

SUSTAINABLE
ARCHITECTURE
DESIGN STUDIO
THE HEYSEL
PLATEAU AND THE
STADIUM AREA

SUSTAINABLE ARCHITECTURE DESIGN STUDIO, MA-1
BRUFACE - ULB + VUB - 2019/2020

SADS-I PROJECT 2019-20
SUSTAINABLE ARCHITECTURE DESIGN STUDIO
REGENERATION OF BRUSSELS HEYSEL PLATEAU AND STADIUM AREA

TEACHING TEAM:

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HERA VAN SANDE & GEERT PAUWELS (VUB)

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- 08 **THE NEXUS TOWER**
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STEP TOWER

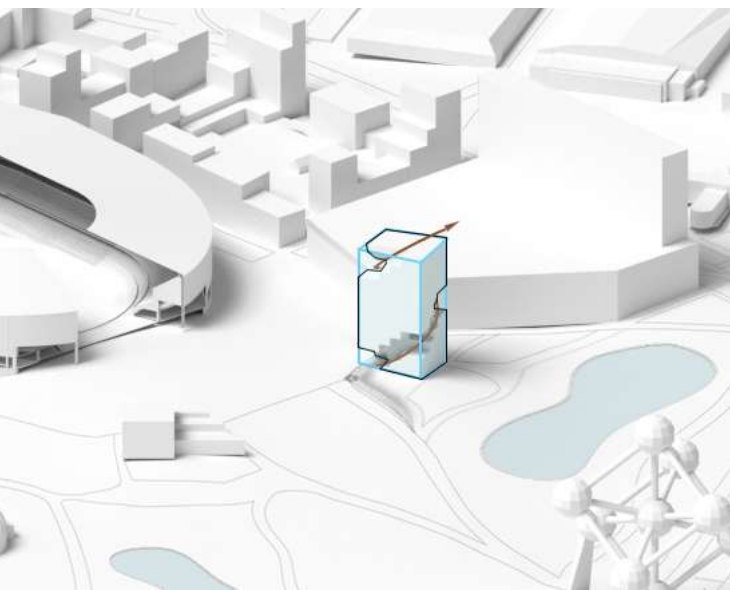
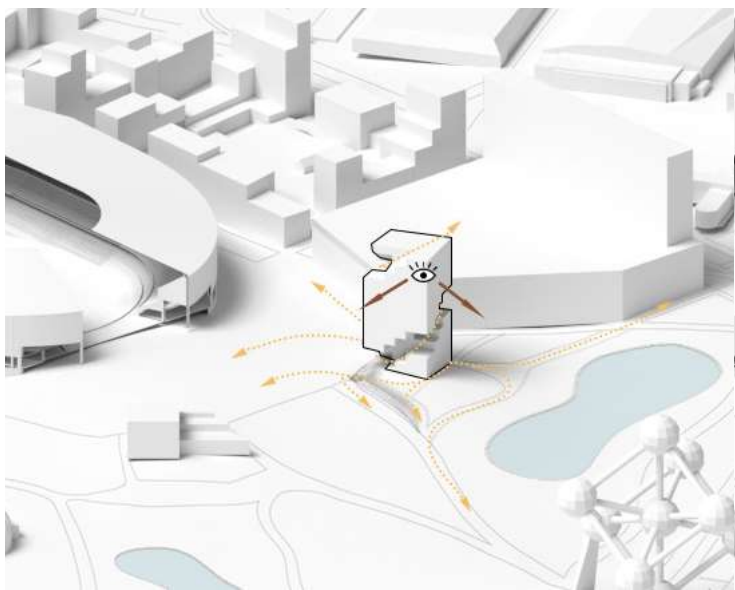
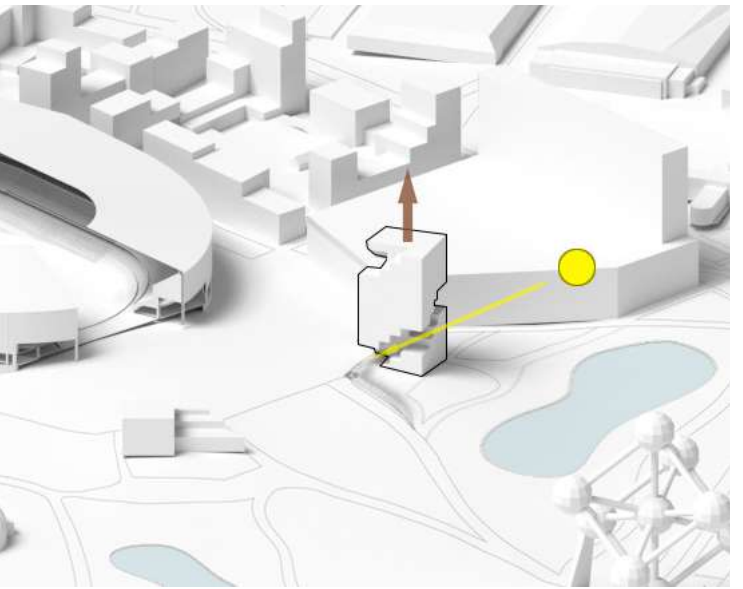
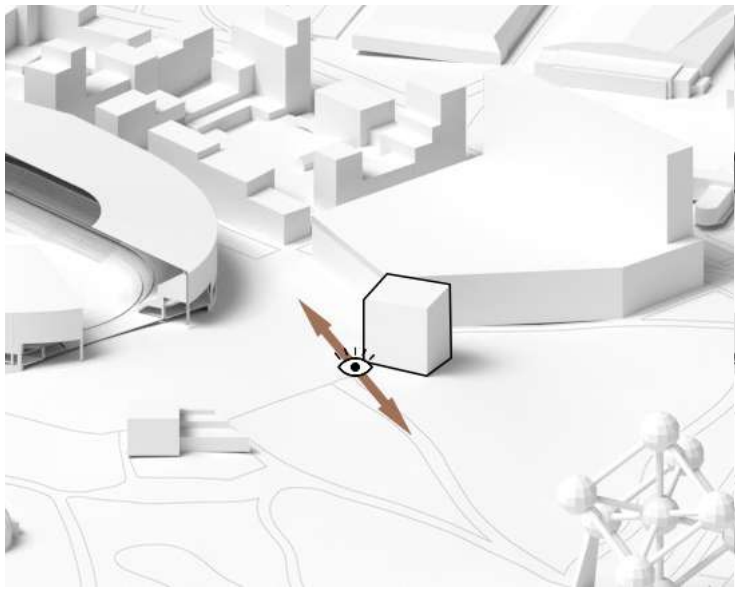
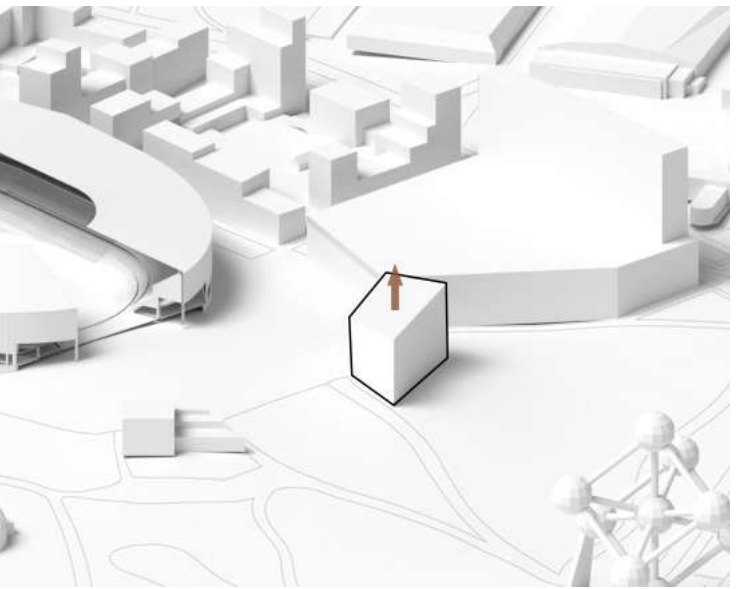
STUDENT:
LEONARDO STEFANI



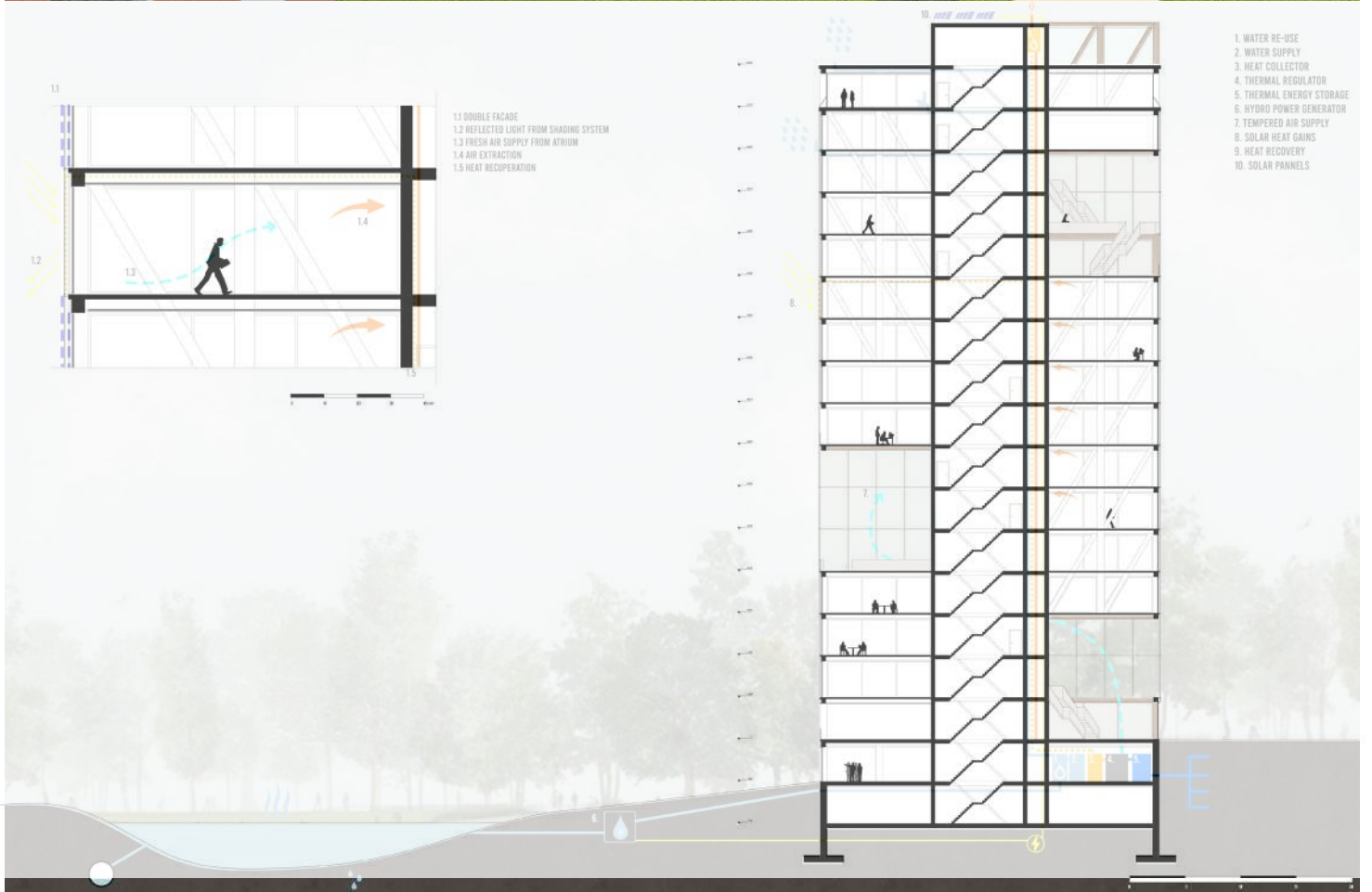
01



LOCALIZATION IN THE MASTERPLAN



1.SITE IDENTIFICATION 2.VOLUME CREATION 3.ADAPTATION TO LOCAL VIEW TRAJECTORIES 4.CREATION OF SPIRAL ATRIUM
5.SOCIAL INTERACTION AND TOP VIEW 6.CREATION OF TECHNICAL CHIMNEY

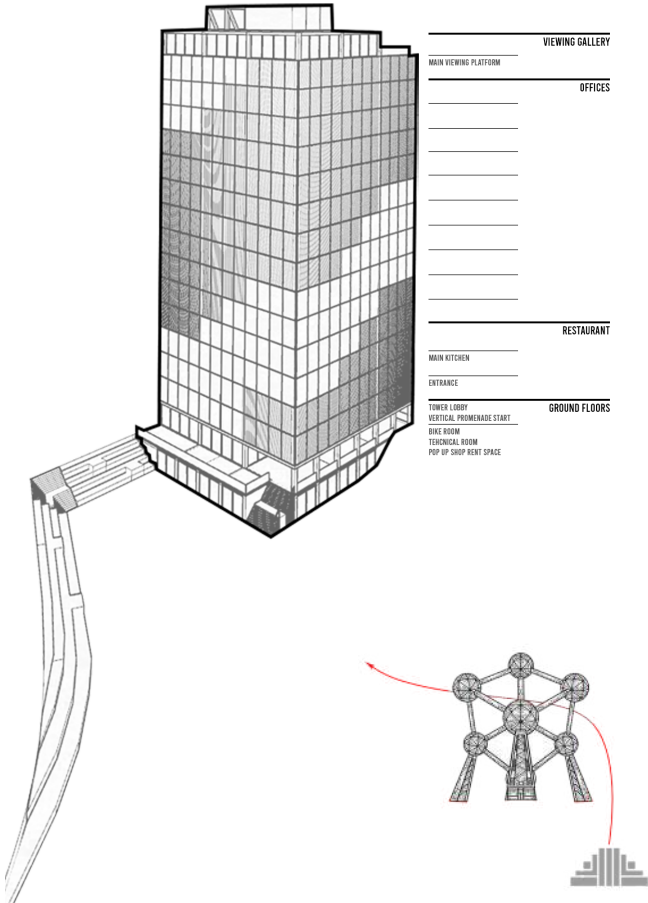


1.CONTEXTPLAN REZ 2.SUSTAINABLE SECTION

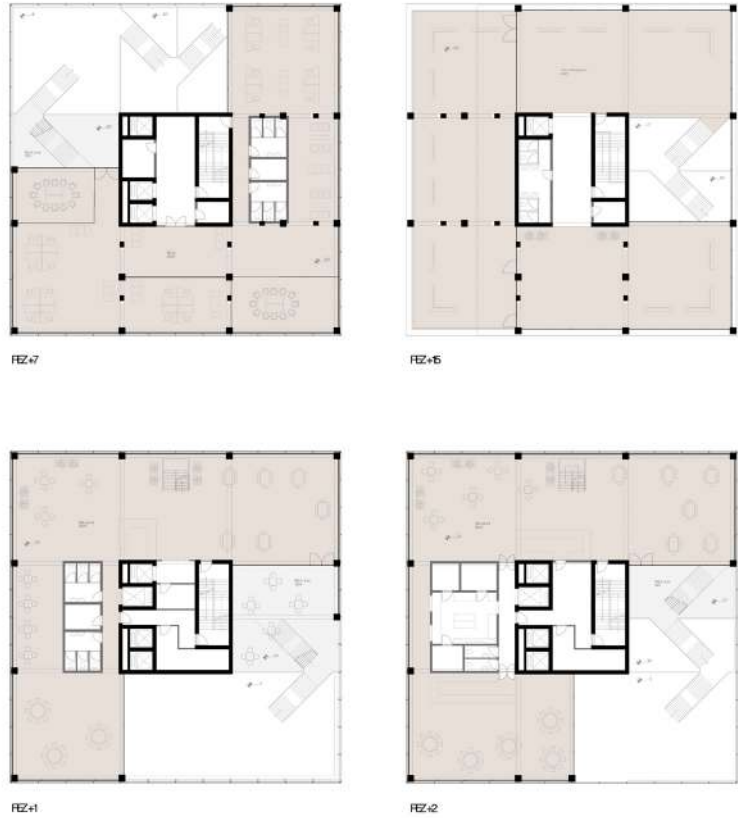
1



2



3



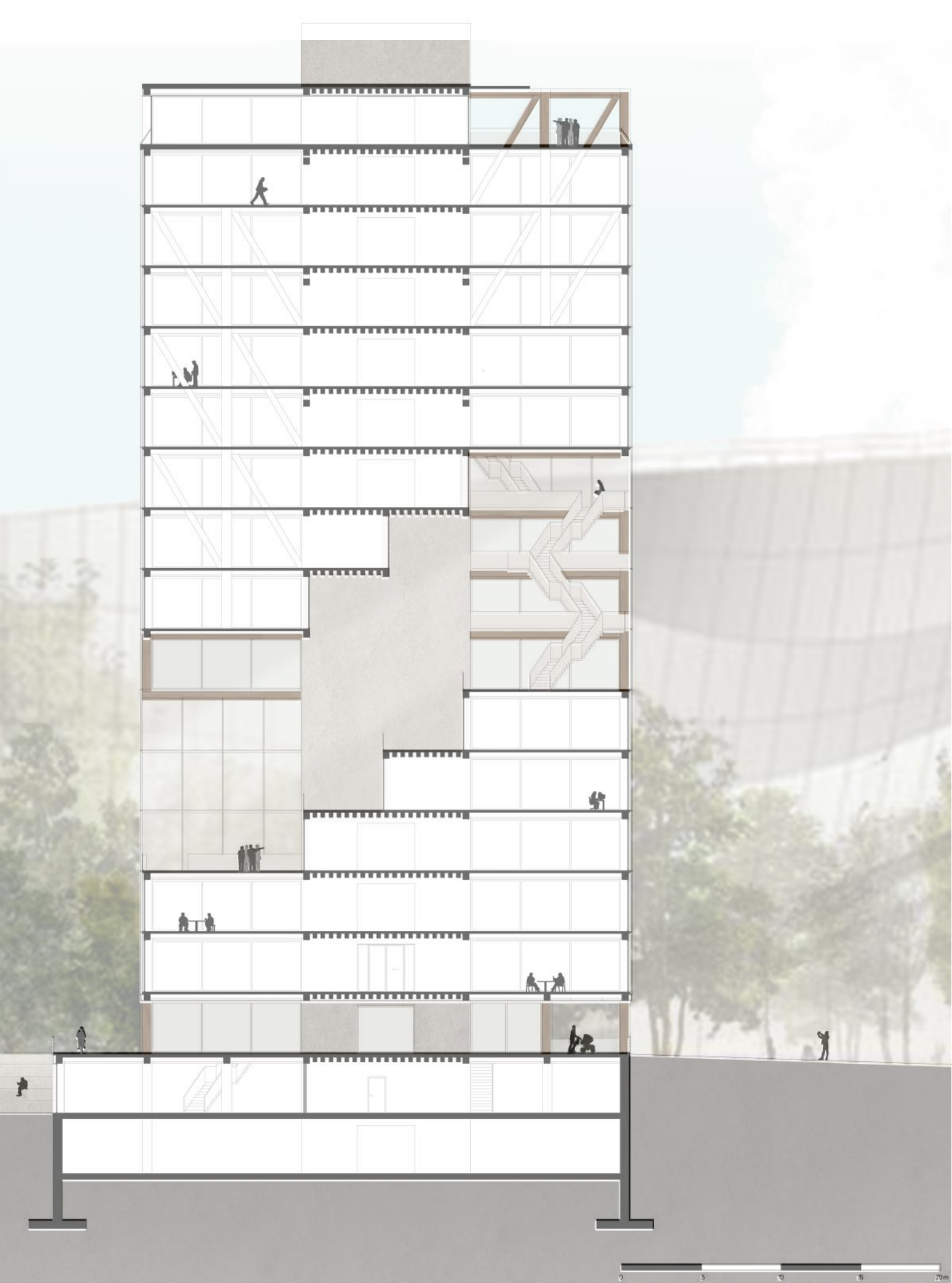
Step tower was designed to become the main iconic building of the Green Generation Masterplan. As the Heysel plateau has quite a rich history of iconic buildings, Step tower envisions to be the next step in its timeline. The design of the tower has the purpose to link it to the past as well as to the future and future dreams, making it an obvious iconic pick.

The innovative structure of the tower and its sustainable approach will be a demonstration of Belgian construction capabilities and Belgian pride. On the other hand, its transparency also reflects its ownership to everyone. Towers are rarely accessible to the general public above a certain amount of floors. Step tower was designed to be accessible to the general public from top to bottom through a vertical promenade along the spiral atrium. It defies the logic of towers being constructed and solely used by wealthy people and organizations. The transparency of the building and its program increase the feeling of public accessibility and openness of the tower.

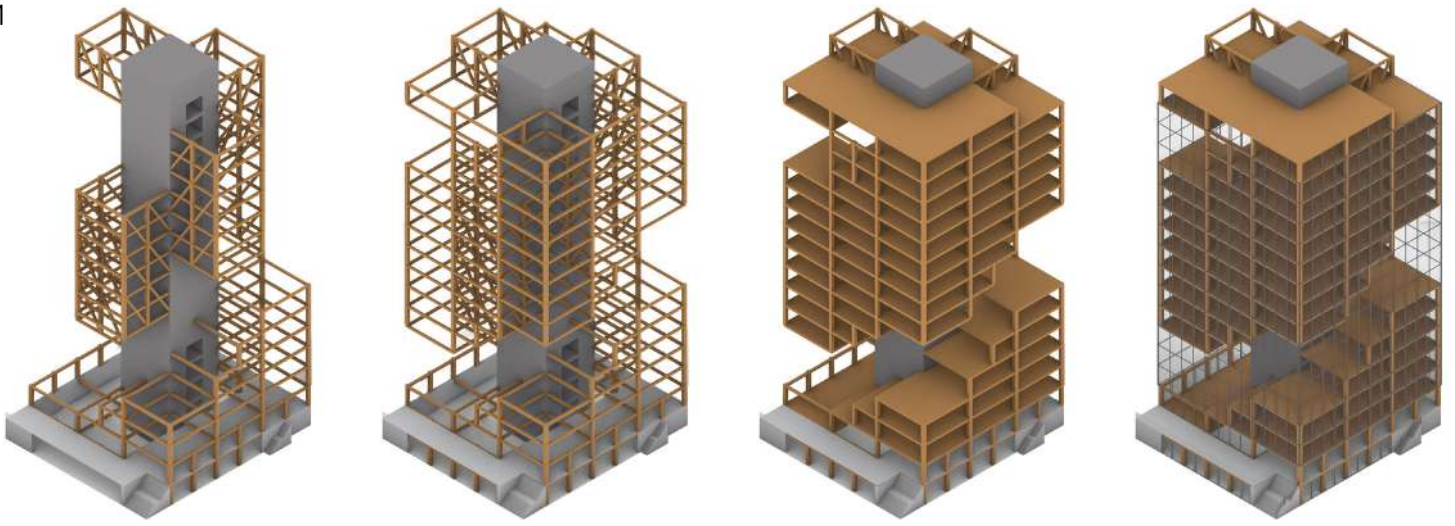
As sustainability is becoming a common approach in the construction industry, it was natural to adapt the design accordingly. Two main sustainable aspects stand out from the rest. First, the spiral atrium brings light deep into the building but was mainly created as a vertical chimney that is an important aspect of the natural ventilation of the tower. For the atrium to be functional as a chimney, it was important to close it off as much from the outdoor as from the indoor environment. This created the need for a double façade at each level that is used to collect solar heat energy that is then stored and used when needed. The second main sustainable aspect of the tower is its micro hydro power generation plant. Towers are synonym of large water consumption and large hydraulic head. This combined with the surrounding topography created the ideal opportunity to apply this emerging technology.

Through its design and sustainable approach, Step tower is an attempt at making the Belgian people proud of their capabilities and giving them new, generally non accessible, experiences. After all who never dreamt of walking around in a chimney to see the outstanding view at the top?

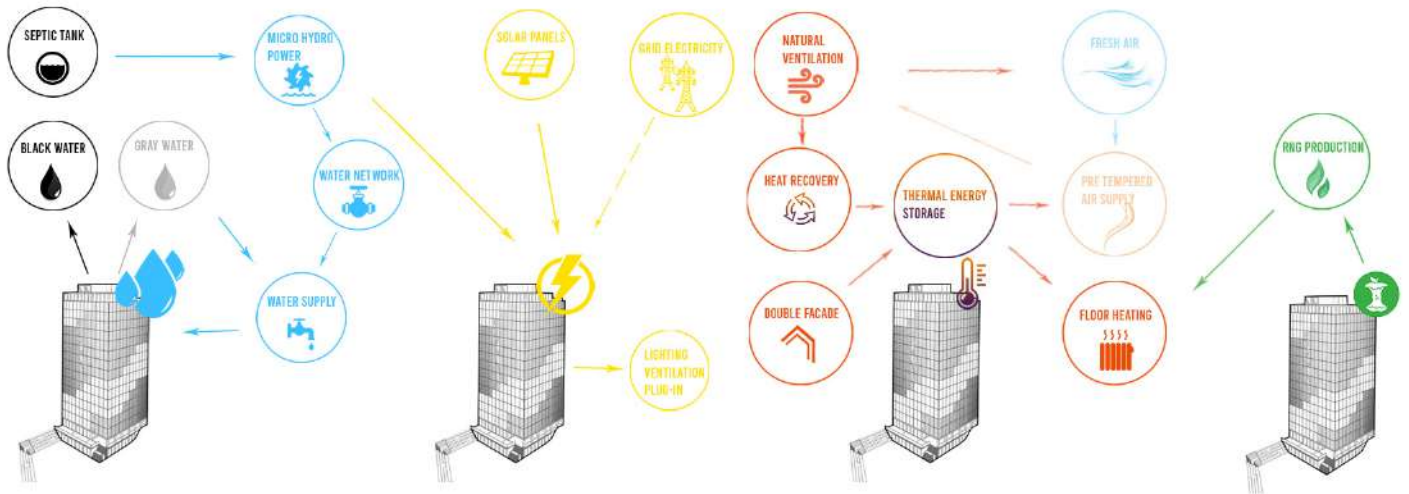
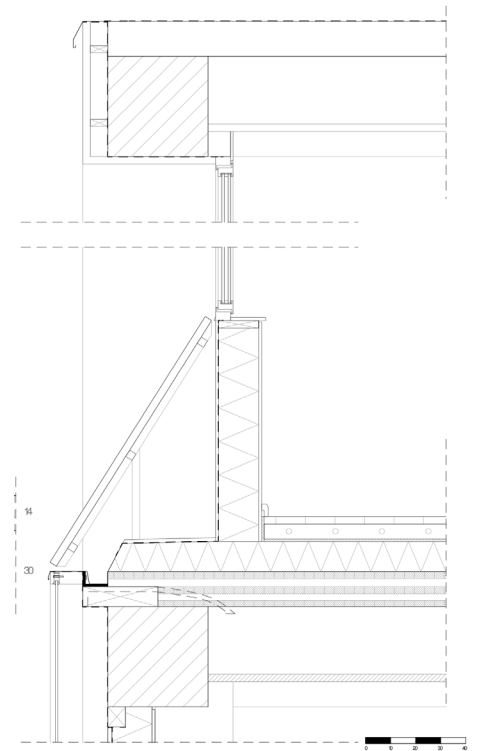
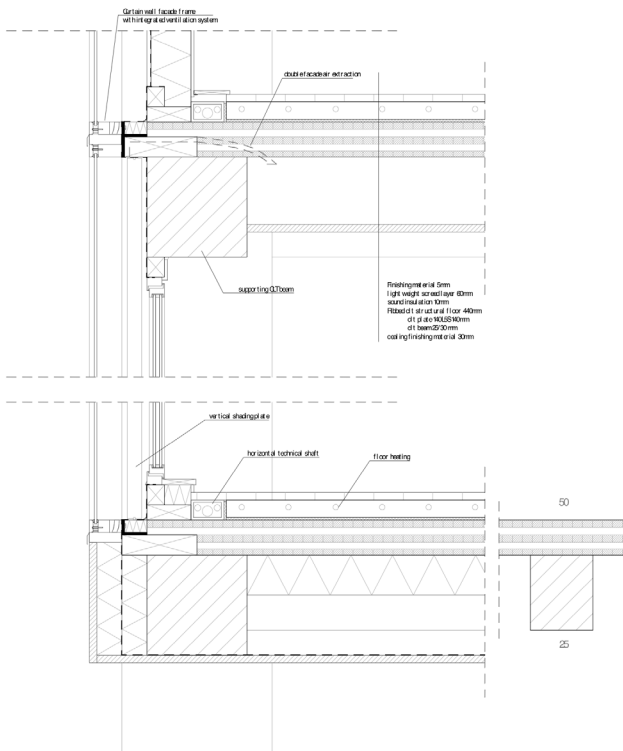




1



2



1.STRUCTURE 2.FACADE DETAIL 3.CONSUMPTION CYCLES



1.RENDERING FROM AFAR 2.RENDERING INSIDE SPIRAL ATRIUM

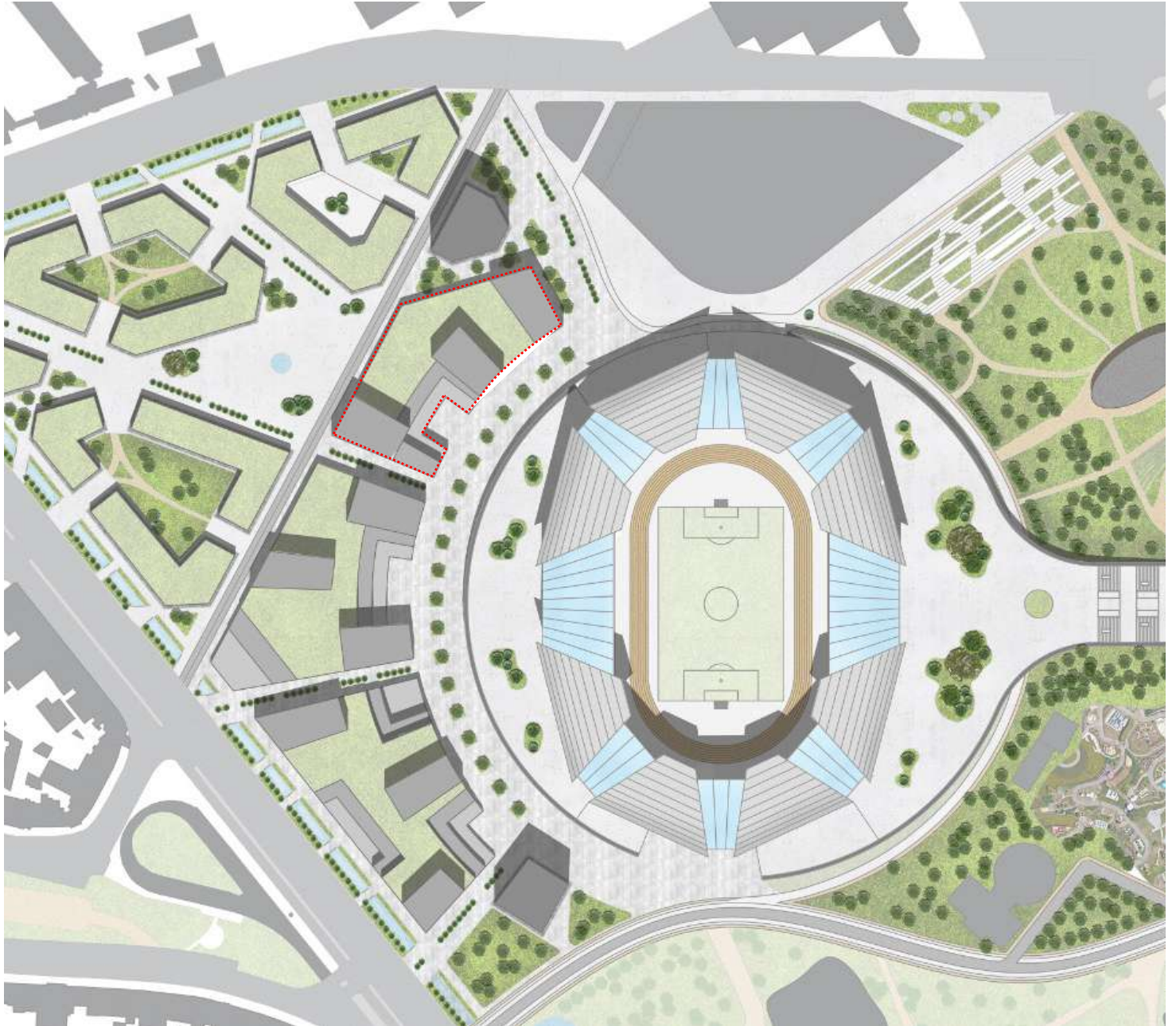
CENTERPOINT LIBRARY

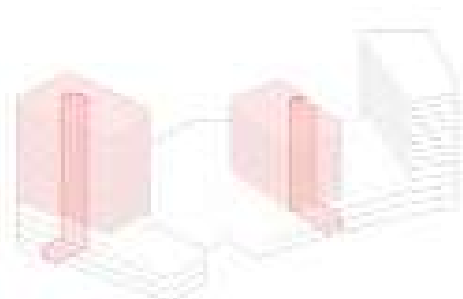
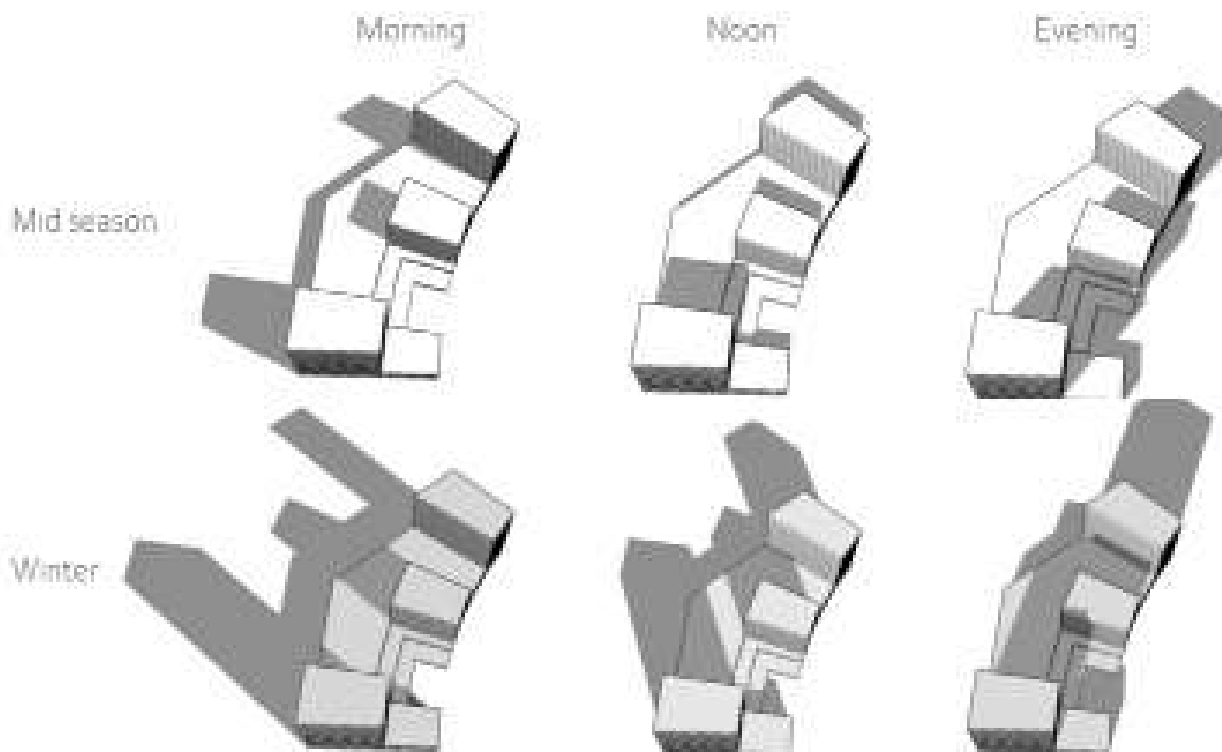
STUDENT:
SOFIE VANDERMEEREN



