



# Vertical housing & social sustainability

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# Thesis introduction

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# Vertical Housing & Social Sustainability

***Urbanization** requires adaptation to **population density** and embrace of **associated housing typologies**, including vertical living that is cost-efficient, sustainable, resilient, and inclusive. High congestion levels in urban areas and lack of land, demand the construction of vertical housing structures.*

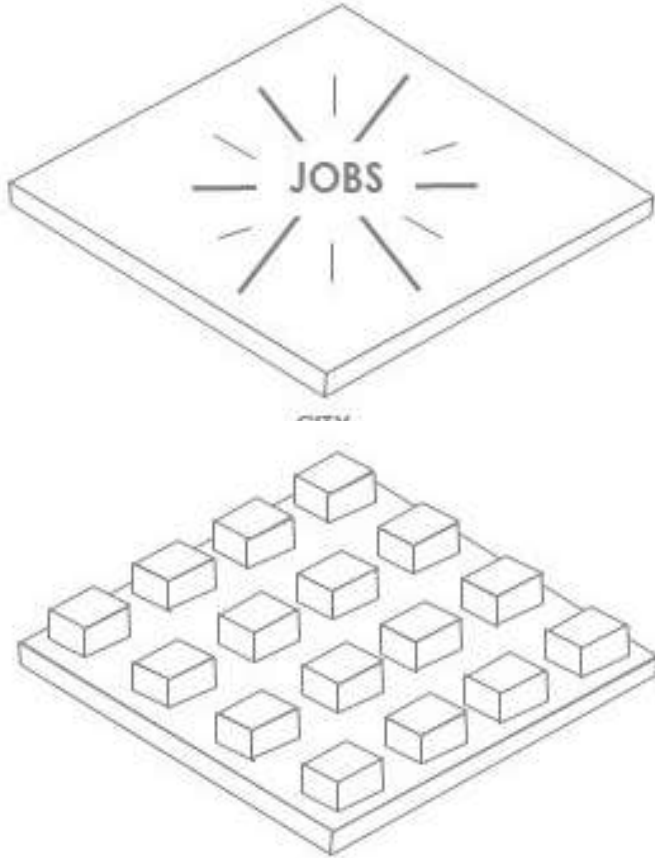




# Literature review

# Introduction

## The need of vertical housing to solve urban sprawl



## High demand for houses and offices

Over the years, Kuwait has experienced rapid and unprecedented population growth, but with only a slightly significant increase in urban areas. This has happened as urban development and urban economies continue to be key shapers of urban planning processes and national development since most businesses in the private sector are situated in the cities.

The urban environment has constantly been associated with a surge in the human population, increased industrial and locomotive activities, and a rising carbon footprint due to emissions from industries. In most cases, the concept of housing in urban areas plays a centralized role because of its association with positive developments, such as the construction of industries, an increase in automobiles, and the construction of new roads. However, urban housing is also actively associated with negative impacts, such as the emergence of slums, crowded roads, and social degradation. Kuwait's rapid population growth came after the discovery of huge oil reserves in the country (Alghais and David 20).

The alarming uncontrolled rise in Kuwait's urban density has caused issues related to housing shortage and traffic congestion. Therefore, countering the negatives associated with urban housing has informed the need for Kuwait's government and urban planners to shift to vertical structures. According to Ellyatt, the high demand for affordable housing in the oil-rich gulf countries has led to long waiting lists. For instance, even though all citizens are entitled to a house, 106,747 people are on Kuwait's waiting list compared to Bahrain's 60,000 (Dickinson; Ellyatt).

To add onto the matter, information from the Land Portal denote that the waiting period can even reach a whopping 18 years. Thus, the building of environmentally sensitive, affordable, and sustainable houses for citizens has the potential to reduce the problems and increase the sustainability of the urban environment in the region. Vertical housing offers an alternative to housing and environmental problems in the gulf, and applying the same in Kuwait can be a significant step in reducing urban sprawl problems in the city.

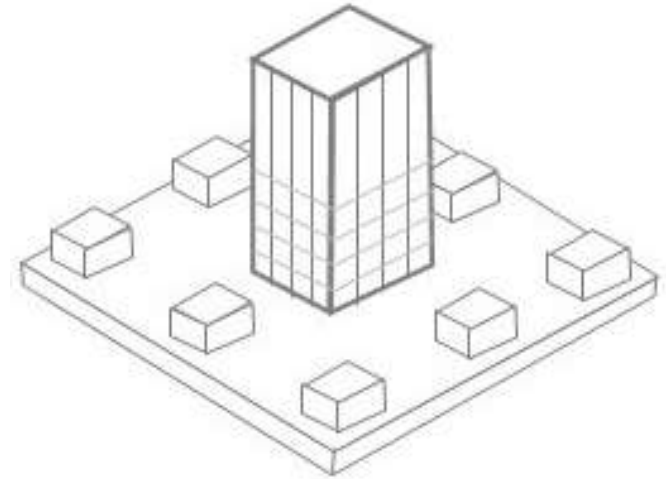
# Kuwait's current housing system

Kuwait is an example of a country that is attempting to address the negatives of urban sprawl and congestion within its cities. According to Dickinson, the housing shortage in Kuwait is among the top priorities of the government. For this reason, since 2016, the Kuwait government has partnered with World Bank to enhance the efficiency, dependability, and transparency of the process of land administration in the country (Land Portal).

In addition, Yousef Al-Haroun states that Kuwait's housing patterns have shifted from single-owned buildings to leased apartments. Correspondingly, many residential neighborhoods that were originally designed as low-density areas have become overcrowded apartment buildings (Al-Haroun 1). Nayef and David also offer an observation through Kuwait's 2050 Agent-Based Model, which aims to construct new buildings to address the current problems of housing shortages, overcrowding, and traffic congestion (Alghais and Pullar 1-2).

In Kuwait, people desire detached housing typologies to avoid the vertical, overcrowded governmental housing units. However, vertical housing is a more sustainable approach that facilitates the achievement of environmental, economic, and social sustainability in a city.

Kuwait's housing problem can be traced to 1974, when the government introduced the National Housing Authority to oversee all housing concerns and welfare. The authority had detailed regulations and rules regarding the houses' size and location, with programs set to facilitate home construction for low income and middle-income families (Alshalfan). The stratification of housing in terms of income was canceled in 1984 and replaced with the equal housing welfare accessible to all citizens regardless of status. The reason is that the government was trying to integrate social justice and equality among its citizens regarding the provision of housing. However, despite the move, the Kuwaiti government failed to meet the increasing housing demands from citizens, forcing them to seek alternative means for accommodation.



**Lack of privacy and outdoor spaces**

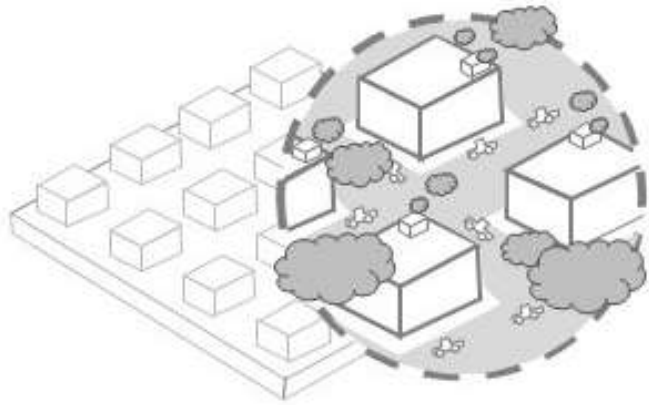
# Effects of Urban Sprawl on Urban Sustainability

In effect, the government introduced apartment buildings as an alternative to the rising housing demand and reducing supply. Apartment living was a substitute to low-density housing, which occupied more urban space. The Kuwaiti government used the apartment housing model as an experiment to uphold the welfare of citizens in terms of shelter. To this end, vertical housing is the most recent improvement to solve the housing problem in Kuwait. However, the design of the previous vertical housing attempt did not meet people requirements because of the lack of privacy, outdoor spaces as well as the aesthetic design.

Vertical housing is a development approach that prefers the construction of vertically shaped houses, which use the least land space. Correspondingly, vertical houses have numerous apartments to accommodate a significant number of people or families under one roof. The conventional apartment building is the foundation for what is now known as vertical housing. Vertical housing offers modifications and programmatic additions to traditional apartments and detached housing. 8 House, which is outlined later in this literature review, is a precedent that details the environmental benefits.

In most urban and suburban areas across the world, urban sprawl is defined as an unregulated increase in single-zone housing, reliance on private automobiles, and rising numbers of low-density housing. Single-zone houses comprise detached family homes, while low-density houses are common in residential areas where the housing density is very low. As a city's population expands, the land available for commercial construction and government infrastructure diminishes. The rise of urban populations and the surge of private automobiles has been a considerable contributor to an increase in greenhouse gas (GHG) emissions. Latin American cities, such as Brazil, Mexico, and Sao Paulo, have been linked to a rising carbon footprint because of intensified industrial activities in the areas, large numbers of private automobiles, and increased reliance on single-family homes. Hence, the construction vertical houses offers an alternative solution to the problem of urban sprawl.

Wilson and Arnab, in their book *The Environmental Impacts of Sprawl: Emergent Themes From the Past Decade of Planning Research*, confirm that urban sprawl critically affects city environments and their surroundings areas. The environmental impacts are widespread and can be seen in terms of deterioration in air quality, changes in energy use, land use modifications, and drainage and water use patterns in city centers. As mentioned, one cause of these many negative environmental impacts is the increased number of citizens with private cars. The expansion of city boundaries offers more opportunities for building roads, which, in turn, offers an incentive for individual automobile use (Wilson and Arnab 3308). When the number of private vehicles increases in a city, the amount of GHG emissions in the city and the surrounding areas escalates. The consequences of urban sprawl are also associated with an upsurge in the concentration of carbon monoxide, nitrogen oxides, fine particulate matter, and volatile organic compounds in the atmosphere. All these aspects harm the environment and lower the wellbeing of the public living in urban areas.



**Increased household and automobiles causes an increase GHG emission**

In terms of energy use, the size of an urban area determines the amount of energy consumed by the citizenry daily. Urban sprawl in more expansive areas results in an increase in the amount of energy used in households and factories, whereas compact urban structures are more energy-efficient since they utilize less energy for private passenger transportation and emit fewer greenhouse gases per capita than expansive regions do (Wilson and Arnab 3309). Sprawling development also degrades the quality of land and water sources available for use within city centers. Simply put, sprawl undermines the sustainability of urban areas by increasing transportation emissions and the development and construction of available land, leading to high energy consumption and damaging the environment.

Ojima, Ricardo, and Daniel J. Hogan, in their article "The Demographic Composition of Urban Sprawl," expound on the connection between the sensitivity of our environment and the changing context of a city's natural surroundings. Cities across the world argue what is the cause, asking if it is the people's responsibility through the use of public transport or the type of housing being built in cities. Questions have also been asked about the role of the local government in reducing urban sprawl and enacting proper laws that allow and deter, at the same time, unrestricted expansion. On the same matter, Ojima and Daniel argue that people in modern cities focus on problems that affect their environments at a regional scale to ensure proactivity and sensitivity towards sustainability (191). They submit that a lower demographic density will have a proportionally greater need to use automobiles, which increases GHG emissions in the atmosphere (Ojima and Daniel 191). Globally, cities are attempting change by introducing and expanding public transportation systems and modifying housing through urban planning initiatives.

# Combating Urban Sprawl to Increase Sustainability

The key to solving the many challenges associated with urban sprawl lies in the hands of urban planners and designers, things like fragmented housing, an increase in private automobiles, and rising GHG emissions. Dunham-Jones Ellen and June Williamson, in *Retrofitting Suburbia: Urban Design Solutions for Redesigning Suburbs*, document North American suburbia, attesting that more valuable, sustainable practices are increasingly replacing less sustainable development patterns. Privately-owned shopping malls and aging office parks are being demolished and replaced with multi-block, mixed-use town centers with public squares and greens (1-Dunham-Jones and June). Within these new town centers, a suggestion has been to include suburban office and retail buildings that were formerly further afield. Archaic zoning ordinances are also being overhauled to permit higher density and mixed-use development. Moreover, urban planners are reducing land consumption at the periphery and redirecting the growth inwards to regenerate underperforming suburban areas where infrastructure already exists (2-Dunham-Jones and June). Notably, architects, urban designers, public officials, citizens, and urban planners have a shared responsibility in developing and introducing a new phase of the town centers.

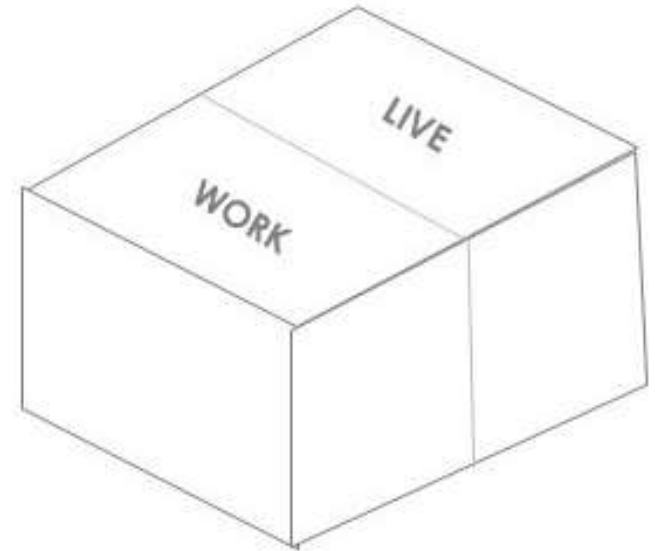
Improving urban and suburban housing is feasible in many parts of the world. Different cities apply distinct approaches to address the environmental and sustainability problems associated with urban sprawl. For instance, in Kansas City, MO, Minneapolis, MN, Norfolk, VA, and Northeastern Ohio, there are incentives to rehabilitate and retrofit aging housing stock. The message is that urban sprawl can be reduced in a world that identifies and implements relevant urban planning practices that focus on sustainable housing modifications.



# Multi-family Housing as a Sustainable Solution

Multi-family housing is growing in cities across the world. It is a design approach in which multiple separate residential housing units are contained in one building, enabling different families and individuals to live closer together and continue to grow. Most researchers admit that multi-family housing is a relevant and valuable approach to increasing sustainability and reducing the many negative aspects of urban sprawl. Crosbie, Michael James agrees and posits in *Living Together: Multi-Family Housing Today* that, presently, there is a greater emphasis on multi-family housing design because of its sensitivity to sustainability and urban population control (6). Multi-family houses are sustainable because they conserve the available resources by increasing the utilization of limited space by many people and bring the living into great harmony with nature by avoiding unnecessary expansion and land occupation. Multi-family houses, such as converted factories, are more sustainable because of their ability to combine live/workspaces as well as by using less natural resources (Crosbie 7). Unlike past architectural and design programs that separate living and workplaces, the present models of multi-family housing combine the two, which reduces construction and costs incurred by renting a workspace and commuting to it every day.

On the other hand, Valtman, Bradley J, in *Putting the Family Back in Multifamily: Reconnecting Urban Density and Family Housing in North Seattle*, contradicts Crosbie by using Seattle, WA as an example. The increasing population and densification of the city have initiated a new wave of housing construction primarily for individual use rather than family occupation. Family-oriented units have also been converted to single-occupancy units, creating a problematic spatial infrastructure that hampers the younger generations. Population increase is an indicator of changes in urban systems and structures, which need to limit the further expansion of land use and focus on the effective use of what is available (Eraydin and Tuna 186). North Seattle demands a renewed focus on multi-family units that efficiently use limited space, conserve energy, and demonstrate sustainable urban planning energies.



# Conclusion

Urban sprawl is associated with uncontrolled land occupation through infrastructural development. With the availability of land, people tend to build single-family homes. Part of solving the urban housing problem is the introduction of multi-family vertical homes, which are considered to be sensitive to the environment and urban development. Vertical housing continues to be a preferred alternative to solving the housing problem across fast growing cities, such as Kuwait. Therefore, there is a need to understand how effectively the Kuwaiti government can implement the vertical housing plan and convince more citizens to live in vertical houses than in single-family homes so that they can enjoy the associated benefits.



# Design agenda





## Design agenda

Integrating nature into vertical housing to create spaces that encourage social activities and promote community lifestyle

Urbanization in Kuwait has faced **issues** with **low-quality design** and **low interest** in sustainable vertical housing, which is my motivation for choosing this topic.



