings goes far beyond the value of avoided energy and water costs, to improved countries productivity and enhanced sustainability value for the green building is enormous. Thus the approach for green bilding construction should be more encouraged for a better living future.