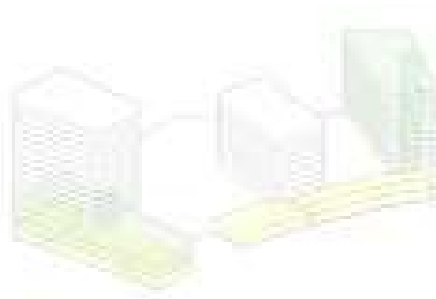
LIBRARY

02





Housing (11 000 m² = 32%)



Offices (9 600 m² = 29%)
Shops / bars / restaurant
(1 400 m² = 4%)

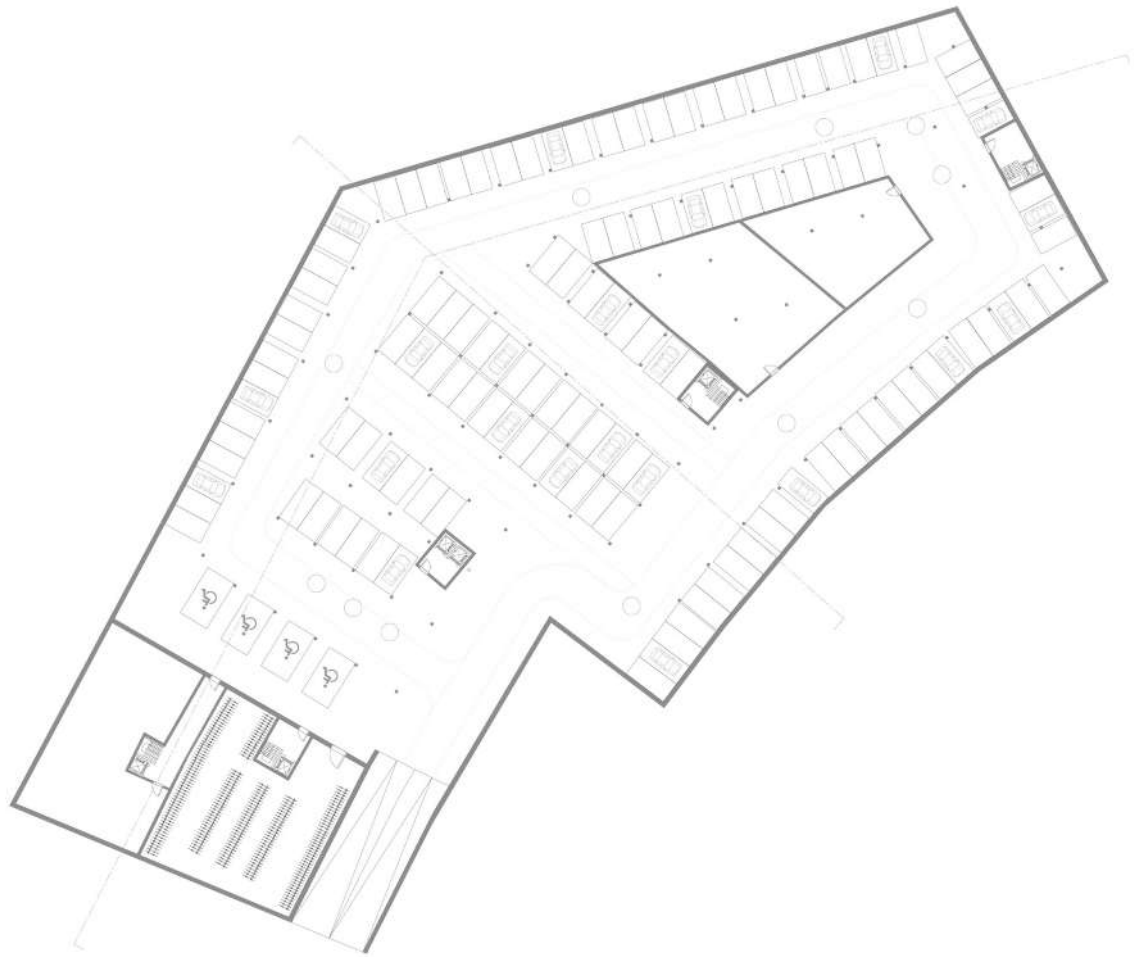


Library / cultural center
(11 600 m² = 35%)

Night function

Day functions

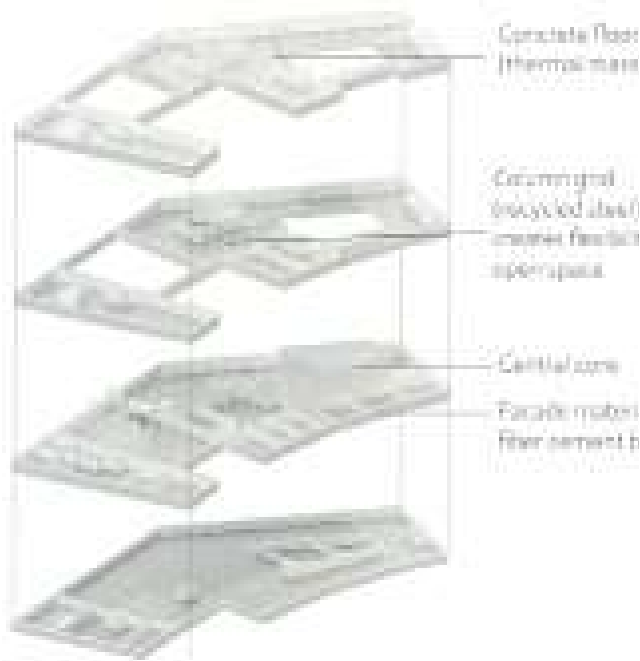
Day + evening function







SECTIONS





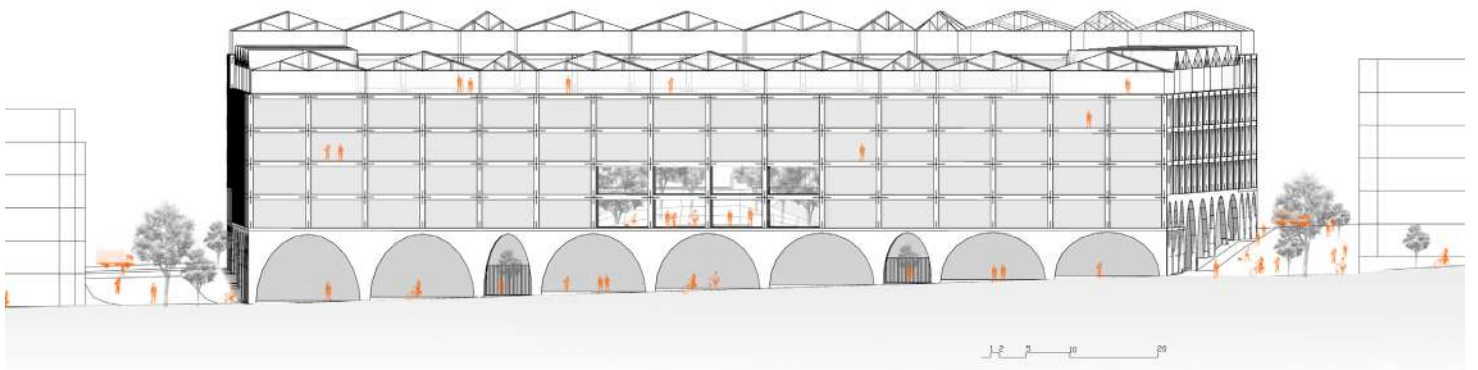


RENDERINGS

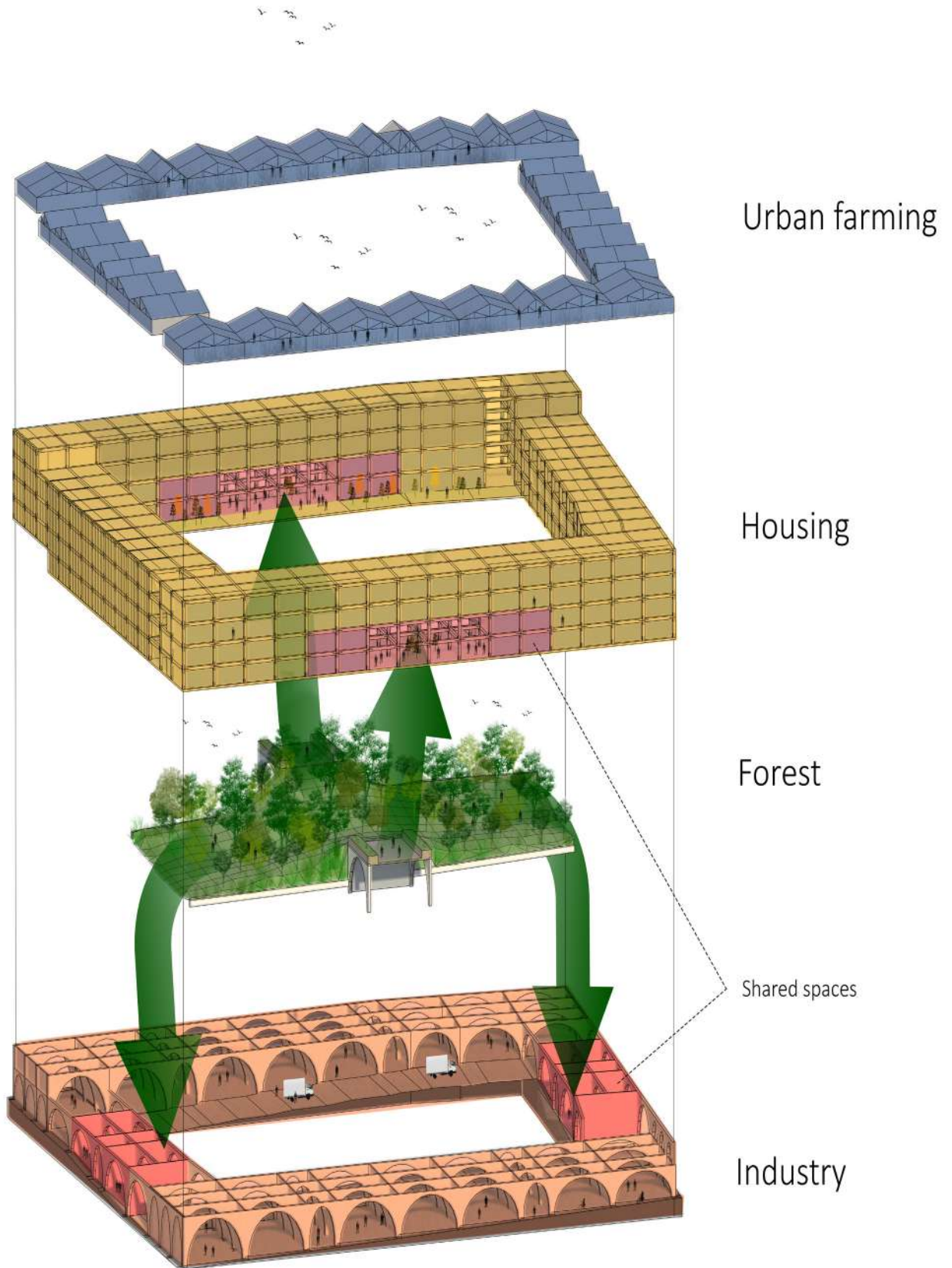
**MIX-CITY
INDUSTRY & HOUSING**

STUDENT:
LÉOPOLD SEPULCHRE

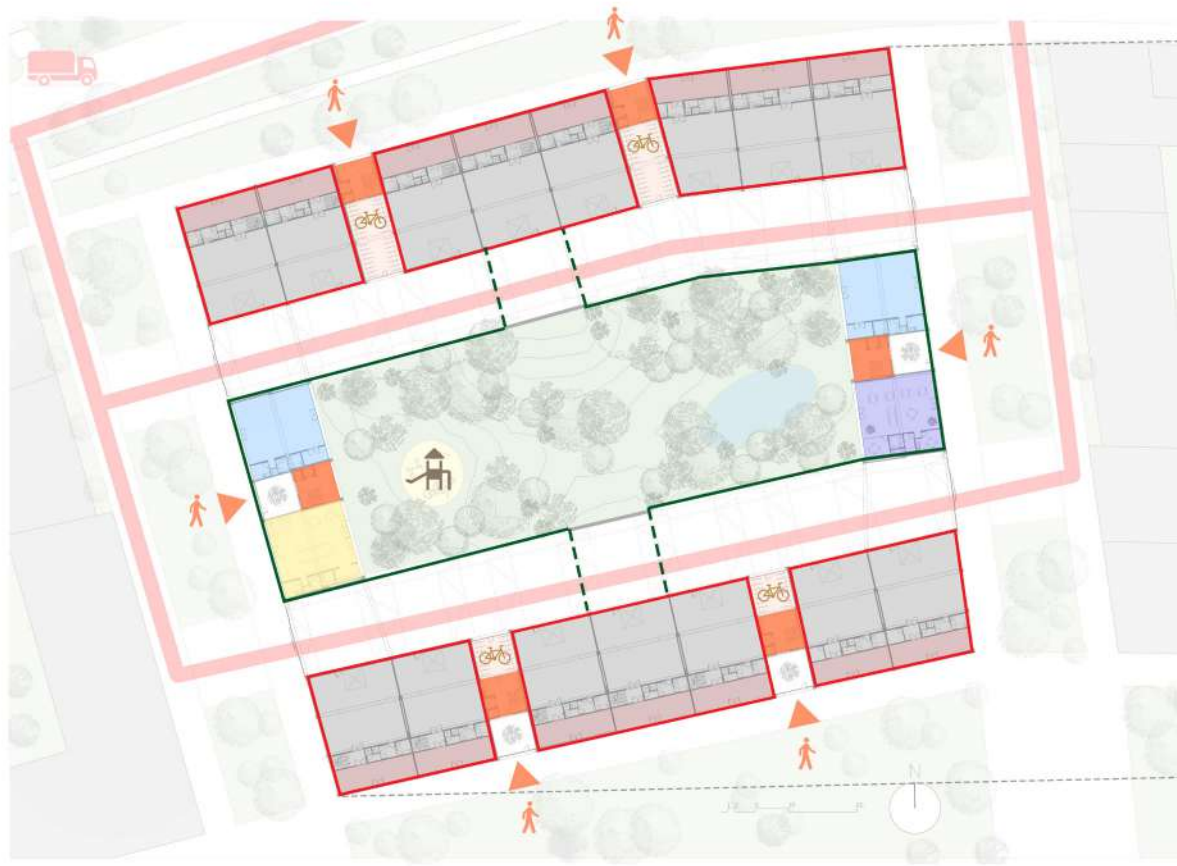




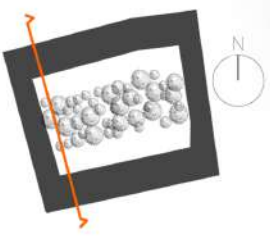
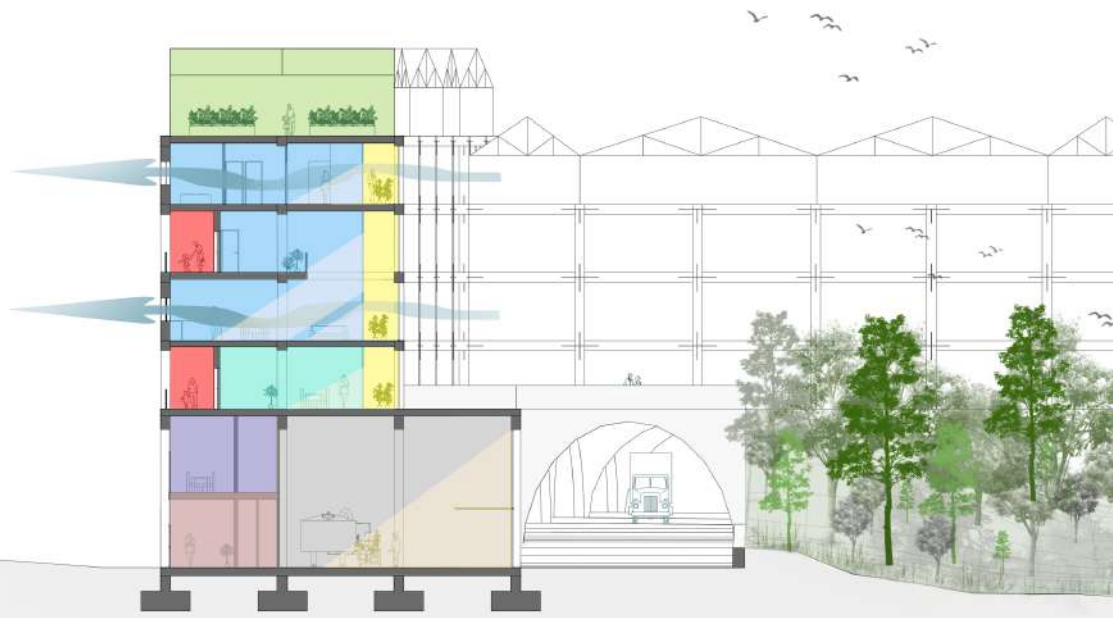
1. LOCALIZATION IN THE MASTERPLAN 2.SOUTH ELEVATION



- **Industry**
 - - **Showroom**
in relation to the street
 - - **Atelier**
with view on the park
- 1x industry
= **216 m²**
Combination of 2
= **432 m²**
(fire legislation :
max 500 m²)



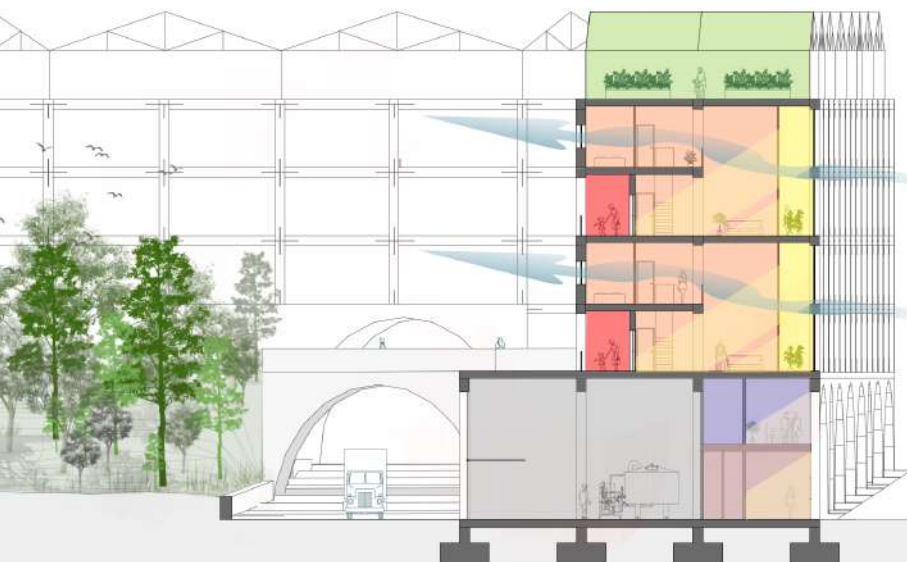
- - **Green House**
Urban farming
- - **Circulations**
- Industry :**
- - **Ateliers**
- - **Showroom**
- - **Office**





Shared Spaces

- - **Community room**
possibility to share cooking & eating, laundry, lounge, playground
225m² & 95m²
- - **Workers community room**
room for workers to meet, and share lunch, lounge
144m²
- - **Co-working**
for inhabitant and externals
190m² x2 + 144m²
- - **Meeting & event room**
to be rented by industrials or inhabitant
144m² x2
- - **Central park**
connecting shared spaces
biophilia & well-being for workers
biodiversity
- - **Water pond**
storm water retention
wetland to purify water,
industry cleaning



Appartements :

- **Solar geometry**
Big openings south
Insulation North

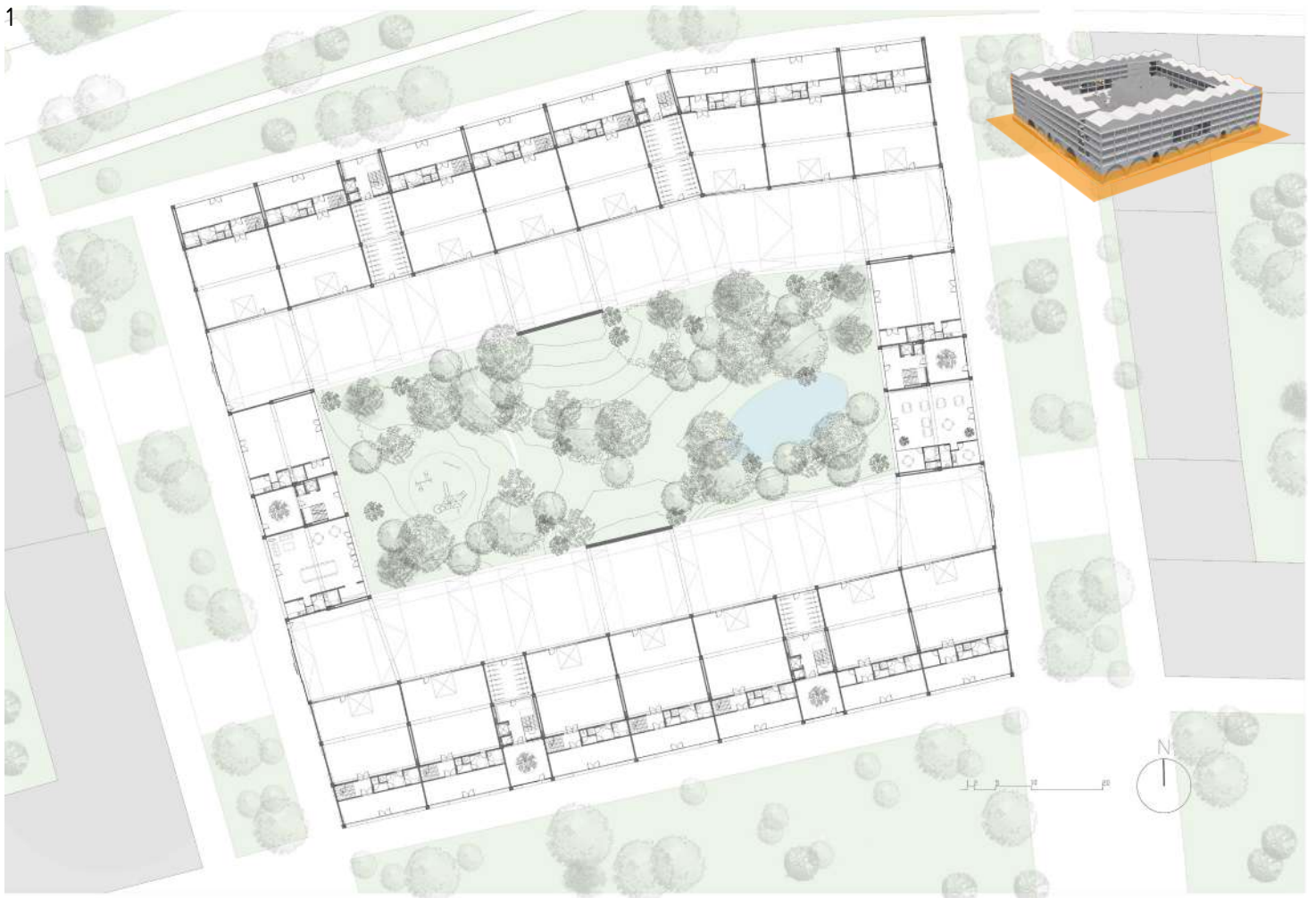
● - **Wintergardens**
Double skin façade
Microclimate

- **Double orientation**
cross ventilation

Mixity in appartements :

- - **Simplex** : 55m², x42 units
- - **Duplex** : 90m², x48 units
- - **Triplex** : 160m², x10 units

1

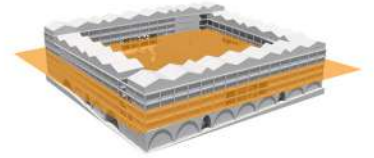
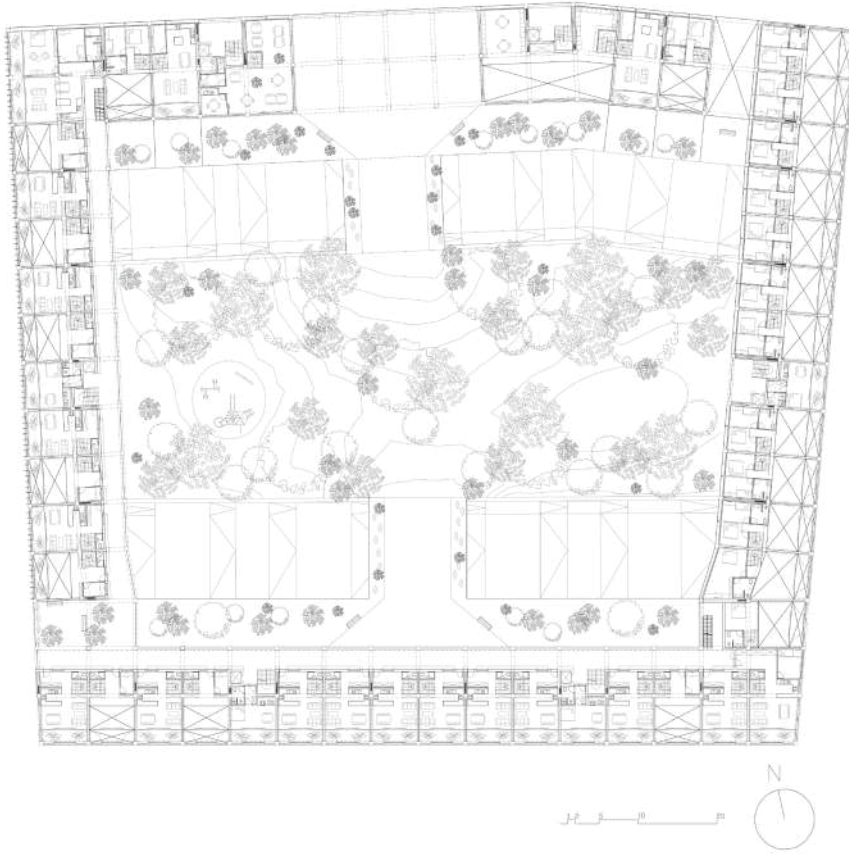


2

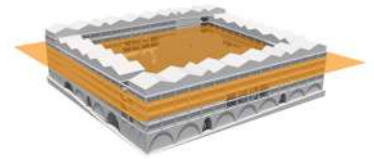
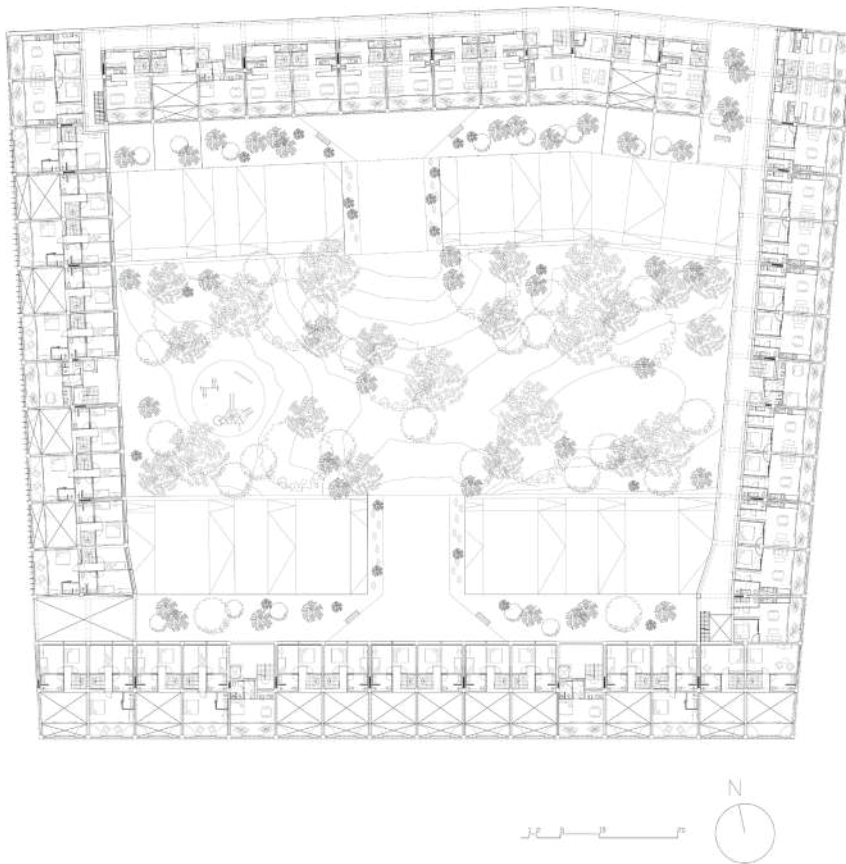


1.GROUND FLOOR 2.FIRST FLOOR

1

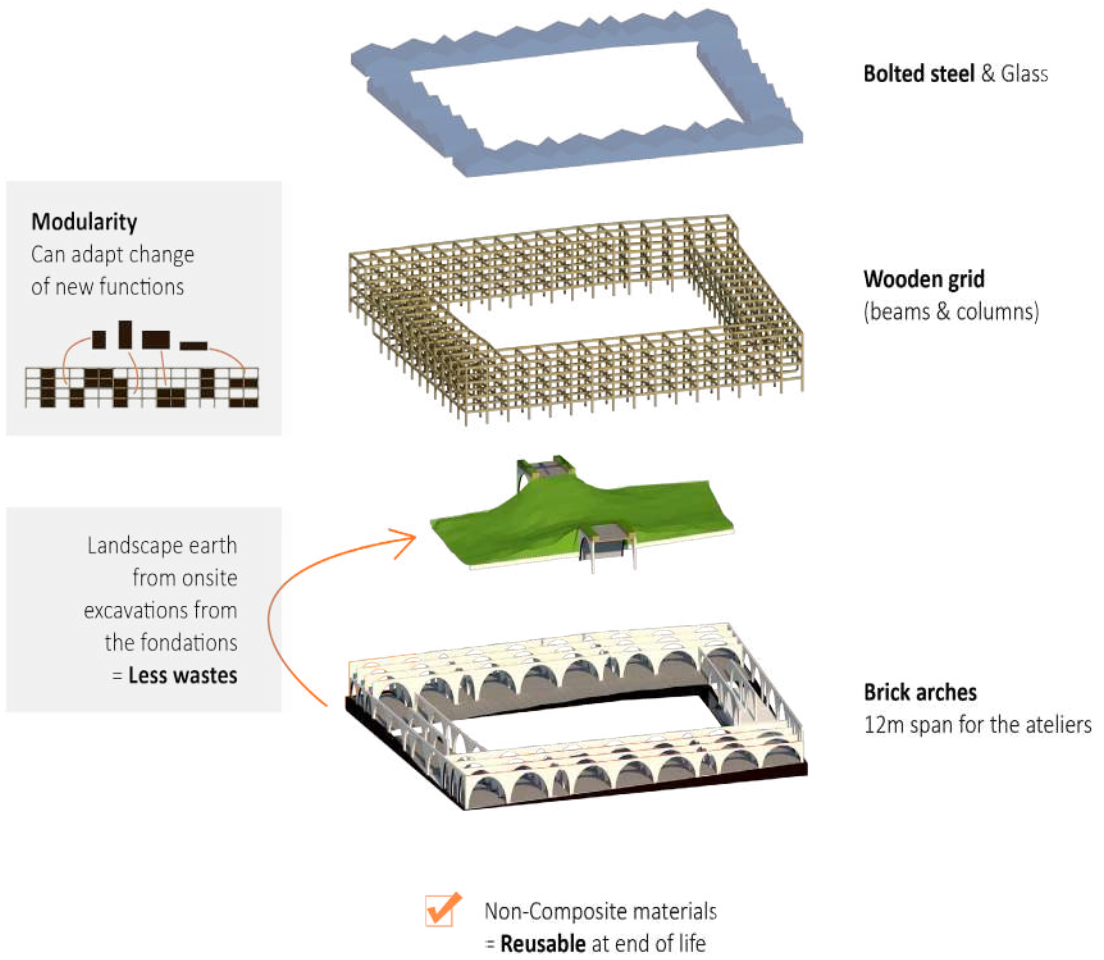


2



1. THIRD FLOOR 2. FOURTH FLOOR

1



2





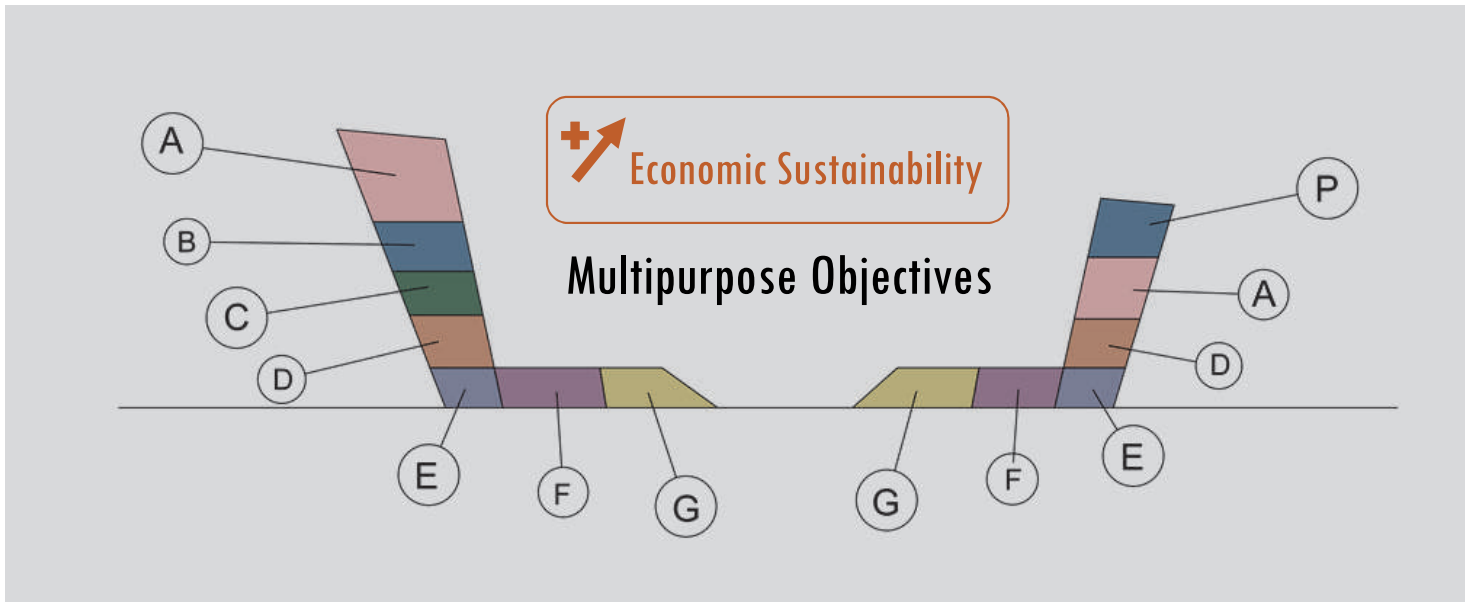
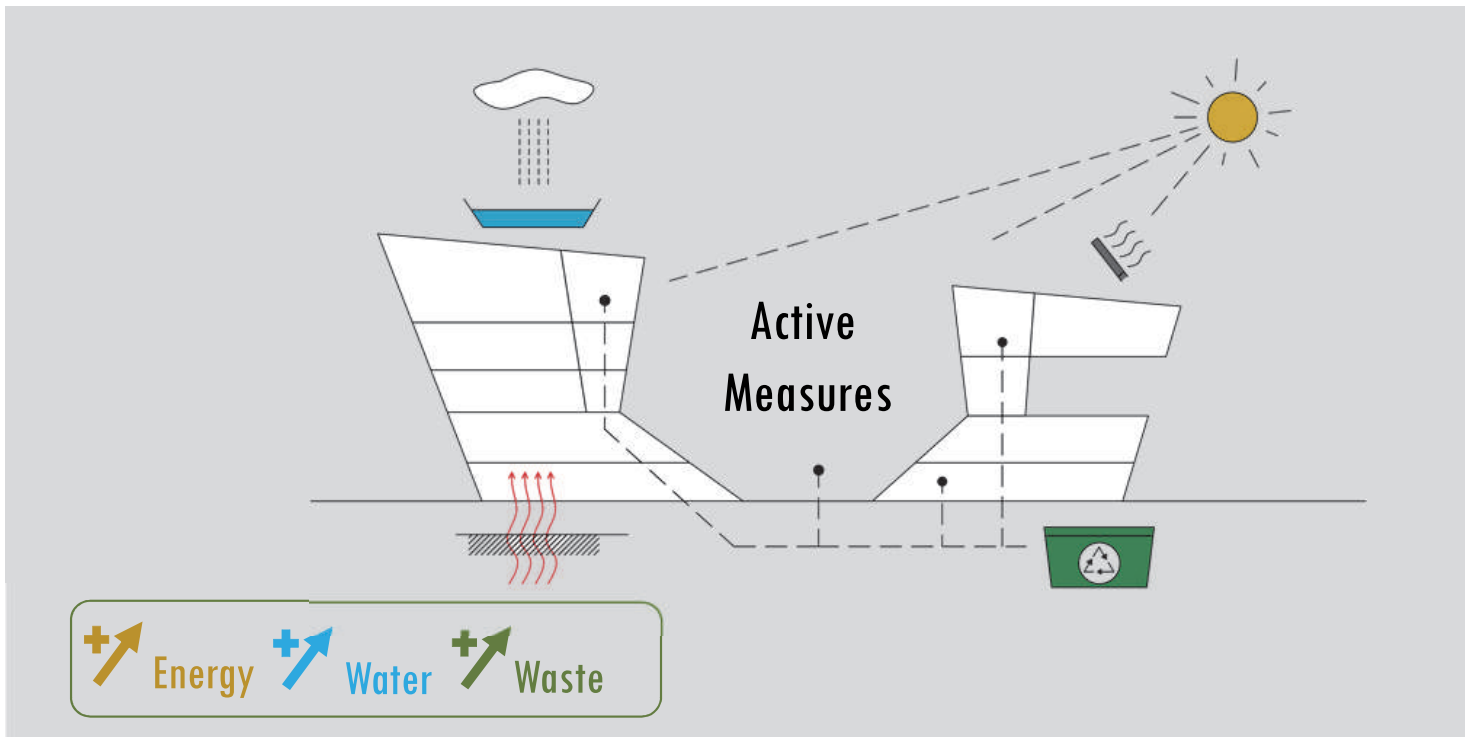
3.RENDERING