Nature

+



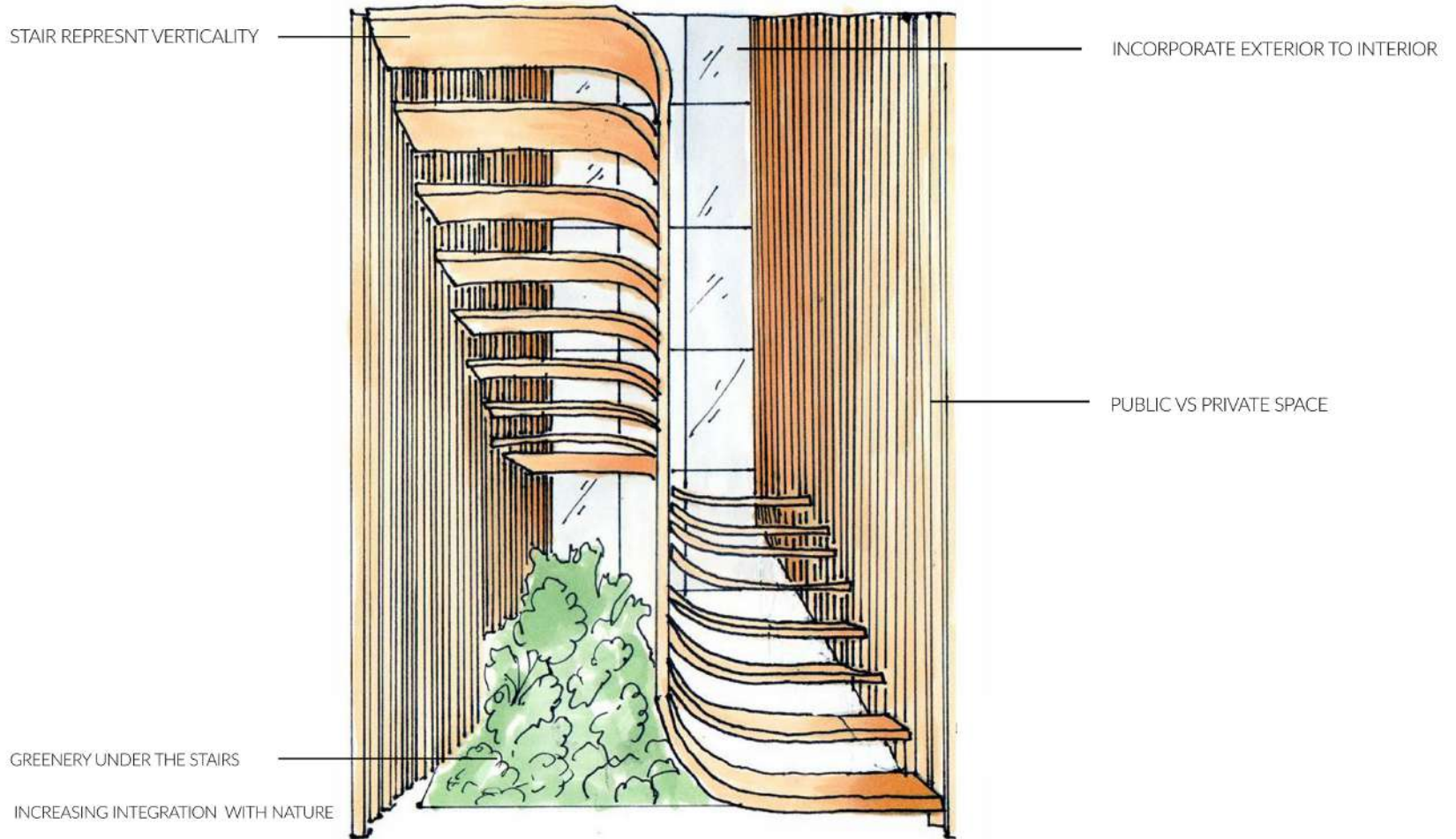
Vertical housing

+



Healthy community living

# Design prope 1 : Scale



# Design prope 2a: Materials

SUSTAINABLE

NATURAL

DURABLE

HEALTHY



BAMBOO



CERTIFIED WOOD



ULTRA-COMPACT DEKTON SURFACE



LINEN



RAMMED EARTH



RAMMED EARTH



GLASS



RAMMED EARTH



## Design prope 2b: Materials



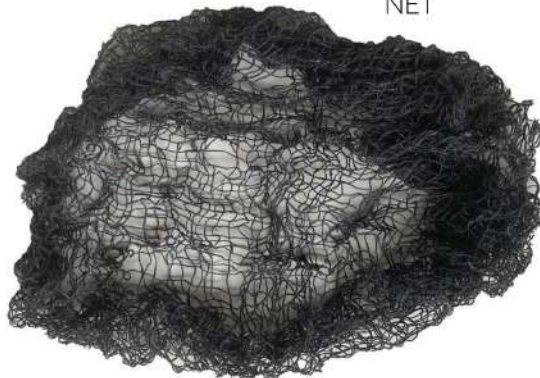
CLAY



STONE



CIRCULAR  
WOOD



NET



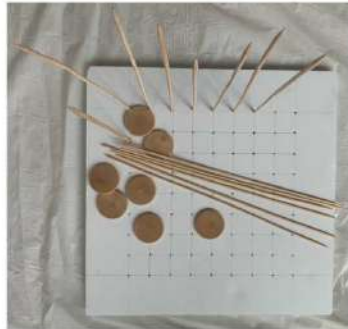
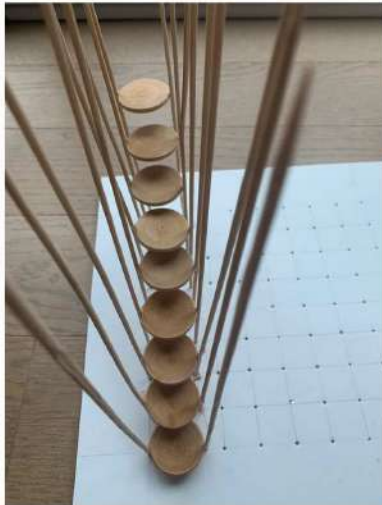
DOWELS



# Design prope 2c: Models



INCORPORATE WOOD WITH CLAY  
FOLD THE CLAY TO HAVE ORGANIC SHAPE



USEING DIFFERENT SHAPE OF WOOD TO CREATE VERTICAL ELEMENT  
INCORPORATE WOOD WITH STONE  
ADDING NET TO DEFINE PUBLIC AND PRIVATE SPACE

## Design prope 3: Experience





# Kuwait history



The high price of land makes it a challenge to add outdoor spaces in contemporary houses due to their spatial demands.



## Timeline

1950



Courtyard

1960



More green spaces luxury

Socio- cultural & economic changes

2014



No garden expandability security

1950s

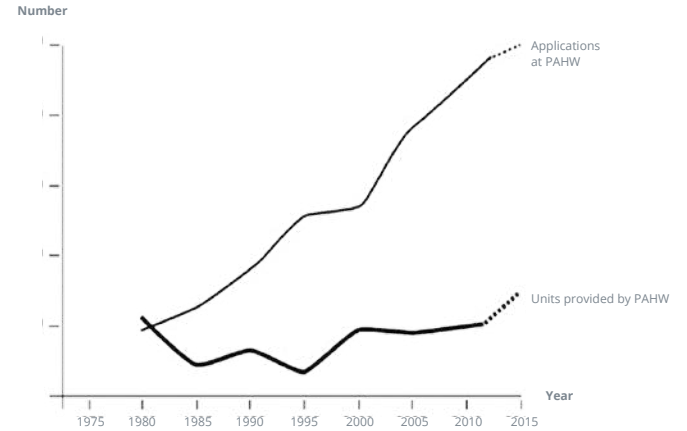
Oil boom

1990

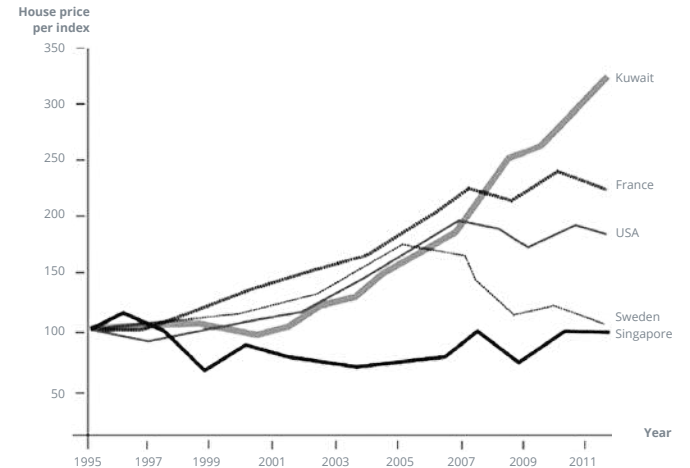
Government's mismanagement

First Gulf War

## Demand and Supply for Kuwait's housing welfare



## House price comparison by country ( base 100) from 1995- 2012



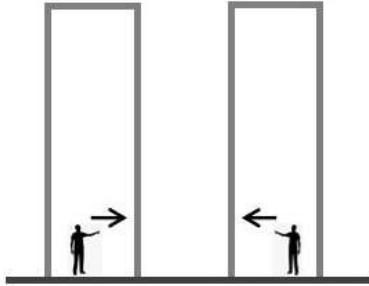




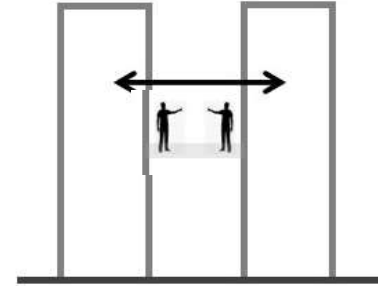
# Design strategies

Ideation

## Connectivity

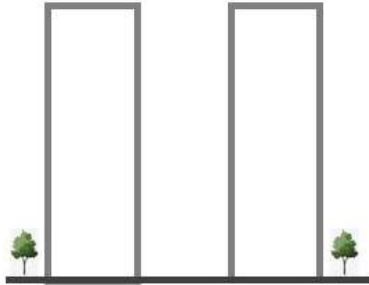


People staying at different blocks  
**isolated** by apartment walls

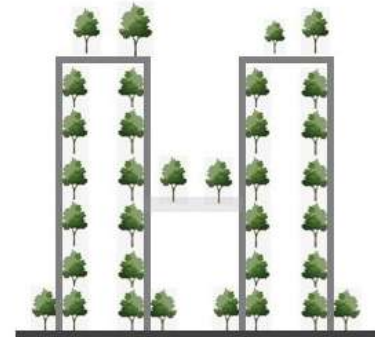


People connected by **sky bridge**,  
building new communities

## inside out

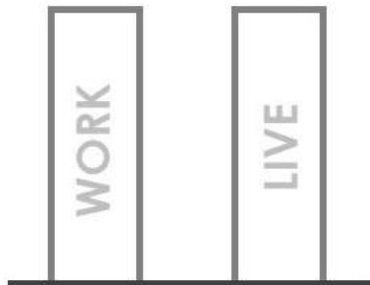


Trees available only at street level

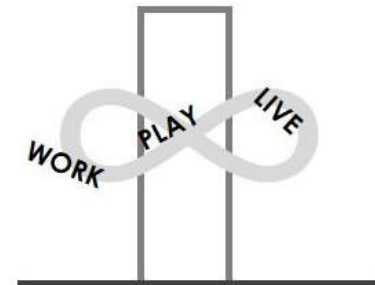


Creating rooftop garden and pocket  
greens to bring nature into the building

## All in one

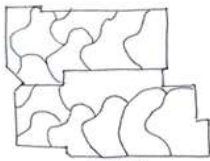


Seperate entity for work and  
live

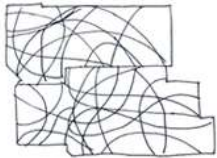


Single entity serving all the needs

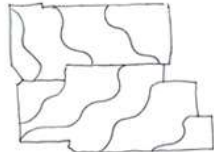
# Massing strategies



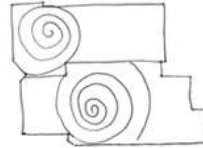
INTERACTION



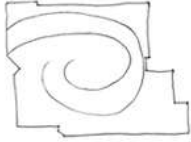
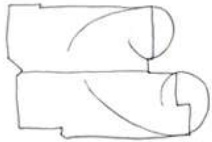
REUNION



FLUIDITY



MOVEMENT



FLUIDITY AND MOVEMENT

*Undulating movement*



*light and shadow*



# THE NAUTILUS

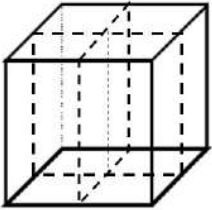
*Continuity*





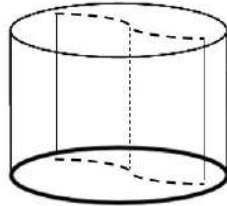
# Interior spaces planning strategies

*Repetitive*



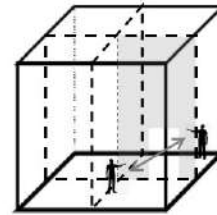
Conventional boring and **monotony**  
straight linear partitions

*Point of attraction*



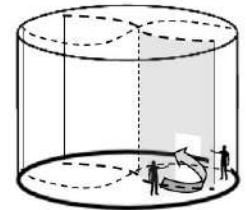
Brings out the beauty of each **curvy**  
**unique space**

*Exposed/ totally enclosed*

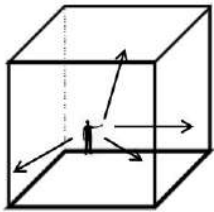


**Direct open** spaces, less privacy/  
completely **enclosed** space

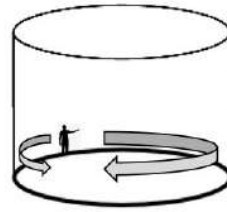
*Semi enclosed*



Curvy spaces allows some **privacy** at some  
corners at the same time being open

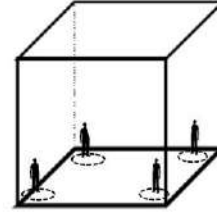


**Visually limited** by 4 flat walls



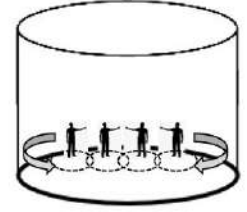
Visually **lengthening** and **enlarging**  
an area, promotes imagination

*Exclusive*



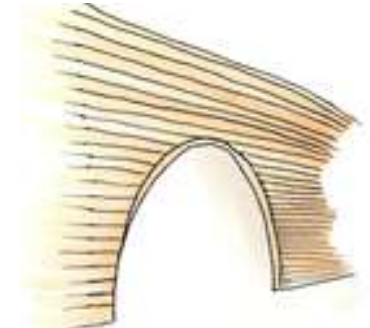
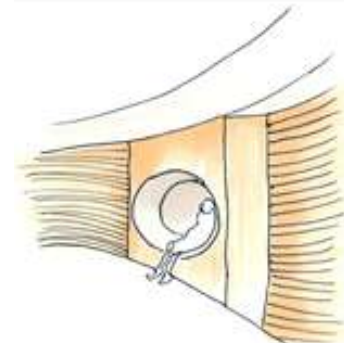
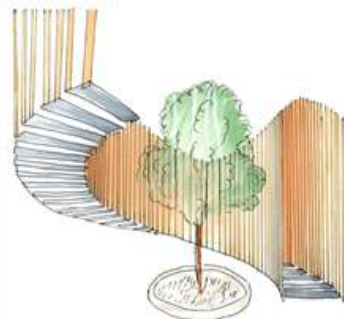
**Strangers** standing in corners

*Inclusive*



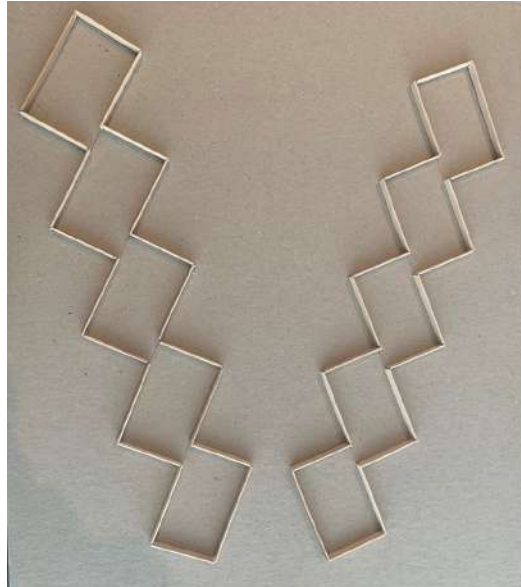
No corners, encouraging everyone to  
make **friends**

## Sketches



# Site sketch model

Removing the wall fence to engage community travelling through buildings and creating outdoor seating area