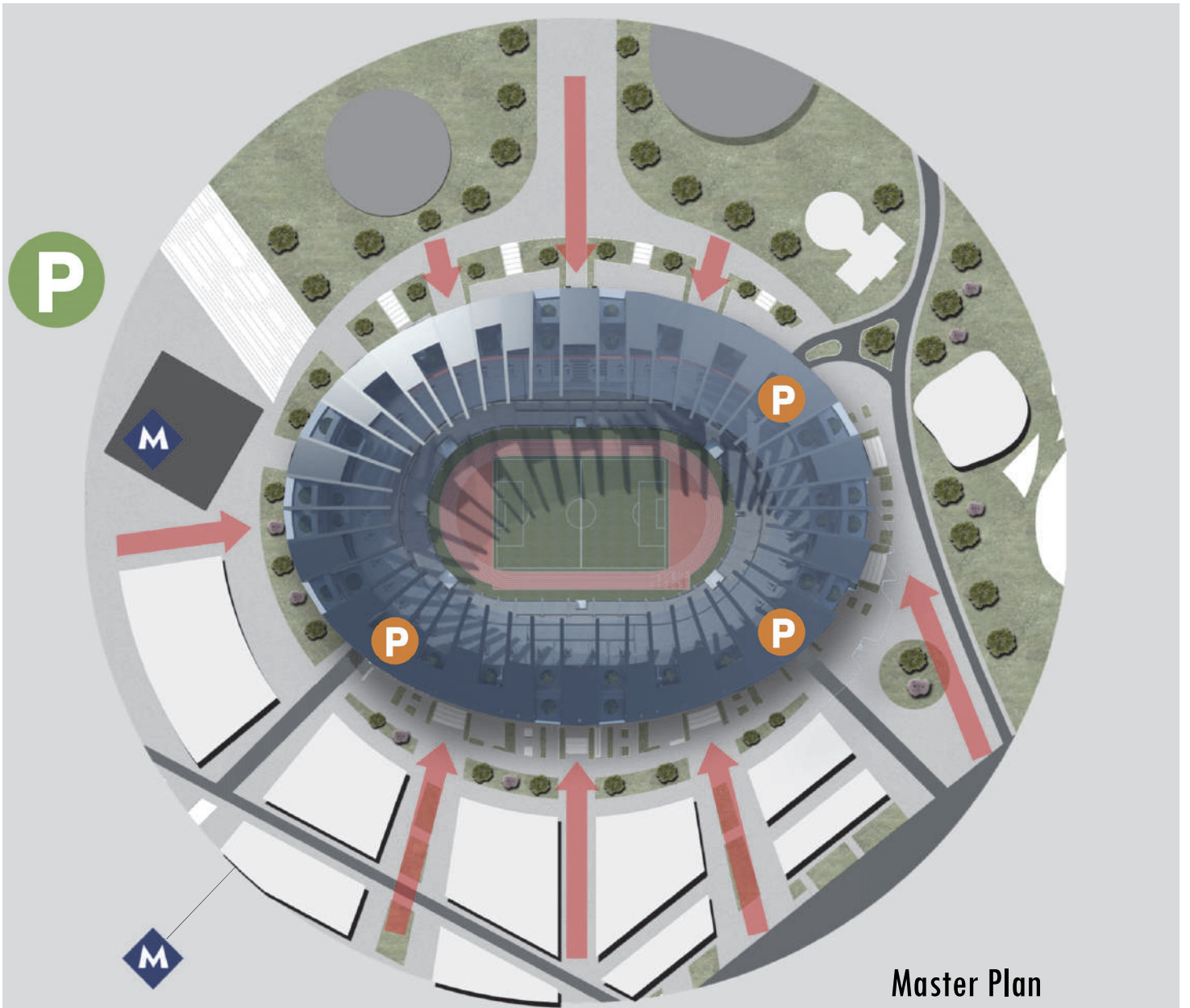
CENTERPOINT STADIUM

STUDENT:
MICHEL RAAD



04





Legend



Access to All Stadium Services



Metro Stations

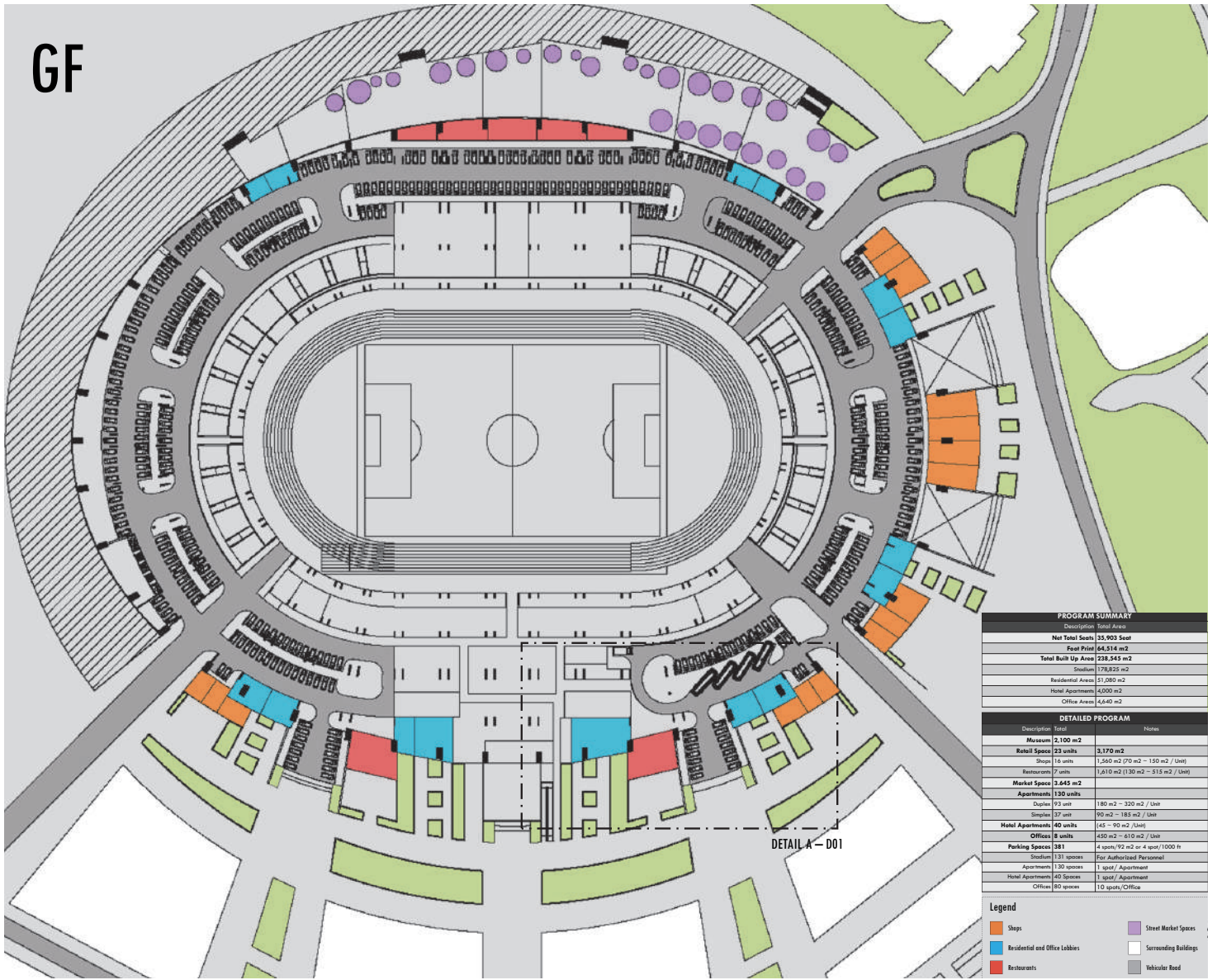


Offsite Parking for Spectators



Onsite Parking for Residents, Office Employees, VIPs, Media, Players, Match Officials and Stadium Personnel

GF

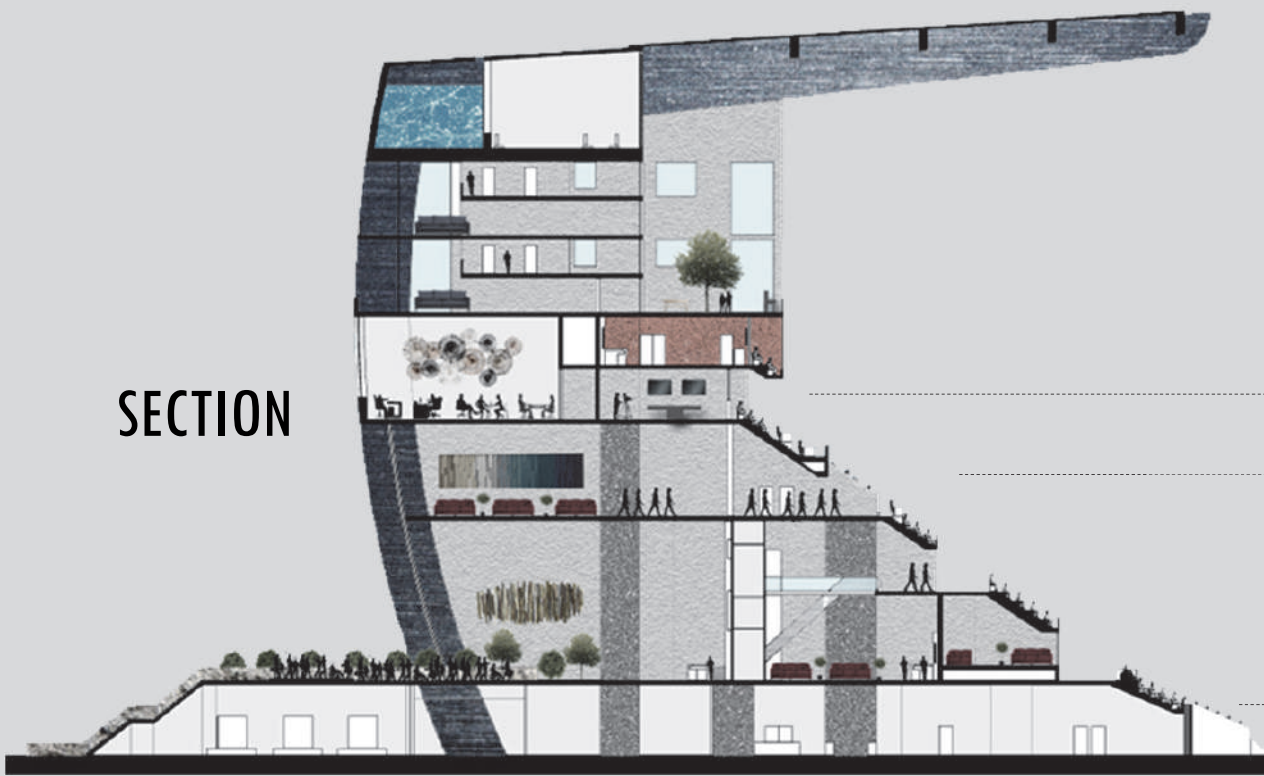


PROGRAM SUMMARY	
Description	Total Area
Max Total Seats	35,903 Seat
Foot Print	64,514 m ²
Total Built Up Area	238,545 m ²
Stadium	178,825 m ²
Residential Area	51,080 m ²
Hotel Apartments	4,000 m ²
Office Area	4,440 m ²

DETAILED PROGRAM		
Description	Total	Notes
Museum	2,100 m ²	
Retail Space	23 units	3,170 m ²
Shops	16 units	1,340 m ² (70 m ² - 150 m ² / Unit)
Restaurants	7 units	1,810 m ² (130 m ² - 315 m ² / Unit)
Market Spaces	3,845 m ²	
Apartments	130 units	
Duplex	93 unit	180 m ² - 320 m ² / Unit
Simplex	37 unit	90 m ² - 185 m ² / Unit
Hotel Apartments	40 units	145 - 90 m ² / Unit
Offices	8 units	450 m ² - 610 m ² / Unit
Parking Spaces	381	4 spots/92 m ² or 4 spots/1000 ft
Stadium	131 spaces	For Authorized Personnel
Apartments	130 spaces	1 spot/ Apartment
Hotel Apartments	40 Spaces	1 spot/ Apartment
Offices	80 spaces	10 spots/Office

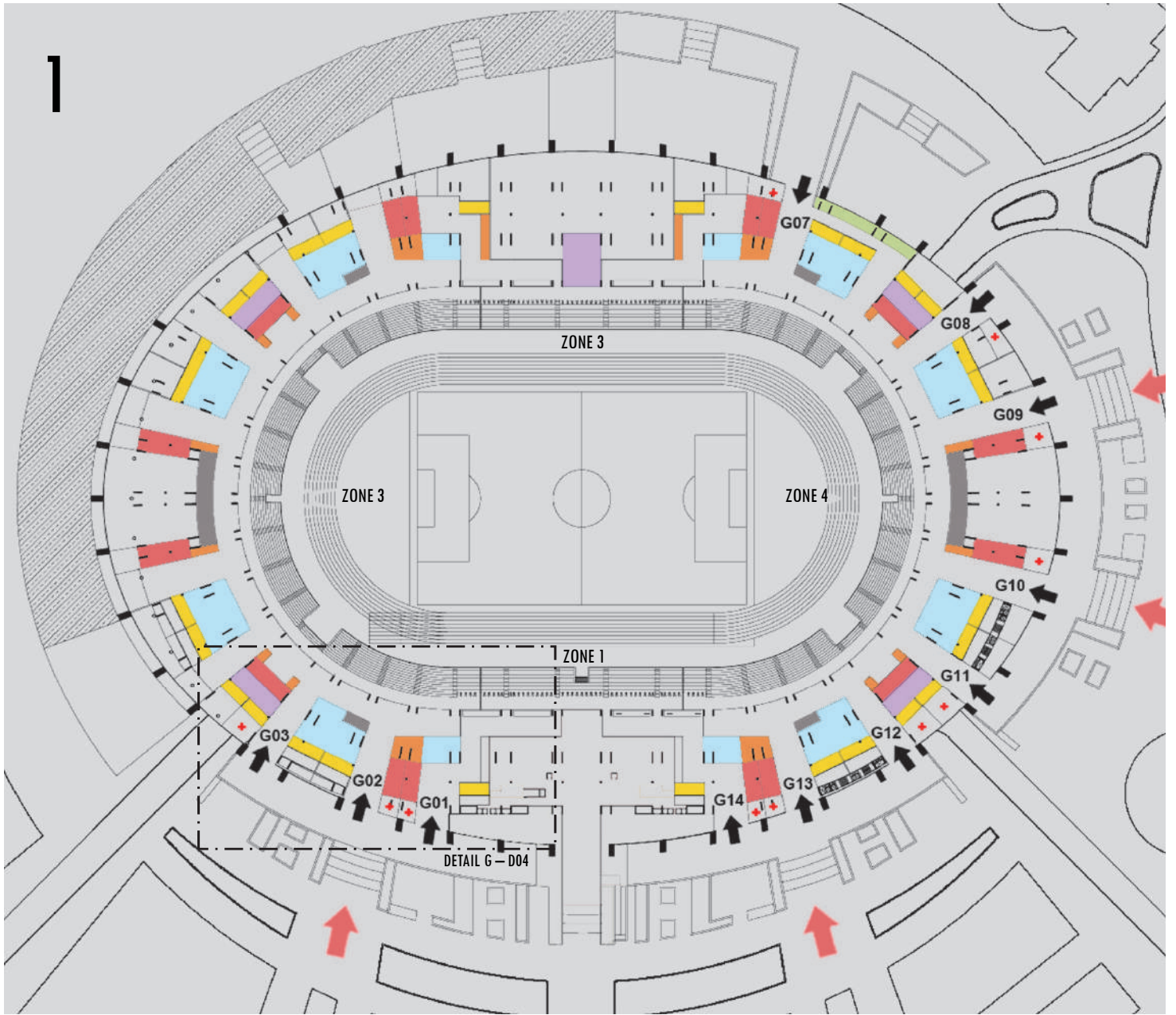
Legend	
Shops	Street Market Spaces
Residential and Office Lobbies	Surrounding Buildings
Restaurants	Vehicular Road

SECTION

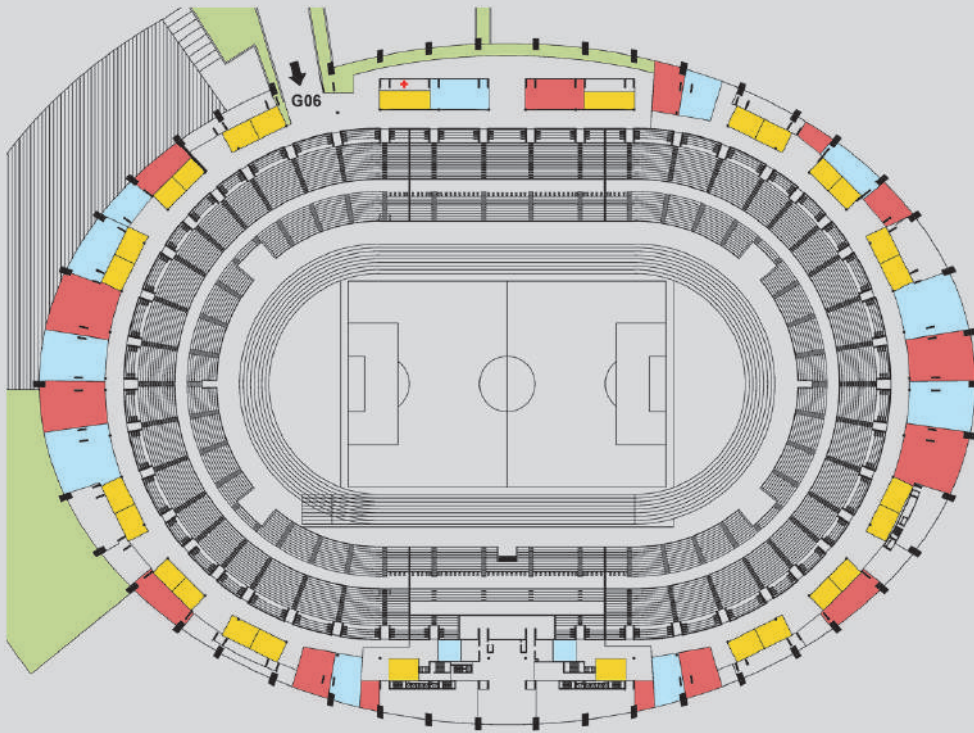


4
3
GF

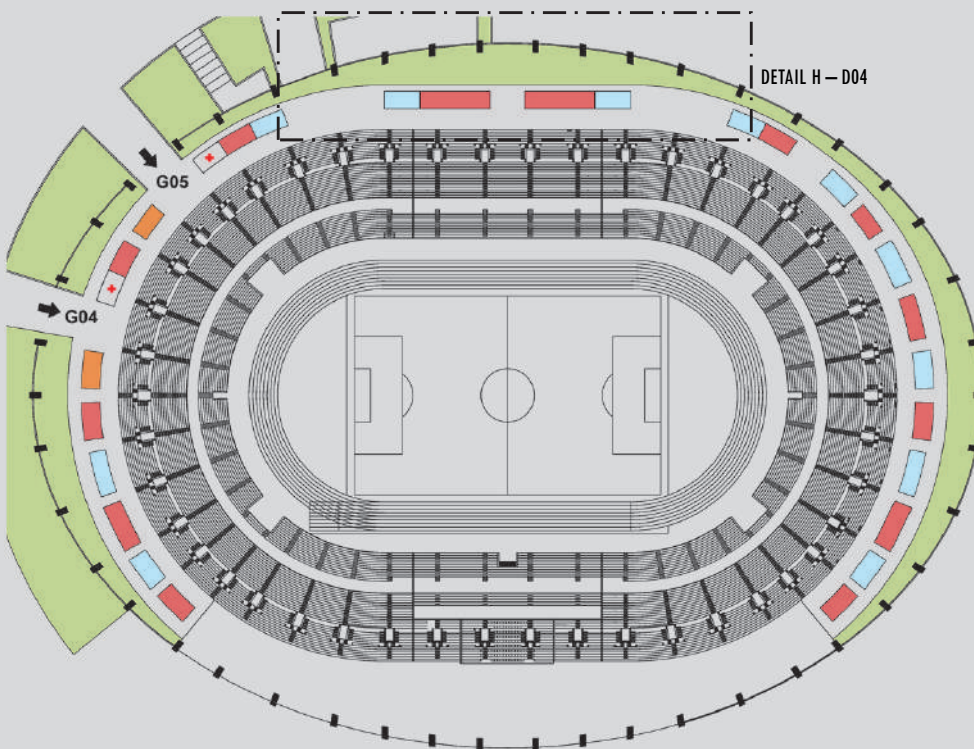
1



GRANSTANDS — 3RD FLOOR



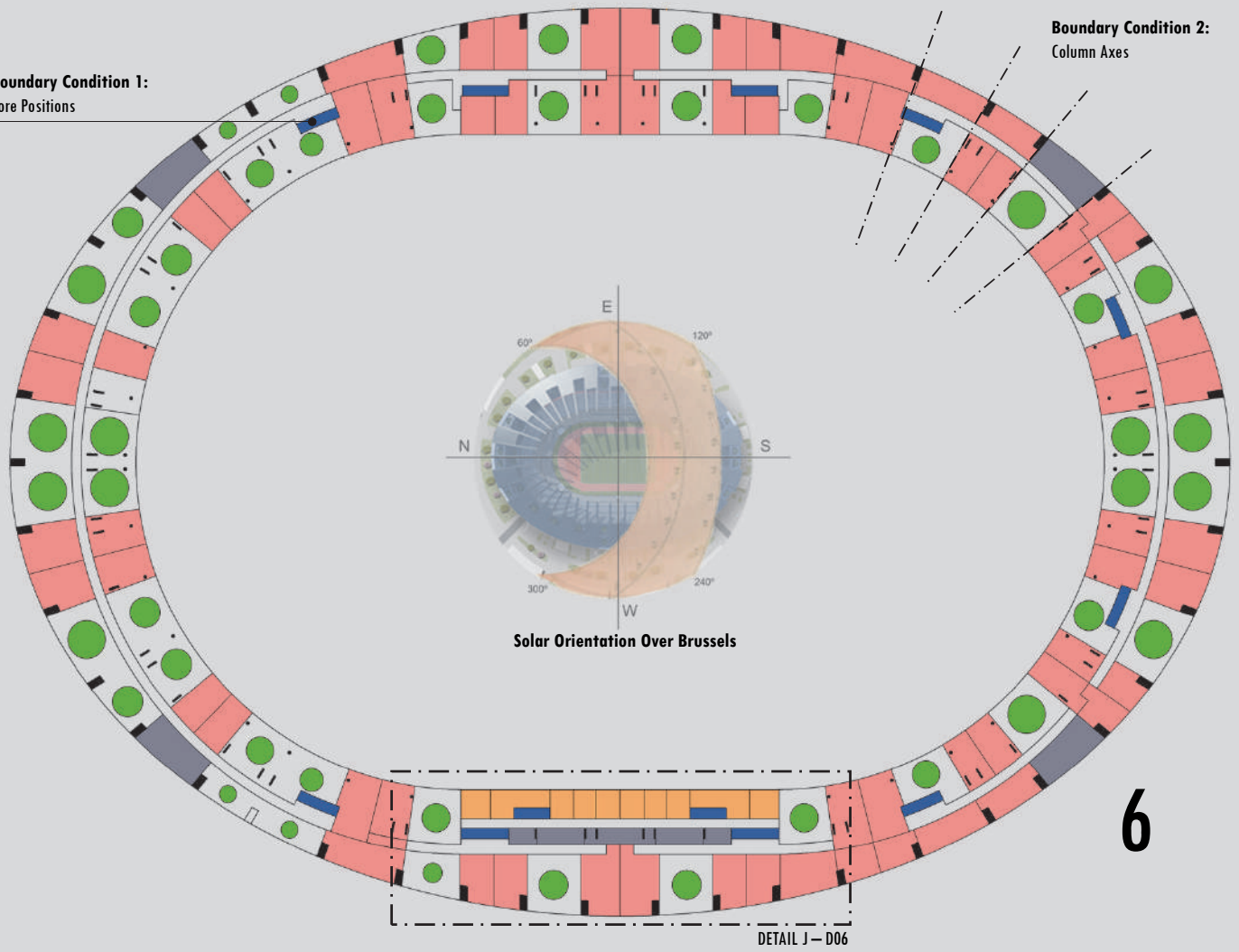
GRANSTANDS — 4TH FLOOR



1ST RESIDENTIAL LEVEL — 6TH FLOOR

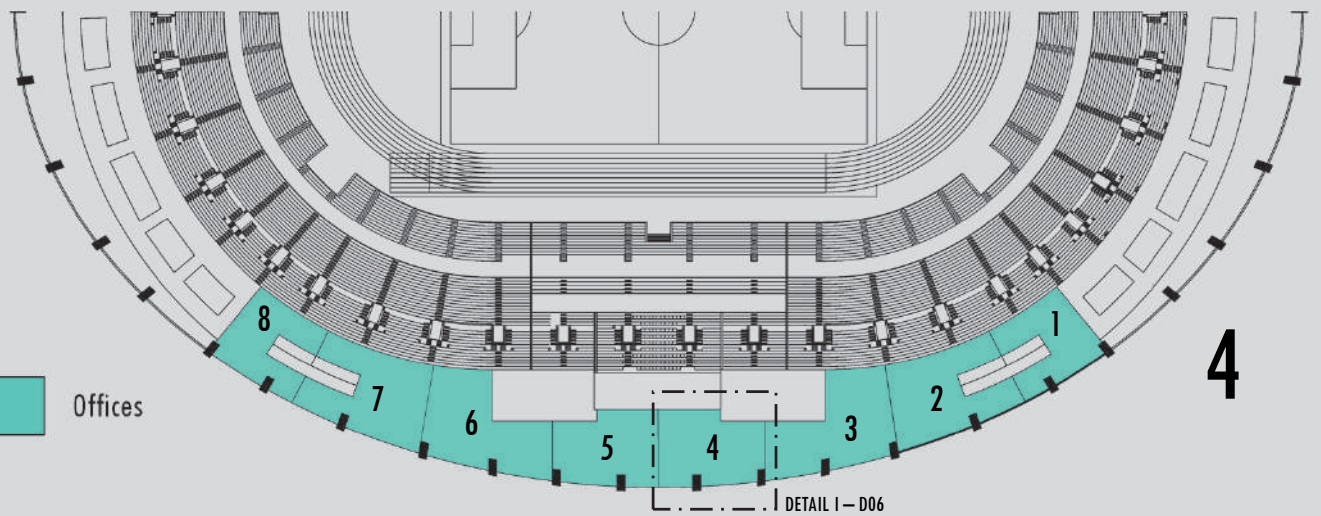
Boundary Condition 1:
Core Positions

Boundary Condition 2:
Column Axes

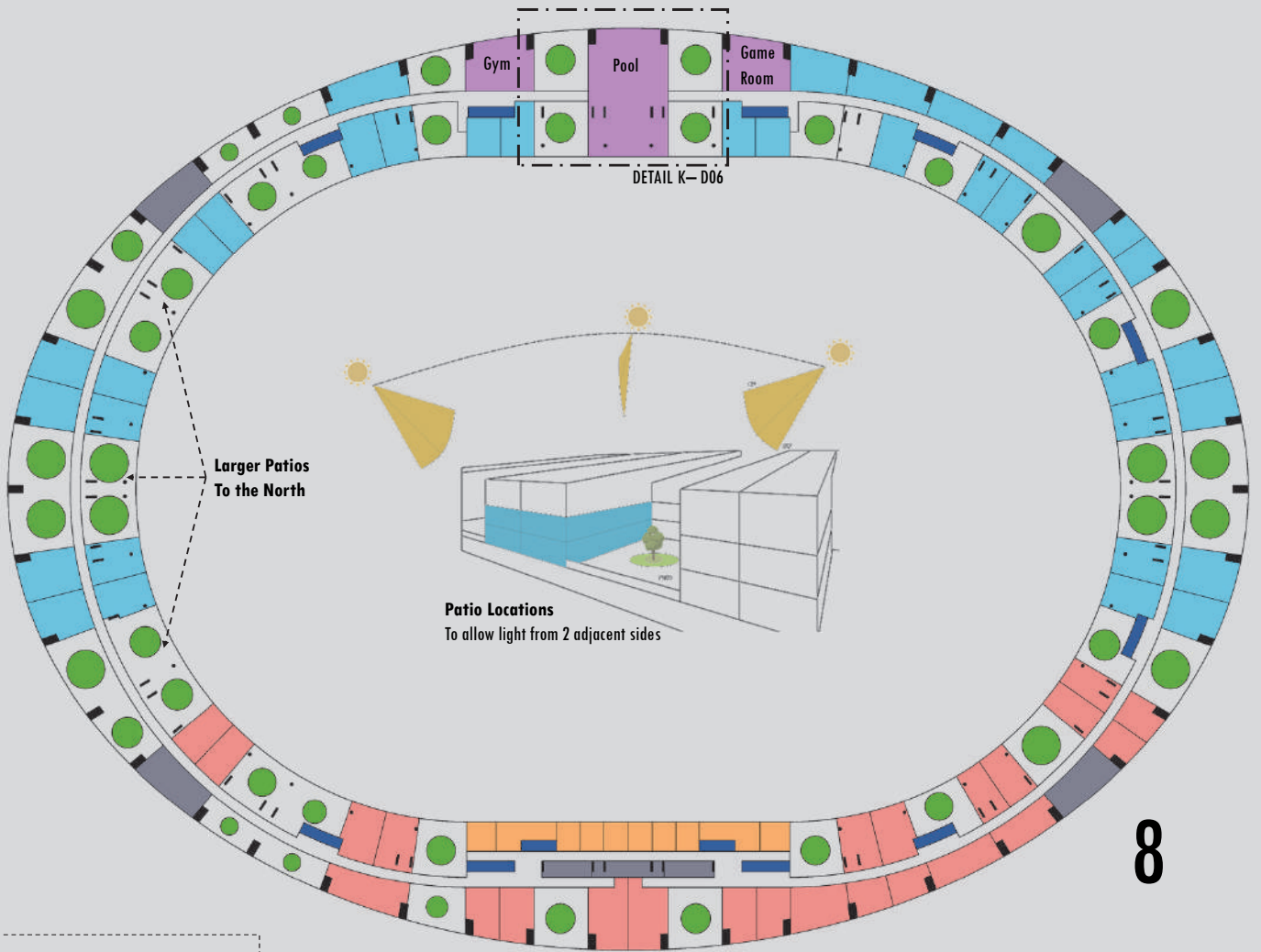


OFFICES — 4TH FLOOR

Offices



2ND RESIDENTIAL LEVEL — 8TH FLOOR



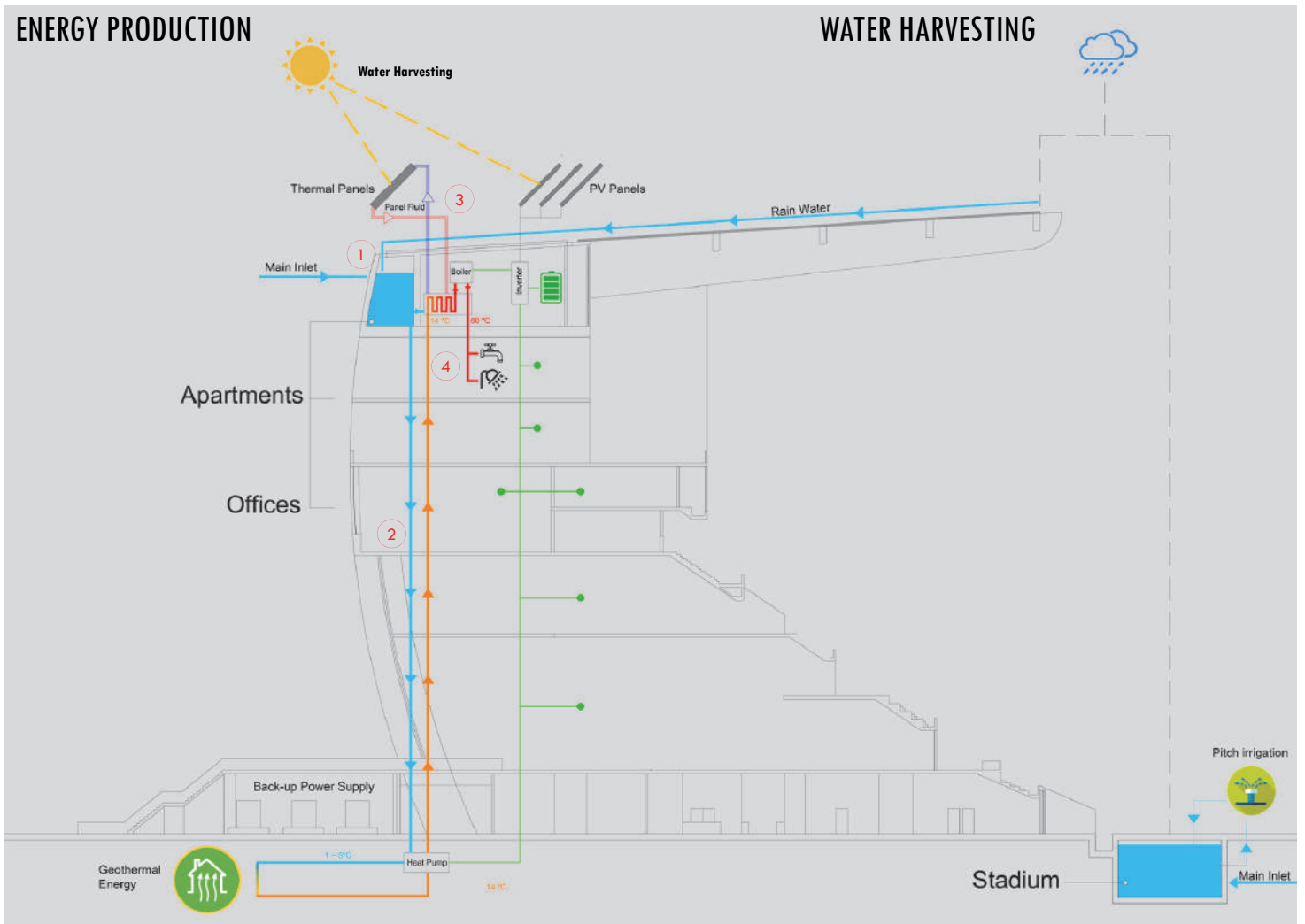
Legend

- Duplex
- Simplex
- Hotel Apartments
- Common Area
- Patios
- Technical Areas
- Vertical Circulation

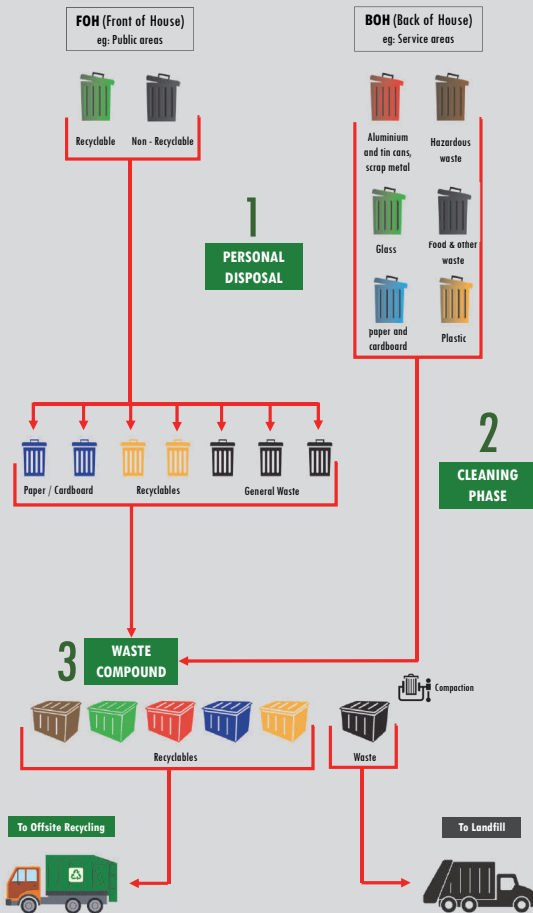


ENERGY PRODUCTION

WATER HARVESTING



WASTE MANAGEMENT SCHEME



*REFER TO DETAIL L - 008 FOR WASTE MANAGEMENT FACILITY

Estimated Production

Energy

- 1 m² PV Panel → 225 kWh / Year (Brussels)
 - 40,000 Seats Stadium → 12,500 kWh / Match
 - Average Household → 3600 kWh / Year
- } Basis for Calculation

Type	Requirement	Available Space
Residential	570,000 kWh/y	3,665 m ² =
Stadium	12,500 kWh/M	824,625 kWh/y

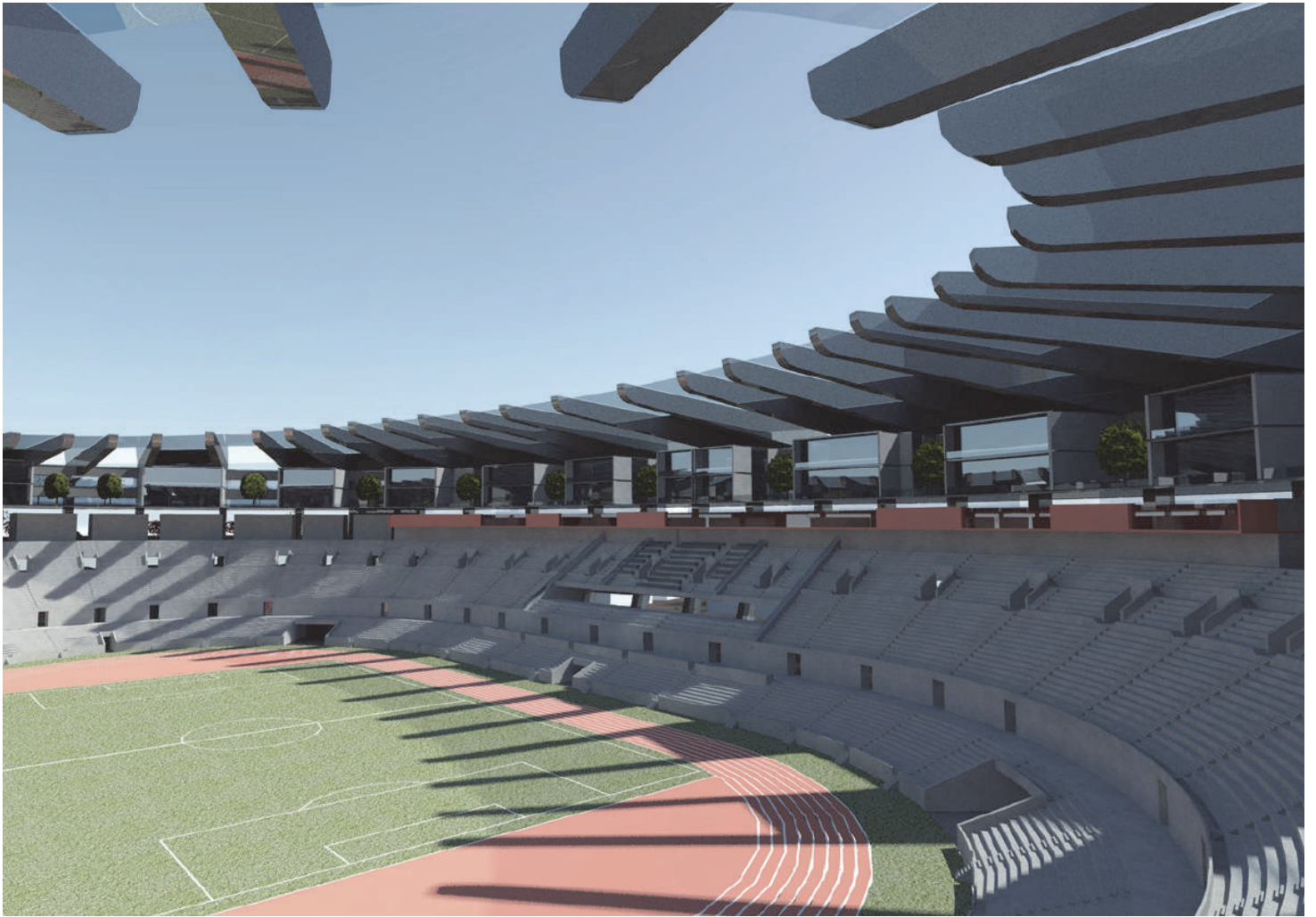
Full Residential Energy Demand + 20 Matches/year

Water

- Average Precipitation in Belgium → 785 mm/Year → 785 L / m² / year
 - Pitch area → 41,300 m² / Covered Area → 42,000 m²
 - Average Consumption In Belgium → 120 L / Person / Day
 - Consumption For Stadiums → 18.93 L / Person / Match
- } Basis for Calculation

Type	Requirement	Precipitation / Y
Residential	36,354,000 L/y	32,970,000 L/Y
Stadium	757,200 L/M	32,420,500 L/Y

90% Residential Water Demand + 42 Matches/year



THE FARM HUB

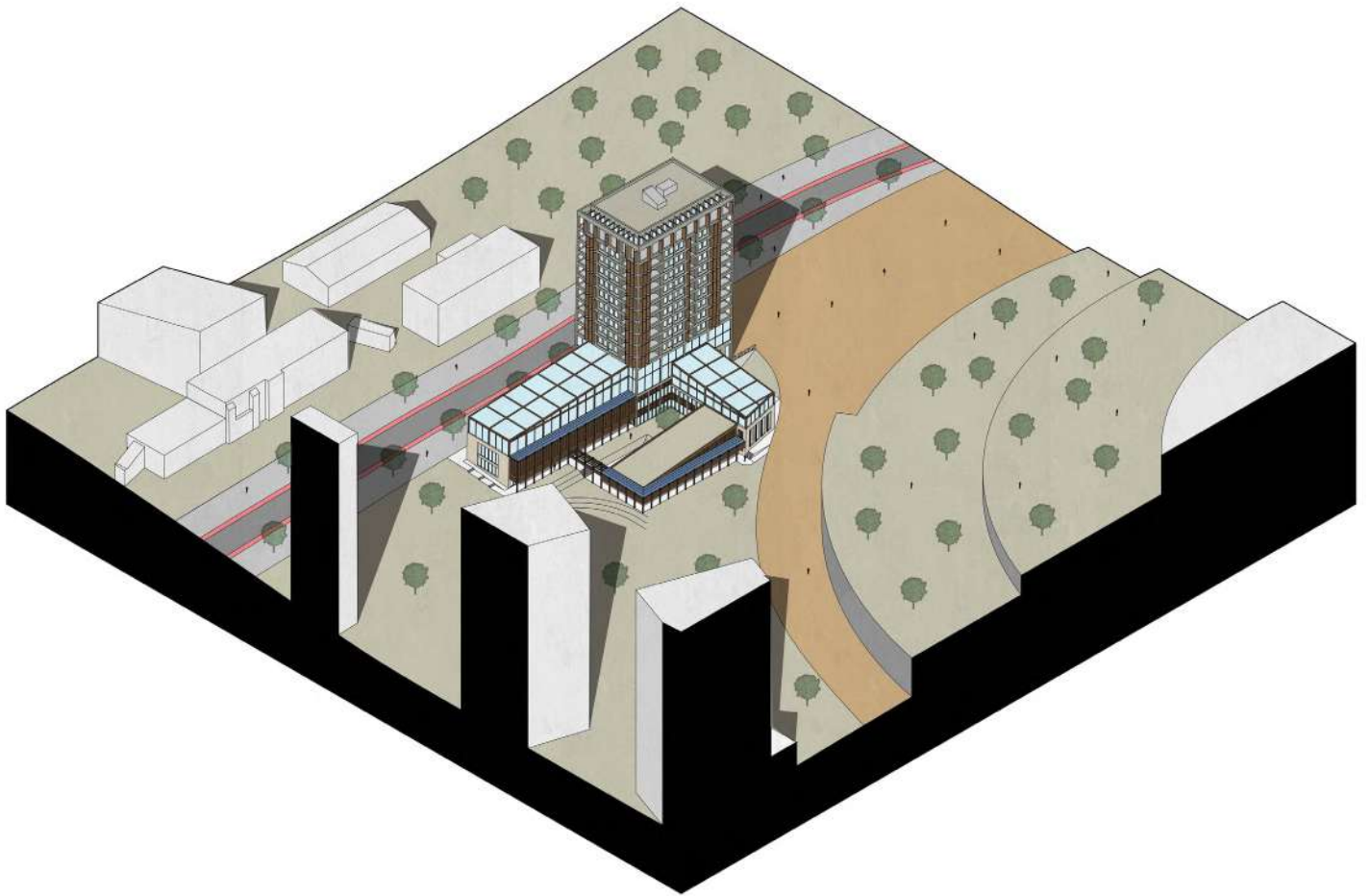
STUDENT:
ARTHUR WINDERICKX



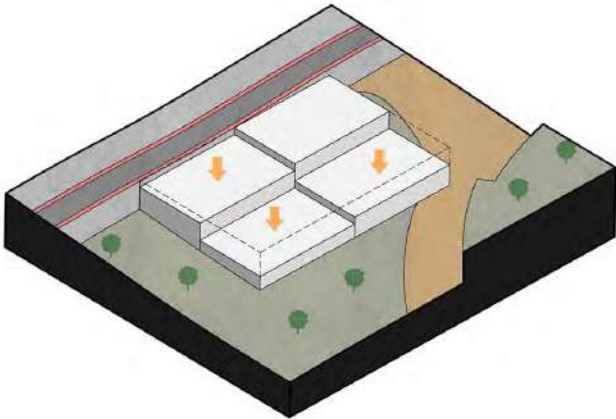
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3

Masterplan Green Gate North

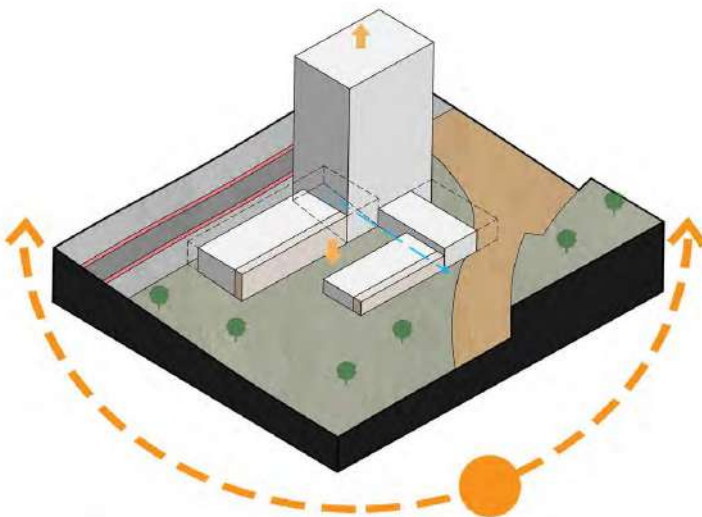


1. Topography



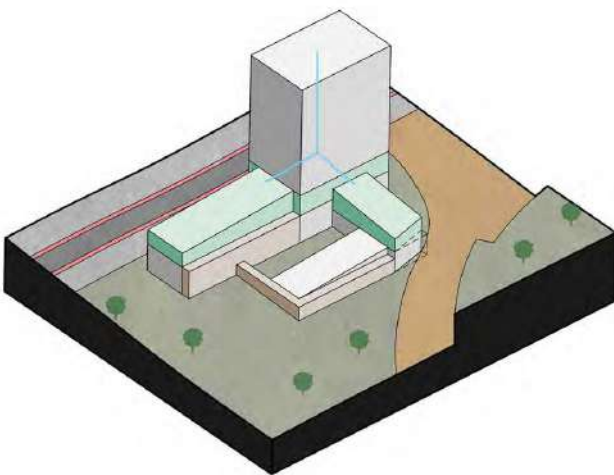
- The height of the building is subdivided in several parts regarding to the natural slope.

2. View & orientation



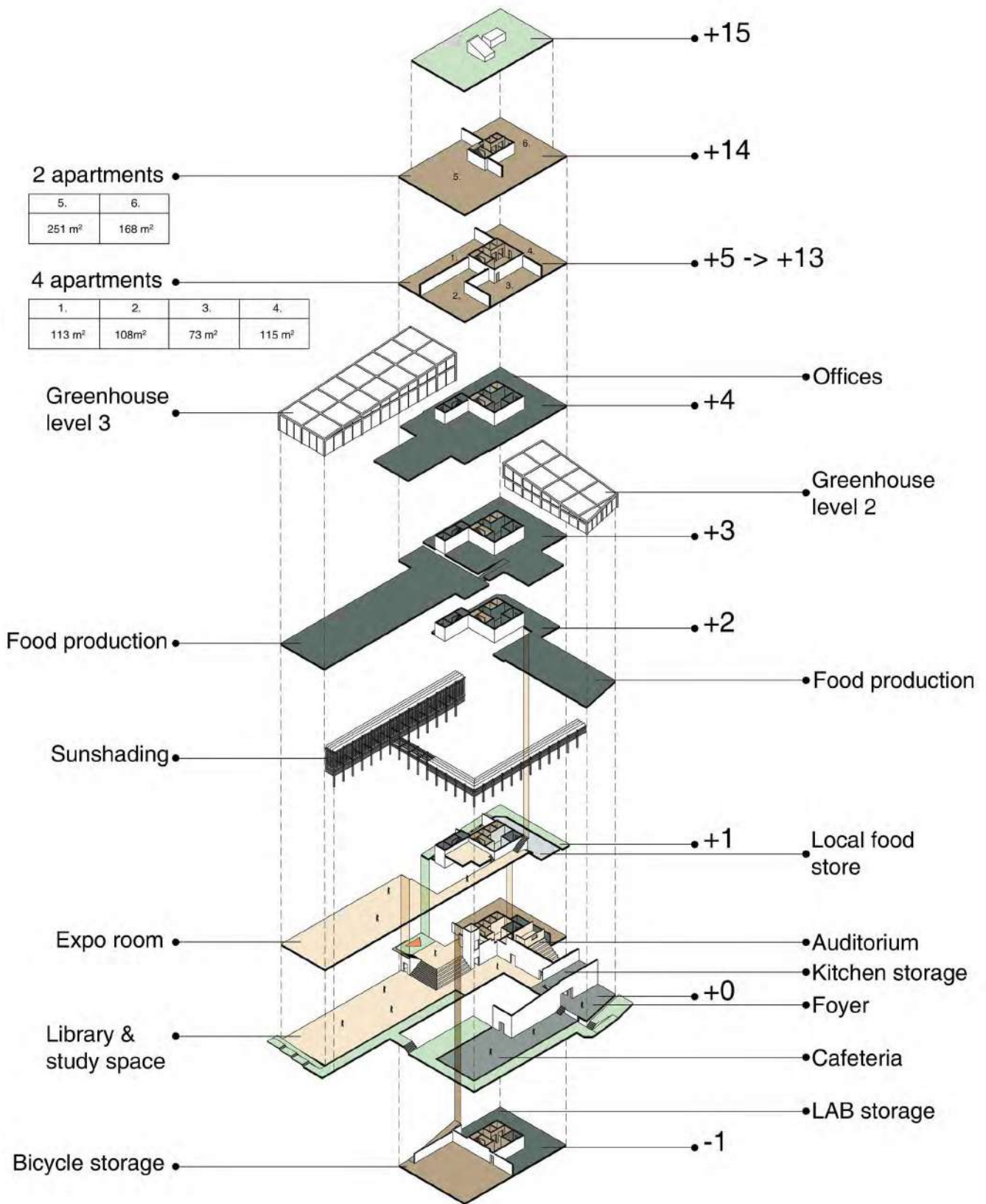
- Considering the sun orientation is the tower placed in the nord and is sunshading provided at the south facades. The main entrance is placed at the south west part of the tower to allow a view above the lower part of complex toward the valley.

3. Productivity



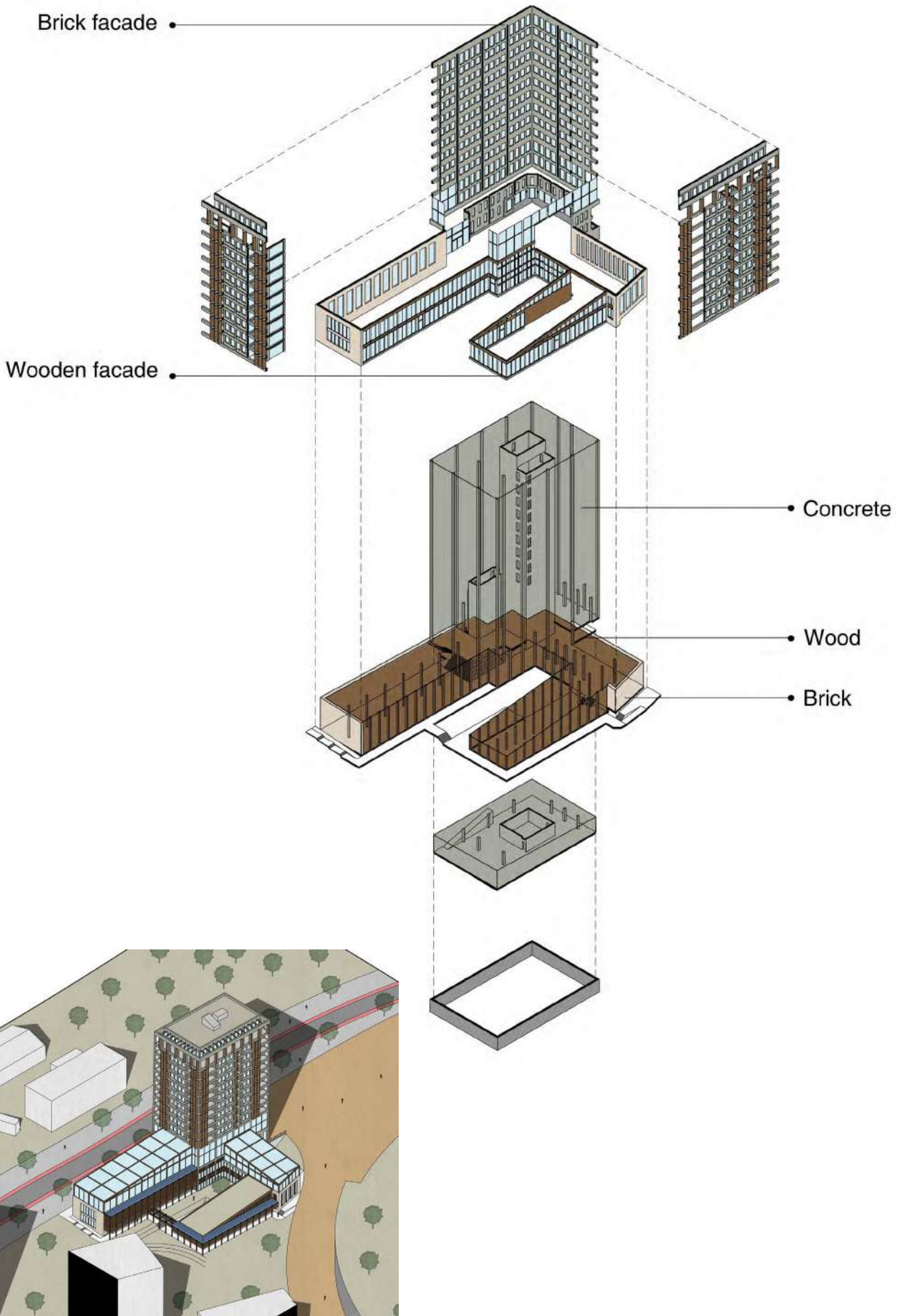
- The food production happens above the lower building parts and is provided by water harvesting of the residences. Creating an interaction between the other function.

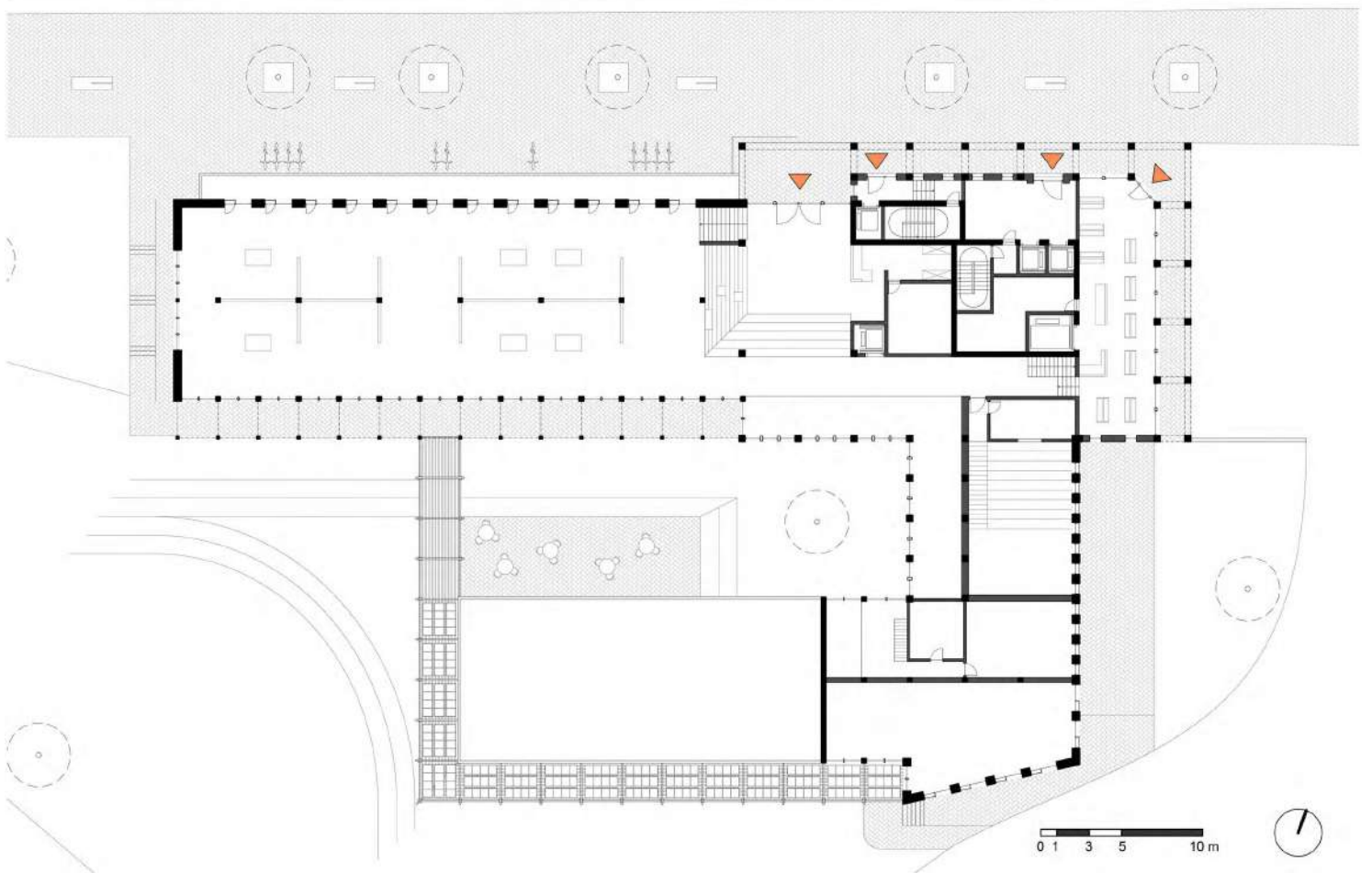
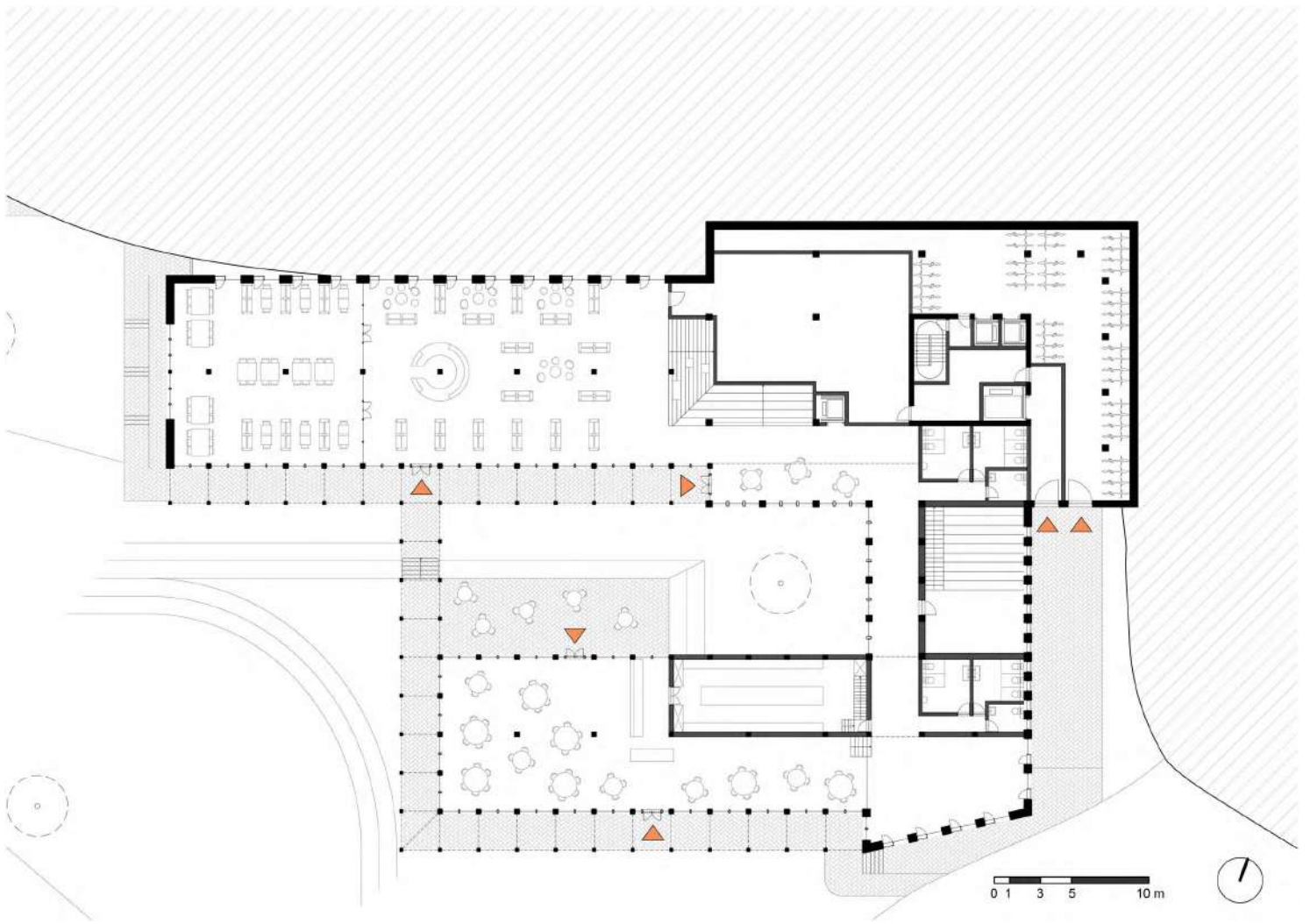
Program

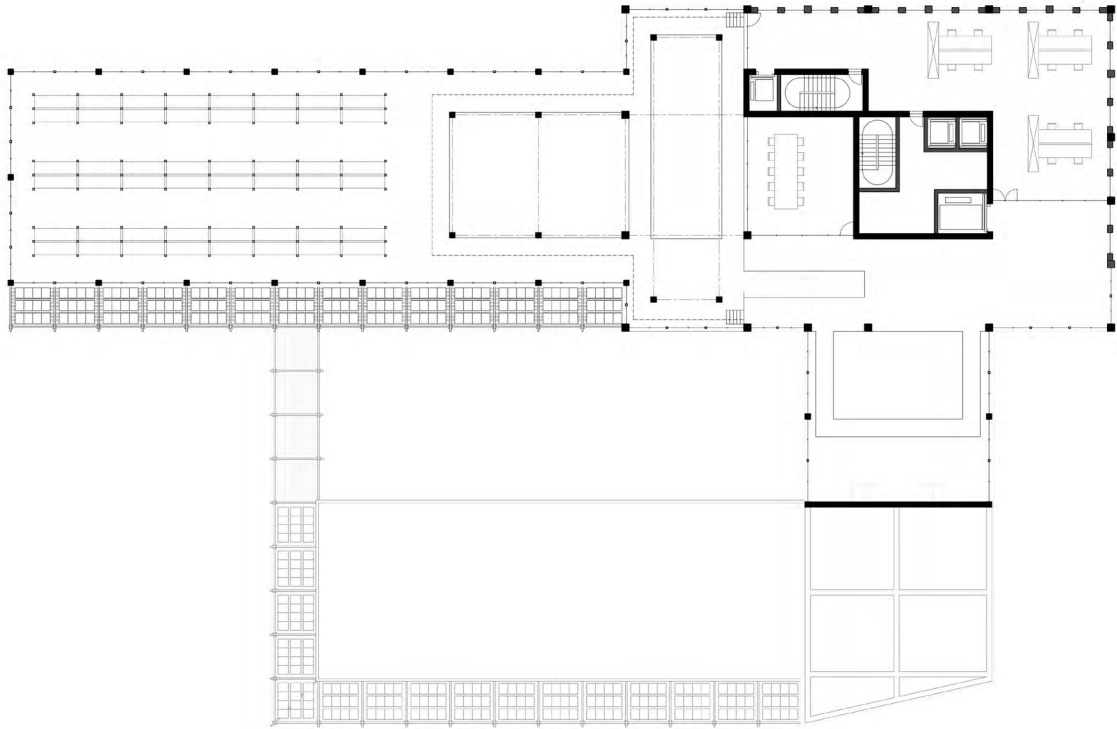


- Educational hub
- Cafeteria
- Farm hub
- Food store
- Residences
- Exterior space