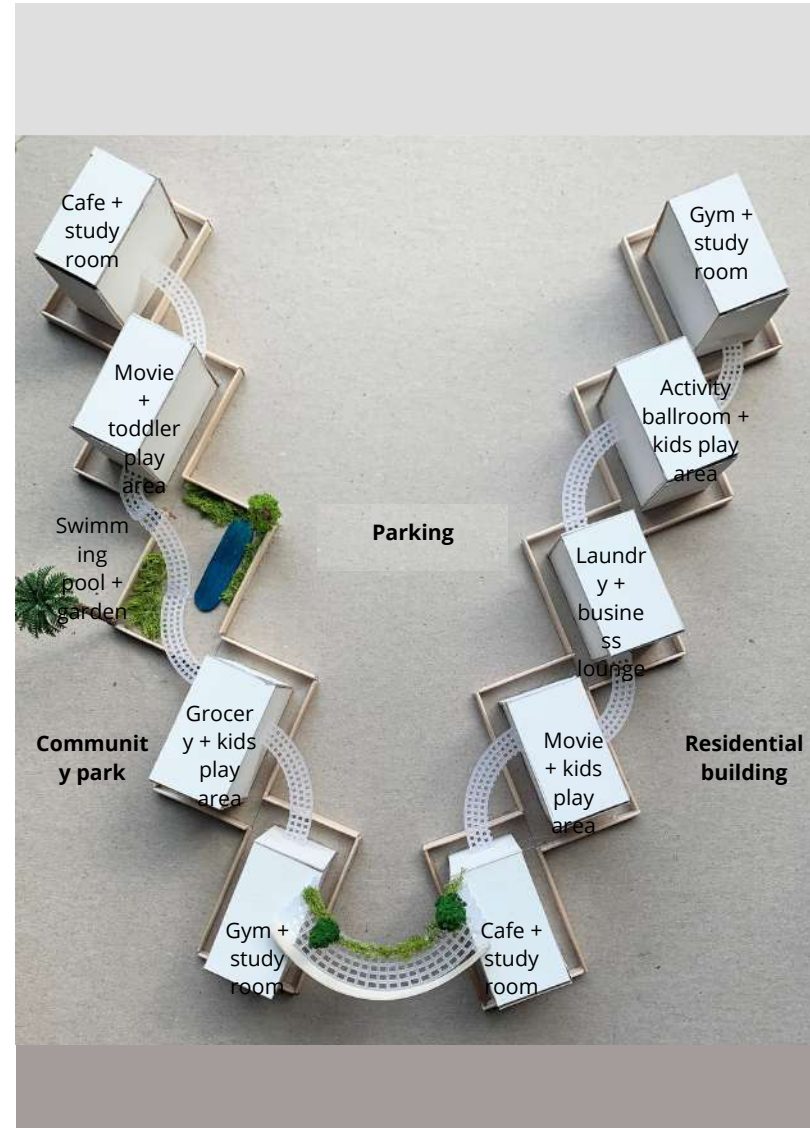
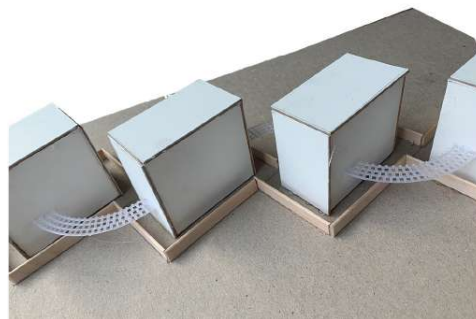
Open sky walk from roof top with sea view



Accessing community building from different levels



Pedestrian bridge between buildings from second floor





# Precedent studies



5



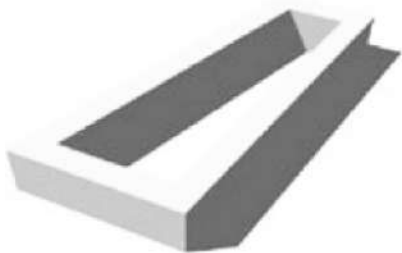


## 8 HOUSE

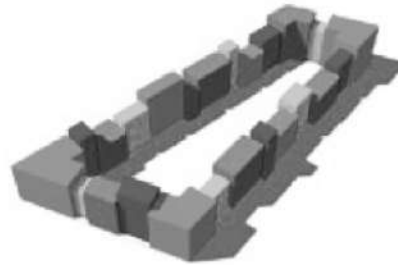
8 House is a three-dimensional neighborhood project located in Copenhagen, Denmark. Completed in 2010 by Bjarke Ingels, BIG, it is a mixed-use building that contains different types of residential housing, as well as retail and offices, connected by a continuous promenade and cycling path up to the 10th floor. It has 475 units, and the apartments are placed at the top, while the commercial program at the base of the building.

# Concepts

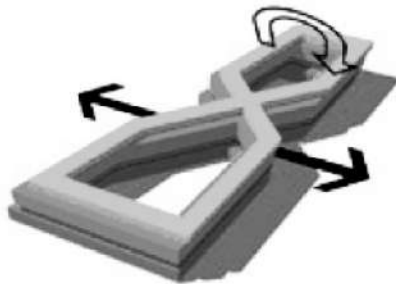
Basic Perimeter block



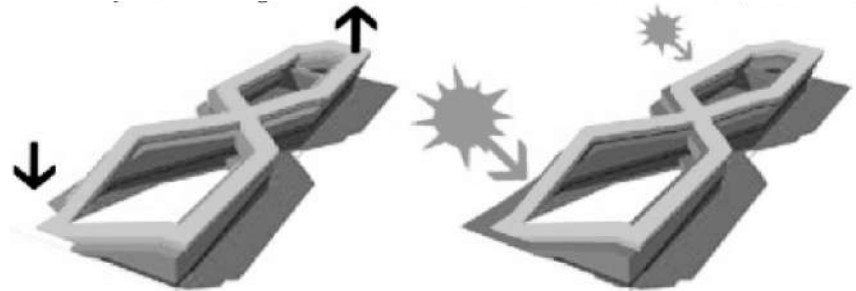
Wanted: Variety like a city in a building



Layered functions according to needs:  
commercial first floor, residential above



Master plan requirement:  
Passageway through to Hien Hansen's Square  
Twist into a bowtie: 2 courtyards defined



Playing with height of functions to achieve variety.  
Pinching down SE corner: view to nature, reduce solar gain  
Pulling up: NE corner offices: shade loving





**Question: Why is the 8 House Design attractive, and how does it control urban sprawl?**

Community: 8 House's design maximizes views to the interior open space while providing multiple meeting points for residents.

Connection: the shape allows a continuous path around the building, easily connecting residents to each other and facilities.

Lifestyle: the design creates space for the residents to play, walk, and bike without having to travel.



Verticality: the design enables many people on a small piece of land.

Individuality: each unit is full size, with light and air accessibility from both sides.

Nature: residents are able to view the surrounding nature from each side of the building.







### **Interior/Exterior Residential Conditions**

Apart from the already outlined benefits of vertical housing construction, designers and architects are also focusing on how to improve the connection between the interior and the exterior. Architects and urban designers have a greater responsibility rather than just focusing on sustainable housing solutions as they must also include the everyday quality of life of their residents. In "Un-Private House", Bell, Michael states that a key to modern housing is the blending of the interior space with modern architectural styles. On some occasions, interior designers play with the lines and apply deftly mixed forms to give houses and spaces gender-neutral looks. Others enlist natural elements, such as walnut, on the walls, floors, and around the tub, to connect the design features with nature. All these interactions aim to connect the housing design with the natural environment. Blaise, Petra agrees, in *Inside Outside*, that modern construction should integrate the interior with landscape design elements.



# Case study





## Franklin Tower Residence



### Location

200 N 16th St. Philadelphia, PA



### Owner

PMC Property purchased in 2015 and renovated



### Built

late '70s through the mid'80s



### Project size

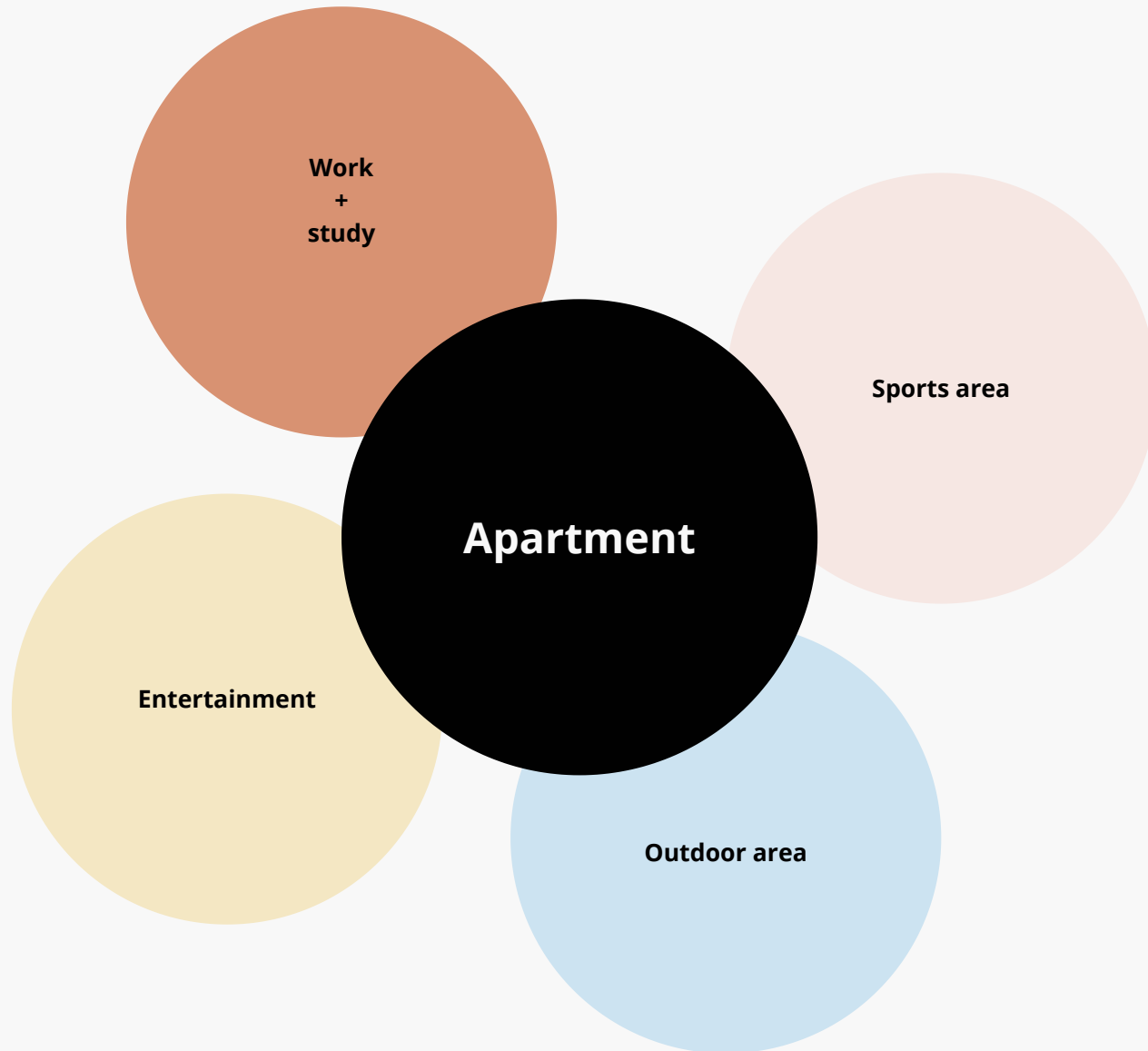
607 ,000 Sq. ft

**24-story**

One & two- bedroom **luxury apartment**

50 ,000 of amenity space

**Luxury apartment with amenity provided to caters all the residence daily needs**





# Entertainment room ideas



*role play*

Kids play room



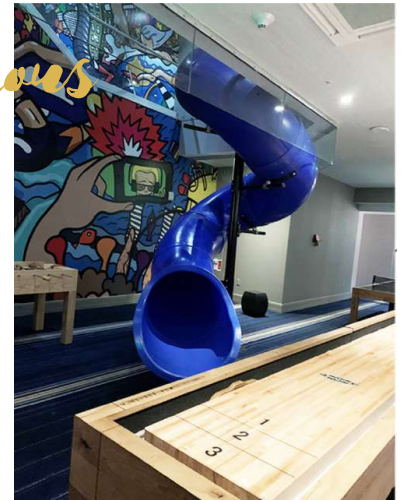
*challenging*

Movie room

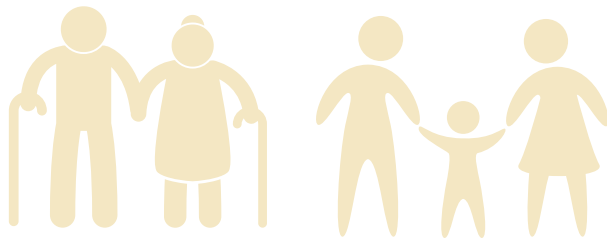
Billiards, TV lounge

*adventurous*

*thrilling*



Game lounge with slide



'entertainment room for all'

# Outdoor roof deck



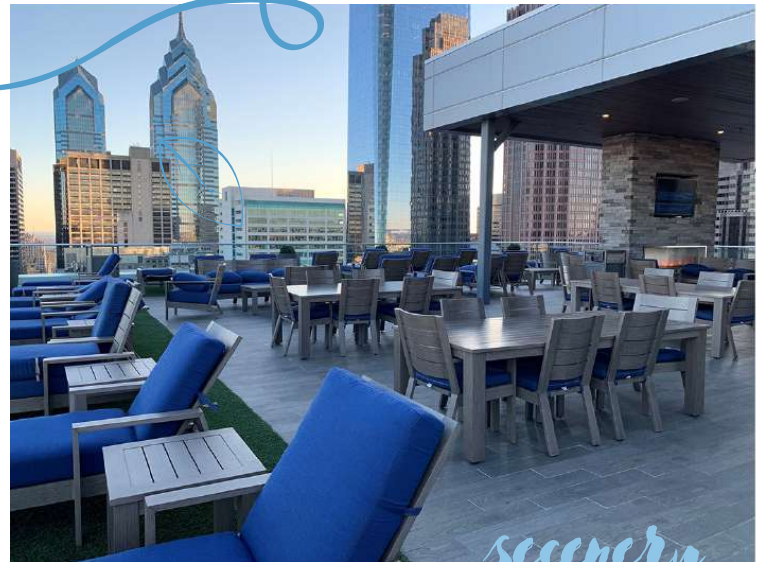
Fire place

Ada circulation

dining



Grill area



Furnished roof deck



# Study room ideas



+

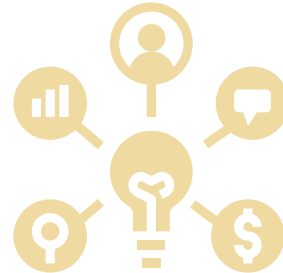


*presentation*

Business lounge



Private study room



Meeting room



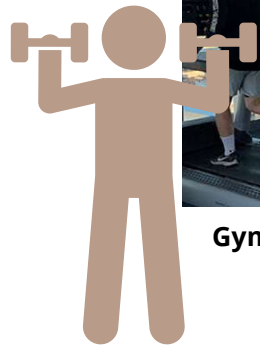
*ideation*

Study booth

*self improvement*



# Sports area



Gym

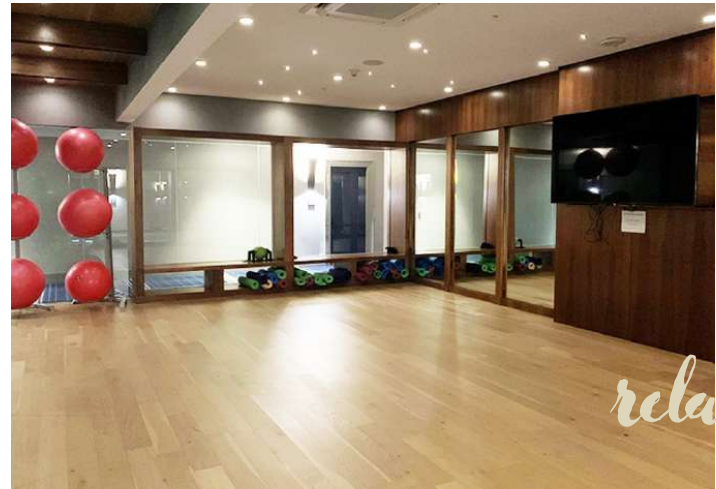
*fitness*



Peloton studio



Basketball court



*relaxation*

Yoga room

## **KEY INFORMATION INTERVIEW**

Name: Mathew Vargas

Title: Asst Property Manager

Date: 22/1/2021

### **What is the main goal/purpose of your facility? (Are there annual reports, pamphlets, etc. available?)**

Create an environment that is equal parts social, recreational, and professional, from management perspective safety and health is a big part of our goal.

### **How would you describe your organizational culture?**

Delivering good customer service.

### **How does the design of your facility differ from other similar facilities? How is it the same?**

As a former office building. The old building has two elevators and the empty space that was turn to wonderful amenities. Interesting construction of adaptive reuse.

### **Who are the types of people that come to this facility?**

Anybody (students, families, disabled people)

### **What is the average age/ability range of the occupants?**

runs the entire spectrum.

### **What are the different departments within your facility? What do they do?**

- Variety of one bedroom (junior bedroom – regular bedroom)
- Two bedroom
- Penthouse (two bedrooms)

**Number of staffs? How many at facility at a time? (List of job titles)**

- Manager- 1
  - Assistant Manager- 1
  - Maintenance Staffs - 2
  - Cleaners- 3
  - Rental Consultants-2
  - Front Desk 1
- Total 10

**Do you have an organizational chart?**

No

**What activities take place in the public areas? What works? What doesn't?**

Fitness classes have a positive resonance in the house, and we usually have private gatherings in the open kitchen and dining area.