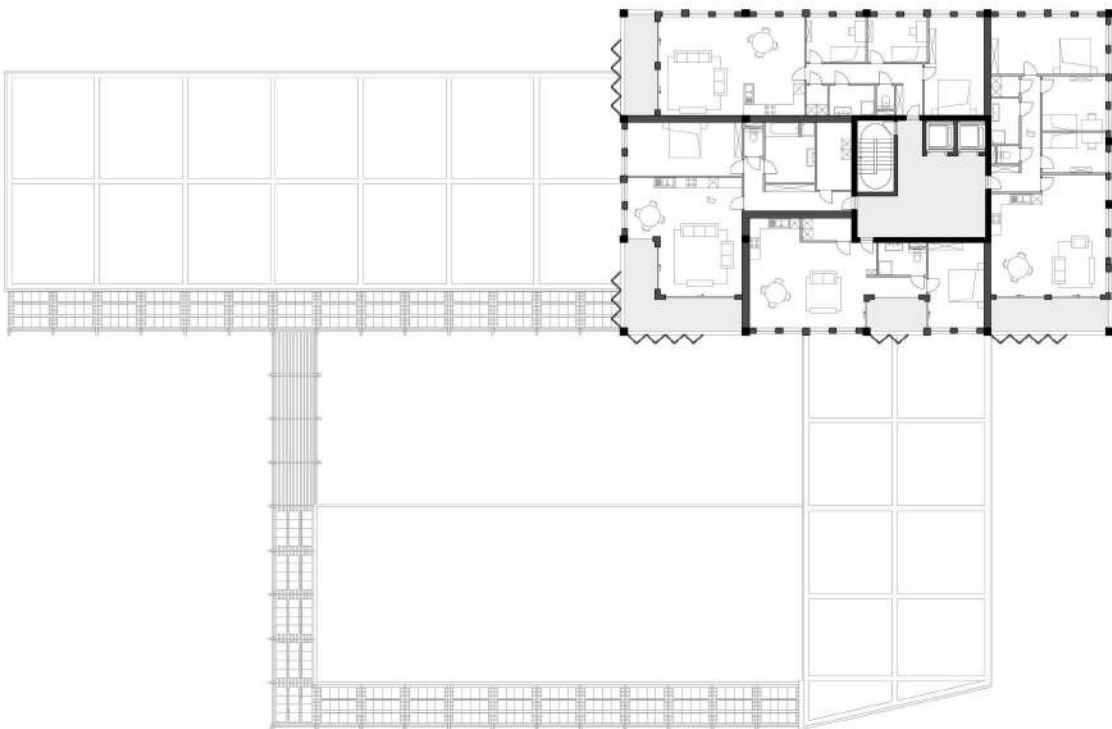
Structure & materiality





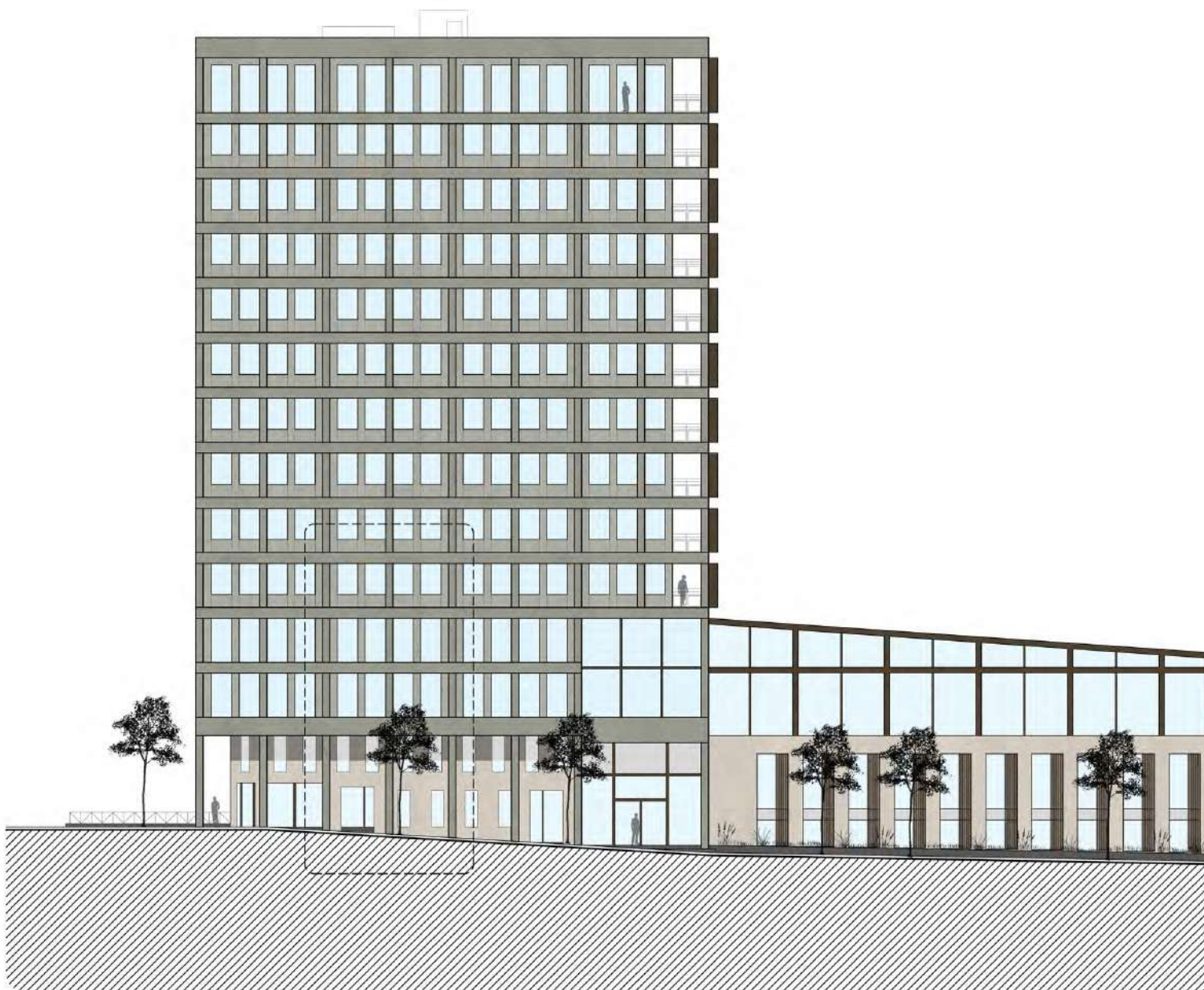
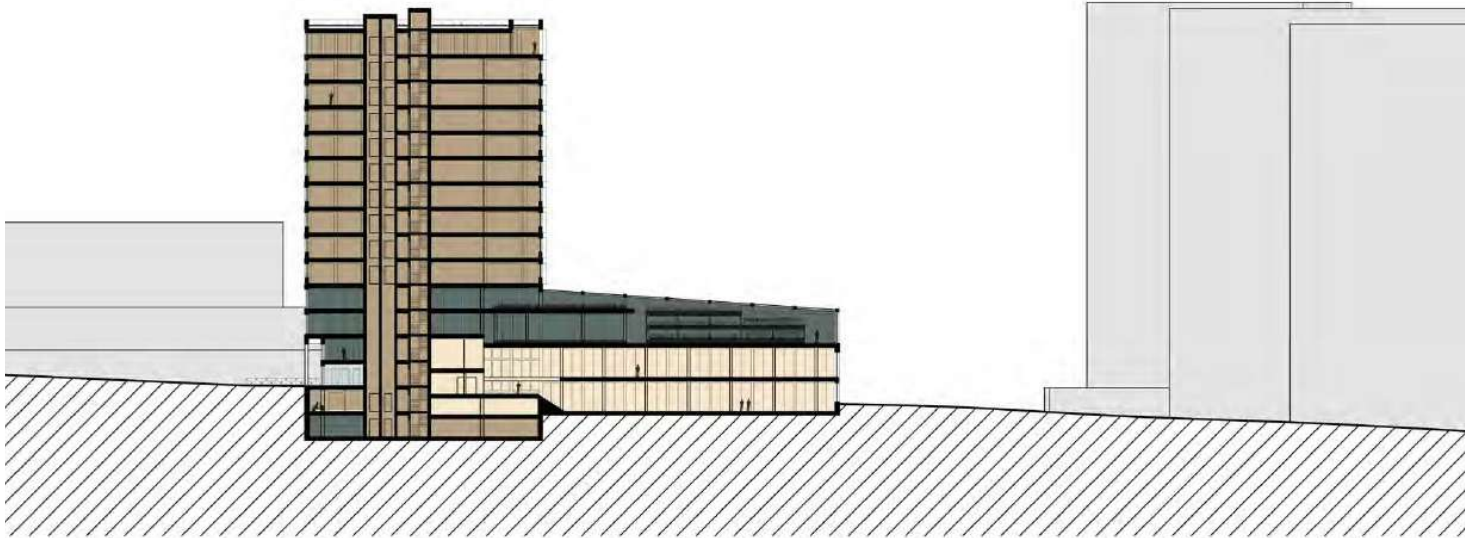


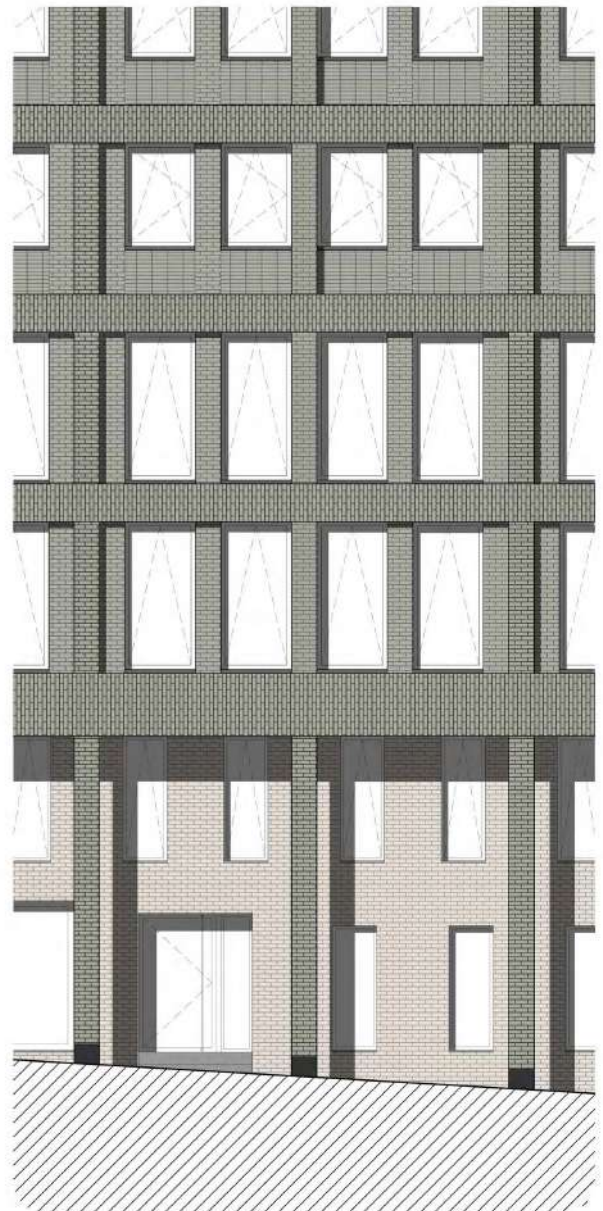
0 1 3 5 10 m



0 1 3 5 10 m







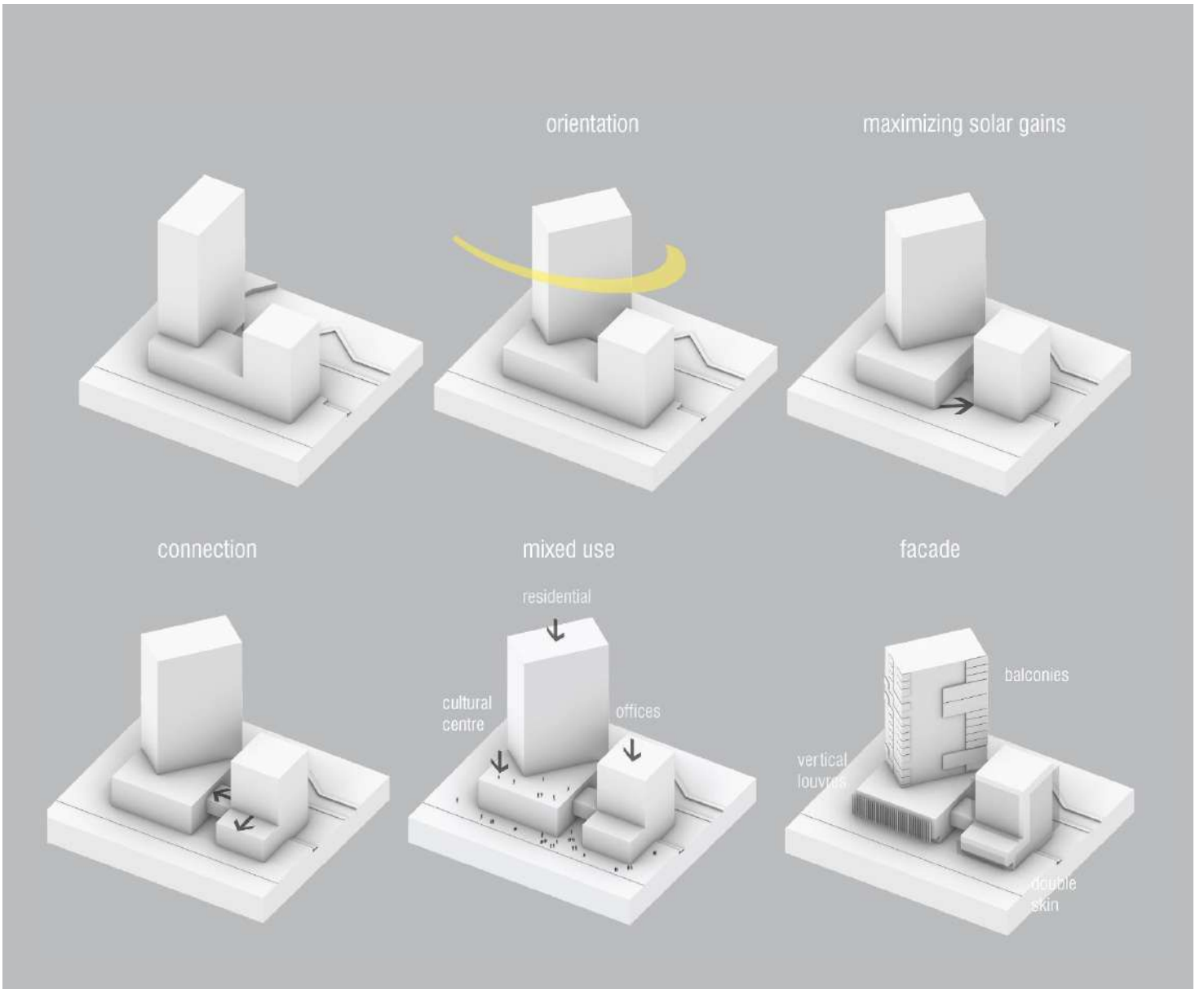
HOUBA TOWER

STUDENT:

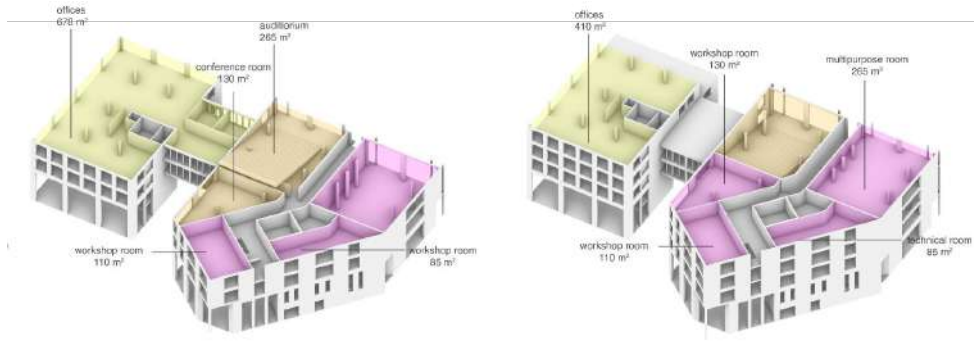
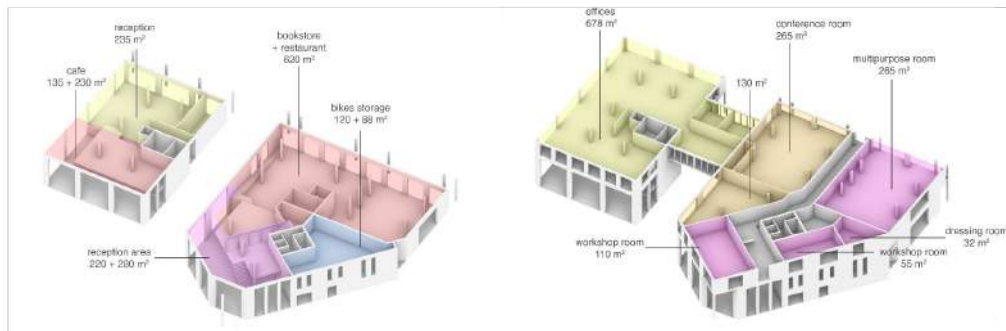
TIMMY VAN DEN PANHUYZEN

06

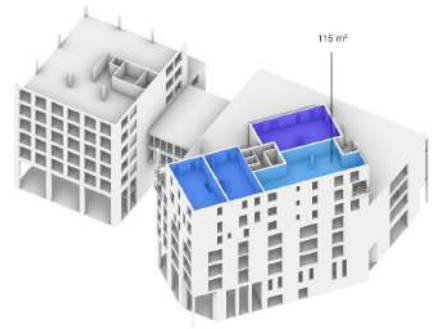
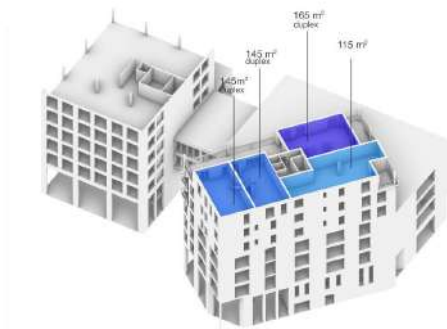
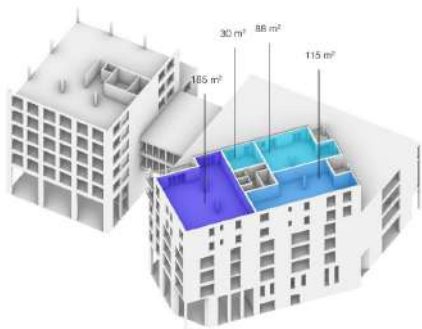




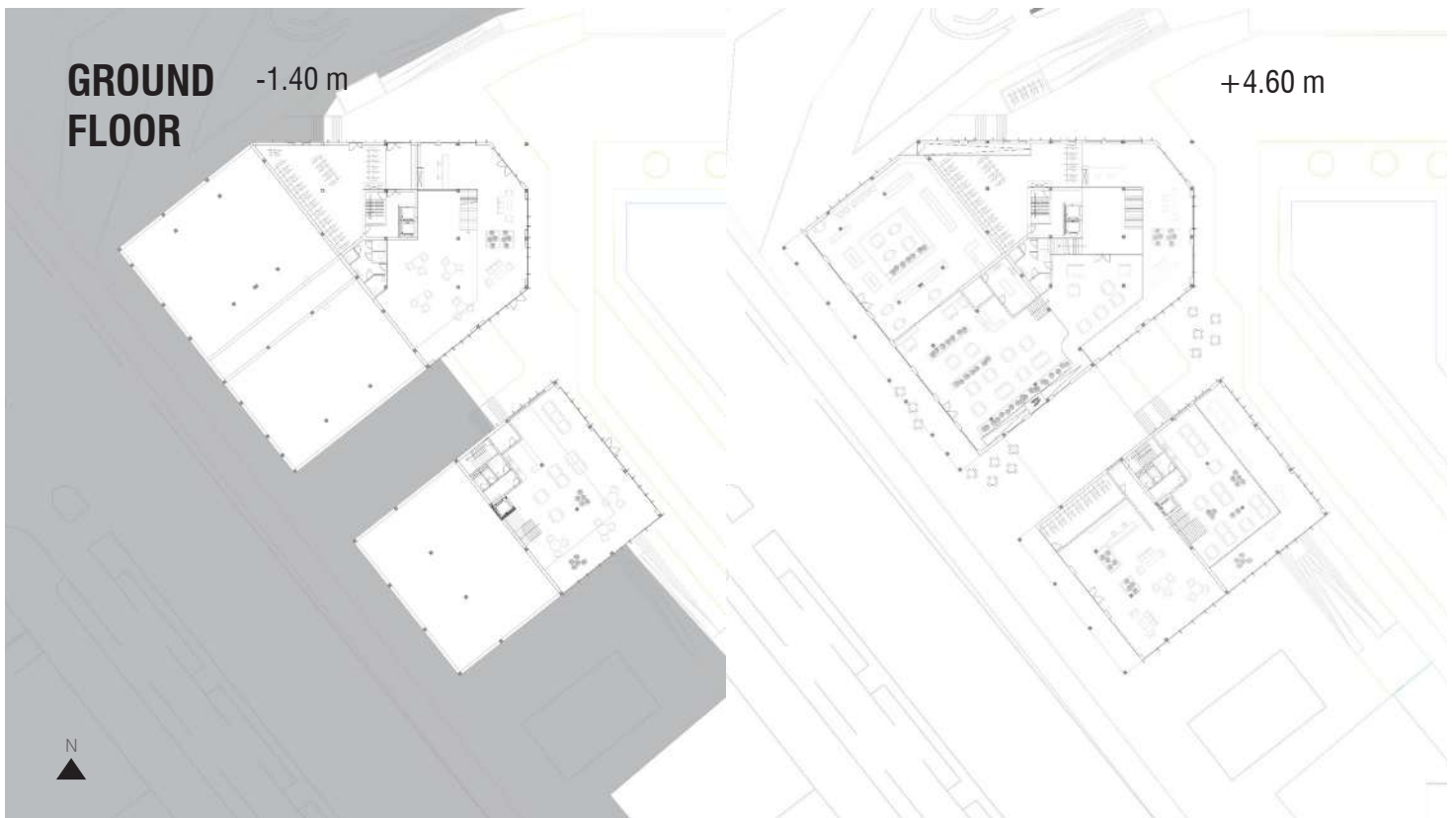
PROGRAM



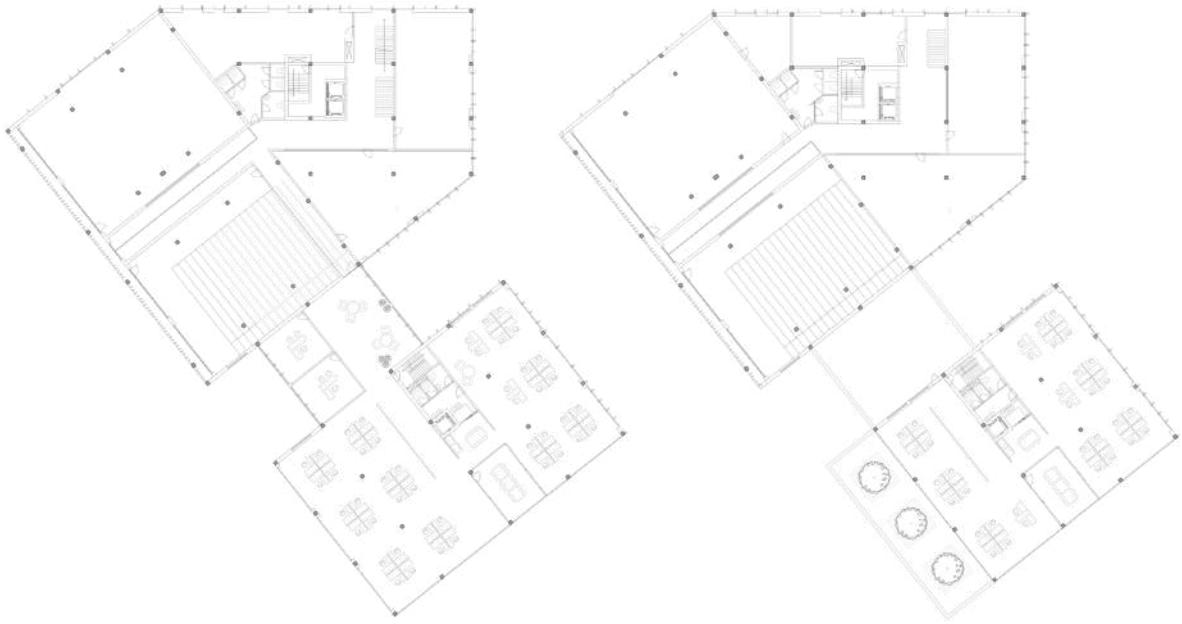
- RESIDENTIAL
- SHARED by cultural centre and offices
- CAFE / RESTAU
- OFFICES
- CULTURAL CENTRE



- RESIDENTIAL
-
-
-



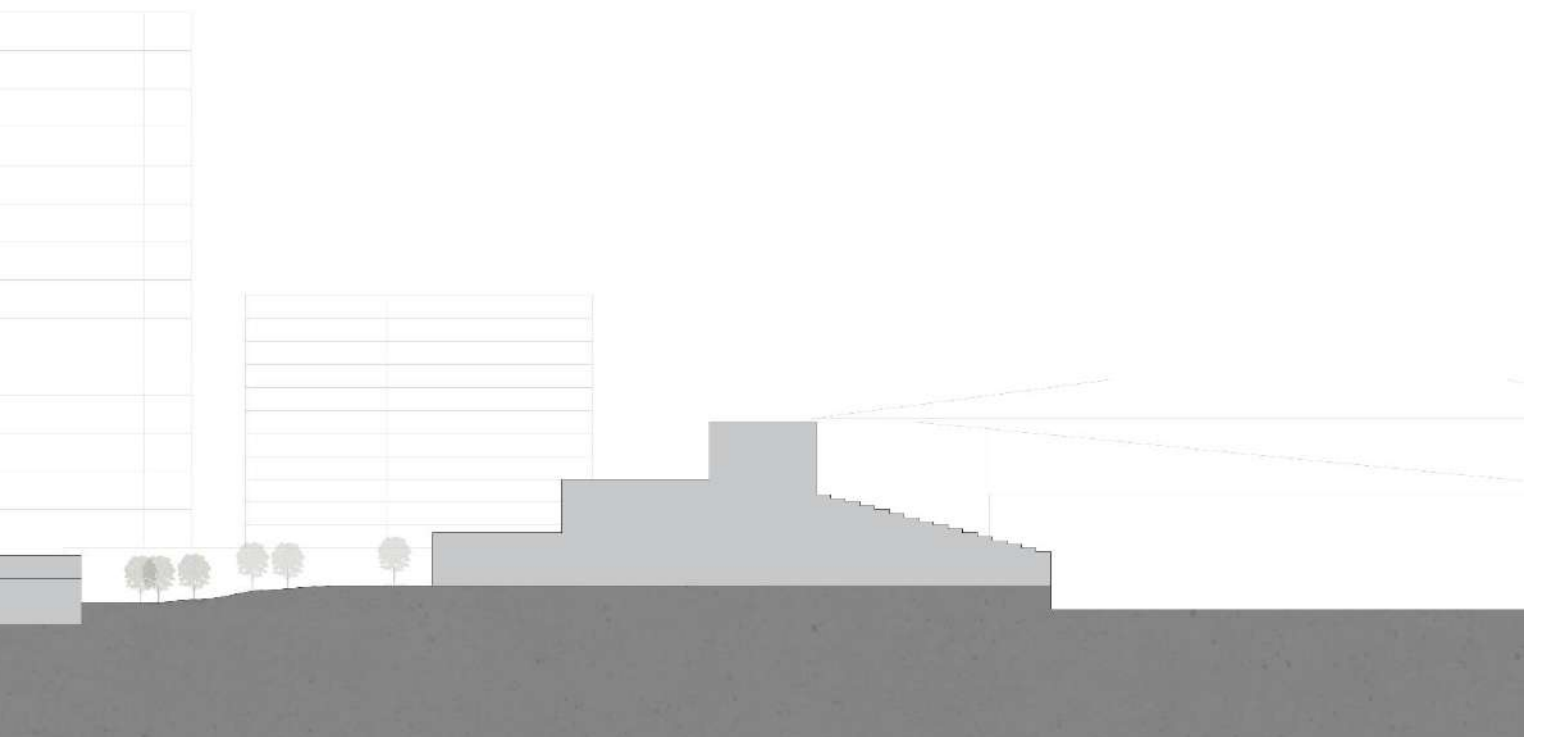
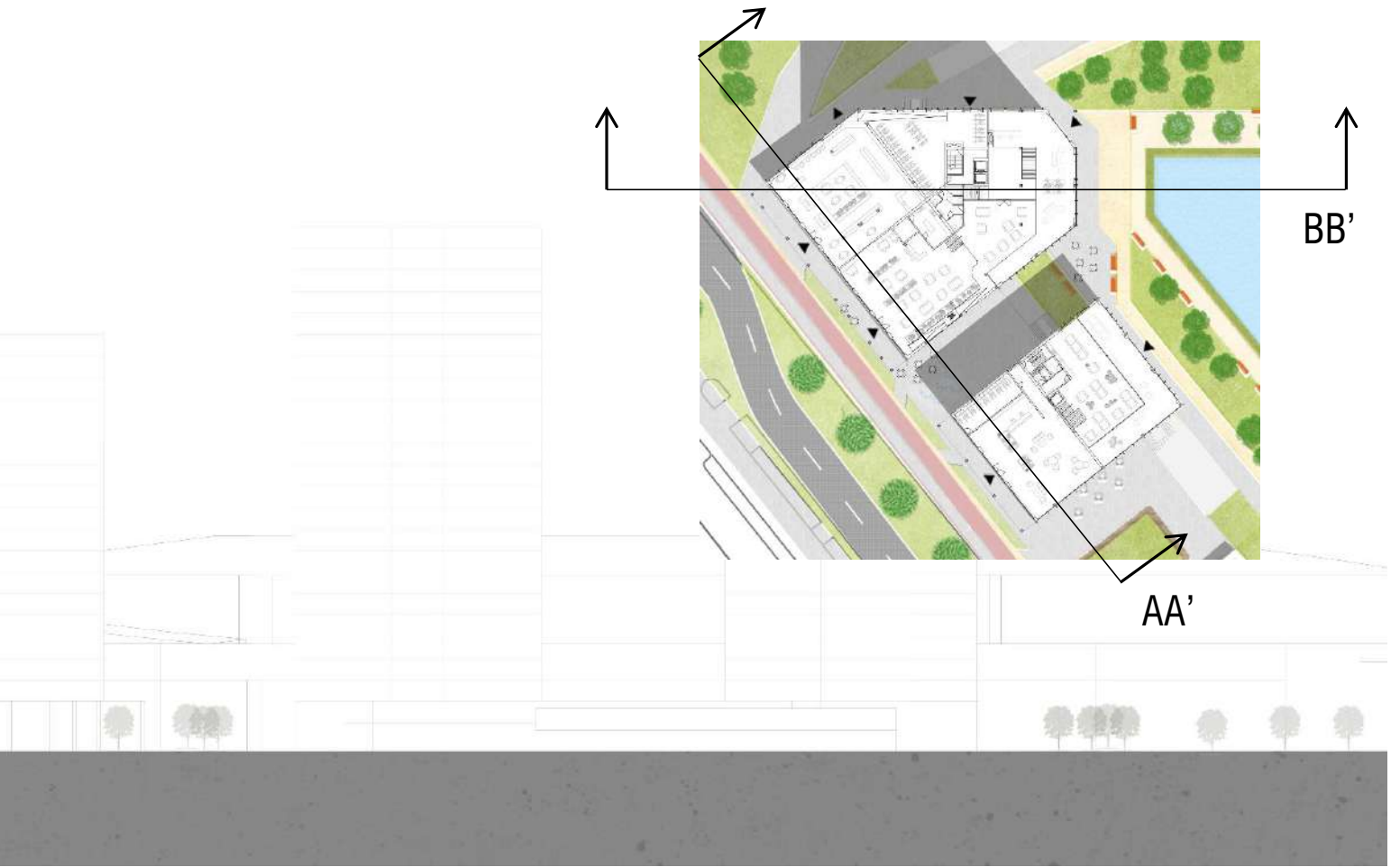
PLAN +2 & +3



PLAN HOUSING



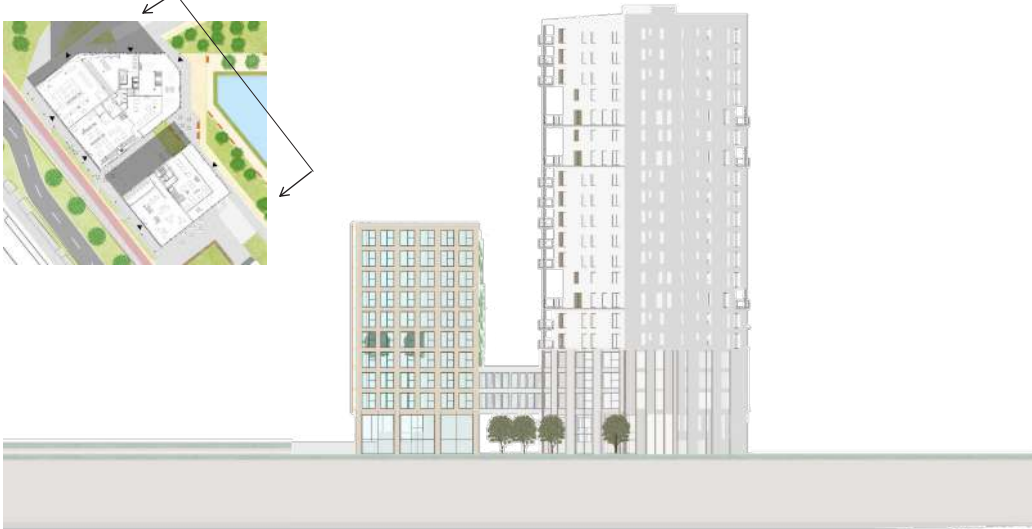




ELEVATION



ELEVATION

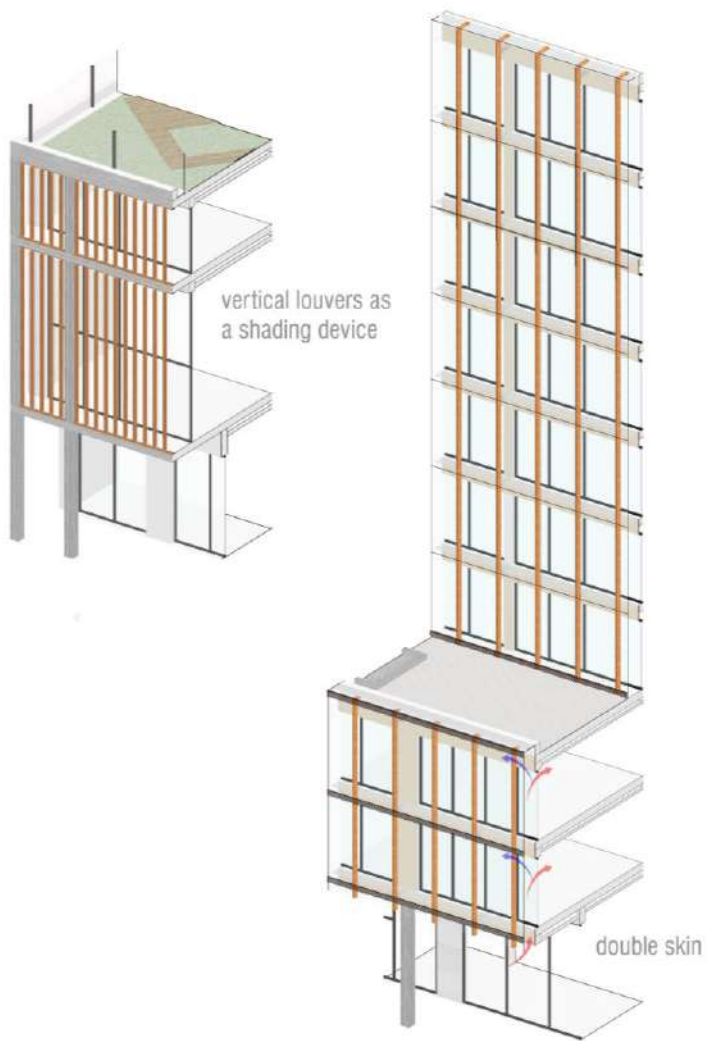


ELEVATION



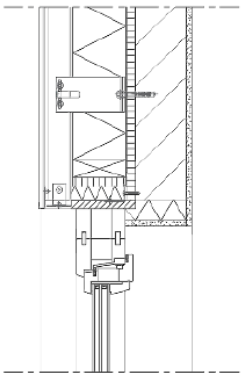
SUSTAINABILITY



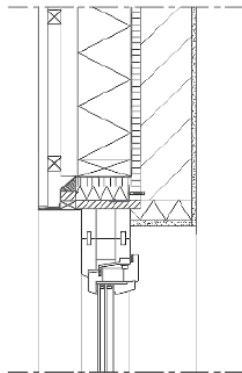


BUILDING CIRCULAR

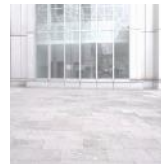
OTHER RECLAIMED MATERIALS



wooden panels,
demountable via
click system



wooden cladding,
reclaimed





HEYSEL CULTURAL CENTRE

STUDENT:
WATHIQ HARASHEH



07

SITE



Concept

The basic idea was to create an ICONIC structure which re-simulates the architectural evolution in a touring area

Why Cultural Center

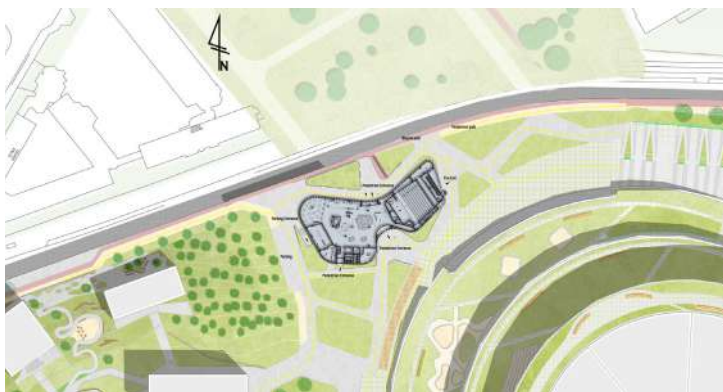
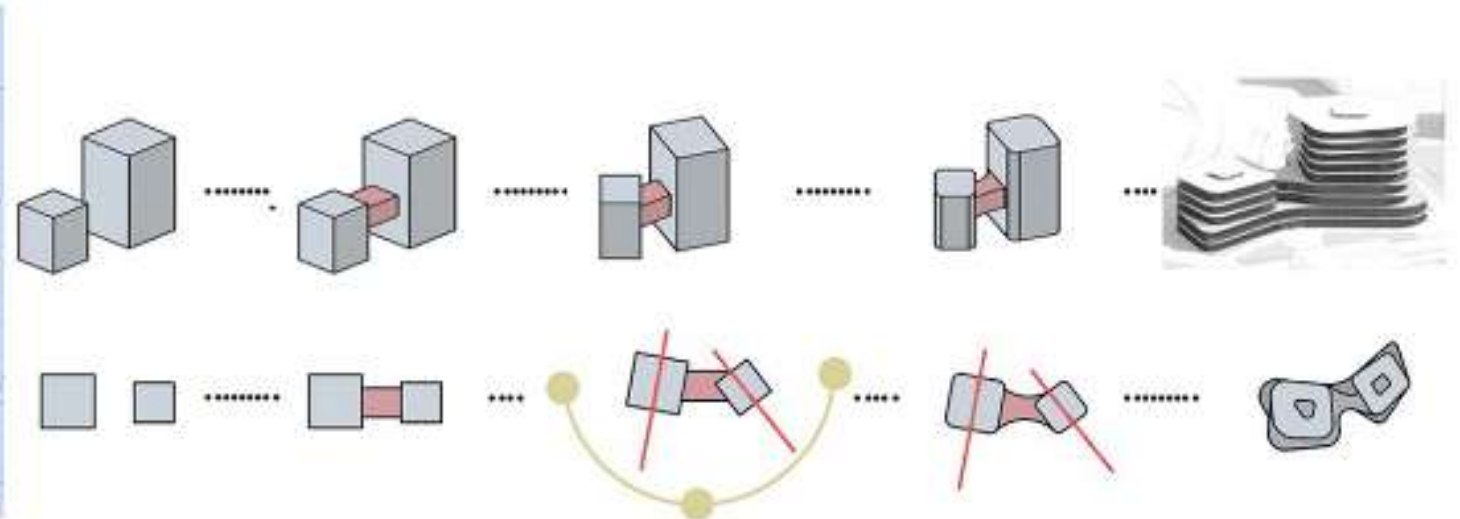
Cultural centers are becoming more popular around the world, as technology, More and more people are becoming interested in other cultures in addition to wanting to share their own. Cultural centers are a prime way to bring communities together in their learning

Why Sustainable

Because its a cultural center, it should reflect the country's culture and architectural development

How

The project aims to integrate with the nature through its organic form and smooth lines in addition to preserving green spaces as much as possible and restitution most of the built area by green roofs, and achieving many sustainable aspects



LOCALIZATION IN THE MASTERPLAN AND CONCEPT

Orientation

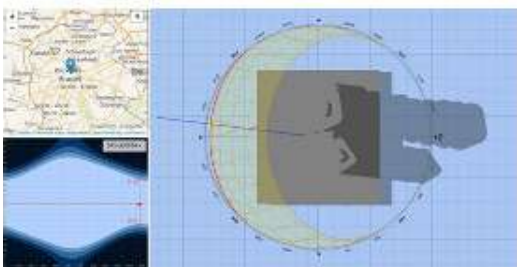
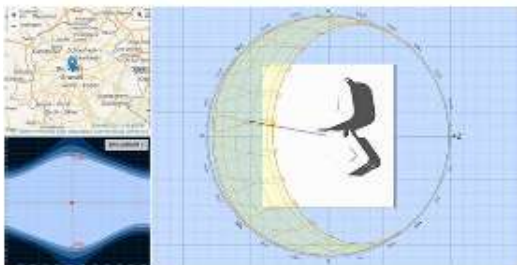
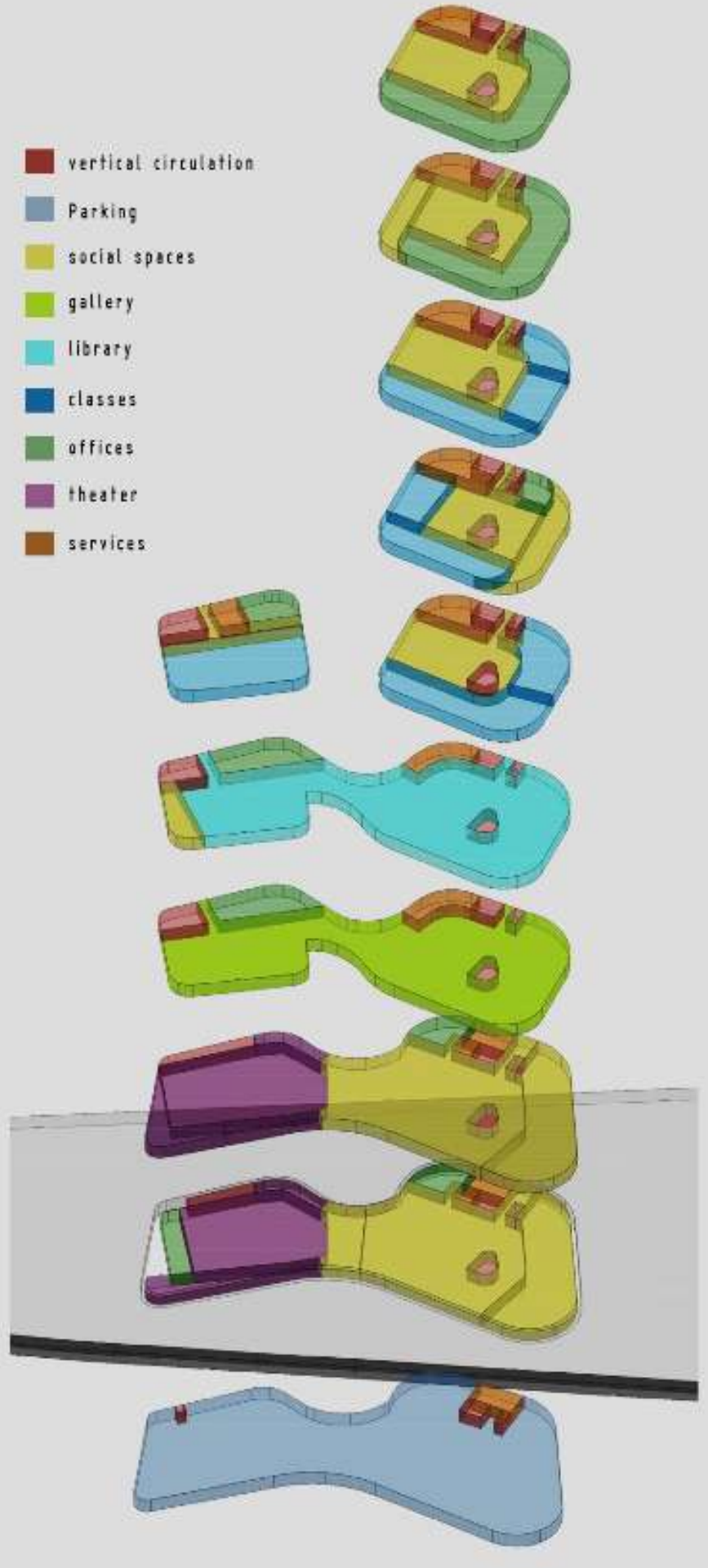
orientation plays an important role in form finding processes, its a vital aspect of any sustainable building to achieve thermal comfort in the inner environment at summer and winter, and also helps to maximize solar gains for passive heating and daylight

	Offices
	Offices
	Classes
	Classes
	Classes
Multipurpose Hall	
	Library
	Gallery
	Social Spaces & Cafeteria
Theater	Social Spaces & Cafeteria
	Parking

PROGRAM

Program	Area (m²)
Site	8500
Parking	2000
Theater	700
cafeteria	600
Interaction Spaces	3200
Gallery	1400
Multipurpose Hall	1400
Classes	1200
Offices	700
Total Area	11200
Total Green spaces	6600

- vertical circulation
- Parking
- social spaces
- gallery
- library
- classes
- offices
- theater
- services



Site Plan

By: Wathiq Harasheh



Master



Elevations



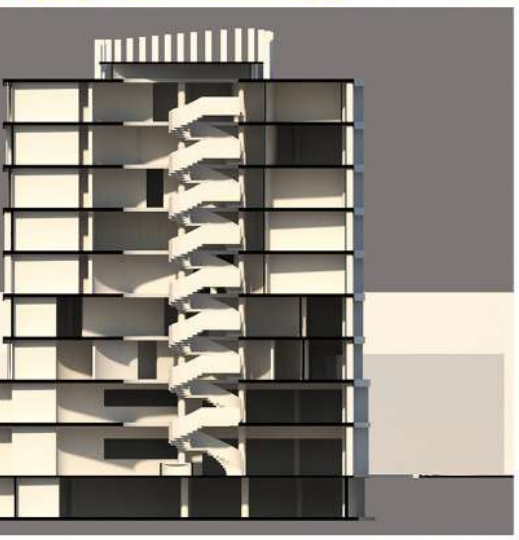
Southern Elevation



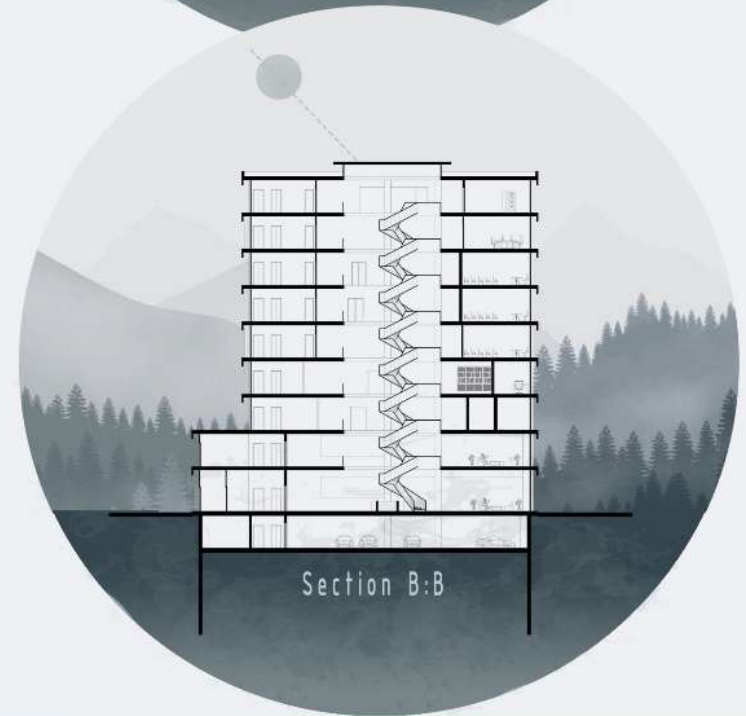
Northern Elevation



Plan



Sections



PLANS



Ground Plan



First plan



Third plan



Fourth plan



Sixth plan



Seventh plan

EXPLODED ISOMETRIC



Second plan

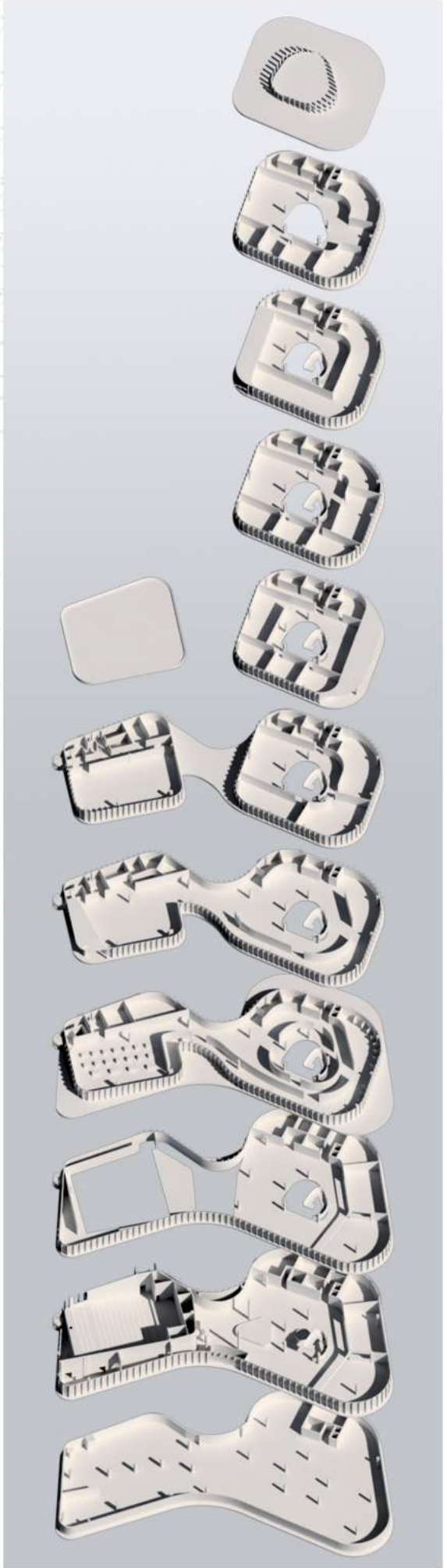


Fifth plan



Eighth plan

By: Wathiq Harasheh





By: Wathiq Harasheh



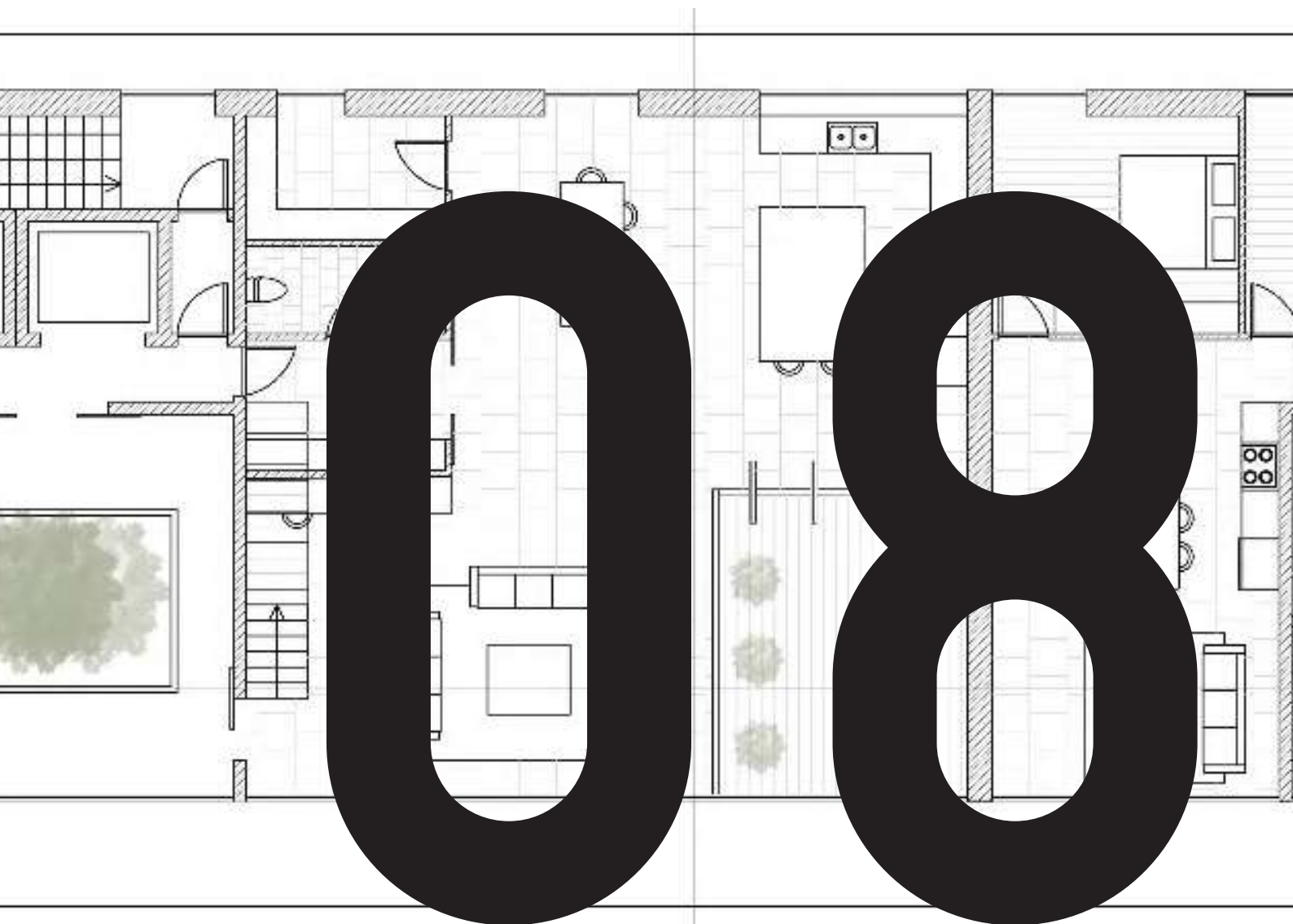
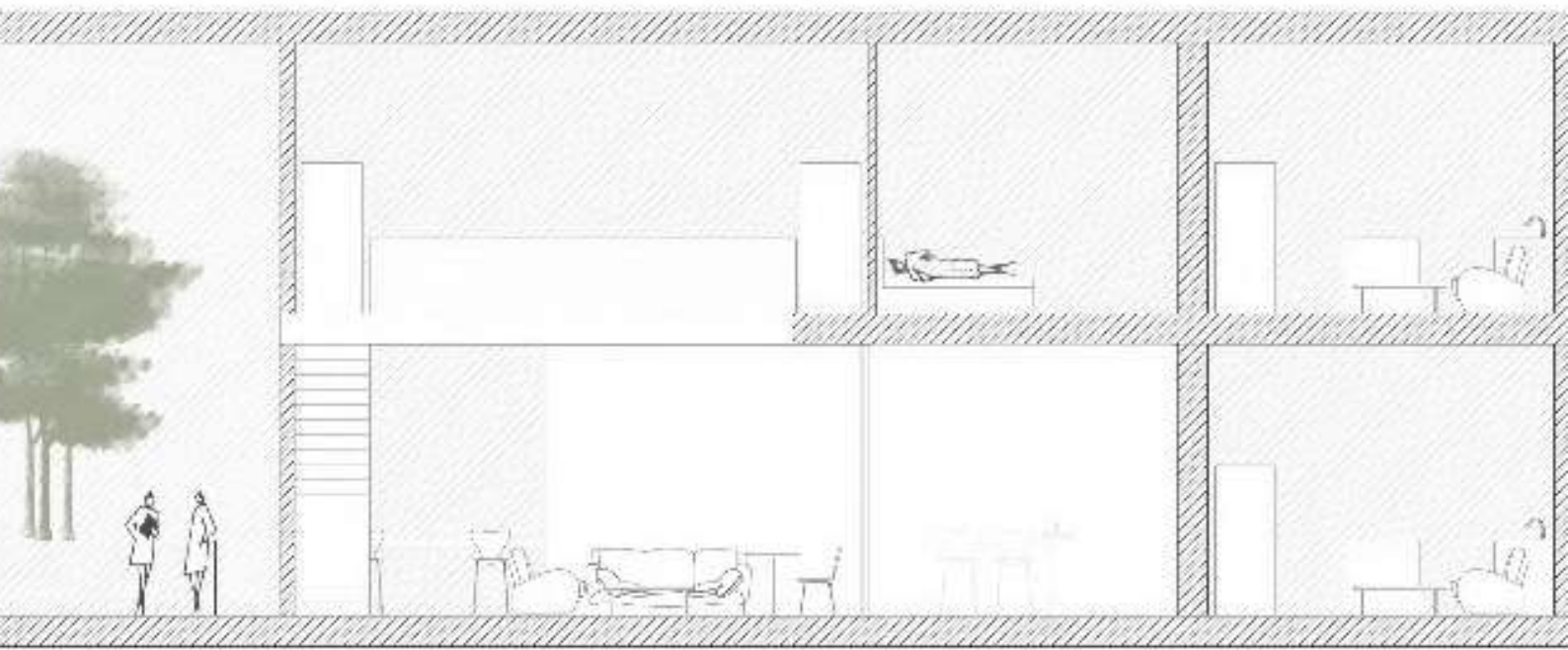
RENDERINGS



RENDERINGS

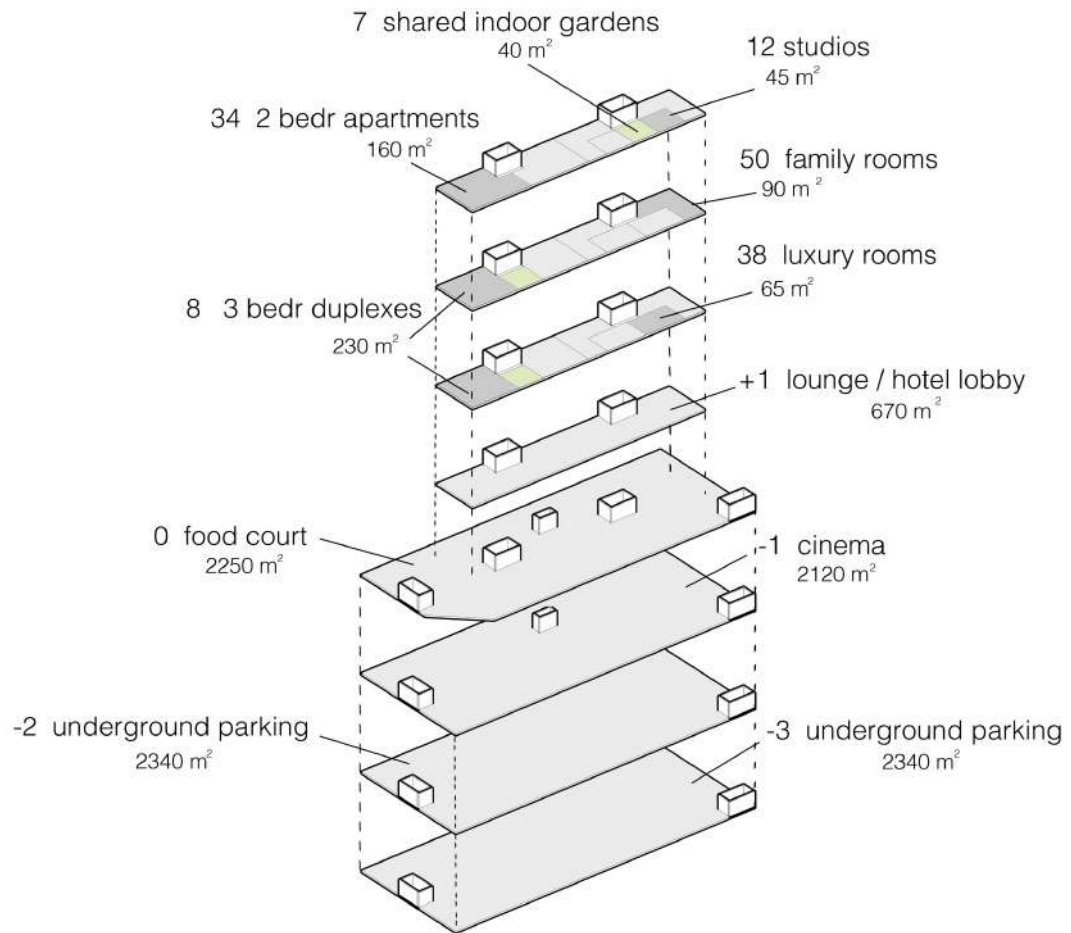
THE NEXUS TOWER

STUDENT:
JULINA MARITTA SPINOY





Program



The Nexus Tower is a 25-story mixed-use skyscraper that is part of the Nexus masterplan, situated at the Heysel plateau. Nexus means a connection. The building creates multiple connections.

First, it creates a connection with its near surroundings. At the south side, the golden generation stadium is located. At the east and west side, it is flanked by two other skyscrapers, creating a static, urban connection high up in the air. Second, it houses multiple functions being an underground parking, an underground cinema, a food court on the ground floor and an aparthotel and apartments in the tower. By mixing these functions, different groups of people are connected. And third, there is the green connection being shared indoor garden, creating a place where residents on one hand, and hotel guests on the other hand, can meet and connect. The underground parking is situated at the -2 and -3 level. It provides a total of 180 parking spots. On top of the parking and directly accessible from it, there is the cinema. The cinema is situated on the -1 level and has an entrance at the ground floor and an entrance from the parking. The cinema houses 5 rooms with each 156 seats, a store, a lounge area and toilets.

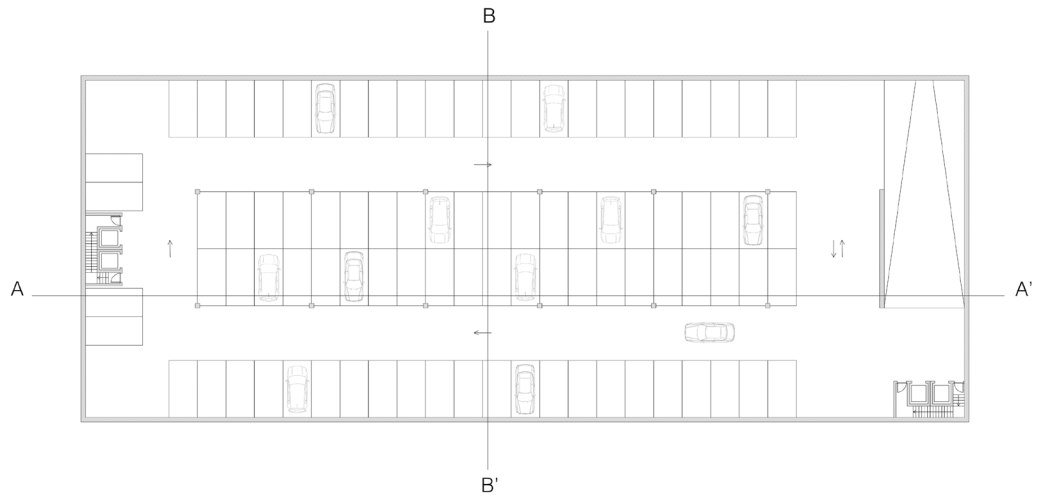
The food court is located on the ground floor. The food court has a separate entrance, just as the cinema. People visiting the cinema can also walk through and enter the food court to grab a snack, eat before or after the movie. The ground floor also houses the separate entrances of the apartments and the aparthotel. The lounge and hotel reception are located at the +1 level and are only accessible through the apartment and aparthotel entrances. The circulation of the apartments is hidden, creating more privacy for permanent residents.

The lounge has a lot of inside lounging area, a bar and a roof terrace. Both residents and hotel guests can benefit from this and eventually meet each other.

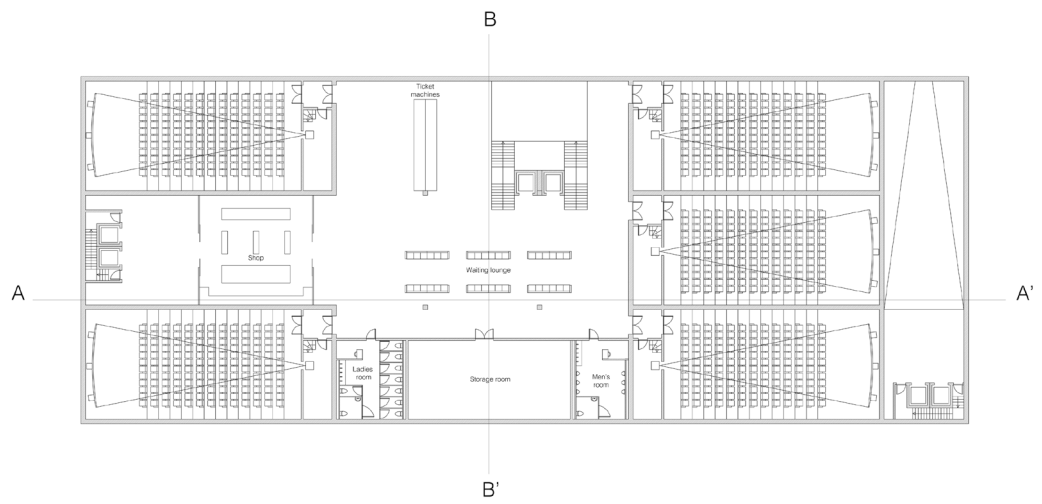
From the +2 till the +25 level, the tower is split in two. The east part are residences, the west part are hotel rooms, with each a separate circulation. There are two types of apartments: a spacious 2-bedroom apartment of 160 m² and an even bigger 3-bedroom duplex of 230 m² with a shared indoor garden, only shared with the next-door neighbor. Both the 2-bedroom apartments and the duplexes have an indoor terrace with more privacy. The aparthotel has 3 types of rooms: a small studio room of 45 m², a 1-bedroom luxury room of 65 m² and a family room of 90 m². Each room has a kitchen, bathroom and living room.

The building is sustainable by using different sorts of strategies. The overhanging concrete floorplates provide shading at the south façade throughout the summer when the sun is high. During winter when the sun is lower and reaches the concrete floors. These floors can store heat and release it when the room cools down, reducing the need for heating. Solar panels on the roof also contribute to this. At the east and west façade, wood cladding is used to provide shade and create privacy since there are other towers at both sides. Rainwater is collected at the roof and re-used in the building to flush the toilets and water the plants. And finally, there is the mixed program which interacts and connects, creating a building in which people live, relax, eat, drink and meet, all year round.