**What are the public areas in the space?**

- Lobby
- Peloton Cycle Studio
- Yoga studio
- Gym
- Indoor basketball court
- Resident lounge featuring table games, big screen TVs, and WIFI
- Fully furnished roof deck with panoramic views, outdoor fire place, and grills
- Theater and media rooms
- Business center with private and collaborative work spaces
- Entertaining kitchen and dining area for private parties
- Kids' playroom

**In your opinion, what are the most and least successful vertical housing?**

This is a wide-open question. When property under performs, there several different things and the hardest all of it is the maintenance. The maintenance is very important, also awareness of capital improvements and capital investment so constantly, you need to keep your eye on the future. We have to make long term decisions. Holding a piece of real state is a long-term investment, also we should invest in people.



**What are your design advices when designing residential Vertical housing in this time of pandemic?**

I would imagine that the property in a post pandemic world will start building more amenity space for working from home, like how we have our business center so properly it will be more in this kind of space with free WIFI. And I think that will start to rely on and expand more.







# The nautilus

Design proposal









# Site plan

Scale: 1/120"





Outdoors seating area

# First floor plan

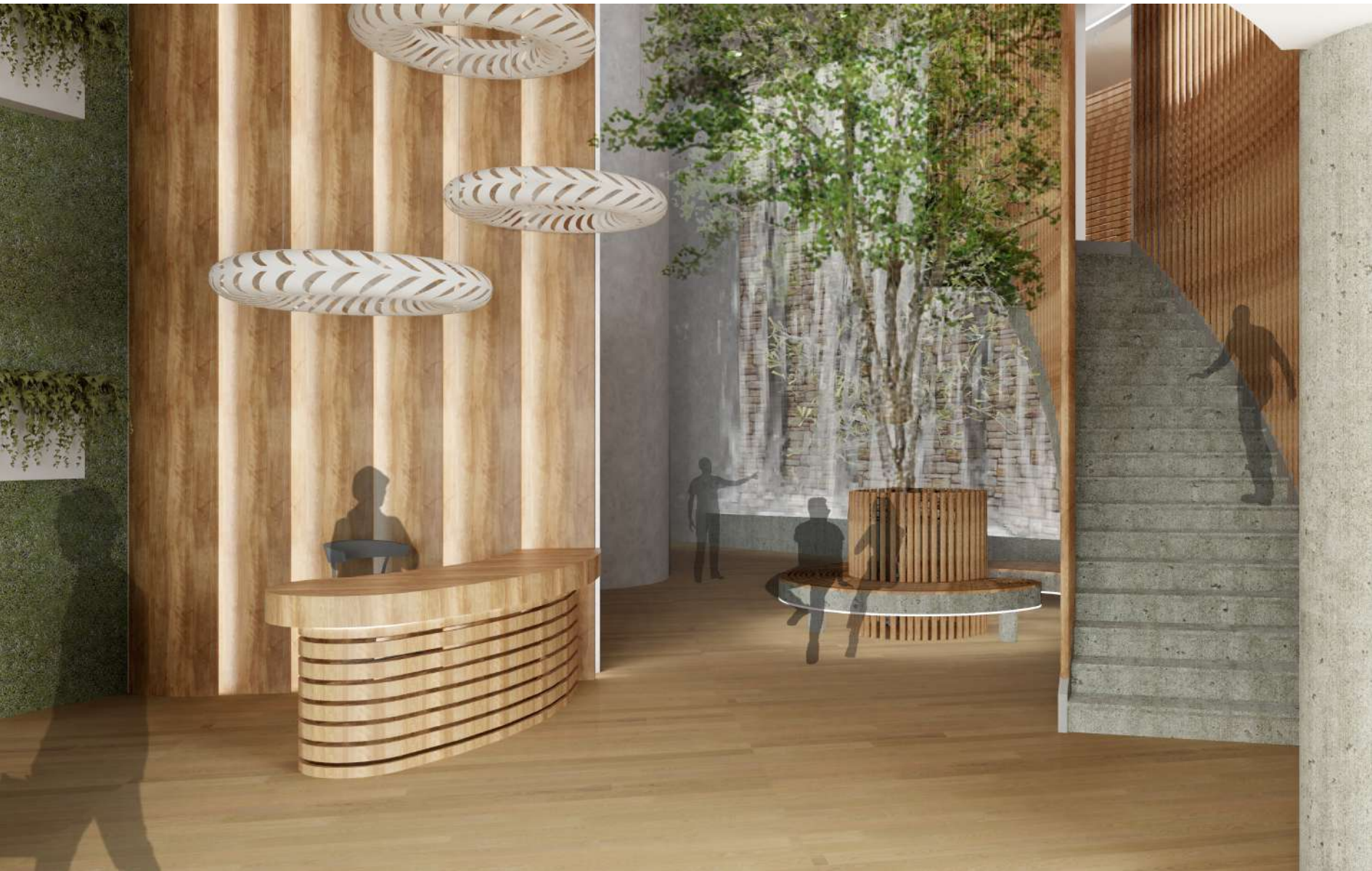
Scale: 1/64"











Lobby

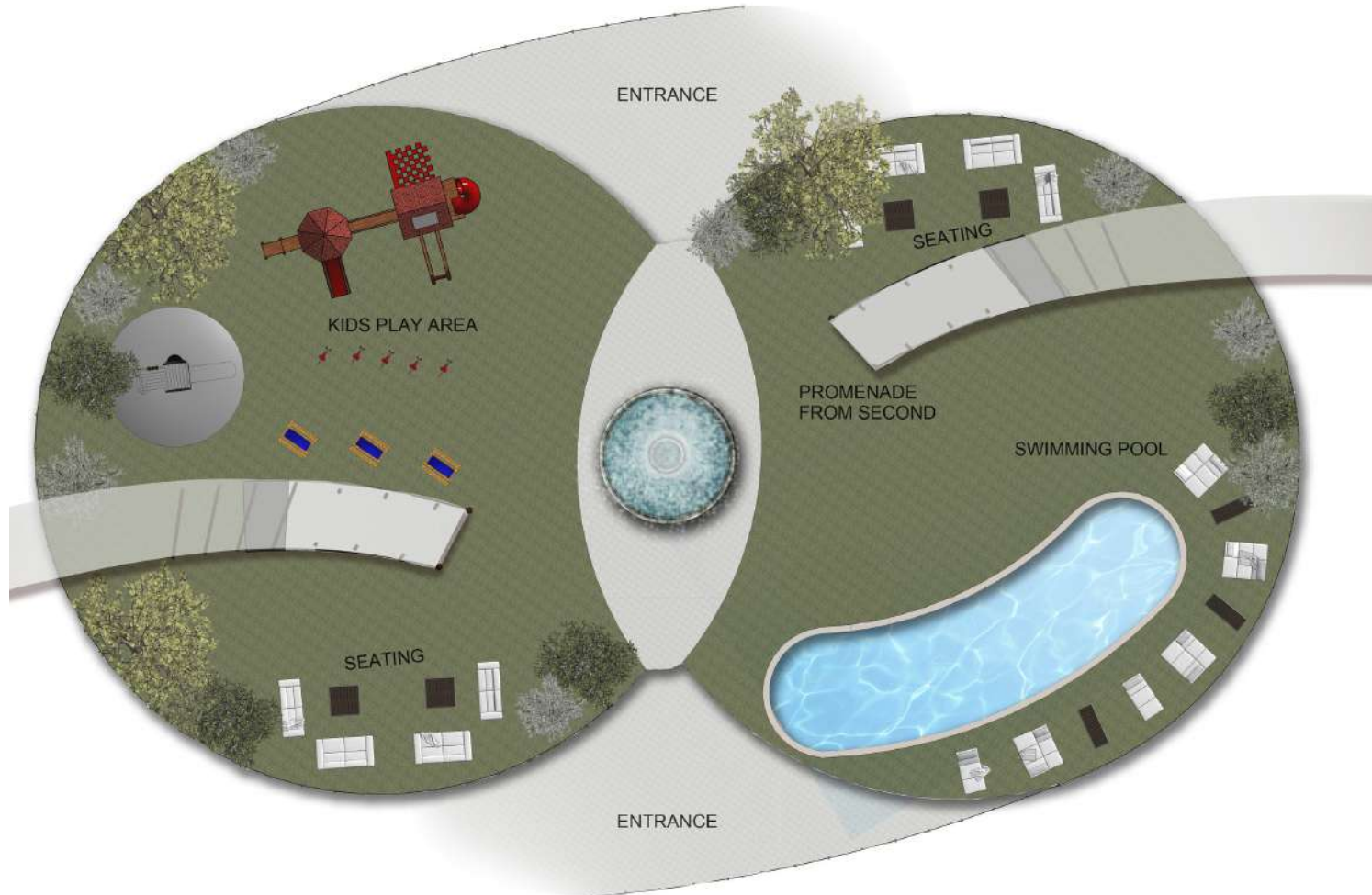


Lounge area



# First floor community park plan

Scale: 1/64"





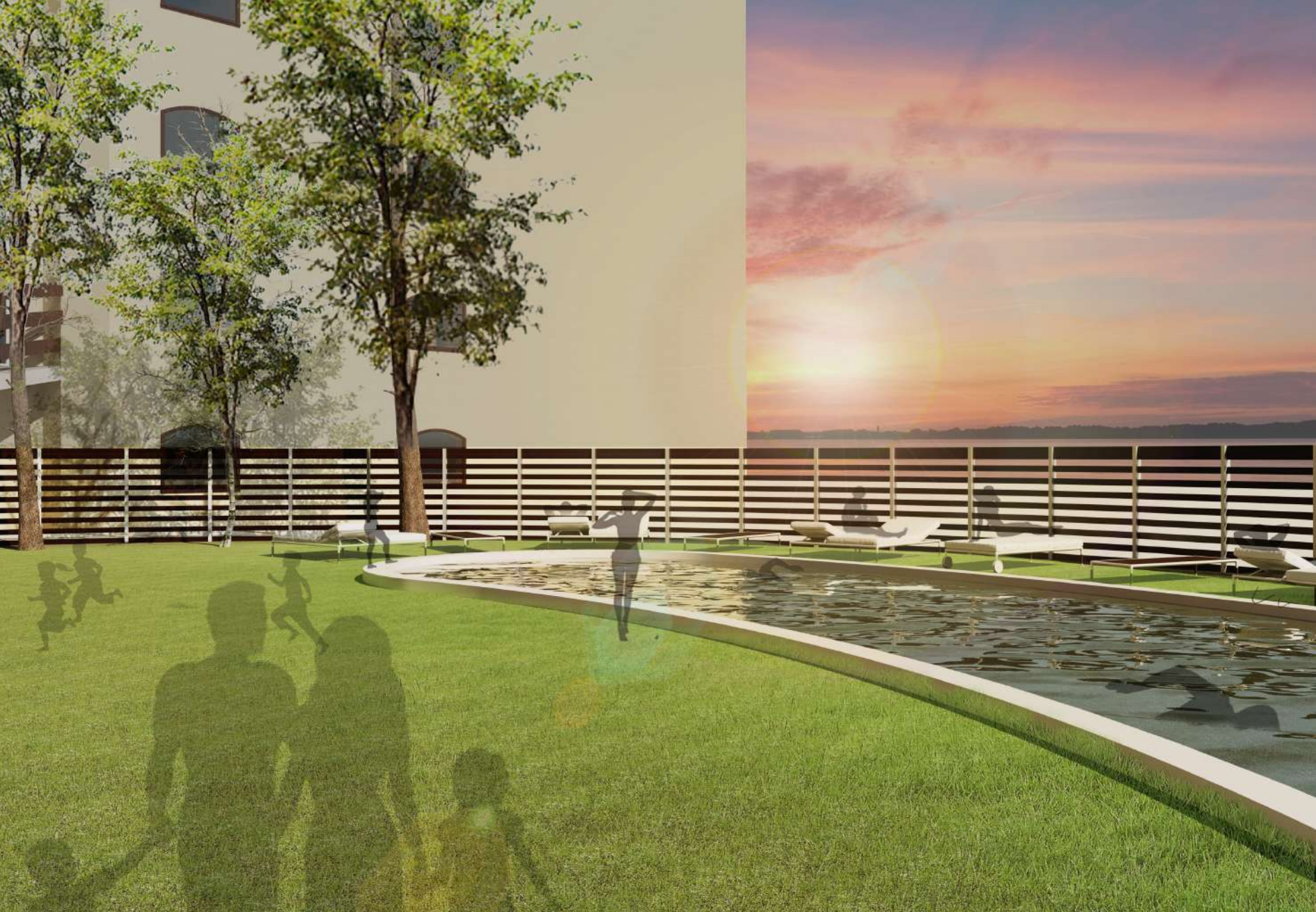






Community park





Community park swimming pool

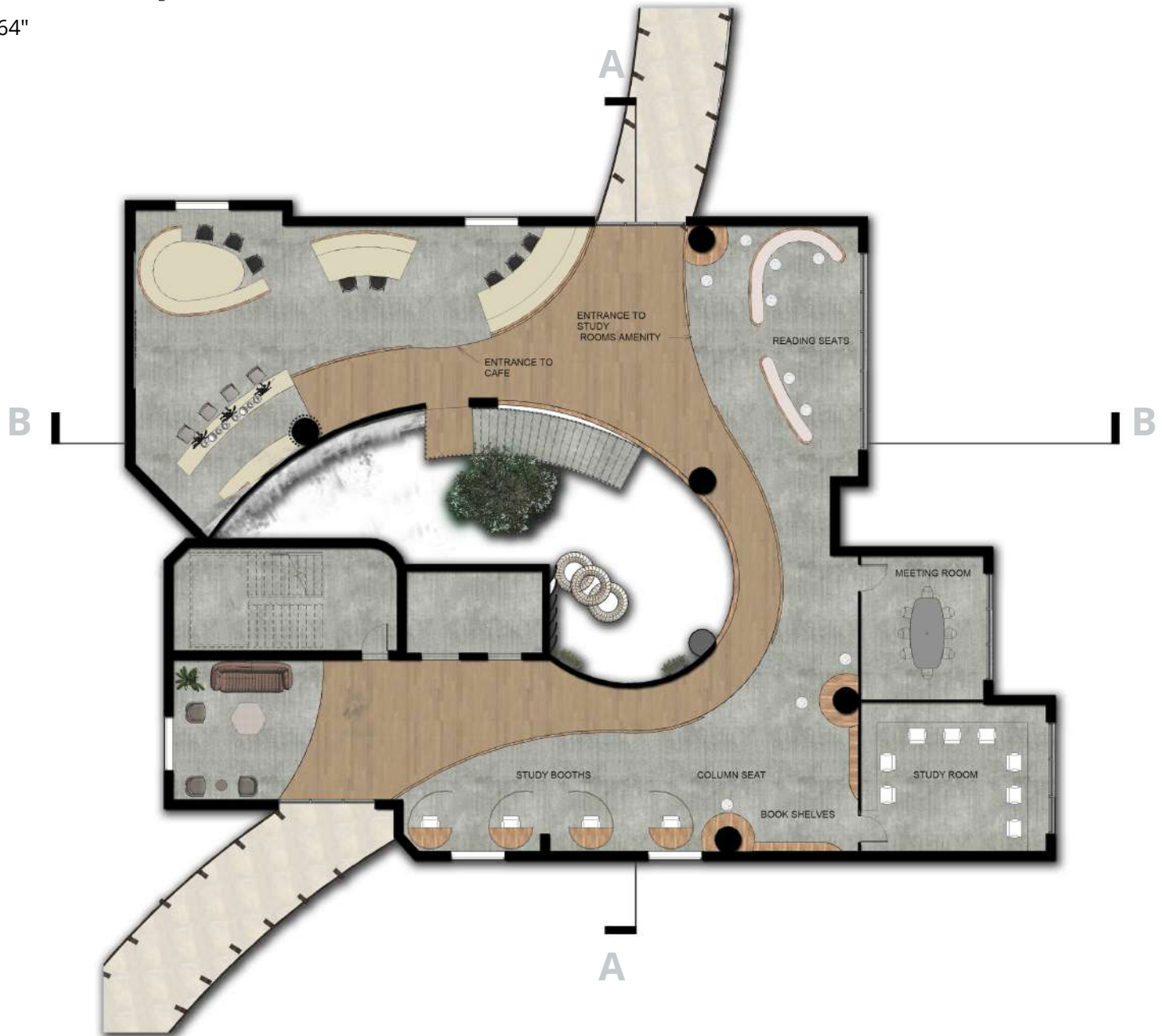




The pedestrian

# Second floor plan

Scale: 1/64"







Study room- Entrance



Study room- Reading area





Study room- Study booths



Study room- Column seats



Nautilus café entrance







Nautilus café bar

Nautilus café seating





# Third- sixth floor plan

Scale: 1/ 64"









Master bedroom



Indoor garden





# Roof plan

Scale: 1/ 64"