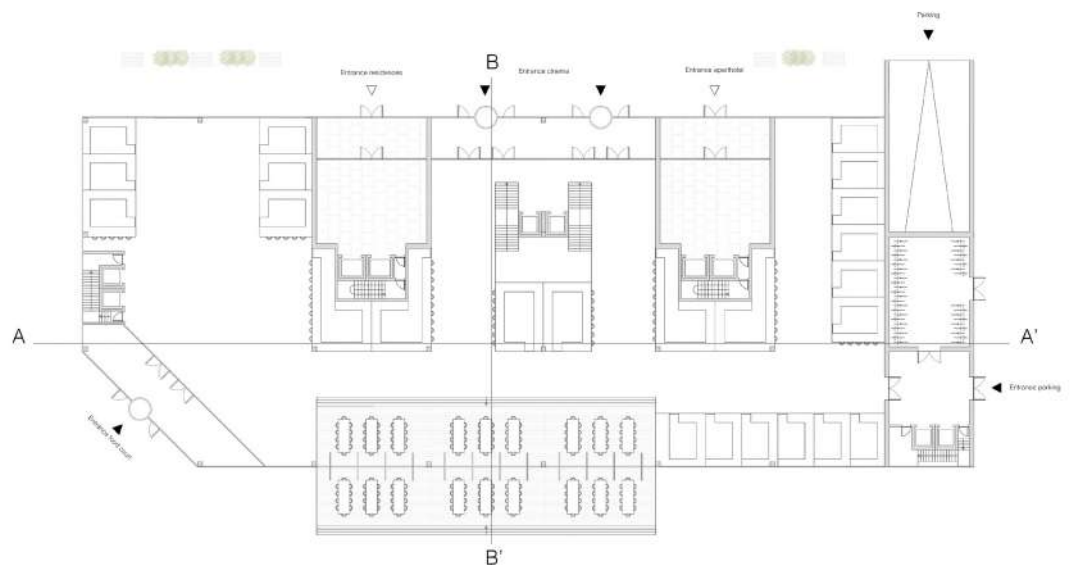
- 2 - 3 Parking

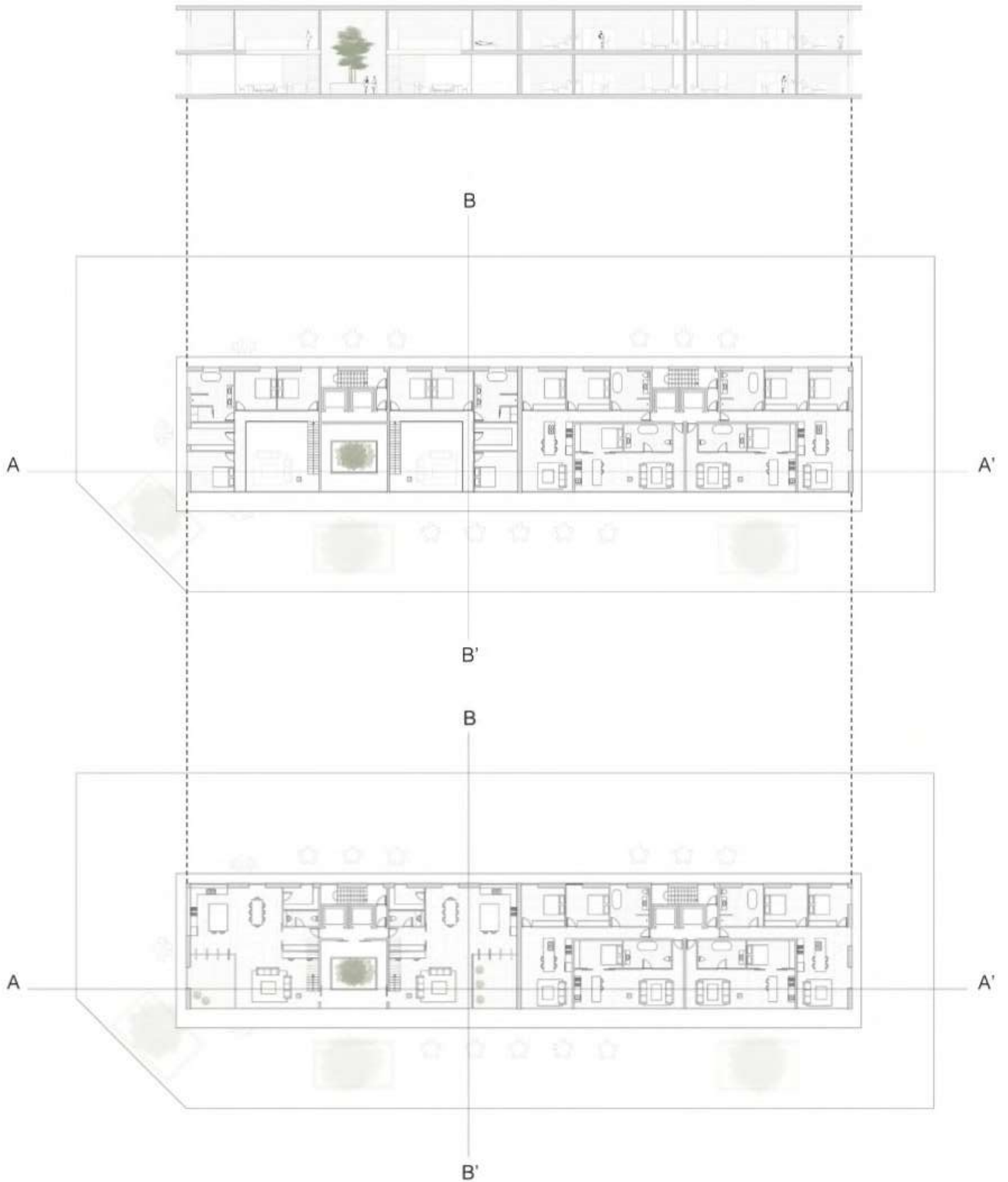


- 1 Cinema

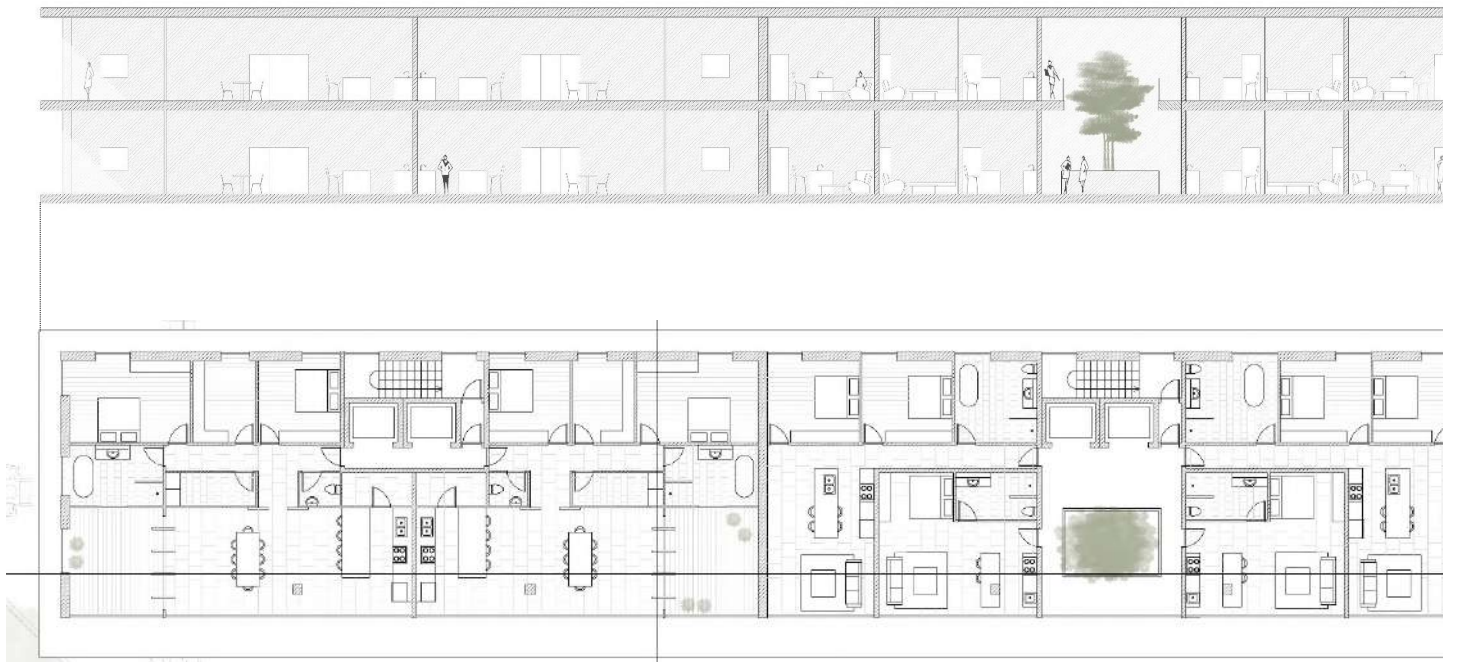


0 Food court

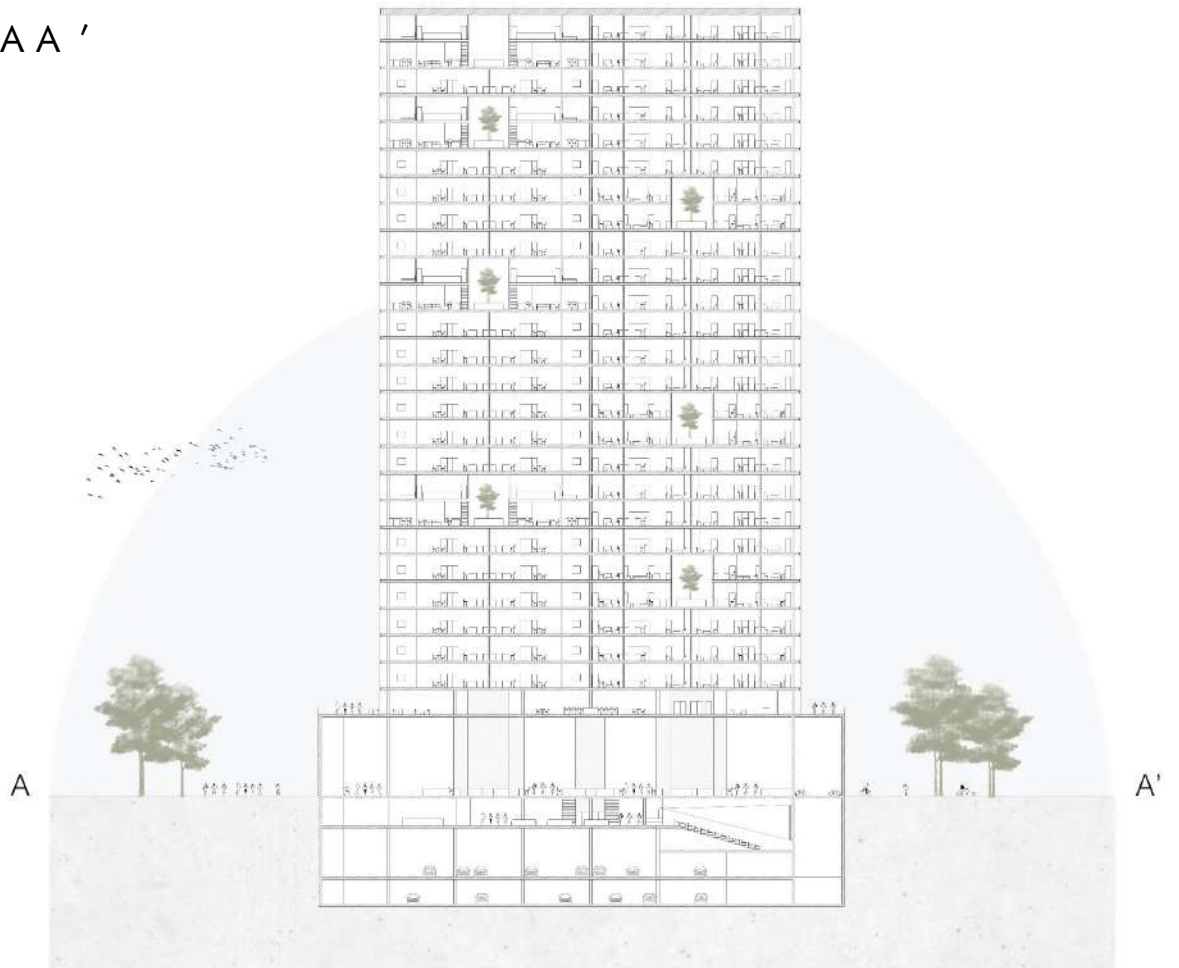




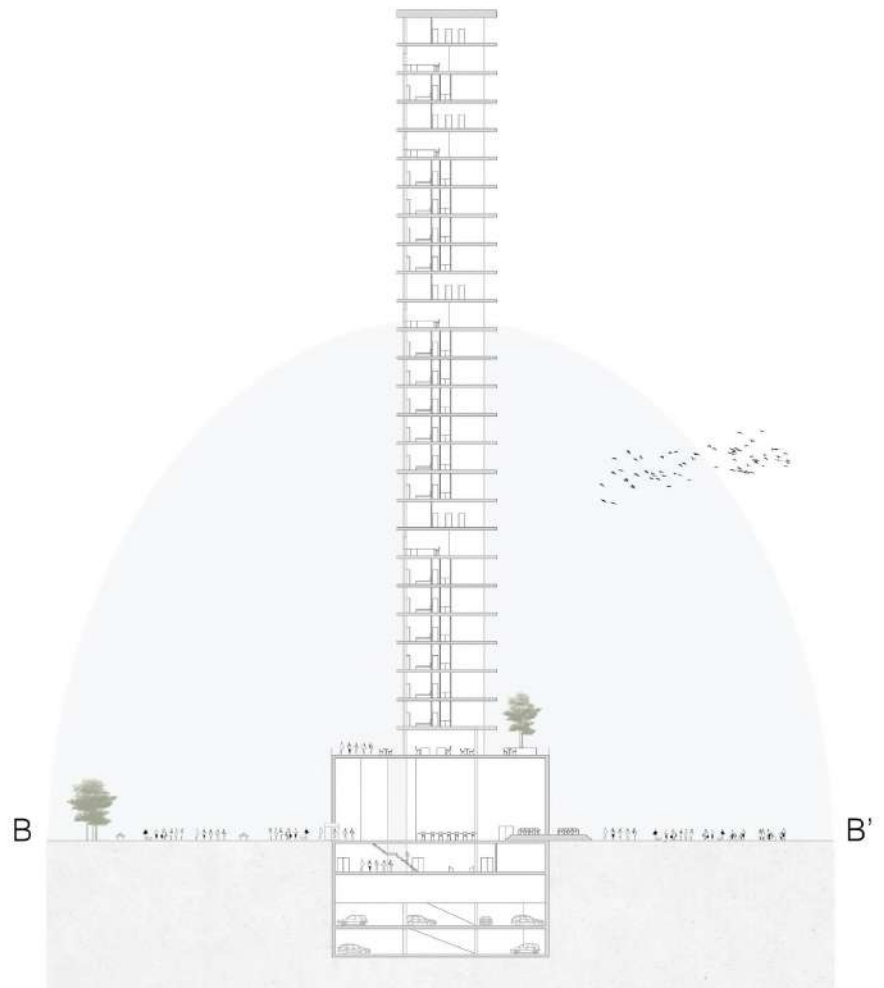
APARTMENT FLOOR-TYPE



Section AA'



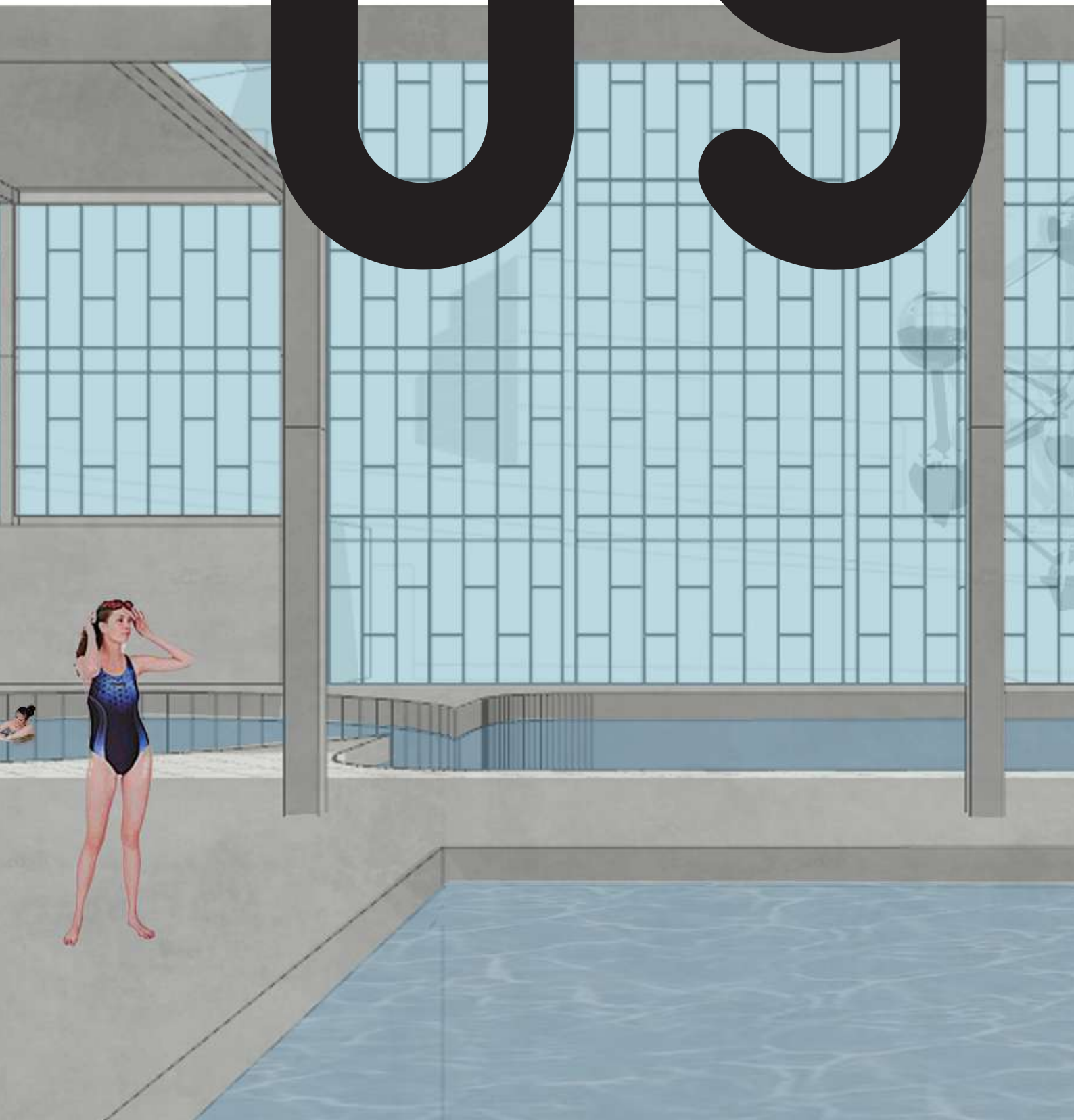
Section BB'

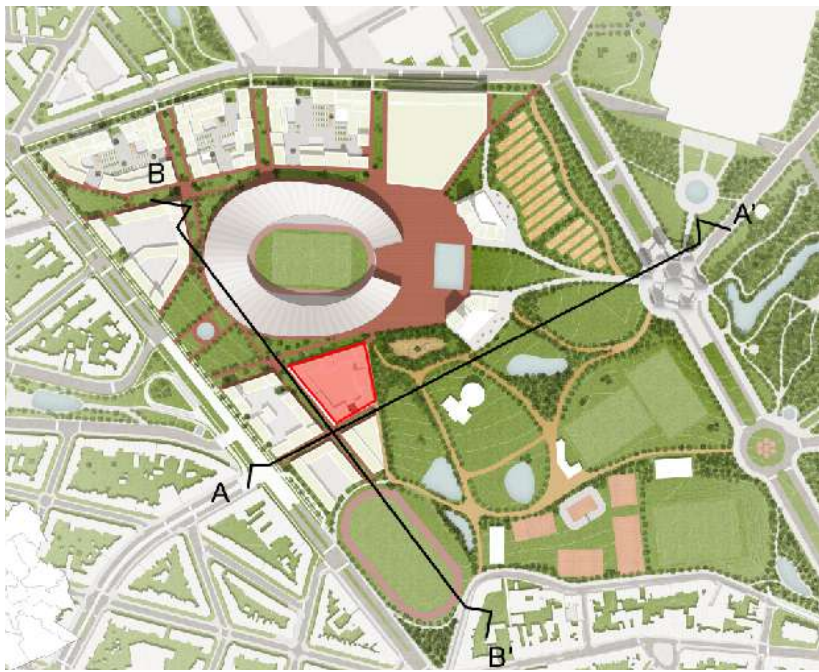


FITNESS AND WELLNESS CENTRE

STUDENT:
MARIE-LOUISE GIRAUD

09





GOOD FOR NEIGHBOURHOOD 

COMPLEMENTS AND ENHANCES CONTEXT



NEW OPPORTUNITIES



FOR EVERYBODY



MIXITY IN PROGRAM



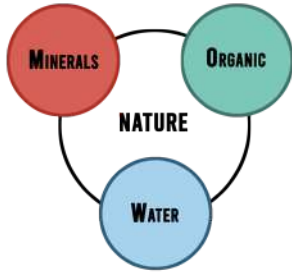
GENERAL WELL-BEING



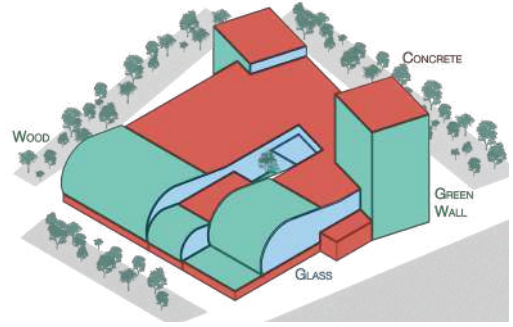
IN TOUCH WITH NATURE



Concept

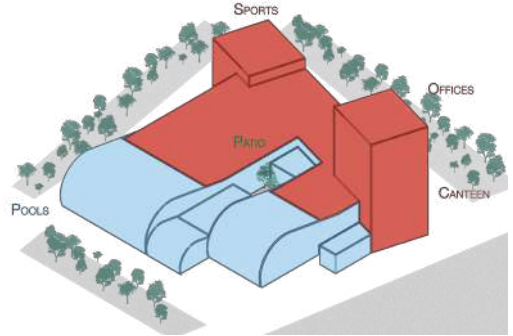


materiality



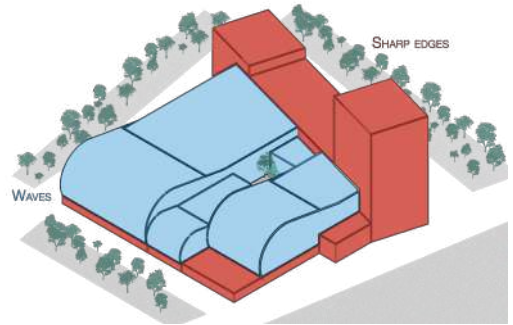
“Mens sana in corpore sano”

Function



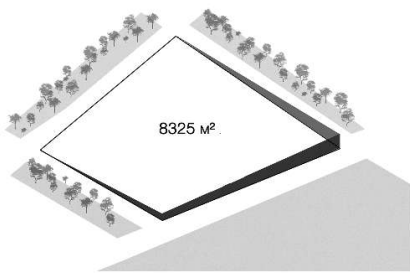
Fitness
and **wellness center**

shape

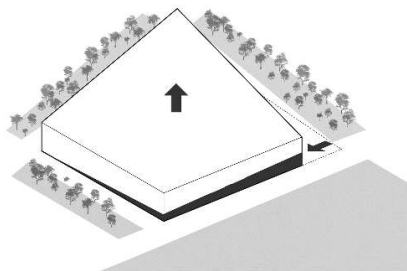


Form finding

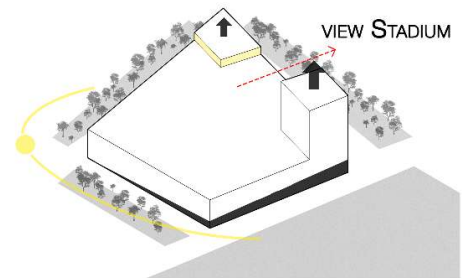
TERRAIN SIZE



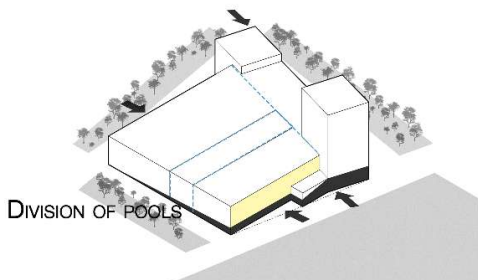
2D TO 3D



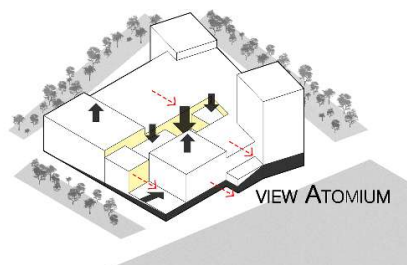
TOWER TO NORTH



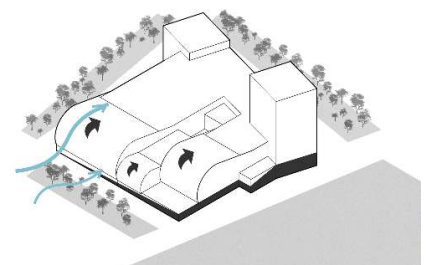
RESHAPE TO FIT STRUCTURE



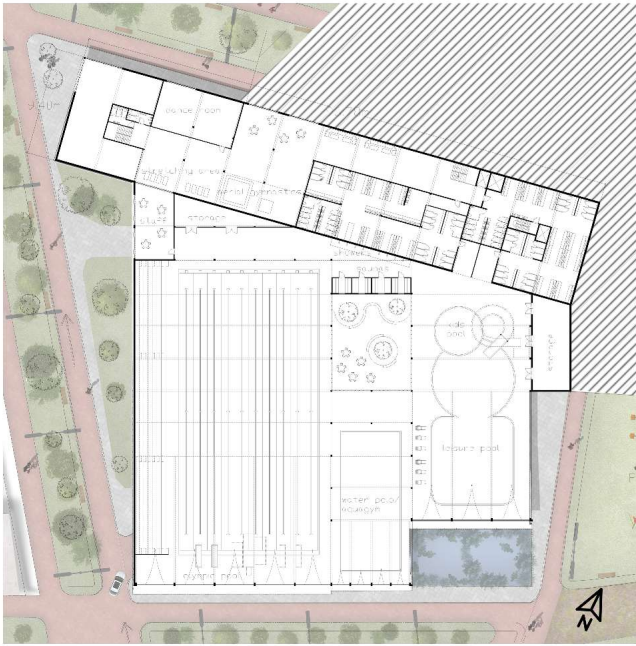
VIEWS AND DAYLIGHT



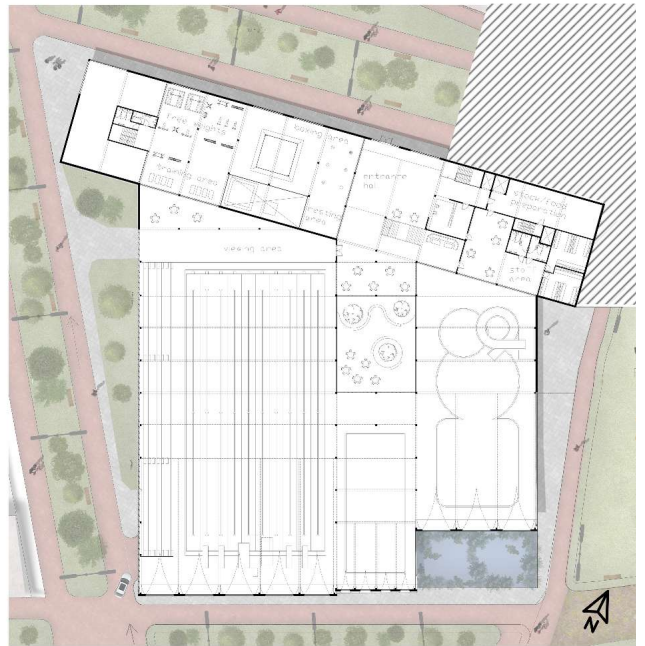
ROUND ROOF OF POOLS



Plan -1



Plan +0



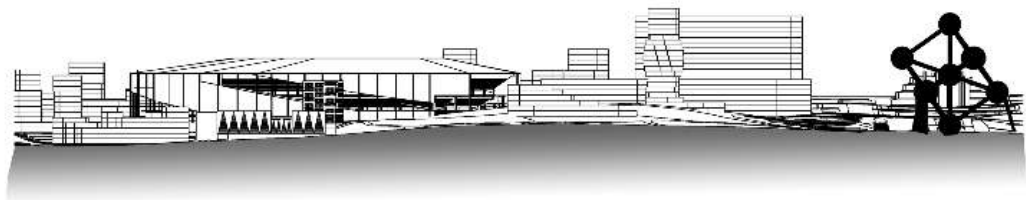
PLAN +1 1:500



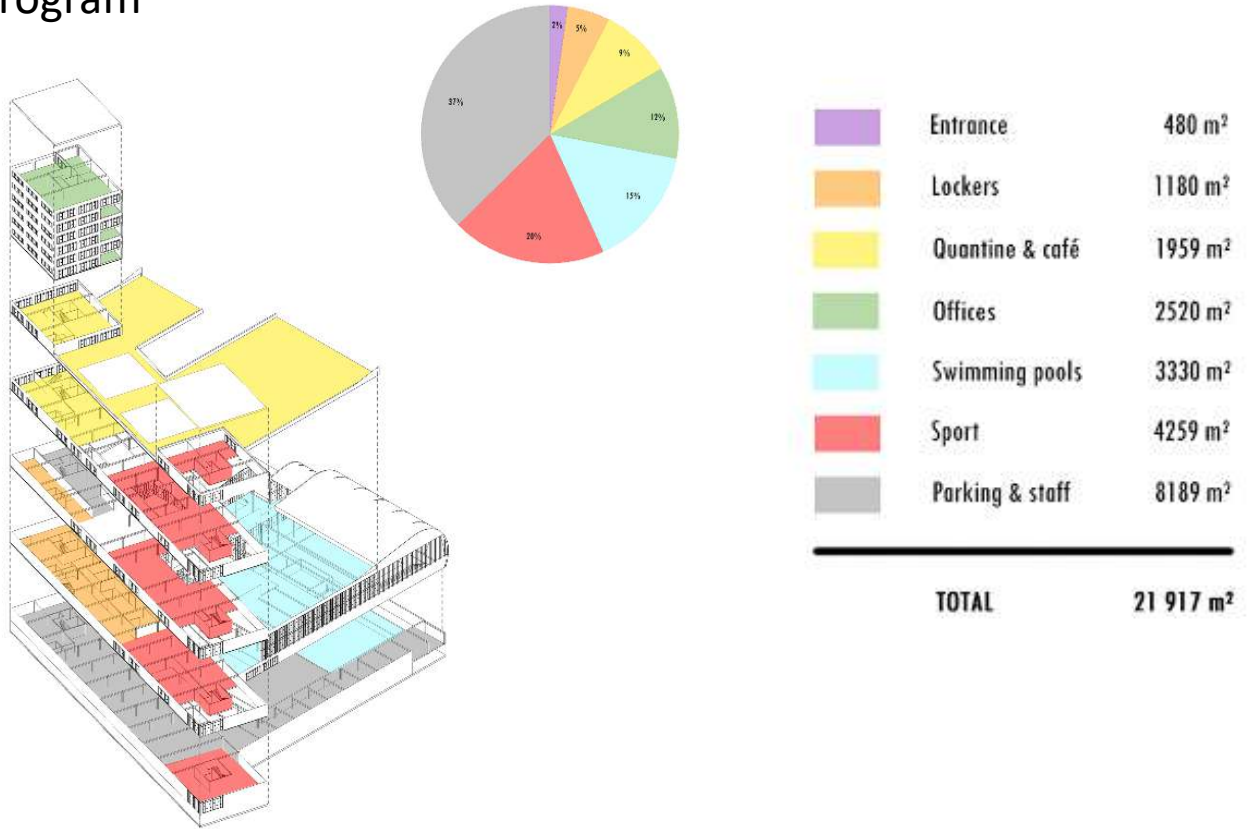
PLAN +2 1:500



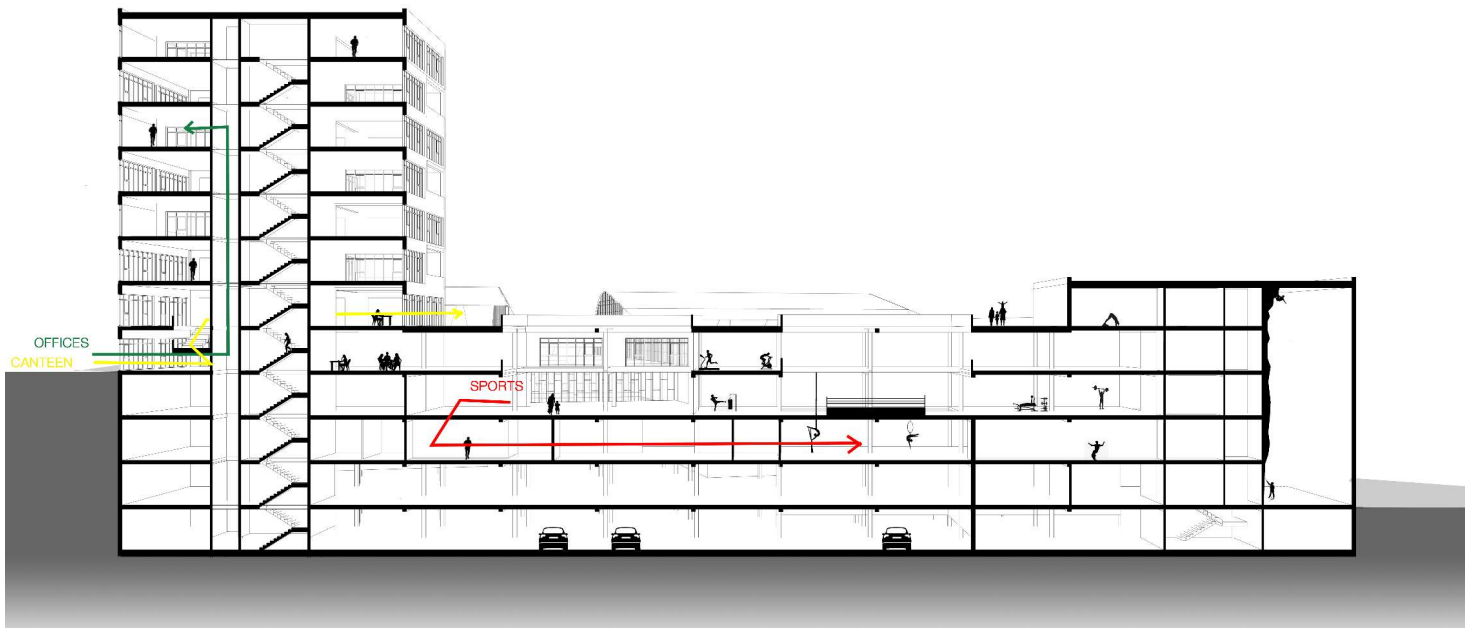
AA'



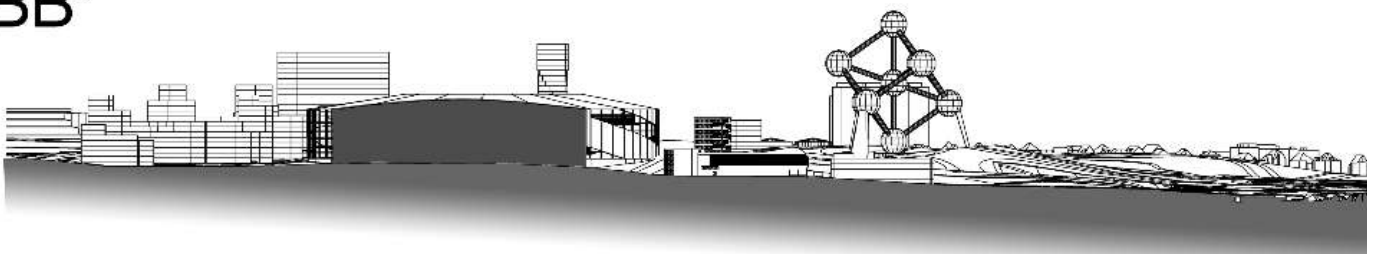
Program



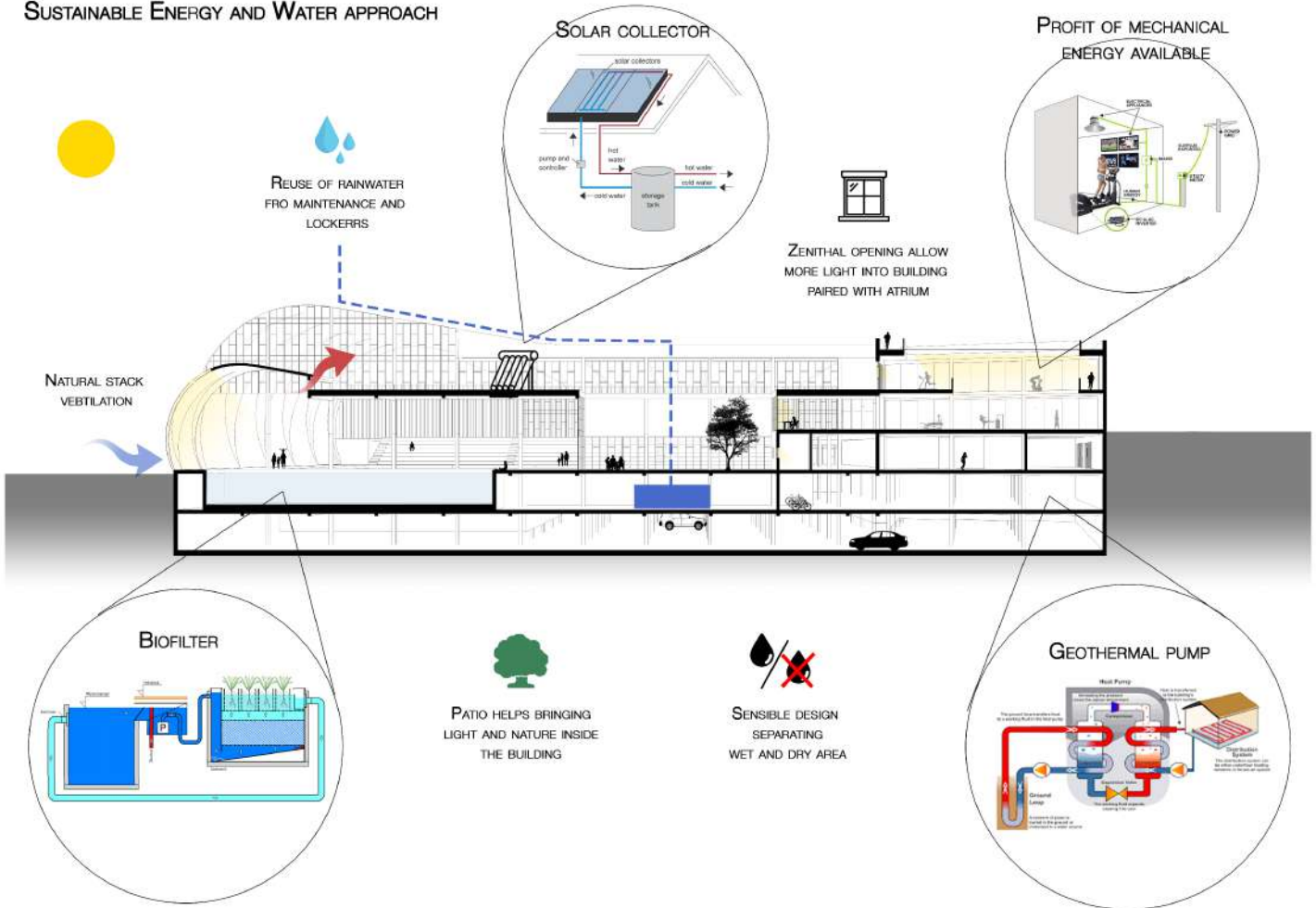
Circulation



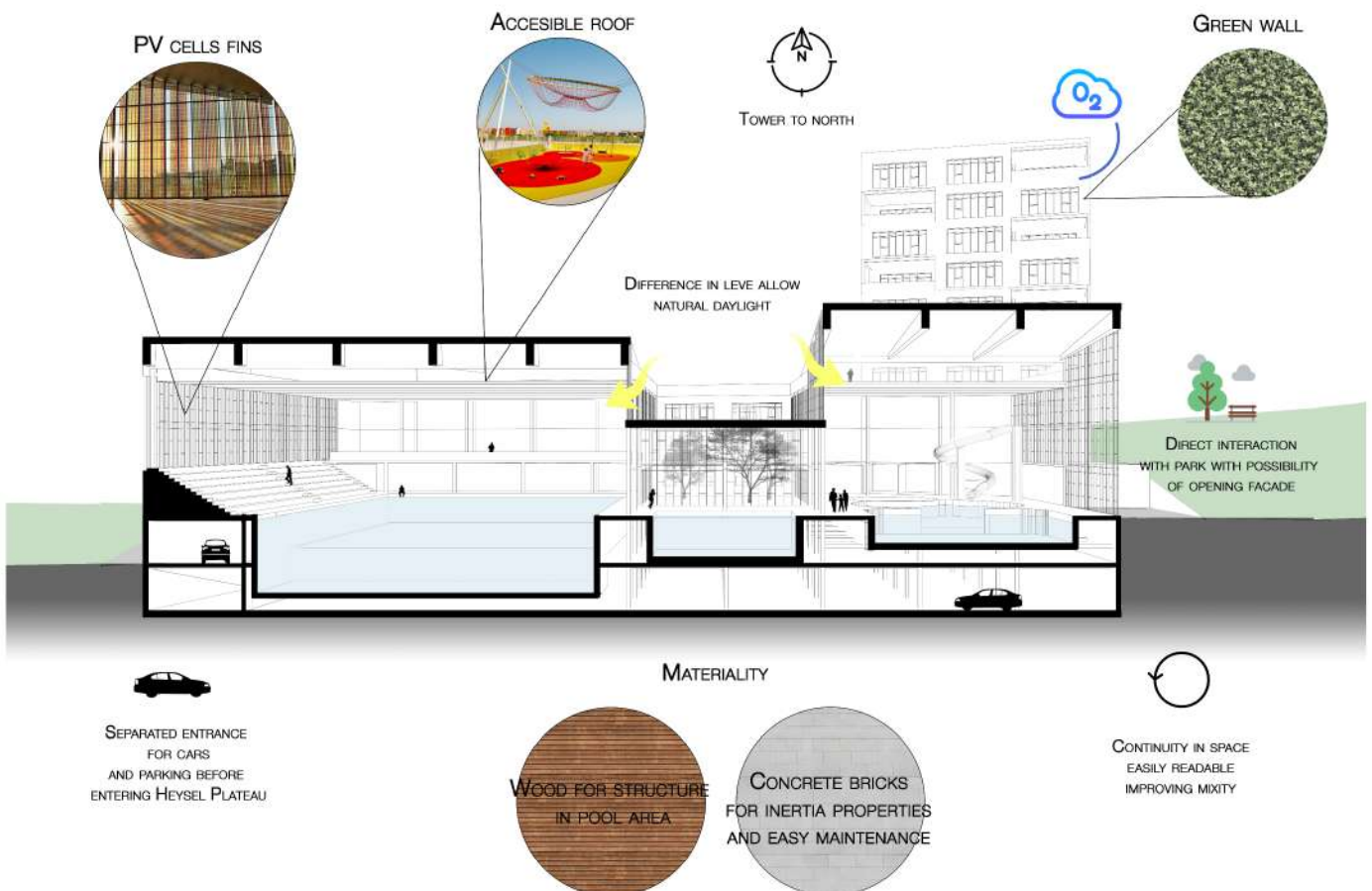
BB'