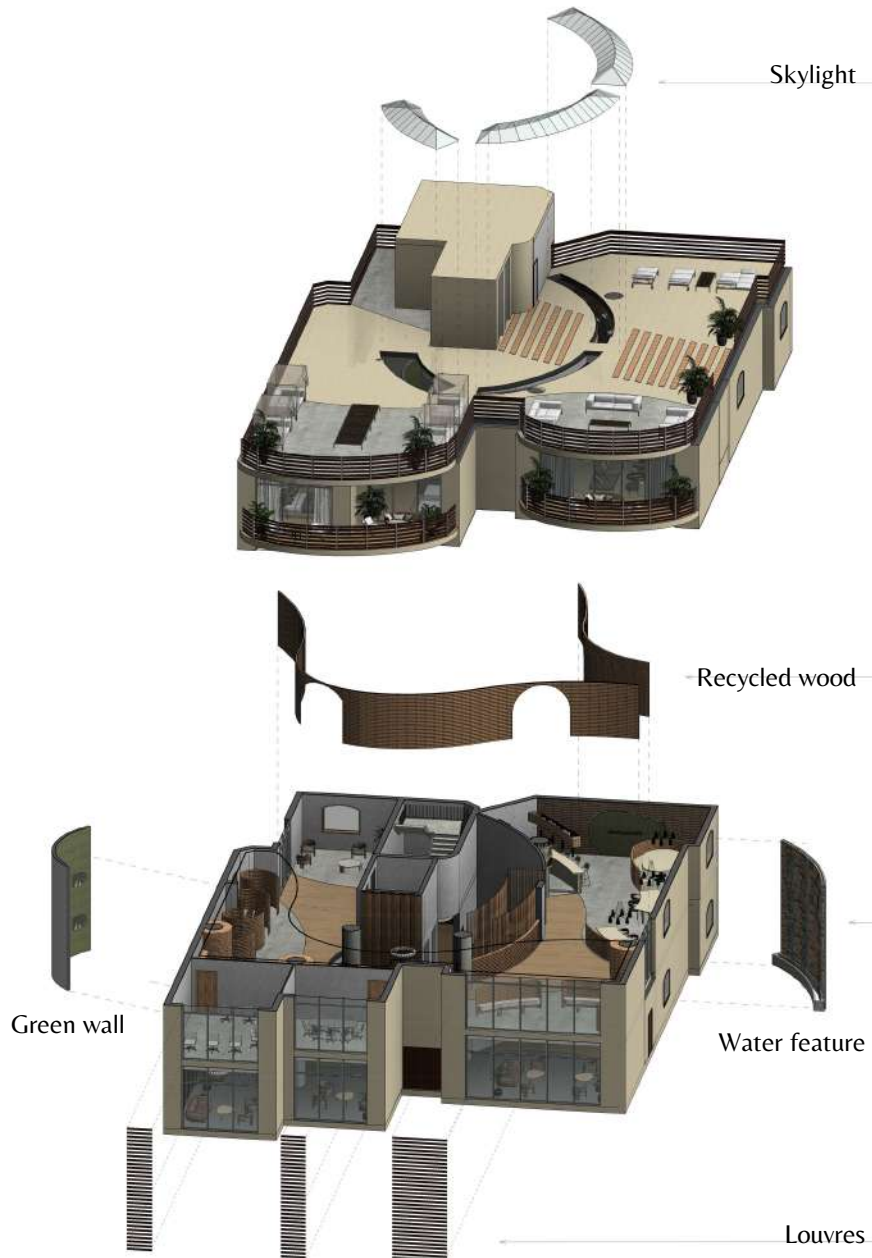




Sky bridge



# Sustainable axonometry



# Material selection

Stone



Flooring



Concrete



Wall covering



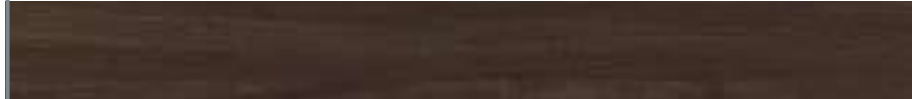
Natural stone tarventine



Recycled steel louvres



Wood



River rocks faux stone wall panels



Reclaimed wood



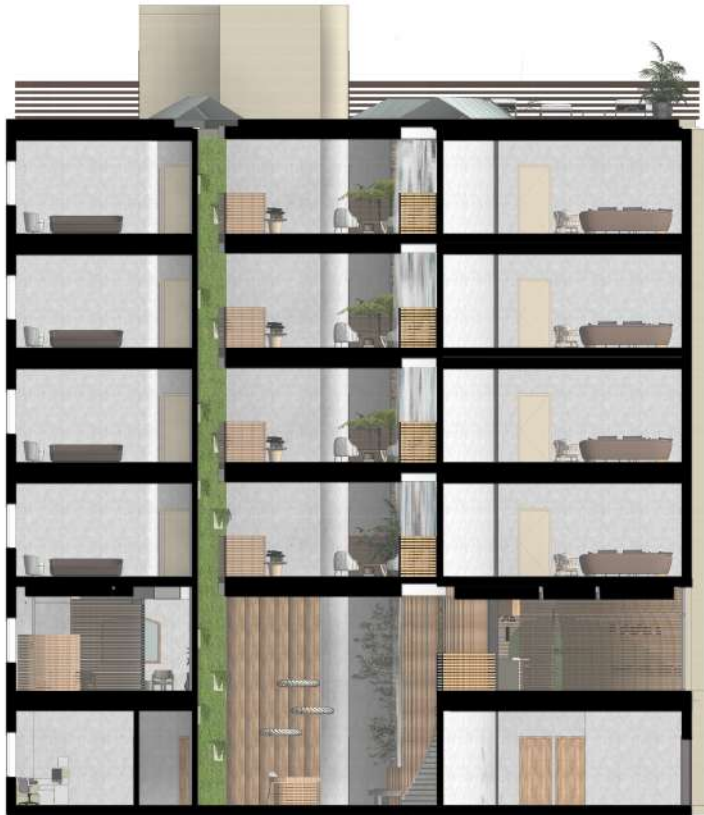
Green wall





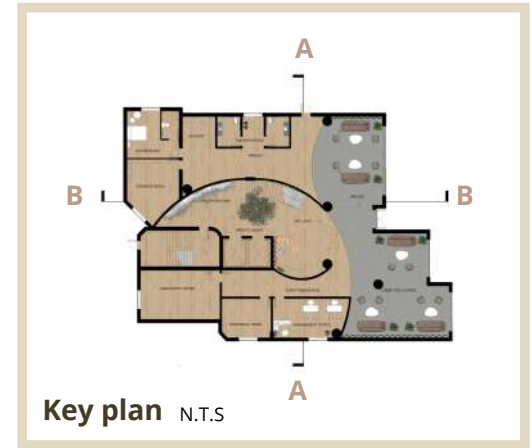
# Section a-a

Scale: 1/ 64"



# Section b-b

Scale: 1/ 64"

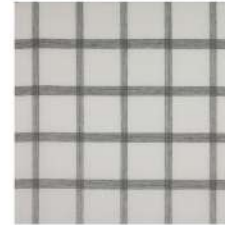


# Furniture selection

First floor

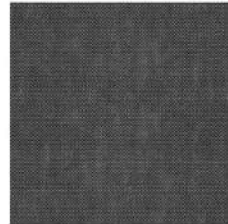


Second floor





Third floor



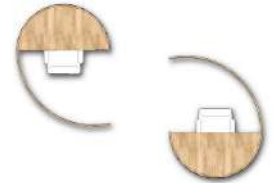
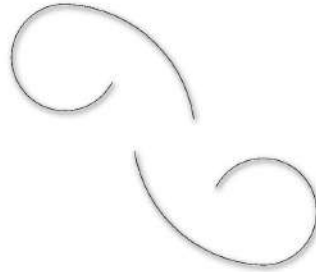
Third floor indoor garden



Private



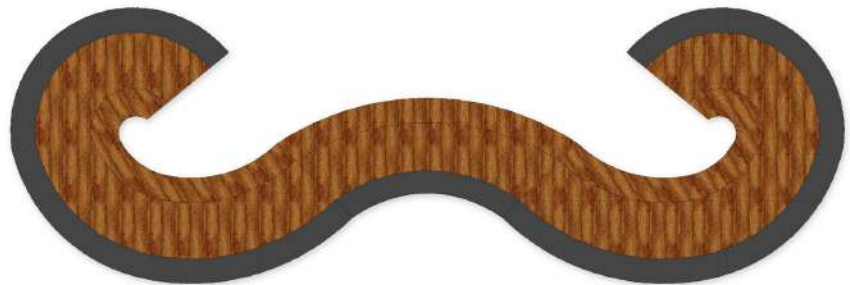
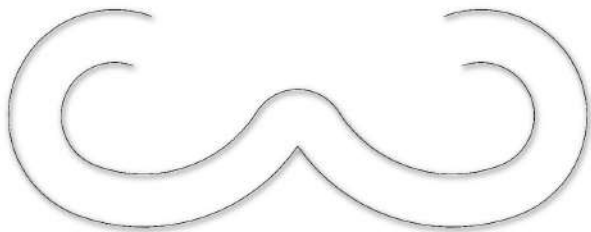
Semi private



Public



Community





# Code compliance studies

Means of egress

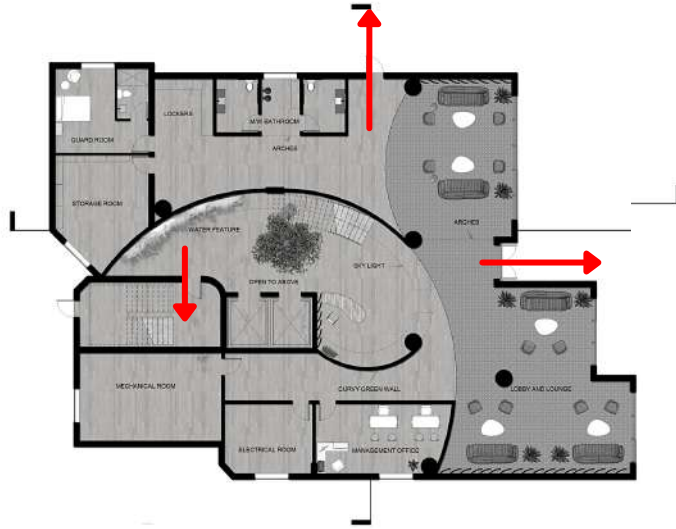
Building occupancy table

Plumbing

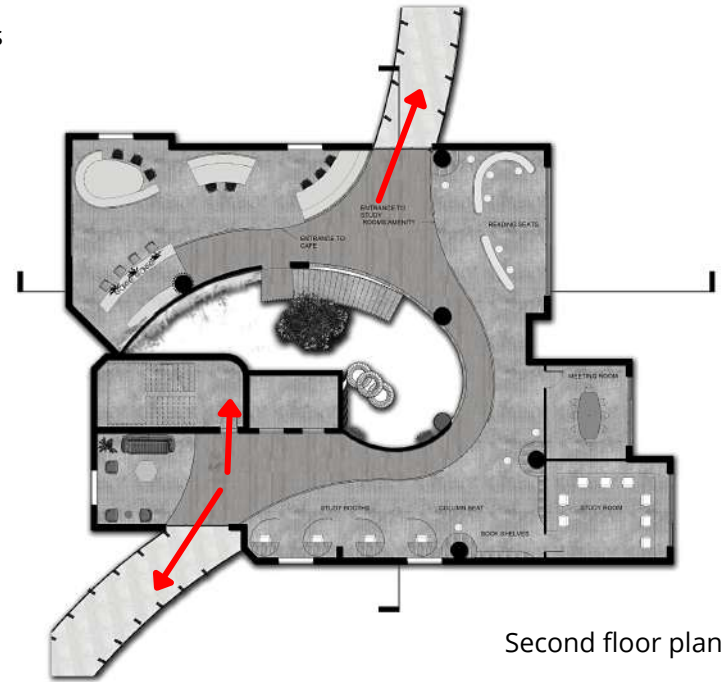
# Means of egress

## Escape route

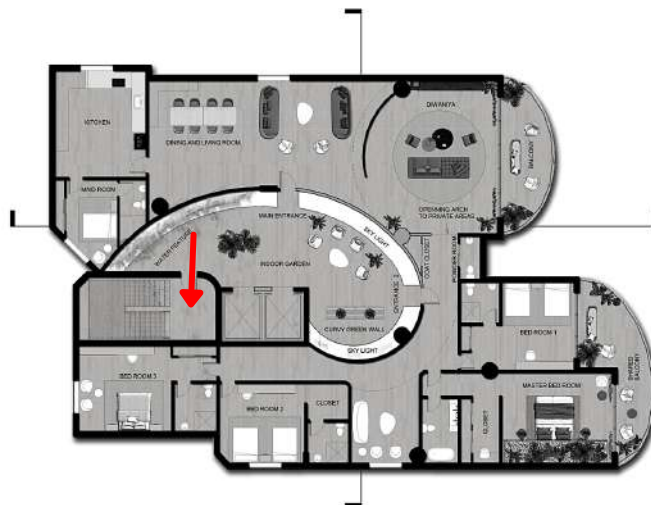
The building contains 1 protected cores and 2 fire exits all leading to safe areas



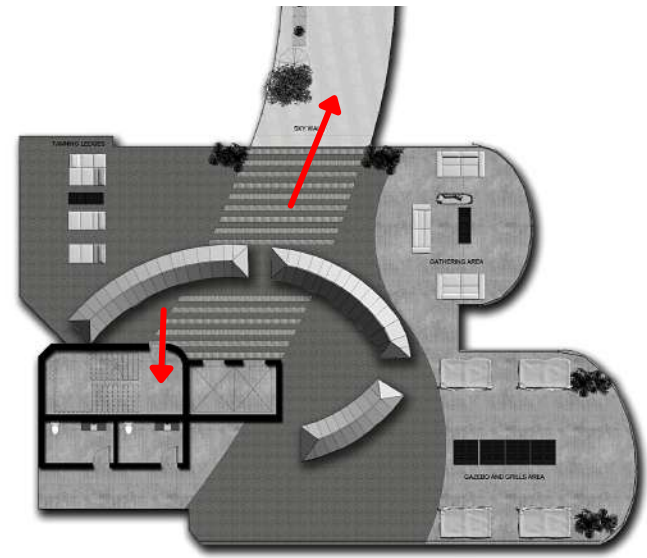
First floor plan



Second floor plan



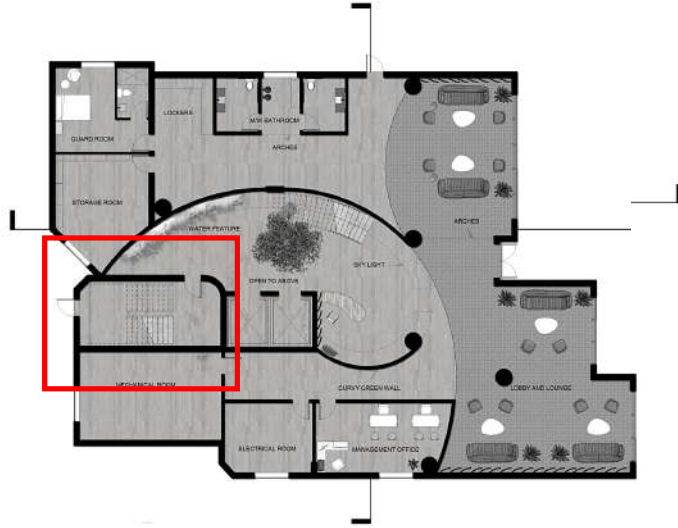
Third- sixth floor plan



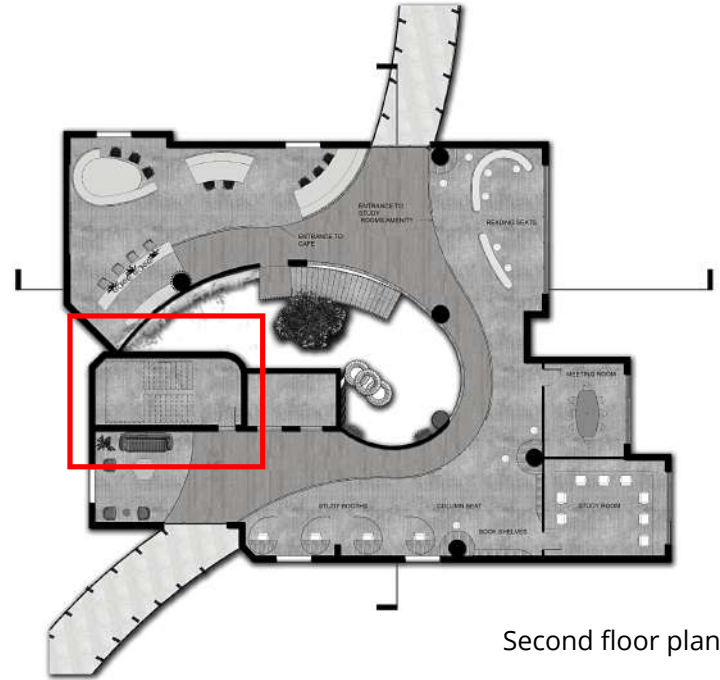
Roof plan

#### 4.7.4 Stairway landings

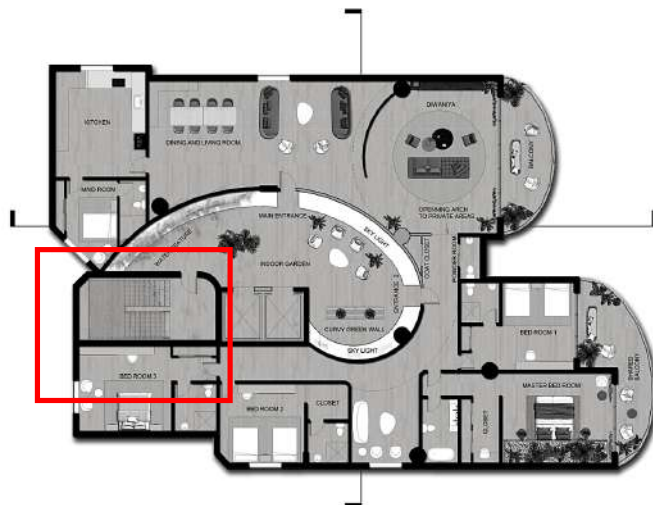
There shall be a floor or landing at the top and bottom of each stairway. The width of landings shall be not less than the width of stairways served.



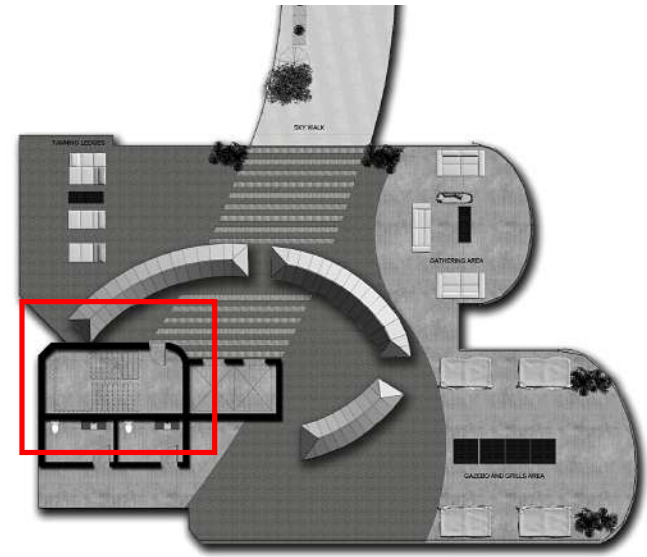
First floor plan



Second floor plan



Third- sixth floor plan



Roof plan



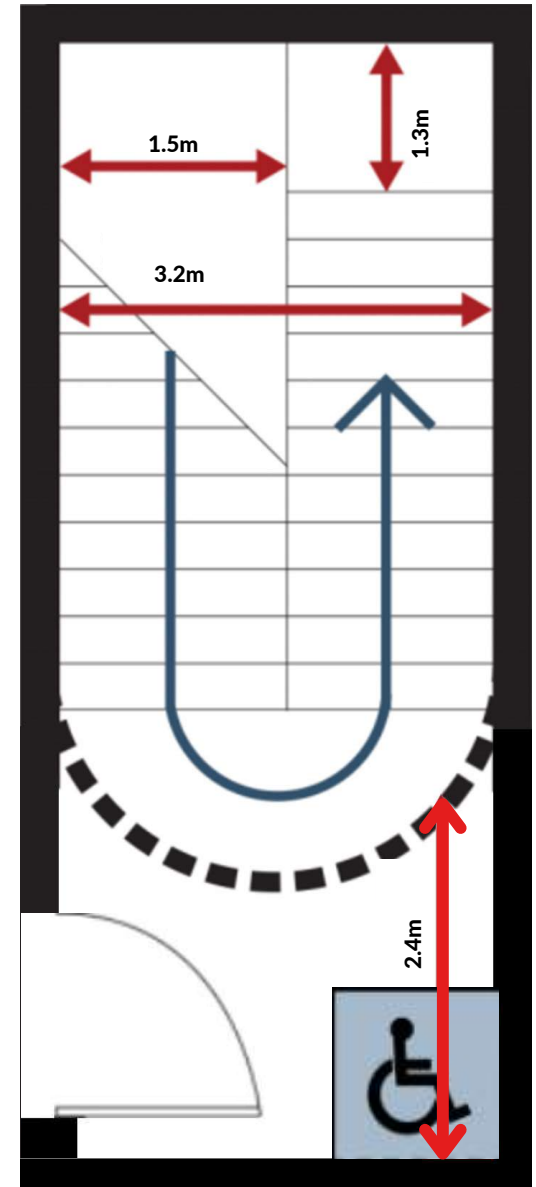
Every landing shall have a minimum width measured perpendicular to the direction of travel equal to the width of the stairway. Where the stairway has a straight run the depth need not exceed 48 inches (1219 mm). Doors opening onto a landing shall not reduce the landing to less than one-half the required width. When fully open, the door shall not project more than 7 inches (178 mm) into a landing. Where wheelchair spaces are required on the stairway landing, the wheelchair space shall not be located in the required width of the landing and doors shall not swing over the wheelchair spaces.

#### 4.7.2 Width and Capacity

The required capacity of stairways shall be determined based on occupancy load, but the minimum width shall not be less than 44 inches (1118 mm) except with stairways serving an occupant load less than 50 shall have a width of not less than 36 inches (914 mm).





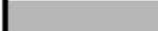

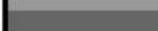



Active fire strategies provided at fire staircases



Staircase design of each floor complying to standards

# Occupancy load table

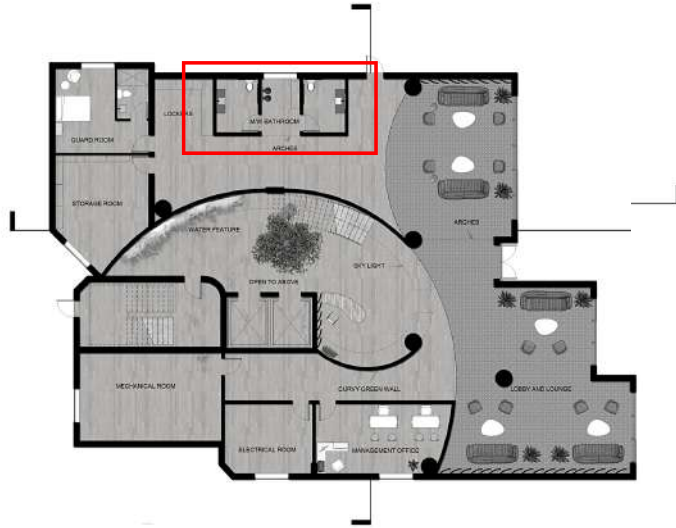
Function of space	Quantity	Sq. ft	Total Sq. ft	Occupant load	
Typical Apartment	5	4,305	21,525		
Master Bed Room	1	250	250	1.25	
Bed Room	3	170	510	2.55	
walk-in Closet	4	45	180	0.90	
Maid room + Bathroom	1	150	150	0.75	
living Room + Dining Room	1	500	500	2.50	
Diwaniya ( men`s Reception )	1	250	250	2.50	
kitchen	1	200	200	1.00	
Storage	1	235	235	0.78	
Balcony	1	430	430	86.00	
Indoor garden and Circulation	1	1200	1200	12.00	
<b>Support-Shared spaces on First Floor</b>			<b>10,765</b>		
Management office	1	500	500	5.00	
Mechanical Room	1	350	350	1.16	
Electrical Room	1	120	120	0.40	
Storage	1	385	385	1.27	
Package Lockers room	1	300	300	0.99	
Lobby	1	500	500	100.00	
Lounge	1	2000	2000	400.00	
Garden and Circulation	1	6000	6000	120.00	
<b>Roof Deck</b>			<b>4,305</b>		
Grills area	1	1000	1000	200.00	
Tanning Ledges area	1	500	500	100.00	
Gazebo-seating area	5	121	605	121.00	
Garden and gathering area	1	3000	2000	400.00	
<b>Amenity Spaces on second floor</b>	<b>4</b>	<b>2,150</b>	<b>4,305</b>		
Study room - Meeting lounge	1		2500	25.00	
café	1		1505	15.05	
Seating area			300	3.00	
<b>Community Park</b>			<b>10,765</b>		
Outdoor Playground	1	2000	2000	40.00	
Toddler play area	1	1000	1000	20.00	
Swimming pool area	1	2000	2000	40.00	
Outdoor Gathering- Landscape	1	3865	3865	773.00	
<b>Total SQ. Footage of Program</b>			<b>51,665</b>		

Function of space	FLOOR AREA IN SQ. FT. [m2] PER OCCUPANT	Colour code
<b>Accessory storage areas, mechanical equipment room</b>	300 [28 m2]	
<b>Assembly without fixed seats</b>	7 [.7 m2]	
standing space	5 [.5 m2]	
unconcentrated ( table and chairs)	15 [1.4 m2]	
exercise room	50 [4.6 m2]	
<b>Business areas</b>	100 [9.3 m2]	
<b>Kitchens, commercial</b>	200 [18.6 m2]	
<b>Residential</b>	200 [18.6 m2]	

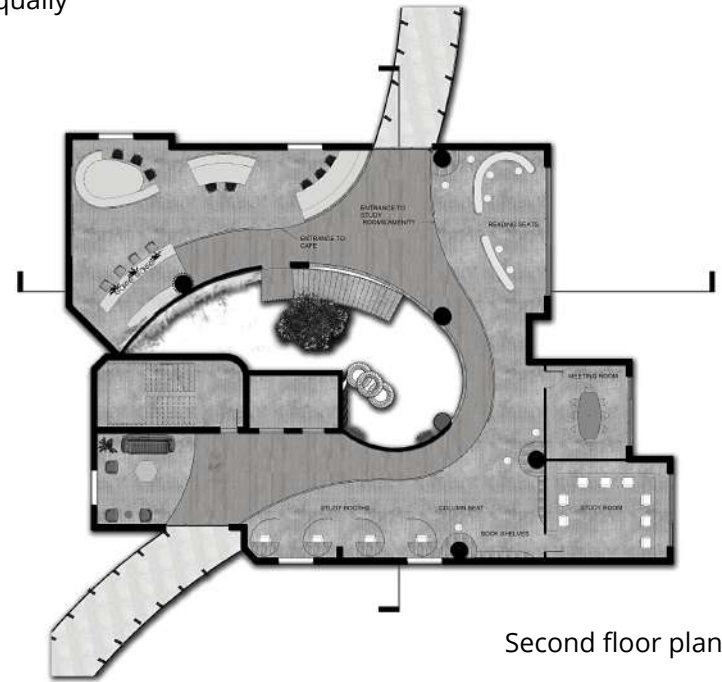


# Plumbing

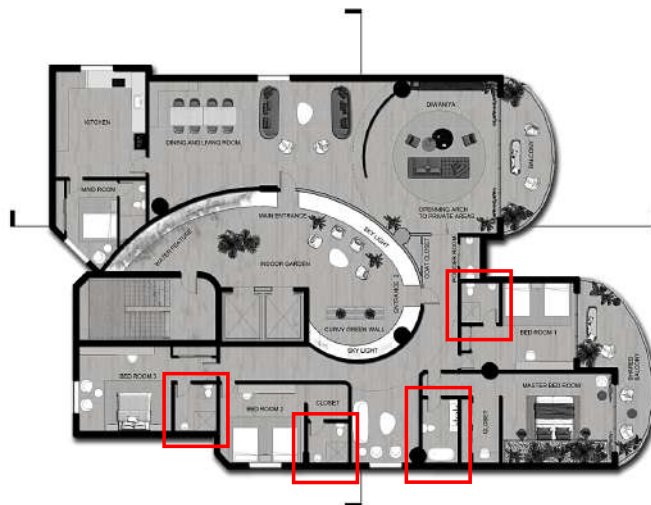
Toilets shall be provided for each sex assuming that the occupant load is equally divided between males and females.



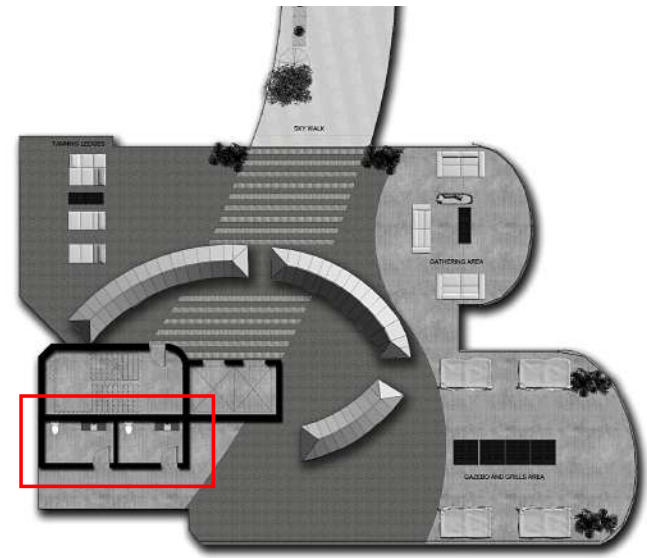
First floor plan



Second floor plan



Third- sixth floor plan



Roof plan





# Site



# Sulaibikhat Vertical Housing



Site photo



**Location**  
Sulaibikhat, Kuwait City, Kuwait



**Designed**  
Public Authority for Housing Welfare- Kuwait



**Built**  
2015



**Project size**  
62 buildings, 32,290 Sq. Footage for each building

6 storey/ building

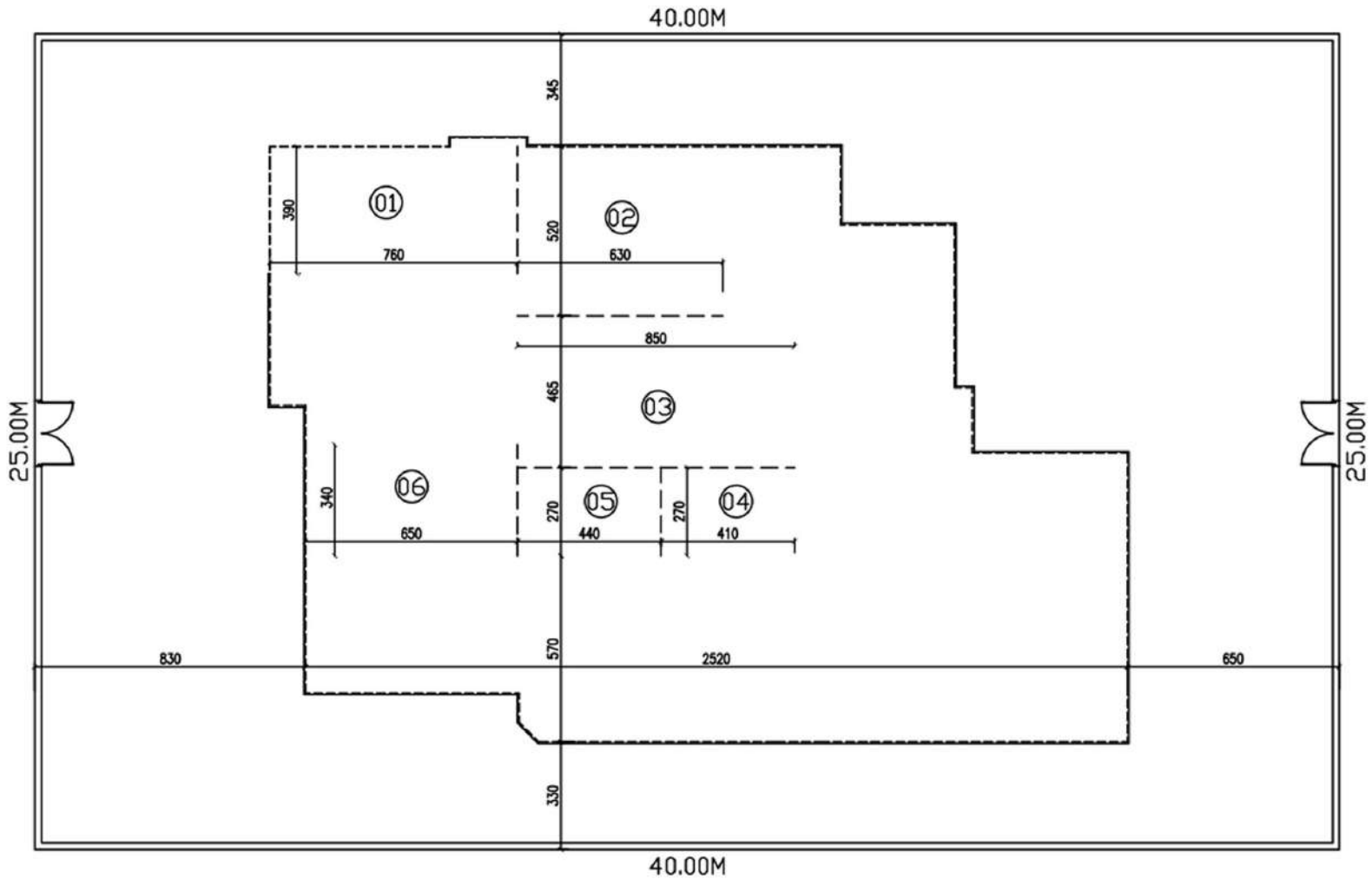
5 units/ building



-  School
-  Mosque
-  Grocery
-  Garden
-  Hospital

1F : 10,765 Sq. Footage    2-6F : 4,305 Sq. Footage    1 residential unit/ floor    6 clusters    10 buildings / cluster