SUSTAINABLE ENERGY AND WATER APPROACH



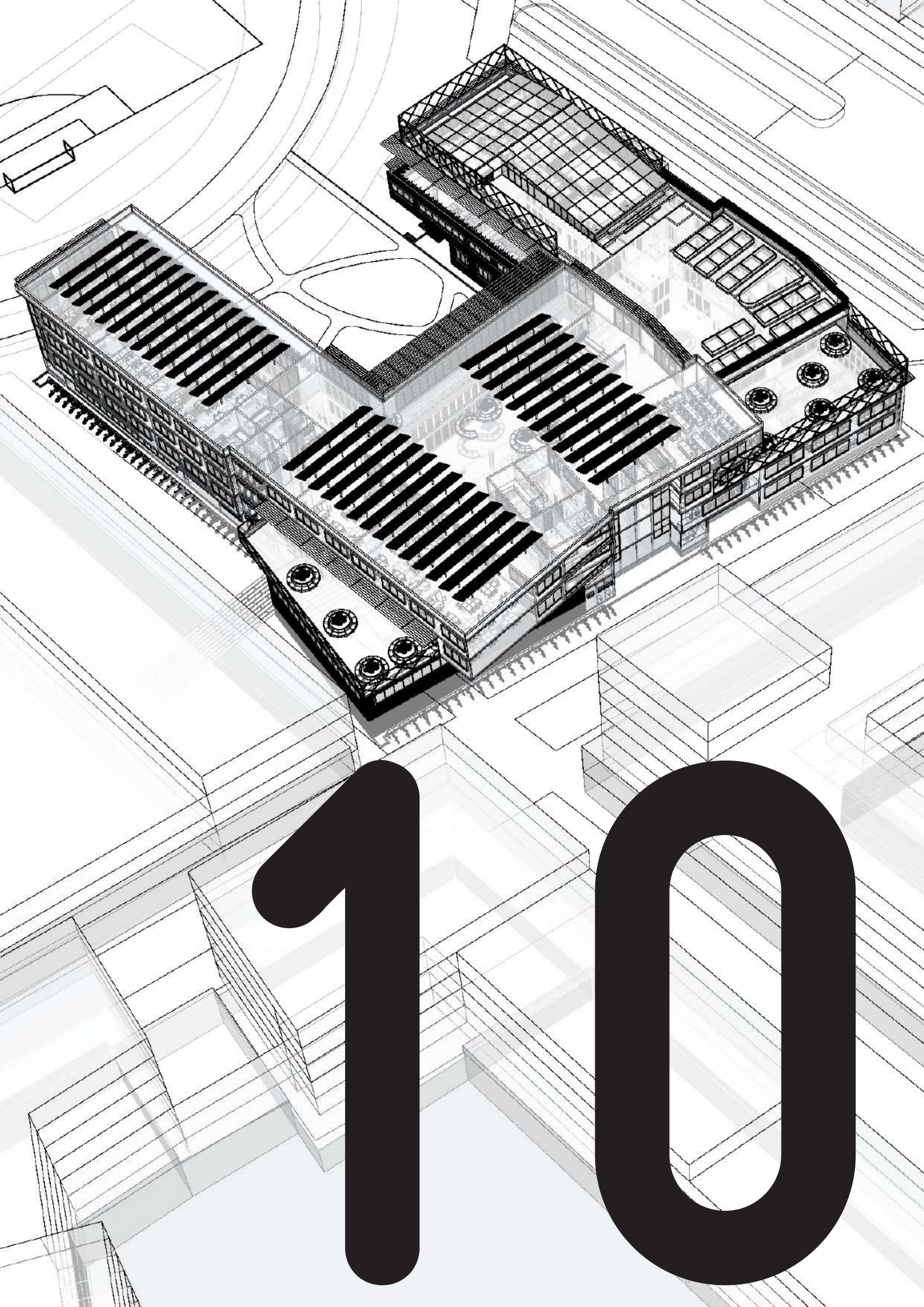
SUSTAINABLE MATERIALS AND DESIGN APPROACH





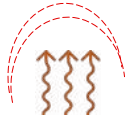
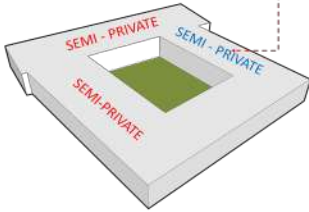
GREEN SCHOOL

STUDENT:
TRACY OHENEWAA ASARE



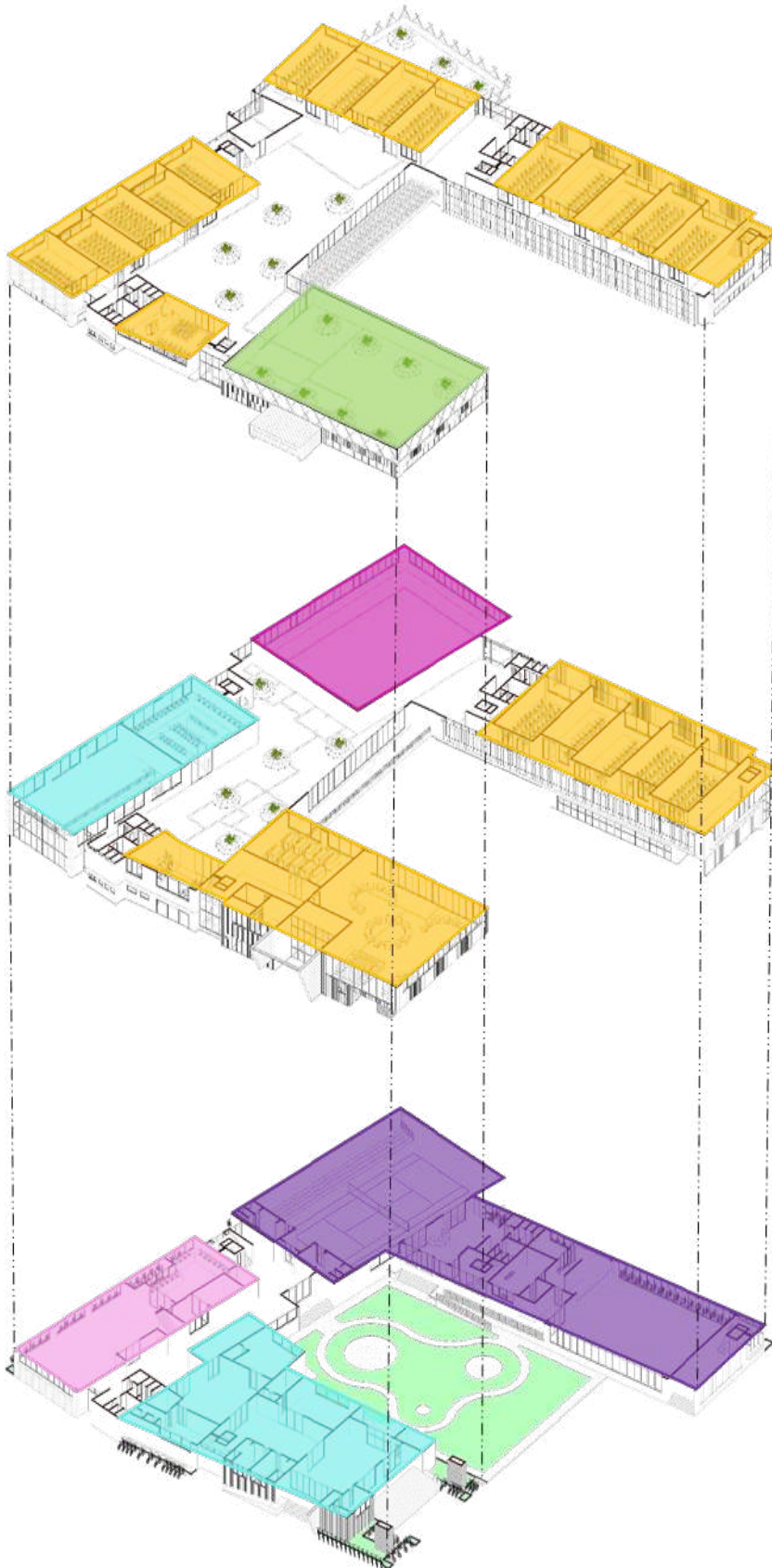
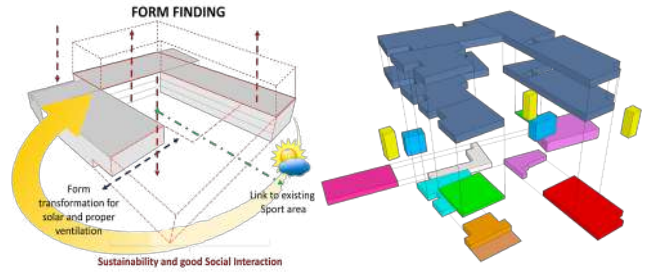
SPATIAL RELATION

Shared Spaces
Shares inner Court

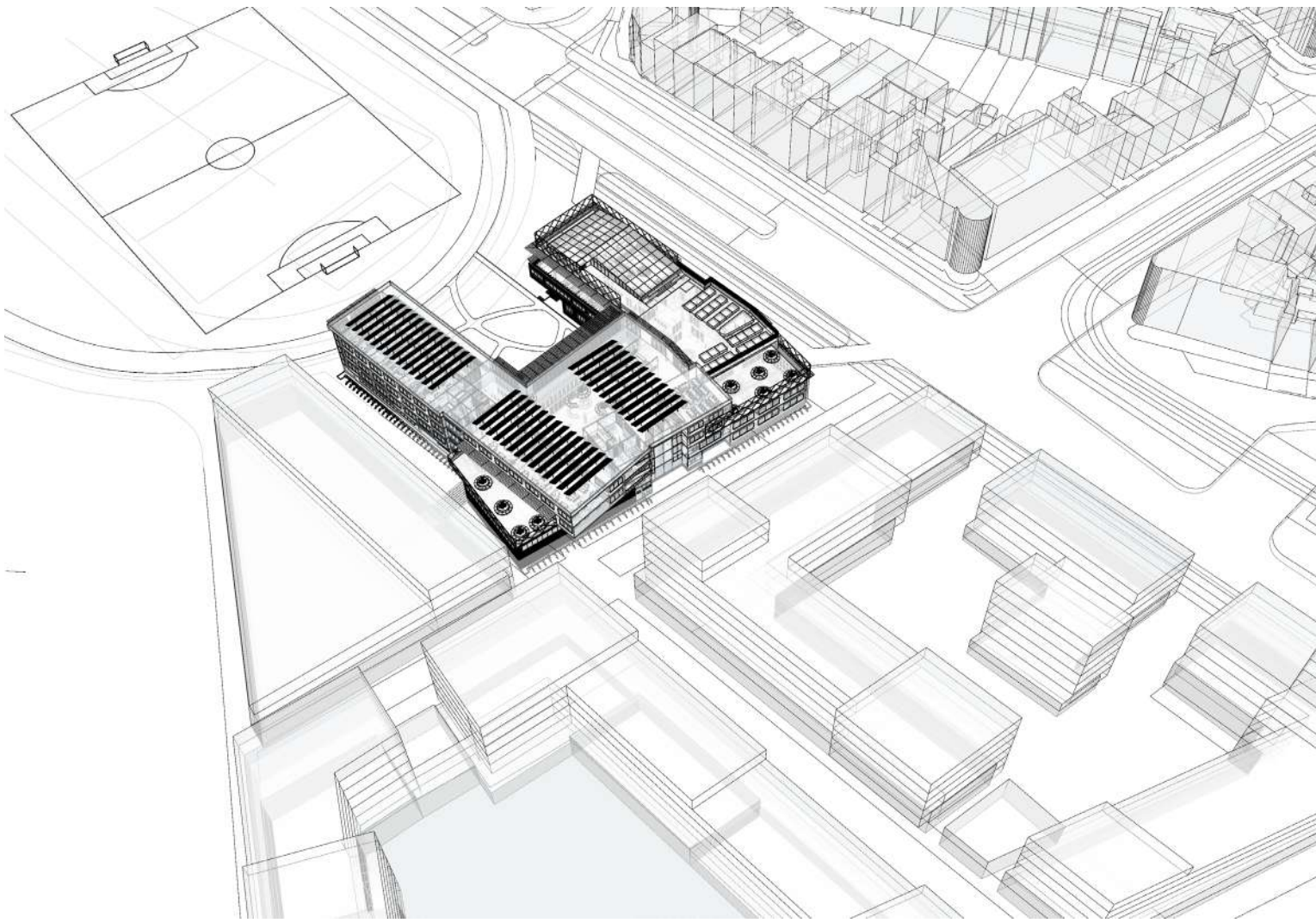


Solar Power
Green Roofs
Water Harvesting
Court Yard System

FORM FINDING



- Canteen/ restaurant
- Circulation
- Library
- Indoor sport and multipurpose hall
- Classroom, labs, Music room
- vegetation
- Entrance lobby



The focus of the design is to understand the basic principle in construction where sustainable plays a major role. The orientation of the building by considering the environment, optimizing the existing natural resources like reusing of water as well as building materials and energy systems. My is bounded by mixed used facilities and a mini football pitch.

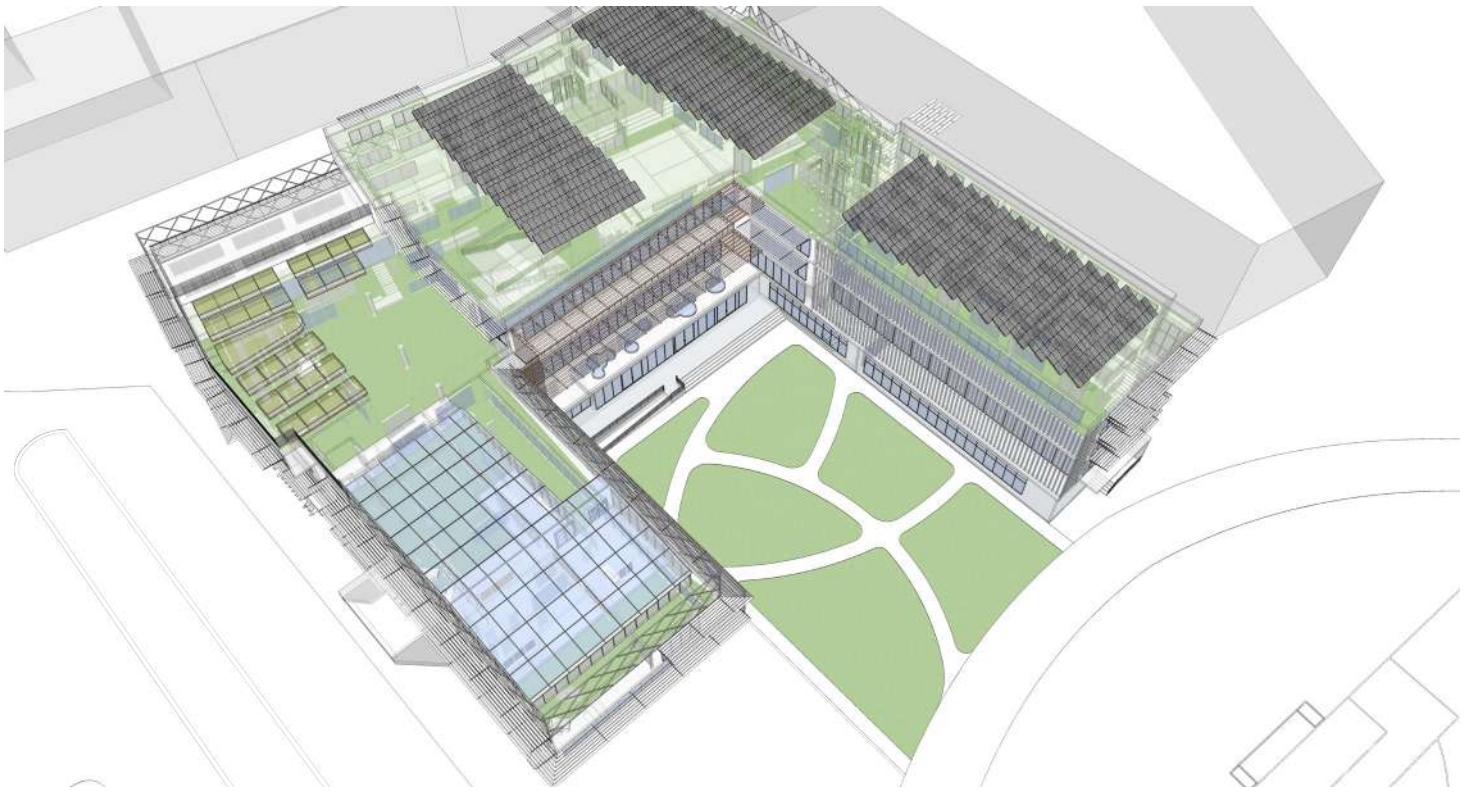
The concept about an interactive environment achieved during the form finding. This made me adopt the U-shaped geometry with a courtyard acting as the initiation point of the entire space. The main entrance opens directly into a courtyard, which gives a sense of openness. One will experience a space that gives meaning to its surrounding spaces. With solar orientation, the school is shaped in a way where the volume is higher at the part where there are maximum solar gains.

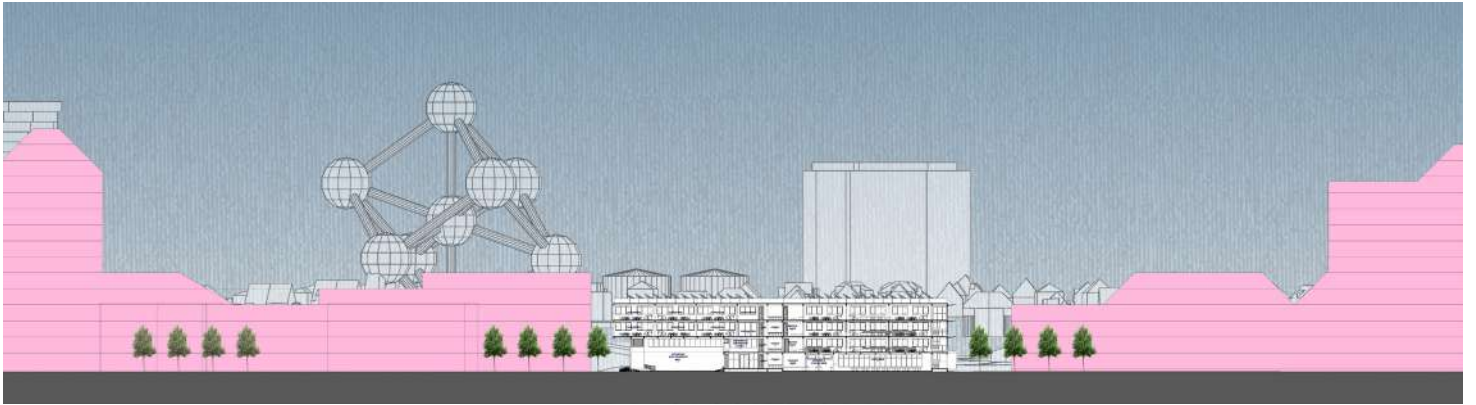
To achieve energy efficiency, I tried to maximize solar gains into the spaces with the use of curtain walls. I also optimize the building heat conservation by making it more

compact, the classrooms have been oriented to the south, a courtyard that acts like a buffer and as a micro-climate zone where children can interact with the environment. The building generates its own electricity, using photo-voltaic panels on the roof and facades as well as solar thermal collector to produce hot water into the building.

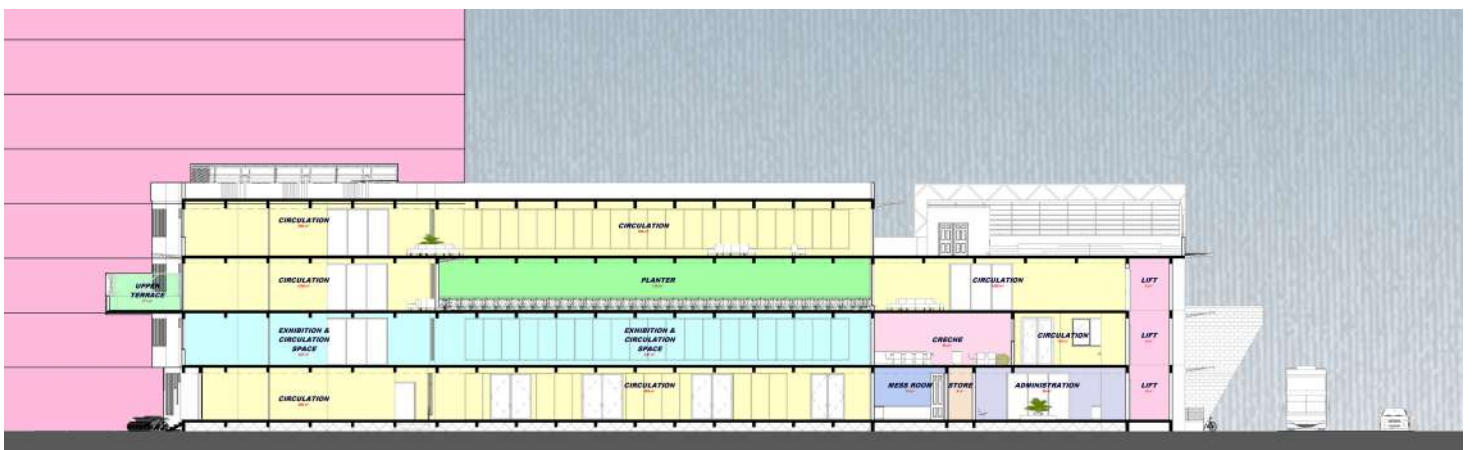
The construction system is the convention post and beam structure with Hemp block since its perfect for low-energy buildings and pre-stressed slabs. The facade will be clad with wood and Glass for the curtain walls. These materials are used for heat retention purposes. Horizontal fins are used as shading device to block excessive sunlight during the hot summer, but to allow sunlight to shine through a window in the winter, to help warm a building in the south. Whereas vertical shading device on the west and east.

In conclusion, with sustainable design strategies incorporated will help reduce energy consumption and minimize damage to the environment.





section a-a



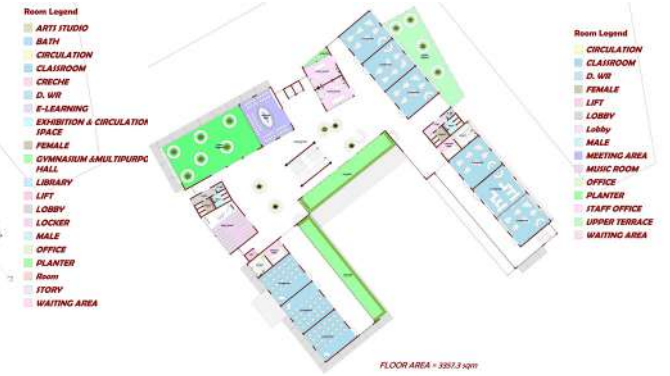
section b-b



GROUND FLOOR PLAN



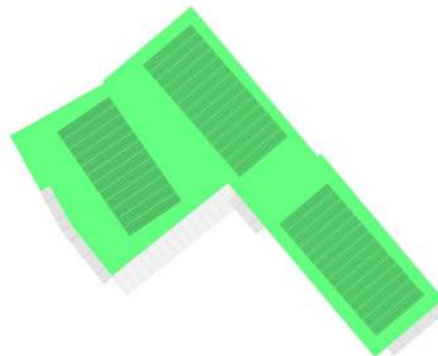
FIRST FLOOR PLAN



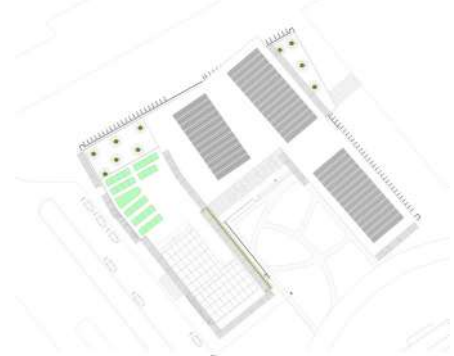
SECOND FLOOR PLAN



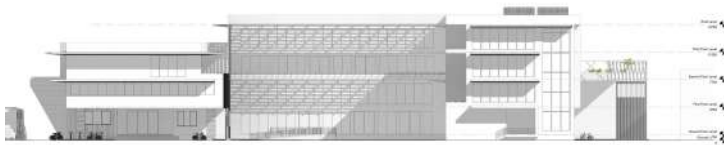
THIRD FLOOR PLAN



ROOF FLOOR PLAN



LAYOUT PLAN

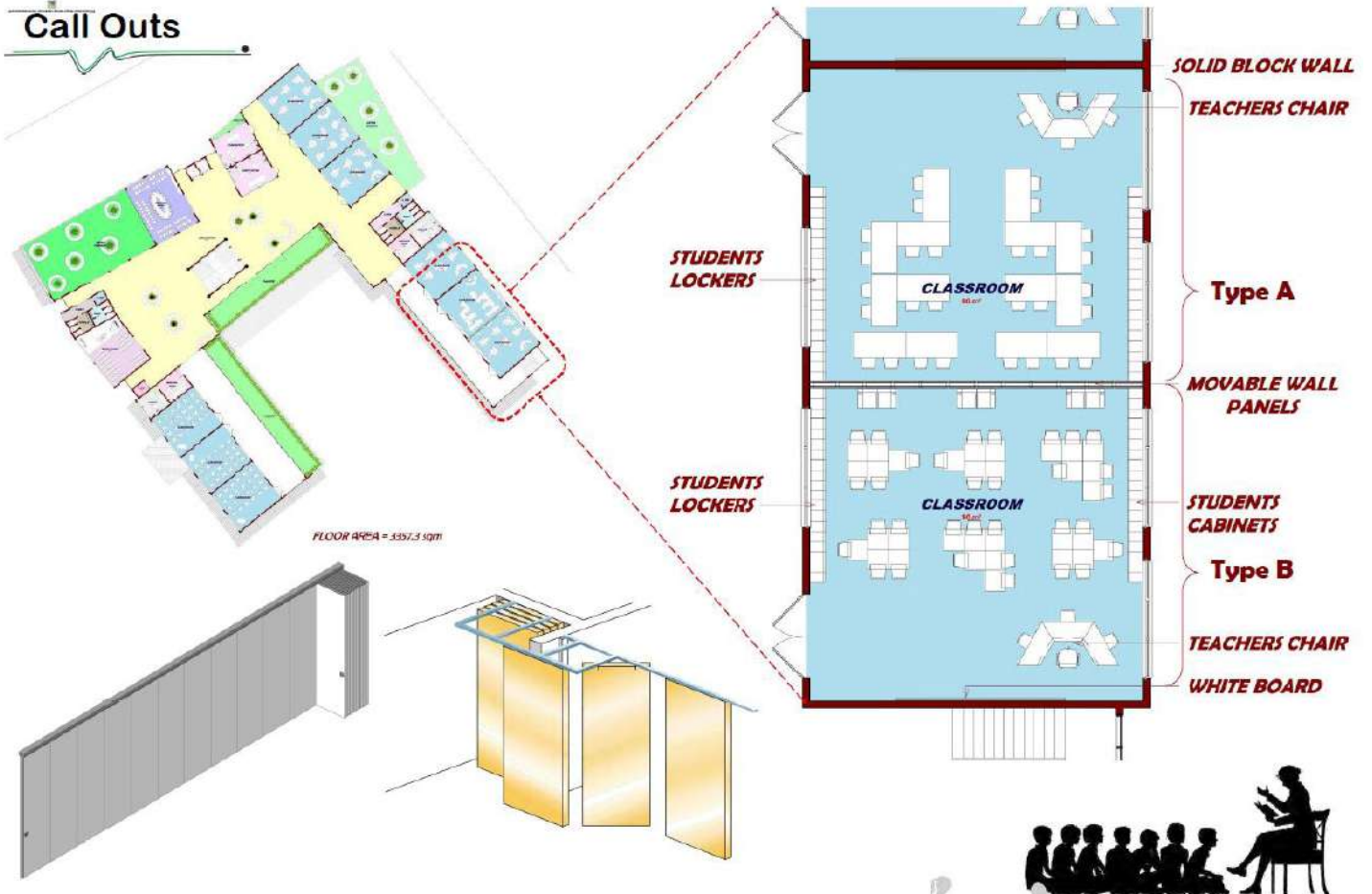


ELEVATION 1



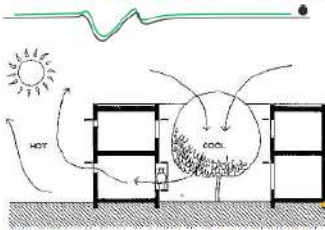
ELEVATION 2

Call Outs





SUSTAINABLE STRATEGIES



Climate responsive design (Courtyard System)



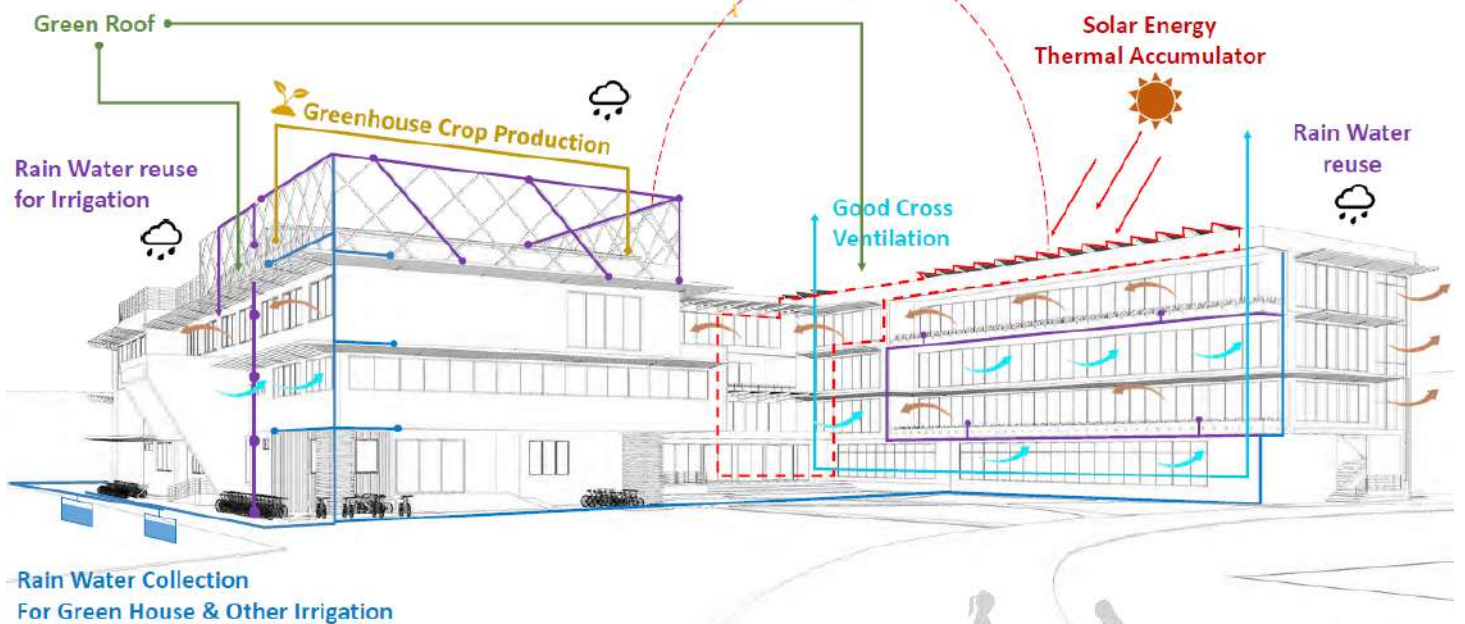
Energy Saving: Court yard system for evaporative Cooling from residual heat

Water Reuse: Rain water use for irrigation and flushing of toilets

Green Roof: Cooling, reduction of Carbon Emissions.

Ventilation: Cross Ventilation for good air circulation During Summer.

Lobbies to regulate heat loss within the spaces.



SUSTAINABLE ARCHITECTURE DESIGN STUDIO, MA-1
BRUFACE - ULB + VUB - 2019/2020