# First floor area

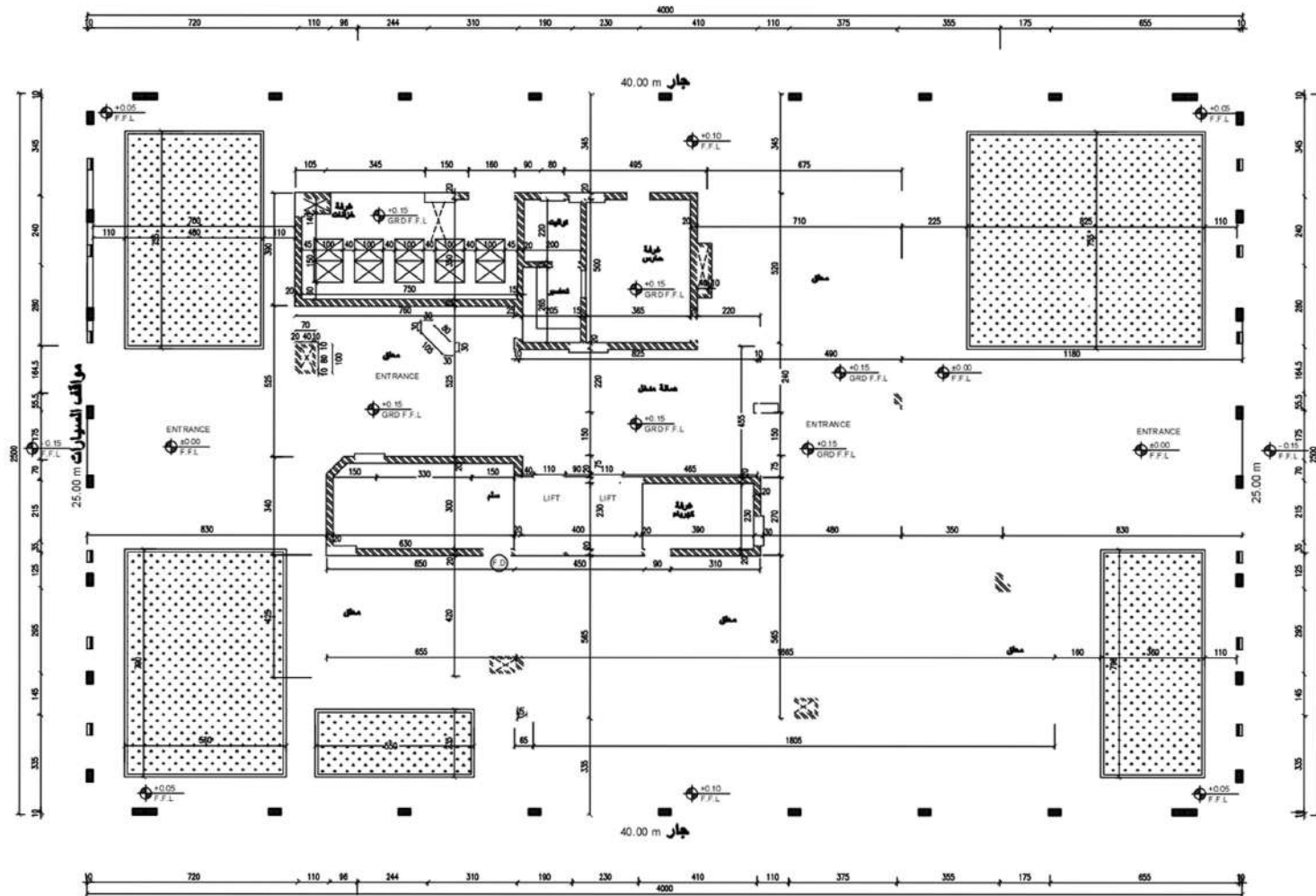


Mech. Room - 01	-	7.60 × 3.90	=	29.64 Sqm
Guard Room - 02	-	6.30 × 5.20	=	32.76 Sqm
Lobby - 03	-	8.50 × 4.65	=	39.52 Sqm
Elec. Room - 04	-	4.10 × 2.70	=	11.07 Sqm
Elevator - 05	-	4.40 × 2.70	=	11.88 Sqm
Stair - 06	-	6.50 × 3.40	=	22.10 Sqm

Total Covd Area = 146.97 Sqm

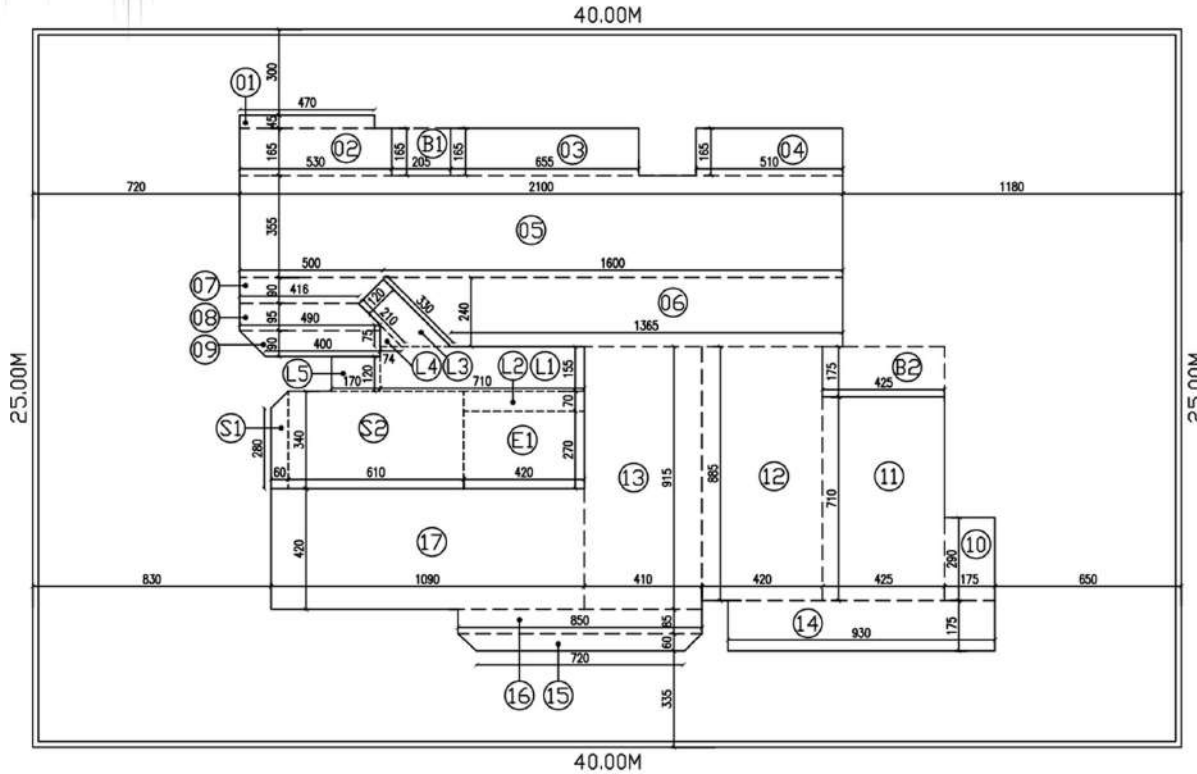
FIRST FLOOR AREA

# First floor plan





# Typical floor area



TYPICAL FLOOR AREA

## TYPICAL FLOOR AREA

01	- 4.70 x 0.45	= 2.11 Sqm
02	- 5.30 x 1.65	= 8.74 Sqm
03	- 6.55 x 1.65	= 10.80 Sqm
04	- 5.10 x 1.65	= 8.41 Sqm
05	- 21.00 x 3.55	= 74.55 Sqm
06	- (13.65 + 16.00) / 2 x 2.40	= 35.58 Sqm
07	- (8.16 + 5.00) / 2 x 0.90	= 4.12 Sqm
08	- (8.16 + 4.90) / 2 x 0.95	= 4.30 Sqm
09	- (8.90 + 4.00) / 2 x 0.90	= 4.00 Sqm
10	- 1.75 x 2.90	= 5.07 Sqm
11	- 4.25 x 7.10	= 30.17 Sqm
12	- 4.20 x 8.85	= 37.17 Sqm
13	- 4.10 x 9.15	= 37.51 Sqm
14	- 9.30 x 1.75	= 16.27 Sqm
15	- (7.20 + 8.50) / 2 x 0.60	= 4.71 Sqm
16	- 8.50 x 0.85	= 7.22 Sqm
17	- 10.90 x 4.20	= 45.78 Sqm
<b>Total Covd Area</b>		<b>= 336.51 Sqm</b>

### 5 FLOORS

$$336.51 \times 5 = 1682.55 \text{ Sqm}$$

## SERVICES AREA

L1	- 7.10 x 1.55	= 3.78 Sqm	] Lobby - 19.13 Sqm
L2	- 4.20 x 0.70	= 12.25 Sqm	
L3	- (2.10 + 3.30) / 2 x 1.20	= 0.78 Sqm	
L4	- 0.74 x 0.75 / 2	= 0.28 Sqm	
L5	- 1.70 x 1.20	= 2.04 Sqm	
S1	- (2.80 + 3.40) / 2 x 0.60	= 1.86 Sqm	] Stair - 22.60 Sqm
S2	- 6.10 x 3.40	= 20.74 Sqm	
E1	- 4.20 x 2.70	= 11.34 Sqm	- Elev. - 11.34 Sqm
<b>Total Covd Area</b>		<b>= 53.07 Sqm</b>	

## BALCON AREA

B1	- 2.05 x 1.65	= 3.38 Sqm
B2	- 4.25 x 1.75	= 4.43 Sqm
<b>Total Covd Area</b>		<b>= 7.81 Sqm</b>









# Programme list

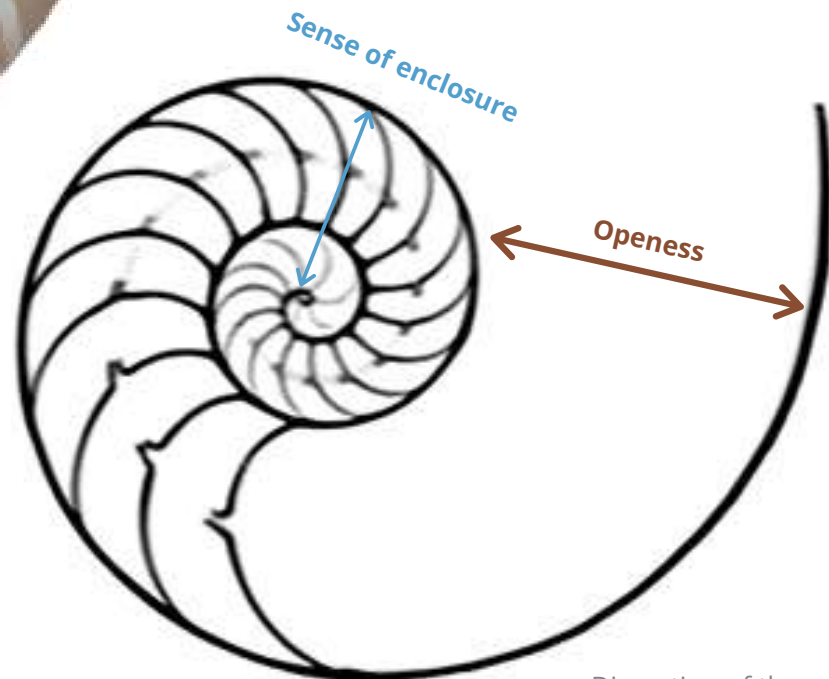
8

# Spatial study of the Nautilus

Form of the nautilus



*Seamless flow of  
the spaces*



Inspired by the

**Layering of spaces**

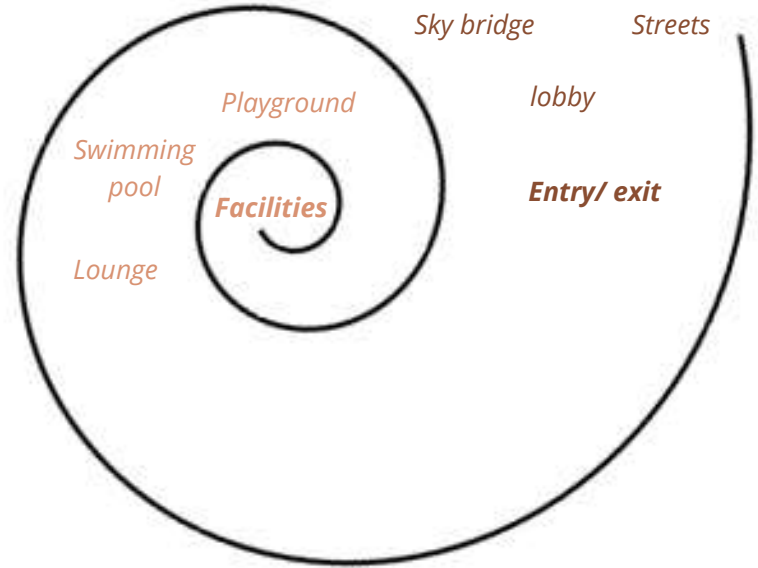
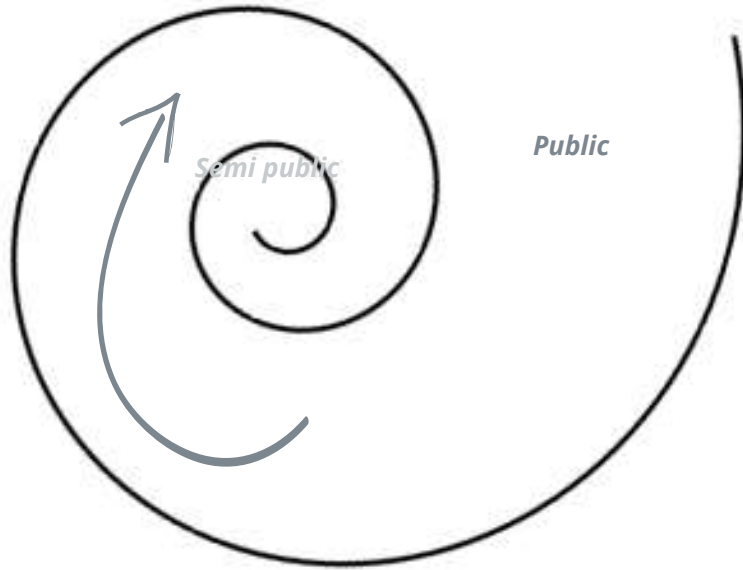
Dissection of the nautilus  
showing proximity of the space

**Semi public** = zones used by specific user

**Public** = accessed by everyone to reach to other spaces

**Outdoors ( 1st floor, roof top )**

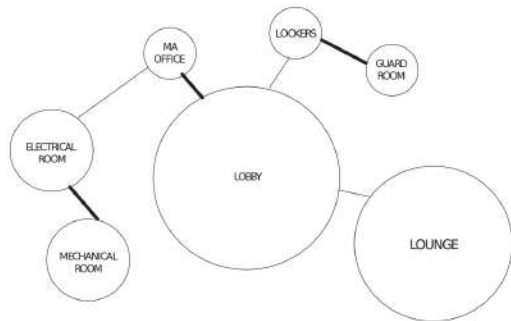
**Public to semi public space**



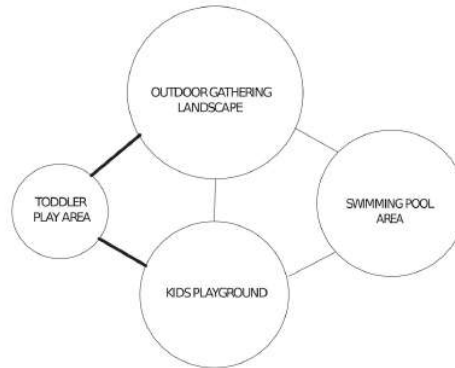
**Major adj agencies**



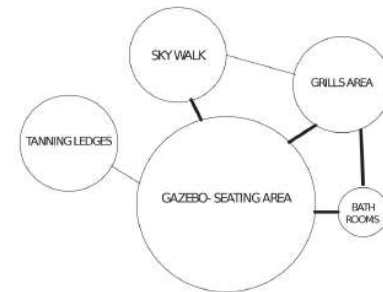
**Minor adj agencies**



**First floor**  
entry of the building



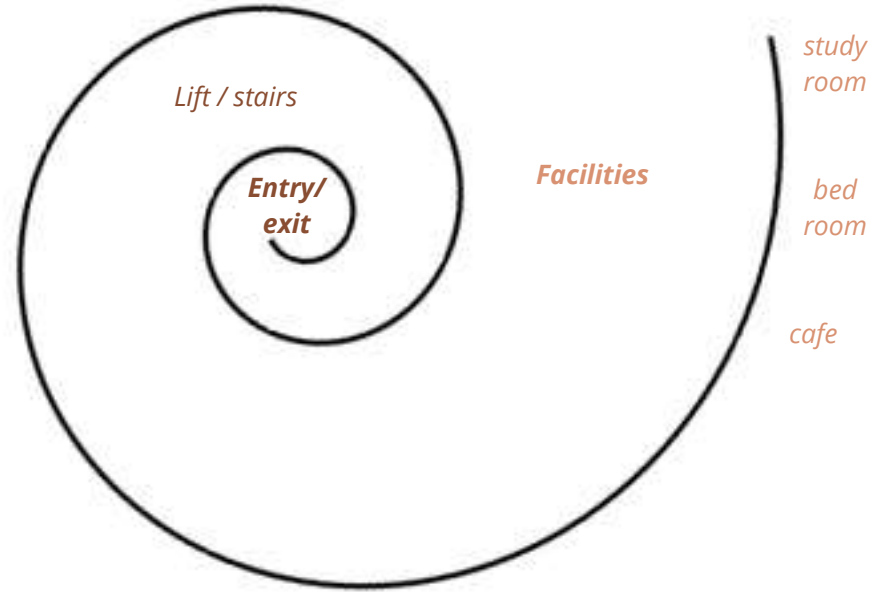
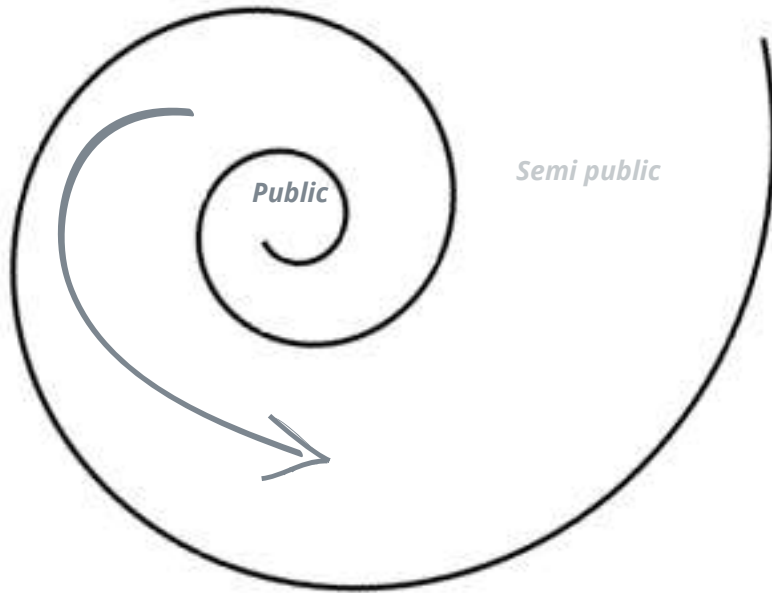
**Community park**



**Roof deck**  
entry of the buildig

Indoors ( 1st- 6th floor)

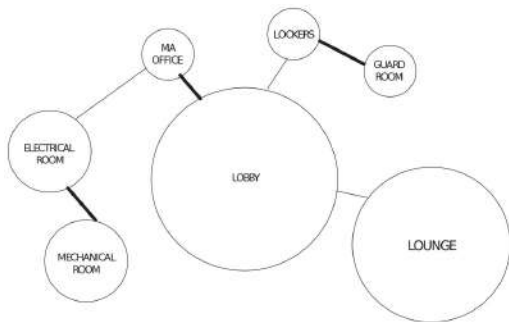
*Semi public to public*



Major adj agencies

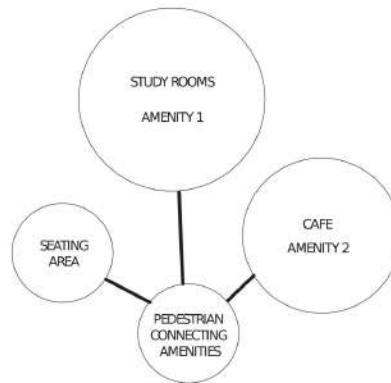


Minor adj agencies



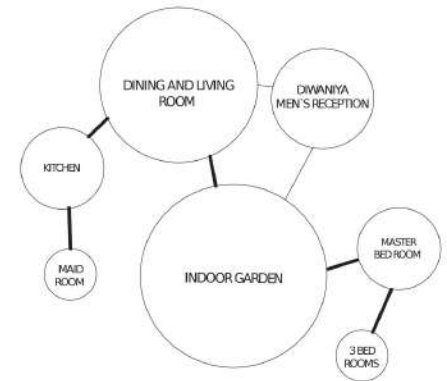
**First floor**

private entrance for residence



**Second floor**

amenity spaces  
2 different amenities in each building



**Third to sixth floor**

typical residential  
apartment



Description	Quantity	Sq. Footage	Total Sq. Footage
Typical Apartment	5	4,305	21,525
Master Bed Room	1	250	250
Bed Room	3	170	510
walk-in Closet	4	45	180
Maid room + Bathroom	1	150	150
living Room + Dining Room	1	500	500
Diwaniya ( men `s Reception )	1	250	250
Bath room	6	50	300
kitchen	1	200	200
Storage	1	235	235
water feature	1	100	100
Balcony	1	430	430
Indoor garden and Circulation	1	1200	1200
<b>Support-Shared spaces on First Floor</b>			<b>10,765</b>
Elevators	2	60	120
Guard Room with Bath Room	1	250	250
Management office	1	500	500
Mechanical Room	1	350	350
Electrical Room	1	120	120
Stairs	1	240	240
Storage	1	385	385
Package Lockers room	1	300	300
Lobby	1	500	500
Lounge	1	2000	2000
Garden and Circulation	1	6000	6000
<b>Roof Deck</b>			<b>4,305</b>
Grills area	1	1000	1000
Tanning Ledges area	1	500	500
Gazebo-seating area	5	121	605
Garden and gathering area	1	3000	2000
Bath room	2	100	200
<b>Amenity Spaces on second floor</b>	<b>4</b>	<b>2,150</b>	<b>4,305</b>
Study room - Meeting lounge	1		2500
café	1		1505
Seating area			300
<b>Community Park</b>			<b>10,765</b>
Outdoor Playground	1	2000	2000
Toddler play area	1	1000	1000
Swimming pool area	1	2000	2000
Outdoor Gathering- Landscape	1	3865	3865
<b>Total SQ. Footage of Program</b>			<b>51,665</b>





# Appendices

9

## KUWAITIS QUESTIONNAIRE

**I have asked 8 people from Kuwait the following questions to understand their needs in future houses and the shortcomings of living in vertical houses.**

Name: Age:

Marital status:

How many children do you have? And their age?

1. Do you have your own house?
2. Where do you live?
3. Did you apply for housing in Public Authority for Housing Welfare?
4. How many years you are waiting for the housing?
5. If yes. Did you apply for a land or government vertical apartment?
6. Do you prefer to wait a long time to have your land from the government instead of waiting a short time to have a government apartment (Vertical housing)? and why?
7. In your point of view, what are the disadvantages of current government`s vertical housing?
8. Name five facilities that you would like to see in the future vertical housing? (Café, Gym, etc.)
9. Name your top three components that you would like to have in your future house?
10. Choose three words to describe your dream house?



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# ABDULLAH ALSHUTTI

## Thesis Questionnaire

### My thesis topic is "Vertical housing and Social Sustainability"

Urbanization requires adaptation to population density and embrace of associated housing typologies, including vertical living that is cost-efficient, sustainable, resilient, and inclusive. High congestion levels in urban areas and lack of land, demand the construction of vertical housing structures. Urbanization in Kuwait has faced issues with low quality design and low interest in sustainable vertical housing, which is my motivation for choosing this topic.

This questionnaire will help me to develop my project, and design a vertical housing that meet Kuwaitis requirements for better life with consideration of future generations.

Name: Shereefa

Age: 41 yrs

Marital Status: married

Number of children: three

1. Do you have your own house?  
No
2. Where do you live? (Parent house, Rental apartment, etc.)  
Parents house
3. Did you apply for housing in Public Authority for Housing Welfare?  
Yes
4. How many years have you been waiting for a government housing?  
18
5. Did you apply for a land or government's vertical apartment?  
I applied for a land
6. Do you prefer to wait a long time to have your land from the government instead of waiting a short time to have a government apartment (Vertical housing)? and why?  
I prefer waiting for a land so I can build it my way with my own vision of a house.
7. In your point of view, what are the disadvantages of current government's vertical housing? (Sulaibikhat apartments)  
It doesn't cater for large families, grandchildren etc.
8. Name five facilities that you would like to see in the future vertical housing? (Café, Gym, etc.)  
Security, swimming pool, gym, play center for kids, daycare for babies.
9. Name your top three amenities that you would like to have in your future house?  
Interior garden, swimming pool, washroom
10. Choose three words to describe your dream house?  
Modern, high ceilings, open spaces

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Name: Lulwa Bourisli

Age: 34

Marital Status: Divorced

Number of children: 2

1. Do you have your own house?  
No
2. Where do you live? (Parent house, Rental apartment, etc.)  
  
Rental apartment
3. Did you apply for housing in Public Authority for Housing Welfare?  
  
In the past yes
4. How many years have you been waiting for a government housing?  
  
10 years
5. Did you apply for a land or government's vertical apartment?  
  
For land
6. Do you prefer to wait a long time to have your land from the government instead of waiting a short time to have a government apartment (Vertical housing)? and why?  
  
Short time vertical housing, mainly so I can enjoy owning my own place while my children are growing up and to get something guaranteed.
7. In your point of view, what are the disadvantages of current government's vertical housing? (Sulaibikhat government apartments)  
  
In the past I thought they were far but now I see more advantages. My main concern is whether it has a balcony or an outside area such as a roof or backyard.
8. Name five facilities that you would like to see in the future vertical housing? (Café, Gym, etc)  
A balcony, children's play area, rooftop and a gym
9. Name your top three amenities that you would like to have in your future house? (garden, rooftop, open kitchen, etc.)  
Previously mentioned, definitely a garden a rooftop and an open kitchen
10. Choose three words to describe your dream house? (cozy, elegant, etc.)

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Name: Shereefa

Age: 41 yrs

Marital Status: married

Number of children: three

1. Do you have your own house?  
No
2. Where do you live? (Parent house, Rental apartment, etc.)  
Parents house
3. Did you apply for housing in Public Authority for Housing Welfare?  
Yes
4. How many years have you been waiting for a government housing?  
18
5. Did you apply for a land or government's vertical apartment?  
I applied for a land
6. Do you prefer to wait a long time to have your land from the government instead of waiting a short time to have a government apartment (Vertical housing)? and why?  
I prefer waiting for a land so I can build it my way with my own vision of a house.
7. In your point of view, what are the disadvantages of current government's vertical housing? (Sulaibikhat apartments)  
It doesn't cater for large families, grandchildren etc.
8. Name five facilities that you would like to see in the future vertical housing? (Café, Gym, etc.)  
Security, swimming pool, gym, play center for kids, daycare for babies.
9. Name your top three amenities that you would like to have in your future house?  
Interior garden, swimming pool, washroom
10. Choose three words to describe your dream house?  
Modern, high ceilings, open spaces

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Name: Shoag

Age: 27

Marital Status: Married

Number of children: One

1. Do you have your own house?  
No
2. Where do you live? (Parent house, Rental apartment, etc.)  
Private apartment at my in-laws' house
3. Did you apply for housing in Public Authority for Housing Welfare?  
Yes
4. How many years have you been waiting for a government housing?  
Five years
5. Did you apply for a land or government's vertical apartment?  
land
6. Do you prefer to wait a long time to have your land from the government instead of waiting a short time to have a government apartment (Vertical housing)? and why?  
Wait to have a land .. reason: larger space, privacy, can design the land according to my own preference
7. In your point of view, what are the disadvantages of current government's vertical housing? (Sulaibikhat apartments)  
I haven't seen any in reality but perhaps space & design
8. Name five facilities that you would like to see in the future vertical housing? (Café, Gym, etc.)  
Gym  
Outdoor garden  
Grocery shop  
Recreational facilities (An area with sofas, tv, meeting space, coffee machine & kids play area)  
Parcel area
9. Name your top three amenities that you would like to have in your future house?  
Rooftop/outdoor garden or a private patio  
Cinema room  
Ceiling to floor windows with lots of daylight

# ABDULLAH ALSHUTTI

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Name: omar fathi alrashed

Age: 32

Marital Status: married

Number of children: 3

1. Do you have your own house?

No

2. Where do you live? (Parent house, Rental apartment, etc.)

Apartment in Parent house

3. Did you apply for housing in Public Authority for Housing Welfare?

Yes, and I get one and waiting for permission to build it

4. How many years have you been waiting for a government housing?

10 years

5. Did you apply for a land or government's vertical apartment?

For a land

6. Do you prefer to wait a long time to have your land from the government instead of waiting a short time to have a government apartment (Vertical housing)? and why?

If the vertical house big and have all the needs that we ask for and we will have it in very short time of course we will take it

7. In your point of view, what are the disadvantages of current government's vertical housing? (Sulaibikhat apartments)

The. Problem only about the time if u will get it after 1 year example. Fine but after waiting for 8 or 10 years it's not worth it also they should give us some amount to be equal with people who have land

8. Name five facilities that you would like to see in the future vertical housing? (Café, Gym, etc.)

Gym – small super market – small clinic for emergency – restaurant - cafe

9. Name your top three amenities that you would like to have in your future house?

Garden - swimming pool – big living room

10. Choose three words to describe your dream house?

Big – cozy - relax

# ABDULLAH ALSHUTTI

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This questionnaire will help me to develop my project, and design a vertical housing that meet Kuwaitis requirements for better life with consideration of future generations.

Name: Abdulaziz

Age: 39

Marital Status: Married

Number of children: 3

1. Do you have your own house?

No

2. Where do you live? (Parent house, Rental apartment, etc.)

Parent house

3. Did you apply for housing in Public Authority for Housing Welfare?

Yes

4. How many years have you been waiting for a government housing?

15 Years

5. Did you apply for a land or government's vertical apartment?

land

6. Do you prefer to wait a long time to have your land from the government instead of waiting a short time to have a government apartment (Vertical housing)? and why?

I prefer to wait, For many reasons:

1-The great value of the land compared with government apartment.

2-More space (Family gatherings and visits, specific hobbies and activities).

3-Land that fit me and my sons and grandchildren, also I can pass it on to them.

4-The Lack of legal regulating for Vertical apartments like (Maintenance, participation owners, Associations of property owners).

7. In your point of view, what are the disadvantages of current government's vertical housing? (Sulaibikhat apartments)

Society's culture and the bad marketing for vertical housing from Public Authority for Housing.

8. Name five facilities that you would like to see in the future vertical housing? (Café, Gym, etc.)

Restaurants with a view, playground for indoor sports, Hanging agricultural gardens, spa, high class apartments in Kuwait capital.

9. Name your top three amenities that you would like to have in your future house?

Gym, swimming pool, Office and library room.

10. Choose three words to describe your dream house?

Big, Space, Family activities.



# ABDULLAH ALSHUTTI

## Thesis Questionnaire

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This questionnaire will help me to develop my project, and design a vertical housing that meet Kuwaitis requirements for better life with consideration of future generations.

Name: Hamad Ahmed ALShatti

Age: 36

Marital Status: Married

Number of children: 5

1. Do you have your own house?  
No, I don't have
2. Where do you live? (Parent house, Rental apartment, etc.)  
I live in rental house
3. Did you apply for housing in Public Authority for Housing Welfare?  
Yes, I did since 2008
4. How many years have you been waiting for a government housing?  
I waited 12 years
5. Did you apply for a land or government's vertical apartment?  
Yes, I applied for land
6. Do you prefer to wait a long time to have your land from the government instead of waiting a short time to have a government apartment (Vertical housing)? and why?

Of course, I prefer to wait a long time to obtain the land because in the house there is independence and more space to build your needs and the needs of the family in general.

7. In your point of view, what are the disadvantages of current government's vertical housing? (Sulaibkhat apartments)

The disadvantages are the possibility that there will be inconvenience, whether on the upper or lower floors, and also there may be congestion in the parking lots and elevators, and in the future, it is possible that the space will be insufficient if the number of children increases

8. Name five facilities that you would like to see in the future vertical housing? (Café, Gym, etc.)

I would like see (pool swim, cafe, Gym, barber and public library)

9. Name your top three amenities that you would like to have in your future house?

A large garden, an entertainment hall, and a swimming pool

10. Choose three words to describe your dream house?

House of love and stability

# ABDULLAH ALSHUTTI

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This questionnaire will help me to develop my project, and design a vertical housing that meet Kuwaitis requirements for better life with consideration of future generations.

Name: Mohammad Alkhamis

Age: 37

Marital Status: Married

Number of children: 1

1. Do you have your own house?  
- No.
2. Where do you live? (Parent house, Rental apartment, etc.)  
- Parent House.
3. Did you apply for housing in Public Authority for Housing Welfare?  
- Yes.
4. How many years have you been waiting for a government housing?  
- 8 years.
5. Did you apply for a land or government's vertical apartment?  
- land
6. Do you prefer to wait a long time to have your land from the government instead of waiting a short time to have a government apartment (Vertical housing)? and why?  
- Yes, because I prefer to have my own house instead of vertical housing and living in the same building with strangers.
7. In your point of view, what are the disadvantages of current government's vertical housing? (Sulaibkhat apartments)  
- Parking problems, Noise, Pollution, invading privacy, etc.).
8. Name five facilities that you would like to see in the future vertical housing? (Café, Gym, etc.)  
- Gym, Swimming pool, outdoor walking area, garden, balcony, café, medical center.
9. Name your top three amenities that you would like to have in your future house?  
- Backyard, rooftop, swimming pool.
10. Choose three words to describe your dream house?  
- Ownership, independency & satisfaction.



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*10*



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Thankyou

